ACCOUNTING

1 Auditorium 10:45-11:30 Board 9
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Mind Your Health: Addressing the Stigma Surrounding Mental Health and the Economic Burdens Surrounding Personality Disorders

With 1 in 4 adults being affected by mental disorders at some point in their lives, destroying the stigma surrounding mental health, and understanding all the burdens associated with each individual disorder would result in properly supporting all those affected. My research focuses on the economic burden of treating a mental disorder, particularly personality disorders, including more than just the cost of medication. Djora Soeteman’s article “The Economic Burden of Personality Disorders in Mental Health Care” describes costs associated with the activities of personality disorders and, also states that paranoid, borderline, and obsessive-compulsive personality disorders result in increased medical costs. One example of a non-medical related economic strain placed upon those who suffer from personality disorders may be compulsive shopping and absenteeism from work. This then results in decreased income which creates the inability to afford treatment and also builds immense debt. With personality disorders, this creates a never-ending circle where treatment costs can’t be paid because their disorders affect their income which then causes them to spend more to feel better. Understanding the difficulties people with personality disorder endure guide us in finding ways to properly eliminate those cost and even further our knowledge in finding preventative measures to multiple disorders. In conclusion, practicing the knowledge gathered would result in improving the lives of the individuals affected and their families by hopefully reducing the strain placed on them financially and physically.
Nonprofit status is granted to entities organized for a charitable, educational, religious or scientific purpose. Nonprofits are not liable for income tax on their revenues as long as the revenues are related to their core mission. As colleges and universities struggle in an era of declining resources they often seek alternate streams of revenue; some of these look more like businesses and less like non profits. This created the question: are nonprofit colleges and universities complying with the unrelated business income (UBI) laws and regulations? In 2013, the Internal Revenue Service (IRS) audited a sample of 34 college and universities and found that 90% of them were under-reporting their UBI. UBI is income generated from any activity that is not related to a nonprofit institution’s core mission. Some examples of these activities are: selling clothing, receiving revenue from a fitness center, and offering sports camps over the summer. This study evaluated tax returns from a randomized sample of 40 private higher education institutions to determine whether they were compliant with IRS regulations. Several data points were examined to assess the validity of the institution’s income reported.
Creative Accounting: An Analysis of the SEC Accounting and Auditing Enforcement Releases Involving Individual CPAs

This research will quantify and examine data pulled from cases found within the U.S. Securities and Exchange Commission’s (SEC) Accounting and Auditing Enforcement Releases (AAREs). Except for one published paper, prior research has been targeted toward accounting firms. My research will examine these cases regarding individual Certified Public Accountants (CPAs) by capturing information related to both the CPA and the issues surrounding the need for the SEC to have taken enforcement action against that CPA. To make decisions that avoid negative financial impacts we must be able to place our trust in financial reporting that is both usable and comparable. Financial reporting rules that are based upon FASB’s (Financial Accounting Standards Board) framework must reflect objectives, or the "why" behind their usability, as well as recognition, measurement, and disclosure concepts, or the "how" behind their creation; but most importantly they must reflect the qualitative characteristics of usability and comparability that should be achieved in financial reporting. It is the qualitative characteristics of financial statements that make both regulations and codes of ethics imperative for the CPAs who compile or ensure this information. Since there is an expectation of trust placed in these CPAs and their work, which will impact a user’s decision-making behavior and create economic consequences, this further research regarding SEC enforcement actions is imperative to both the profession and the public.
Financial Literacy is an important skill to successfully negotiate within the US socio-economic system. It is, however, not universally acquired and in some populations, severely lacking. Working with individuals recovering from drug and/or alcohol addiction in the City of Worcester, the WSU Enactus Team has addressed this need through workshops on general financial literacy. This project drills deeper and focuses on a specific need for legal fiscal responsibility. Many of the gentlemen in the Reyes House Recovery program have directed their resources towards their addictions. Most have not worked, paid bills, taxes, or other debts and legal obligations for many years. Part of the recovery is to become a productive member of society. The "Back on the Books" project at Reyes House is a two-part endeavor: First, a workshop educating participants on the importance of filing tax returns. Taking into consideration elements such as citizenship, immigration status, pending legal matters, court orders and levies. There will be roadblocks faced for each individual and the action of filing or not filing could have profound reverberating effects. Next, we actually file the returns through the VITA program, a federally recognized program providing IRS certifications to students. Once all of the appointments are set, the final step of the project will be to attend the Reyes House on the set dates, accompanied by a certified tax reviewer, and help the gentleman file their 2017 tax returns.
The purpose of this study is to expand the knowledge of the effect of different methods of rating corporate responsibilities on corporations. We are specifically interested in gaining a deeper understanding of the effect of proactive action on firm value versus the effect of passive participation. Our sample consists of two sets of public corporations. The first set is composed of companies that have sought out and received the B-corp Certification, this set is the “proactive” set. The second set of firms are public corporations that have been listed on the KLD investment index, this set is referred to as the “passive” set. We predict that the proactive set will see a positive correlation between achieving the B-Corp Certification and firm value. Additionally, we predict that corporations in the proactive set will see a greater positive correlation between the B-Corp certification and firm value, than passive companies will see between listing on the KLD index and firm value. Through comparing these relationships we will identify which type of rating has a greater positive impact on companies, and provide insight into the effect of proactive actions on firm value.
This paper takes the award-winning television series *Insecure* and analyzes it through a *Black Feminist Thought* perspective. Through using Patricia Hill Collins and other Black female scholars and historians, I will be showing how *Insecure* is an honest, valid portrayal of Black women. Throughout history, media depictions of Black women have been racist caricatures or steeped in oppressive stereotypes. Black women are rarely taken seriously in mainstream media. They are either the sassy Black sidekick or oversexualized. I will be taking select episodes from *Insecure*, and also from Issa Rae’s web series *Awkward Black Girl* and analyzing it through the lens of Patricia Hill Collins’ *Black Feminist Thought*.

The images of black women are monolithic and negative. White men, white women, and Black men have defined the role of Black women in society. Why ask everyone other than Black women? When Black women are defining themselves and using their voices they’re debunking those stereotypes and myths. Black women are constantly seen as invisible and *Insecure* gives them visibility. Their voices are finally being heard.

The two seasons of *Insecure* result in having Black women talking about things that you normally don’t hear them discussing. Conversations about multiple partners, infertility, and having queer male partners. This is not what you see in mainstream white dominated shows.

*Insecure* is a show that humanizes Black women in a way that is rarely done. Creator Issa Rae shows the audience the complexity of being a Black woman navigating in a racist and patriarchal world.
This presentation explores unsettling similarities between the injustices that law enforcement has imposed on the black community in Harlem and Ferguson, and how these injustices were ultimately the causes of historical and violent riots. The Harlem Riot of 1935 occurred at the tail-end of an era now recognized as The Harlem Renaissance - a cultural, social, and artistic movement during what is considered a golden age in African American culture. It was Harlem's first race riot, and it started because the black community in Harlem were convinced that law enforcement had murdered a young boy of African American and Latin descent. The riots that occurred in Ferguson, Missouri in 2014 also started due to the shooting of a young African American boy by a law enforcement officer. However, both riots occurred for reasons that go much deeper than just a singular event. The New York City mayor during the Harlem Riot issued a commission to investigate the causes of the riot, and the U.S. Department of Justice in 2014 launched an investigation into the events that surrounded the Ferguson riots. Using the information from these official report findings, as well as official news reports and scholarly articles, this presentation examines the similarities and differences between the riots that occurred in these two cities. Ultimately, the similarities are stark, marking monumental moments in history when the black community stood up against discrimination from law enforcement.
Although portrayed as African in popular sources, Tituba was a slave from Indian decent and lived in Salem with her husband, John, in the house of Reverend Samuel Parris. She was one of the first women to be accused of witchcraft in 1692 with America's largest and most gruesome witch scare resulting in her resistance by going off of the existing Puritan fear of her own religious and ethnic heritage. Speaking freely to save her own life she introduced alien concepts to the Puritans and formed an image of ideas from the West Indian Slave Society such as voodoo and ultimately fueled these fantasies of the devil through her eyes resulting in death to 20 people. My research asks if Tituba’s experience of cultural appropriation contributes to the reshaping of old world notions. Was Tituba just a victim of Puritan fears evolving something such as the religious practice of voodoo into something evil like spirit conjuring and bringing the devil to Salem. As Elaine G. Breslaw states, “She hesitantly capitalized on Puritan assumptions regarding Satanism, Tituba drew on memories of her past life for the wondrous details of a story so frightening in its implications that she had to be kept alive as a witness.” As smart and convincing as Tituba’s move was, the misconception and reiteration of evil within her culture lead to where we are today in cultural appropriation towards non western religion and notions.
Subfertility is a critical health problem with social and economic consequences that affect about 9% of couples worldwide. Assistive Reproductive Techniques (ART) have been incorporated in the process of understanding and solving the issue of infertility. Current research is being done to further understand the causes of infertility and how best to overcome it. Recent preliminary data from the Visconti laboratory indicate that manipulation of the metabolic profile of sperm may affect their motility and other physiological features relevant to in vitro fertilization capability and possibly subsequent embryo development. Mammalian sperm acquire the ability to fertilize the egg in the female tract in a process known as capacitation. As has already been discovered, through the use of mouse sperm, calmodulin dependent kinases, CaMK II and CaMK IV, are required for sperm capacitation through an unknown pathway. In this thesis, using data from previous experiments, my research will revolve around testing out inhibitors of different parts of this pathway will allow us to see which proteins are vital for sperm capacitation and which can be bypassed without affecting the motility of the sperm. Additionally, using media that lacks calcium will allow for the observation of how the Ca2+ ion is involved in the function of the pathway, the inhibitors, sperm motility, and sperm capacitation.
The gases released from a cow’s digestive system have a significant effect on the progress of global climate change. Cows and other ruminant animals rely on billions of microorganisms to break down food in a process called fermentation, and these microorganisms produce substantial quantities of methane in the process. Because the atmosphere is becoming heavily laden with greenhouse gases, and the global demand for beef shows no sign of decreasing, it is necessary to find a way to minimize cattle contributions of methane into the atmosphere. Current research shows that specific additive components in ruminant animal feed, such as the polyphenolic tannin compounds found in the tropical fruit rambutan, lead to a decrease in methane release. The exact mechanisms by which microbes exploit these additive components are not yet well understood.

We will first analyze methane concentration by comparing gas sampler tube data in cows fed a grain based diet with tannins added and without tannins. This data will provide us with a preliminary, broad sense of methane release effects from methanogenic microorganisms in vivo. Then, we will collect rumen fluid samples, culture and purify the microorganisms, expose them to agar containing our selected additive feed components, and test for methane concentrations using established in vitro methods.
Breast Cancer is the second leading cause of death in women and is often difficult to predict. A recent study identified changes in DNA methylation at 250 CpG sites in white blood cells that were predictive of breast cancer in a prospective study cohort. Interestingly, when the methylation levels of just five of the sites were used to predict breast cancer, they did so with a greater accuracy than the current leading method of prediction. We aimed to validate these results by examining five of the DNA methylation sites previously identified using a different cohort of samples and a newly developed method. The white blood cell genomic DNA samples we used in our research were provided by a prospective study conducted by the National Cancer Institute. They were collected from 300 women who eventually developed breast cancer (cases) and 300 women who did not (controls). We received two DNA samples isolated from each individual, one from 1-2 years prior to diagnosis and another 4-7 years prior to diagnosis, with comparable time points for the control cases, amounting to 1200 total samples. Our approach, massively parallel amplicon sequencing of bisulfite treated DNA, has been proven to be robust at detecting DNA methylation levels at single nucleotide resolution. We measured DNA methylation rates at each of the five sites in all 1200 samples using next-generation sequencing. Statistical analysis of the data will assess the accuracy of using these white blood cell DNA methylation sites to assess an individual’s breast cancer risk.

Additional faculty collaborators include Susan Sturgeon, School of Public Health and David Sela, Department of Food Science.
Changes in the intracellular concentrations of free Ca²⁺ are integral in the preparation for fertilization of mammalian oocytes and in the initiation of development. However, the mechanism behind these changes remains unknown. The Transient Receptor Potential (TRP) channels are a family of cationic ion channels distributed in a variety of mammalian tissues. In oocytes, these channels, namely TRPV3, are potential mediators for Ca²⁺ influx. In addition to TRPV3, T-type channels, namely Cav3.2, are also speculated to be important channels for Ca²⁺ entry. We have simultaneously knocked out these two Ca²⁺ influx channels in the mouse to explore the effects on Ca²⁺ homeostasis. By studying the Ca²⁺ oscillations in the TRPV3 and Cav3.2 double knockout mice, it can be further determined the importance for both channels and their potential role in the oscillations. In addition to Ca²⁺ monitoring, the fertility of these double null mice has been evaluated through fertility rates, development, and morphological defects that arose from their null pups. Initially, these mice have litters similar to controls and single null mice, however, after the third parturition the number of pups per litter decreases along with significantly higher neonatal mortality, which is different than what happens in controls. Additionally, the Ca²⁺ store content is significantly diminished in double knockout eggs versus controls, as was the frequency of the fertilization-induced Ca²⁺ oscillations. Therefore, TRPV3 and Cav3.2 channels contribute to Ca²⁺ homeostasis of mouse oocytes. Further studies are needed to gain insight into the cause(s) of subfertility of these double knockout mice.
Piggery Systems: Conventional Concrete Slab Floors versus Deep Litter Systems

My research is broken down into two main parts: deep litter systems and the sustainability of conventional piggeries versus deep litter systems. The first half of my research explores the Korean Natural Farming technique of inoculated deep litter system (IDLS) piggeries. IDLS piggeries were developed by Master Kyu Han Cho of the Janong Natural Farming Institute in South Korea. His work, based upon generations of practice, provides farmers with an ecologically and economically sound manure management system. IDLS piggeries are odorless, fly-free, and can sustain green waste for up to 10 years without removal. Currently, IDLS piggeries are not widespread, with the only well-known locations of implementation being Korea and Hawaii. However, many swine producers across the globe have switched from traditional concrete slab piggeries to deep litter system (DLS) piggeries. Fundamentally, IDLS and DLS piggeries share many similarities, including lower management costs and higher animal welfare. Due to the ease of scaling, DLS systems are much more common compared to IDLS systems.

The second half of my research briefly explores conventional concrete piggeries and then compares conventional piggeries to DLS piggeries (and IDLS piggeries, where applicable). I conclude my research findings with the synthesis of information gathered to determine which piggery system is more sustainable for the future of American pork enterprises. Important aspects to consider when comparing conventional and DLS piggeries includes animal welfare, meat quality, greenhouse gas emissions, water usage, and bacteria present.
The American Pit Bull, also known as the American Staffordshire Terrier, has been largely preconceived by society as vicious, unpredictable creatures whose sole purpose is to attack. With many major news headlines refer to these animals as killers, people often are informed about horrific events involving Pit Bulls, and are usually not given the important facts as to what actually provoked the attack. There are many factors to consider when analyzing a dog attack such as training or lack of training, neglect, abuse, along with many other factors that could potentially cause a dog to lash out in a violent manner. There are non-profit organizations such as DogsBite.org, whose sole purpose is to inform the public about "dangerous dogs." This Website also contains advertisements for "Dog Bite Lawyers." Any dog can be aggressive and an entire breed should not be subjected to this blatant discrimination due to proportionally rare unfortunate cases. Although the victim may have suffered the consequences of the abuse/neglect of the dog owner, that background evidence tends to go unmentioned and generally blames the dog/dog breed. My research investigates if it is possible for an entire breed of dogs to be deemed as dangerous, along with the possible ramifications of classifying Pit Bulls in this way.
While it is well understood that spontaneous Ca\textsuperscript{2+} oscillations occur during the early stages of oocyte maturation, the mechanism by which Ca\textsuperscript{2+} influx occurs remains unknown. Transient Receptor Potential (TRP) channels are a family of ion channels present in many mammalian tissues. Due to our discovery that TRPM7 is functionally expressed in immature and mature oocytes as well as in 2-cell embryos, we hypothesize that TRPM7 plays an important role in regulating embryo development. This study was conducted to evaluate the effects of pharmacological inhibition of TRPM7 on early embryonic development. Embryos were collected after fertilization and exposed to a TRPM7 specific inhibitor, NS8593; control embryos without exposure to the inhibitor were cultured. Another group exposed to Apamin was used to confirm that the effects of NS8593 were due to inhibition of TRPM7 and not due to inhibition of Ca\textsuperscript{2+}-activated K\textsuperscript{+} channels. Cleavage rates were noted at 24 hour intervals post-collection. Addition of NS8593 at the time of collection resulted in delayed development and significant reduction in progression to the blastocyst stage when compared to the controls. This delay in development was not observed in embryos exposed to Apamin. These results indicate that TRPM7 plays an important role in early embryonic development. It remains unknown whether the reduced embryo progression is due to inhibition of Ca\textsuperscript{2+} influx alone or whether TRPM7 is required for permeability of other ions such as Mg\textsuperscript{2+} or Zn\textsuperscript{2+}. Additional studies are in progress to provide insight into the temporal requirement of TRPM7 during development.
Cooperative, non-kin male bonds are not often observed in nature, due to intrasexual competition. However, bull elephants have often been observed to form bachelor groups with rare occurrences of aggression. This study focused on the dynamics of social structure within male groups across the wet and dry season within the Tarangire Manyara Ecosystem and Serengeti Ecosystem, each incorporating varying levels of protection. This study focused on determinants of group size, aspects of male social grouping and age cohort structure. Male elephant group size was dependent on protected area and season but not habitat. The largest group sizes were found in Manyara Ranch, suggesting its importance as a bull area. Average group sizes were higher in the dry season compared with the wet season. Small, medium and full adult bulls were all more likely to be found in bachelor groups, as opposed to solitary, indicating a high level of sociality among bulls. Small males were almost always found to be associated with older bulls within bachelor groups, suggesting the importance of older bulls in male society. Musth and the number of females was not correlated with male group size. Male elephant sociality appears to be complex warranting future research to better understand the nature of these relationships. Information such as this will be valuable in constructing conservation plans, encompassing diverse aspects of male elephant dynamics.
Environment and life conditions are two of the most critical factors in determining how healthy a population is likely to be. For instance, it would be expected that a population living in a more rural area with better access to food, water, and clean air would have a lower risk of mortality than a population living in an urban area.

For this study, a mortality profile was reconstructed for the Medieval rural Italian town of Noli through the analysis of skeletal remains and this profile was then compared to data from a contemporary Medieval urban London population (kindly provided by S. DeWitte). For Noli, the adults were aged using transition analysis and the subadults were aged using a combination of epiphysial fusion, dental eruption, and long bone length. A Kaplan-Meier survivorship analysis was used to compare the mortality profiles of these two populations and to test the hypothesis that the Noli population would have had a lower mortality rate than the London population due to their rural environment and lifestyle.

Surprisingly, the results showed that subadults (0-20) had a significantly higher mortality rate in Noli than in London and that there was no statistically significant difference in mortality for the adults. These results show that the differences in environment between Medieval London and Noli did not meaningfully impact the health of the adults of these populations. The elevated Noli subadult mortality, however, suggests that Noli children were undergoing some kind of critical stress that was not impacting the London children.
This study examines the antemortem cranial trauma found on skeletal samples from five Late Intermediate Period sites in the province of Andahuaylas, Peru. Each site was identified as being inhabited by Chanka populations based on burial patterns and the presence of Chanka-style ceramics. One hundred and twenty-four crania were assessed for age, sex, and presence of trauma. Crania were also measured to determine the degree of cranial modification present and its effect on the size and location of lobes of the brain. Crania showing trauma were further assessed for type of trauma, lethality, location, and evidence of healing. Location of trauma was correspondingly mapped onto images of the brain to determine possible impacts on neurological function present in the population. Results showed that half of the entire sample displayed evidence of cranial trauma and there was no significant statistical difference in trauma rates between males and females. Blunt-force trauma to the frontal and parietal bones were the most common forms of injury, corresponding to deficiencies in concentration, judgement making, voluntary muscle movement, eye movement, and language comprehension.
The United States is currently in a state of genocide, even though the Colorblind Era in which we are currently refutes this idea. The continual policing of non-whites, particularly, Black and American Indian women through the criminal justice system, the media and in reproductive rights is a product of white supremacy whose plight is erased and dismissed. White supremacy maintains its core agenda of racial domination and the extermination of the Black and American Indian race by reshaping its tools of race, racism, patriarchy, and whiteness to adapt to the social context of what the state wants. Using available literature on mass incarceration, the regulation of reproduction and the #BlackLivesMatter Movement, I examine the historical and sociological framework of how race and gender still permeate to divide and conquer. Additionally, I will showcase how detrimental the male-oriented focus on the effects of white supremacy in the Black American community, specifically, reinforces whiteness and patriarchy.
Women’s bodies have been politicized and rendered an issue of public concern; their rights to bodily autonomy, sexual expression, and reproduction have been overpowered by patriarchal norms of appropriate female behavior. These norms have historically upheld the standard of female chastity, labeling any woman who has sex or expresses her sexuality a deviant. In the United States, these norms continue to be utilized in the creation of laws that limit women’s right to choose how to exercise their sexual freedoms. Unfortunately, these limitations are often not seen as explicit ways of controlling women’s agency, because, in an attempt to remedy the discrimination that women face, the government enacted laws that appear to protect women from various harms upon their sexuality. In reality, these laws continue to uphold the standard of female purity that defined colonial America. While seemingly protecting all women, these laws view “unchaste” women as undeserving of protection, which continues the oppression that women have experienced since the conception of this nation. This thesis focuses on three of these laws: the reproductive right to an abortion, rape shield law, and revenge porn law. It discusses the histories in which these laws are rooted and illustrates how they came to be repressive. This thesis also comments on contemporary women’s rights movements and critiques the manner in which women’s rights advocacy emerges, burns brightly, and quickly disappears, leaving women once again marginalized in society.
Minority Report: How Perceived Psychological Threat Has Shaped American Prejudice and Policy

The United States of America is marred by its historical and continued subjugation of its diverse ethnic communities. This subjugation, however, is not universal. It is dynamic and affects each minority community differently. From criminalizing the existence of Black Americans, politically co-opting the Asian American ethnic experience, and creating legal justification for stealing the lands of American Indians, to the cross-racial use of eugenics, each ethnic out-group community has faced a different form of terror perpetrated by the in-group government. This paper examines prejudice in America as a response to the psychologically perceived threat of minority groups. By using existing literature on the psychology of prejudice, the oppressive actions undertaken by the United States government, and our founding charters, I argue that prejudice is a fear of the cultural differences between individuals and a resistance to change. In concluding this paper, I argue that these prejudiced policies have served only to hurt America, as they stymie our growth and development as a society by cutting us off from the ideas, beliefs, and experiences of our fellow Americans.
Ideology has long-shaped policy in the United States, yet politics often hides the biased rhetoric that largely influences decisions. Racial, gender, and class stereotypes have been used over centuries to blame the poor for their economic position. Focuses on behavioral and moral explanations of poverty guide policy choices, rather than encompassing solutions to structural barriers. These arguments are heavily based in prejudice. Facially neutral policy hides racist, classist, and sexist claims. Welfare reform of 1996 clearly used an individual shaming process to enact policy in reaction to stereotypes about welfare recipients. Historical shaming of the poor coordinated with racial biases and gender illusions. Provisions directly followed prescribed beliefs about black single mothers on welfare in particular, leading to disparate policy outcomes condemning these women. The Personal Responsibility and Work Reconciliation Act of 1996 manifested these stereotypes under embedded rhetoric that emphasized work requirements, family values, and time limits for poor families on welfare. Using available literature on welfare reform and perceptions of welfare recipients, I conclude that black single mothers faced intersectional discrimination that materialized in 1996 welfare reform.
This paper examines the detrimental effects of federal policies, especially those within education, on minority youth in the United States. Termed the "school-to-prison pipeline," this phenomenon works in such a way that a door to a classroom has become a door to a prison cell. Landmark Supreme Court cases normalized violence in education toward African American youth. Policy changes, under the guise of striking down on drug activity, fostered the mass incarceration of minorities. Educational policies favoring security over literacy funneled youth into the very same pit of mass incarceration. Rates of racial bias, under these policies, have skyrocketed and contributed to a prison-for-profit industry. With such an abysmal situation fattening the pockets of those in charge, solutions seem nonexistent. And, yet potential tweaks to policy, methods of school resolution, and improving teacher education offer a start.
In 2015, President Obama authorized the Every Student Succeeds Act to replace the No Child Left Behind Act. The latest education policy significantly diminishes the decision-making power of the federal government and shifts power to the state level. The shift was instigated by the flawed NCLB legislation, which compromised the educational success and psychological well-being of marginalized students. Despite the ESSA’s attempt to remediate these concerns, inequity in education persists. This is due to provisions in the ESSA that allow for inequity in funding and disparities in high-quality educators. Using the available literature, I examine how the ESSA differs from its predecessor. Additionally, I analyze state implementation plans to illustrate how state discretion over education policy will not allow all states to attain the overarching goals of ESSA legislation, as state plans illustrate varying levels of commitment to minority student education. Ultimately, I conclude that federal education policy continuously fails to provide marginalized youth with the best education. In effect, the government must revise ESSA legislation in a way that will grant more power to the federal government to hold states accountable while allowing states to determine which pathway their policies should lead. Lastly, I suggest that until larger systemic issues such as social and economic inequalities are addressed, the achievement gap between non-marginalized and marginalized groups will not close. Until these issues are resolved, education policy will remain a short-term strategy to reduce disparities in achievement.
American drug policies fail to acknowledge pragmatic models of drug use and addiction. Most users do not harm themselves or others with their use, and in fact, many use drugs to deliberately induce mental states that they perceive to be advantageous in their lives. Drug use itself does not cause addiction. Furthermore, those struggling with an addiction to drugs remain able to make rational decisions and to live fulfilling lives. However, since the early part of the twentieth century, federal policies have tried to eradicate some drugs from America through criminalization while allowing pharmaceutical companies to sell equally harmful products. As a result, some people think of drug users and addicts as morally corrupt regardless of the real harm done to society by their use. A revamping of federal criminal policies during the Reagan Administration initiated the development of a system of mass incarceration in the United States that is unmatched in the rest of the world. Further, the percentage of prisoners that are minorities is much greater than their percentage of the whole population. It is only by ignoring the true nature of drug use and addiction that these policies have been possible. American policymakers need to rethink their positioning of drugs in society if they are going to prescribe rational legislation.
State governments founded land-grant public universities with money raised from the sale of land systematically stolen from American Indians, the theft of which was confirmed in shady and biased cases heard by the Supreme Court. However, the social contract of these public universities preaches accessibility and equity for all constituents of the states. This hypocrisy and innate disconnect between the reality of the creation of these public universities and the vision has perpetuated systematic and institutionalized white supremacy into the current day. Now, public universities have inadequate minority representation and fail to live up to their promise. This is examined in this honors thesis by using five land-grant public university case studies. The structure of these universities continues to oppress and exploit black students through the maintaining of racist imagery, special admissions procedure for ex-felons, and mistreatment of black male student-athletes.
This summer, I worked with The American Friends Service Committee as it transitioned to become The Resistance Center (TRC). One of my projects was uncovering the contract details of the federal discretionary budget for defense. I found that much of the budget and many of the jobs are allocated to weapons production. An irony is that Massachusetts - a state known for its leftism - receives disproportionately large funds for military projects. Residents are being employed by the military industrial complex in spite of their expressed political values.

My current project similarly deals with militarization. TRC has joined forces with the International Campaign to Abolish Nuclear Weapons (ICAN). ICAN accepted the 2017 Nobel Peace Prize for their work done on the Treaty on the Prohibition of Nuclear Weapons - an international treaty which makes nuclear weapons illegal. I have been helping with research and popular education. I expand on existing knowledge of the connection between nuclearization, militarization, and international socioeconomic disparities/ social injustices and develop ways to effectively relay that information.

Through participation in the campaign by divesting from companies that are directly involved in nuclear weapons production (like Honeywell), individuals, organizations, municipalities, states, and eventually the nation will put pressure on the companies to switch to acceptable alternatives. The hope is that residents can be building solar panels instead of Trident Missiles. Part of the presentation will be on my experiences with the organization at a Peace March and possibly at a UN conference.
The United Nations has declared access to drinking water and sanitation a human right; however, drinking water disparities continue to distress global geographic regions. These disparities, specifically access to safe, reliable, and affordable water, should not be isolated as problems of the developing world. Hundreds of communities throughout the United States are facing issues of water inequality as agricultural and chemical contamination increases, aging infrastructure degrades, and water scarcity intensifies. The prioritization of capital interests over human rights concerns intersects with historical marginalization and environmental conditions to create a disproportionate water accessibility burden on low-income and minority communities. Water is to be used as a medium through which we can observe and analyze the coexistence of environmental and social inequalities within the United States. This honors thesis focuses on the physical infrastructure that brings water to the tap, or does not, and the legal framework that shapes accessibility. Proposed solutions derived from public policy and strengthened community capacity are also addressed in the conclusion of this paper. As the United States continues to evolve, basic human rights, such as water, must be ensured through sustainable development that recognizes the importance of the economy, environment, and social equity.
This research compiles different sects of the judicial system in which gay men and lesbian women interact with the law, including criminal law and family. By understanding the different experiences, it quickly becomes apparent that the legal framework is built and maintained to marginalize the gay and lesbian community. In the strife for a more equal society, these laws must be understood, and, more importantly, their history must be understood. Institutional homophobia dates back to the roots of this nation. Using peer-reviewed journal articles and quantitative and analytical research, it becomes clear that the way in which gay men and lesbian women interact with the law differs from how heterosexual people interact with it. While the quick pace of societal change for the gay and lesbian community limit the availability of research pertinent to recent events, the historical record helps paint a telling picture. Combining the ideas of sodomy laws, marriage laws, and custody laws, it is understood that in order to reach equality under the law, judicial discretion must be limited, new legal definitions must be adopted, and new political actors must be put in place to advocate for change.
Civil forfeiture is a policy theoretically created to disincentivize drug trafficking. It gives law enforcement agencies the power to seize private goods without even charging their target of a crime. However, in practice, this process has been ineffective and in many cases unjust. Civil forfeiture as a whole has flown under the average American’s radar for far too long. It incentivizes misuse by the police and was founded on racist policies. The protections provided to citizens during a typical forfeiture proceeding are relatively nonexistent, and as a result many egregious cases of this law’s use have occurred in recent years. Throughout this thesis I examine the historical evolutions of this procedure as well as the backwards incentives it creates. In addition, I continue to outline arguments for and against this procedure on a moral and legal level, and finally, offer policy suggestions from both myself, and legal scholars.
In what ways are access to power denied to some through violence, degradation, and exploitation on individual, institutional, and societal levels (systems of oppression)? How do systems of oppression operate in relation to one another? How do various systems of oppression affect both myself and others? How can we make social change and what would those different worlds look like?

To approach those questions, I use autoethnographic and arts-based research in a creative, hands-on exploration and synthesis of the world as it stands and to advance transformative visions of justice that my research, lived experience, and community lead me to. These methodologies consist of engaging deeply with my topic through artistic production and connecting primary literature to personal experience. Knowledge-creation and presentation alike will be through the process of collage-making, culminating in a series of collages responding to the above questions. Collage is here defined as the process of creating a new and unique assemblage out of found materials, mostly images and print.

My intent is to use the relational techniques of collage-making to apply a relational analysis to systems of oppression. Similarly, my positive visions of social, economic, political, and ecological entanglement will not only be represented in collages but emerge from the very process of crafting them. This work is important because of the power of art, and specifically the ability of collages, to spark critical thought in myriad directions in a diverse audience.
My honors thesis explores the themes of national, cultural, and individual identity in the context of luk khruegs in Thailand. “Luk khrueung” is a Thai term that directly translates as “half-child,” and has been used to refer to anyone with part-Thai heritage, although it is most commonly used to refer to the child of a Thai and a Western parent. The luk khrueung identity is interesting to explore because it occupies the cross-roads between Thai and Western identities. Their heightened presence illustrates the results of an increasingly globalized world, and their presence is intriguing when considering Thailand’s historic love and hatred of Western influence. Western expatriates will never be accepted as “Thai” because their physical appearances directly mark them as “non-Thai,” but as they continue to have children with Thais, their children’s identities will be contested because of the ways Thai society will interpret their appearance and ancestry. The purpose of my research is thus to broaden understandings of how this group manages and experiences its identity in Thailand and abroad. Loosely structured interviews were conducted with five self-identifying luk khruegs who live either in Thailand or in the West in order to gain personal stories and perspectives. The analysis of these interviews shows how luk khruegs are able to take advantage of both their Thainess and their Westernness in varying contexts.
Resonance is an architectural design project with the intent to design and build an installation that generates a sensory experience for the user and viewer. The main intent is to showcase the transformation of digital data into parametric design, while also incorporating the main theories that make up our understanding of spatial atmosphere; such as the body of architecture, the sound of space, effect of surrounding objects, between composure and seduction, the light on things, and beautiful form.

The project aims to provide an installation within the Design Building that encourages student musicians to play their instrument and perform an impromptu concert. This installation will also provide seating for students when not used musically. Design data is informed by the non-sinusoidal waveforms produced while playing string instruments, which is then imported and visualized using Rhinoceros/Grasshopper Software and used to create cut plywood forms which will be assembled on site. The result generates a playful and acoustically-inspired installation that also filters light, and provides a unique programmatically-responsive space.

There are many ways to interact with the installation, from casually viewing from afar to direct participation with its form and space. Resonance's curved fins generate the installation’s program; graciously sweeping inward to create an alcove for a musician to perform, as-well-as the opposite to create a seat to enjoy a coffee break. The undulating curves rhythmically occupy space, and creates its own performance during the day as the sun dances along the plywood fins.
Houzz is a U.S.-based website that contains both a collection of residential design ideas in the form of photographs and a community of homeowners and design professionals. The website receives over 40 million monthly unique visitors and is seen as the 21st century replacement for traditional “home and garden” publications, such as magazines and books. This paper will explore the role that Houzz plays in the realm of home design and the shortcomings of an online resource that privileges design ideas based on favorable Yelp-style reviews, likes, and paid sponsorship and results in a homogenized pool of design solutions. The paper will make recommendations on improvements to the Houzz interface and business model in the interest of promoting a nuanced approach to architectural design.
ART

35  Room 909  8:30-9:15  Panel 1
Megan Knight
Brian J. Cruz Perez
Mary Beth Czupryna-Grodzicki
Samantha Harris-Lariviere
Kate Kaehn
James H. Kellner
Erick J. Velez-Feliciano
Kenneth Chatel (Faculty Sponsor)

Department of Art, Holyoke Community College
The Tapestry Service-Learning Project: A Graphic Design Collaboration

The Tapestry Service Learning project offers the students of Art 257 an opportunity to align our design skills with the mission of Tapestry while gaining real world experience. The purpose of this project is to produce a catalog for Tapestry’s community outreach, education, and fundraising. Tapestry is a non-profit agency providing community-based health services, including sexual and reproductive health, overdose prevention, HIV health and prevention, syringe access and disposal, and WIC family nutrition: areas of healthcare that are vulnerable in today’s political climate. With sites in seven locations throughout Western Massachusetts, Tapestry’s services benefit a large community, providing respect and compassion to those in need. The finished project will be a 20-page catalog that includes a comprehensive company profile, as well as information about services provided, statistics, testimonials, a timeline of Tapestry’s 45-year history, and gifting opportunities. Elements of the catalog include icons, photography, copywriting, and information design, and will undergo an extensive revision and collaboration process. Learning to work alongside Tapestry’s corporate identity has guided our designs, and has provided us with a launching point from which to develop this project. Upon completion, we will provide Tapestry with a major marketing tool. With this, they will be able to tell their story and attract support for their mission, while also raising awareness. In practical terms, the catalog will also serve as a template which can be updated for years to come, offering a sustainable fundraising tool. Through this project, we hope to make positive change in our community while advancing our skills as designers.
This thesis paper will investigate the reasons why work associated with women’s craft is devalued. This theme will be explored through a history of art resulting from a heteronormative society, specifically through the exclusion of certain mediums in the fine arts world such as watercolor, embroidery, and fiber arts. The intersection of this tradition with that of domestic craft will also be examined in order to outline the stigmas that have evolved, which in turn lead women artists to re-appropriate craft as a feminist tool.

The employment of the same visual language in work produced by artists of other genders will be explored in order to discern if craft mediums carry the same impact when connected to various gender identities. Discussion of contemporary art coupled with views of gender identity will make evident that this feminist proclamation of craft must progress past normative identity to something other than feminine or masculine.
As an Art Education student, I have been concluding my spring practicum experience through teaching, writing lesson plans and attending Art Education Seminars. During my course of study, I have been enrolled in seminars that have introduced me to teaching approaches for art, specifically the Reggio Emilia approach. This greater interest in the approach began when I had the opportunity to complete a summer internship in the Art Studio at the Eric Carle Museum of Picture Book Art where the drop-in art space offers guests materials and tools that encourage open-ended exploration and projects that promote personal expression.

While experiencing a public school’s art curriculum, teaching has encouraged me to create lessons that work around restrictive elements such as limited materials. While creating these lessons I have taken some of the broad principles and ideas from Reggio and applied them to how I designed, introduced and documented projects.

During my Honors Project, I planned three art lessons where I adapted principles of Reggio Emilia and taught the lessons in three different environments. This project served as a self-evaluation of my art education knowledge, my ability to modify the concepts developed in the Reggio Emilia approach, and my understanding of children and the way they learn. During my research, I reflected on how this approach worked with different ages, classrooms, and in different contexts. I will share my reflections, pictures and stories of how I have learned to facilitate art making with the Reggio Emilia Approach.
Homer’s Odysseus is often presented as the quintessence of the war-weary soldier who just wants to go home. He’s a model leader, husband, and father—or is he? In a recent interview published in *The New York Times*, British Classicist Emily Wilson (the first woman to translate Homer’s epic into English), discusses the foundational implications of Odysseus’ ambiguous epithet, polytropos (literally “many turns”), and whether it is better translated as “much-turned,” or “much-turning.” This raises an important question: is Odysseus’ decade-long delay due entirely to the contrasting agendas of the gods and monsters, or is the man himself in part to blame?

To create dialogue surrounding this question, I designed and created an artist’s book with five illustrations recalling Greek red-figure vase painting in color, texture, and decorative border. The book is bound in meander style, and when spread flat, makes the shape of a Greek key, echoing the epic’s motifs of the meandering voyage and of the sea. Each illustration explores the nature of one of Odysseus’ many setbacks, depicting him as increasingly involved in his own detainment and thus encouraging the viewer to question whether or not Odysseus fully merits the veneration bestowed upon him by conventional scholarship. My presentation will discuss each illustration alongside the textual evidence upon which it is founded.

Analysis of Odysseus’ character goes straight to the heart of the western literary canon. Are we inclined, as the Homeric Greeks perhaps were, to exaggerate virtue and overlook vice in our literary heroes?
My honors thesis is a creative research project in which I have choreographed and produced a dance concert memorializing the Holocaust and calling attention to the recent resurgence of neo-Nazism in today’s society. This project is designed to examine the effectiveness of dance as a tool for memorialization and social activism. My findings proved that dance is successful at conveying emotions and messages related to remembrance and social justice. The choreographic process for my work was influenced a great deal by my extensive study of the Holocaust and was supplemented by further study of this event and of today’s neo-Nazi movement. I used my academic research to influence my creative research and how I instructed my dancers in movement and intention. For the final part of my research, I asked the audience members of each performance to reflect on their experience and reactions to the work, and by reading these responses I was able to determine that dance was in fact an effective tool for memorialization and social activism.

Art is a powerful tool for change. This type of creative research is critical in the dance field. Artists need to feel empowered to make a difference through their art making. By proving dance’s effectiveness at reaching people in the context of memorializing the Holocaust and addressing the resurgence of neo-Nazism in my own work I hope to pave the way for future choreographers and dancers to make art that incites change.
The field of dance science is of growing popularity as it integrates art and science and offers benefits to the performer and the researcher; however, the potentials of art are often forgotten in the pursuit of knowledge. This choreographic project investigates the relationship of art and science in terms of how the human body is appreciated aesthetically and analyzed mechanically by utilizing dance techniques and kinesiology principles. Presented in two parts, a gallery exhibit and a live dance performance, this project follows the methods of human motion analysis through the past and present day to further the ongoing pursuit of understanding the human body. The research process includes creating movement in the studio, applying movement to dancers, and analyzing their movement through various forms of media. The findings of movement patterns, mechanics, and imagery techniques are demonstrated and presented for an audience. Results are measured by the success of the live performance and gallery exhibit as well as by the feedback from the collaborating dancers in regards to how they feel they can benefit from evidence-based dance pedagogy. The significance lies within the potentials of expanding the ideas and relationships of art and science into the fields of education, performance, and movement research for all populations.
Autism is often misunderstood by neurotypical people. People often fear what they don’t know and may isolate themselves from something they see as different. I wanted to combine my double major in Communication Sciences and Disorders and Visual and Performing Arts to create a visual understanding between two communities; the autistic community and the neurotypical community. As a neurotypical individual, I cannot speak for the Autistic community, but I can advocate in the hopes for creating a better understanding and acceptance. I created my visual work to highlight similarities I found between the two communities: routine and repetition. Autistic individuals use routines to impose order and structure in their daily lives. Some examples of routines include bathing, bedtime, or meal routines. When structure is developed, the environment becomes more manageable. (“Routines and Rituals Performed by Children Diagnosed with Autism.”) Neurotypical individuals use routines as well. Routines help develop a sense of control and normalcy over one’s environment. (“The Power of Routines.”) My body of visual art work aims to represent the routines and repetition individuals in both communities can relate to. I hope my work can start a conversation for better understanding and advocacy between the two diverse communities.
My Senior Thesis is driven by my passion for the preservation and conservation of the historical and cultural significance of art and discovering different ways art can be used universally.

In the spring of my Junior year, when I was awarded a research grant, for my year long project proposal I began observing Art, at the MFA in Boston. I focused on the Ancient World, to discover what, if any commonalities can be observed across cultures. Exploring our perception of art, and its impact on us as individuals, I tried to define what aspects of art are truly universal. My resulting theory is when there is less individual components that makes up an art piece, there is less that people individually identify with.

To demonstrate this, I compiled various simple sounds and translated them into abstract, minimalistic and primitive based visual pieces. The result was large scale painted pieces, around eight feet long, done on burlap material. They were read by musicians in a manner similar to that of sheet music, without the parameters of a bar. The response was a natural and automatic reaction to the images rather than a learned response such as reading music.

Turning sounds into images and then back into sound, resulted in organized simplicity that invoked an equal response. This consistency is a step closer to understanding how we can use art to bridge the gaps between cultures.
This research essay examines the films of Greek director Yorgos Lanthimos from the perspectives of film studies and psychoanalytical studies of taboo and mythology. Lanthimos uses various cinematic techniques to distance the world within his films from our everyday lives. This distancing from our everyday reality allows him to make profound connections to the deepest taboos within society and humanity as a whole. Through comedy and the creation of a seemingly unrealistic world, Lanthimos cuts deeper into the human experience, similarly to how ancient myths are clearly not real, yet can connect to the deepest elements of human experience. I have studied each of Lanthimos’s four feature films in detail, and have drawn connections between his work and the work of Sigmund Freud regarding taboo. Through this method we can understand more about human nature, our fear of addressing taboos, and the ways cinema can break through those fears and bring its audience to a greater understanding of human experiences and emotions which are usually undiscussed. This essay will help form a greater appreciation for Lanthimos’s great contributions to cinema, and for other great works which use similar methods to explore taboos which we can be too afraid to examine directly.
The OranguTrump is a mixed media piece crafted by reusing materials bound by tape and glue, then primped in old clothes and paper clay. The snack food, Cheetos, is engineered to create a hair piece worn by the puerile tree dweller. The facial structure distinguishes this orangutan as the artist’s version of a satirical representation of Donald Trump. This piece was conceptualized shortly after the demoralizing results of the 2016 election. It is undoubtedly clear that the Trump presidency is problematic for many and advantageous for only a few. The filled trash can is not to represent the place where Donald comes from, rather a direction that we may be headed. Objects placed inside the trash can reflect actions of POTUS that have offended the artist, and many others. The Eiffel Tower represents backing out of the Paris Agreement; lumps of coal represent our clean energy solution; elephants and other big game animals that can now be poached and imported into the USA legally; an imported solar panel that is additionally taxed 30%; a copy of the Declaration of Independence that has been tarnished and discarded; bricks and barbed wire from the wall that Mexico will pay for; and, turkey feathers made to look like those of an eagle, as much a metaphor for this President as well as a nod to the Navajo Nation and “Pocahontas”. There is much more that could be included, but the artist could not manage to pilfer a dumpster.
Equipoise consists of original paintings that serve as visual interpretations of the way in which mathematics has fundamentally influenced art. This research has analyzed the role that mathematics, specifically symmetry and balance, has played in centuries of artwork. For instance, Islamic art from various time periods frequently included common mathematical themes. Ancient Islamic artists from as early as 300 A.D. were using geometric patterns as guidelines for their artwork. Over the centuries, the methods used by the artists became more refined, including systematically dividing a circle into equal parts while connecting various points to create repeated motifs. Modern artists, such as M.C. Escher and Simon Beck have also made extensive use of mathematics in printmaking and earthworks. While studying the works of M.C. Escher in an exhibit at the MFA in Boston, it is evident that he relies heavily on grids to meticulously layout his initial prints. Similarly, Simon Beck, a present-day artist and mathematician, also creates intricate geometric designs, but on a much larger scale that often cover between 2.5 and 10 acres of snow or sand. Between the processes used to create designs and the final pieces themselves, the common threads of mathematics, symmetry and balance run deep.
For some time now, visual art has been divided into two distinct types – art for a purpose, used to transmit a message or sell a product, and fine art, art for art’s sake, meant only to be art. This project combines image and message in an effort to achieve an end. The political nature of the messages should be clear to the viewer, drawing from the groundswell of popular opposition to the current administration. But it does so with an eye to creating works with a sensibility closer to ‘fine’ art. Combining woodblock, monotype and collograph printing techniques, this show is comprised of several images, without text, each of which transmits a message to the viewer. The goal is to blur the line between art meant to advertise and art that’s purely for visual consumption. The finished pieces inform without telling, speak without words, while also being aesthetically compelling. That is, after all, the most important part of a work of visual art.
**Little Rosie’s Wish** combines children’s literature and visual arts. The main purpose of the book is to support the social and emotional well-being of children, while at the same time inspiring courage and self-acceptance. The story follows the journey of a fairy named Rosie. Rosie has big plans to paint the sky but is discouraged by those around her. The little fairy must find the courage to make her own wish come true. The illustrations are created through a variety of mixed media, including pastels, paint, colored pencil, pen, marker, and a variety of paper types. The pages are composed of collaged and layered materials. The overall aesthetic of the book consists of a soft, warm palette and pastel hues. Oftentimes, the world can seem like a dark and frightening place, especially when viewed through the eyes of its youngest inhabitants. The artist’s mission is to provide an escape into a world of magic and wonder which will encourage the imagination and creativity of young children.
These ceramic sculptures are organic tree-like and human forms paired with a series of drawings of ammonites. The human forms use high oxidation clay, various glazes, graphite under charcoal, ink, and raku kiln fired media. The resulting crackle glaze creates a dynamic surface against the smoky black background. The dark glossy green accentuates the curves and texture of the sculpture. The large scale tree is fired in an outdoor pit firing. The ammonite drawings that accompany both sculptures is drawn on high quality paper with precise lines. Both firing processes always have an element of mystery and surprise, since the artist cannot totally control the outcome.

Sculptures are my strength and passion. The ammonite drawings and ceramic sculptures are linked because the both share a connection to the earth in terms of medium and form. I am inspired by exploring nature and translating the designs and patterns in nature into art.
Someone’s trash can be someone else’s treasure, when beauty is in the eye of the beholder. Idioms aside, the average American generates about 4.40 pounds of garbage per a day, accumulating a total of about 245 million tons per a year (EPA.gov). Society’s push to encourage a consumeristic lifestyle of buying “new things” is a major factor of our problematic growing trash. However sinister sounding consumerism may be, our throwaway society has been a petri dish for inspiring today’s modern artists. Artists have been able to capitalize on waste’s proliferation and in turn generate meaningful art. The now thriving artistic practice of turning trash to treasure is the preferred medium of many artists. Trash can be a useful and beautiful substance. Trash’s dichotomy (waste and art medium) allows the artist additional complexity when creating with ‘unintentioned’ art material. Artist insight, creativity, ingenuity, and consuming consciousness are in full throttle when working with trash. Beauty is in the Eye of the Beholder explores using trash for artistic purposes in a four-piece visual installation. The four three-dimensional pieces depict abstract eyes made of the discarded discounted material of four different "Michaels Store —$4 grab boxes". The items within each individual box have been used to create a single installation. However horrid wastefulness is, corporate trash accumulation has sparked creativity, ingenuity and a healthy consuming consciousness within the modern art world.
This is an original children’s book narrated from the perspective of Magic, a black cat who travels mysteriously to England in search of his companion person. Inspired by my travel to England with MCLA’s Arts of Medieval and Renaissance Britain travel course, the book includes digitally-edited illustrations drawn in pen and pastel pencils. Some illustrations are inspired by pictures directly taken on site when I was abroad in England in March 2016. The book itself is handmade, bound with a saddle-stitch binding, displaying techniques learned from “Painted Papers, Prints, and Book Arts” class. The saddle stitch method is most effective for binding booklets and publications with 64 pages or fewer. The book gives children aged 5-10 opportunities to explore new places and sparks ambition to travel abroad during college, or even in their later years. The goal is to enrich children’s knowledge of England’s culture to broaden their world views through the picture book format. Magic’s Tail in England is the first in a series I hope to extend to Magic’s travels throughout the world, so children can have multiple books to explore the globe. Only about 40% of Americans have a valid passport; we need more literature for young audiences that encourages children to plan to see the world and learn the history of other societies. The story features Magic the cat at Hyde Park, The Globe Theatre, the Tower of London, and King’s College in Cambridge, with facts about these places woven into the narrative of Magic’s adventures.
In the installation *El Vuelo y su Semilla* (*The Flight and its Seed*), contemporary Mexican artist Betsabeé Romero utilizes modern and pre-Hispanic imagery along with the cultural power of food to represent the adversity faced by Mexican immigrants, while celebrating a shared history and cultural identity. Romero explores themes of migration, heritage, globalization, and the lives of Mexican immigrants, and attempts to make sense of this blend of cultures with her multimedia installation.

This paper examines Romero’s use of food in *El Vuelo y su Semilla* as a symbol for the hardships faced by Mexican immigrants, as well as the enduring strength of Mexican culture. One work in the installation, *Atropellando Maíz*, juxtaposes a pile of kernels with rubber tires carved with relief images of Aztec glyphs to highlight conflicts over indigenous farming rights and the promise of a better life in encroaching urban centers. Another work, *Meses el Aire*, combines traditional Pueblan pottery and Mexican cookbooks with quotes from Gabriel García Márquez’s touchstone novel *One Hundred Years of Solitude*, illustrating the conflict that causes people to migrate, and the heritage that they bring with them when they leave their homeland.

Romero taps into our universal understanding of the joy and pain of food to communicate the complex emotional journey of Mexican migration, uniting immigrants in their struggles and finding strength in their shared cultural heritage.
This paper examines the reception and understanding of First Nations culture in white colonizing society using scholarly writings about the reception of art from non-western art to analyze writings and paintings from Emily Carr’s contemporaries and photos from exhibitions that Carr participated in. Emily Carr is recognized as an iconic Canadian artist and writer, known for her paintings of the British Columbian landscape and her award-winning book *Klee Wyck*. During her lifetime, however, Carr did not receive national recognition for her paintings of First Nations culture. She worked alone in her home province of British Columbia, isolated from artistic circles in eastern Canada. In 1932, Carr painted *Zunoqua of the Cat Village*, showing an abandoned First Nations village overrun by vegetation. The painting captures the colonization of British Columbia and expresses the tension between Carr’s position as a white woman and her genuine interest in ethnographic preservation of First Nations’ culture. This tension enlivens her painting but undermined her aspirations for artistic recognition by subjugating her work to that of the Group of Seven, the predominant modern painters in Canada. Her position as a white woman undermined the ethnographic value of her work; as a member of colonizing society, she could not accurately portray the First Nations culture. Examining the expression of colonization in an iconic Canadian’s art draws attention to the exclusion of First Nations people from not only politics but also art.
The concept of depicting Heaven and heavenly space are tremendously diverse cross-culturally; however in post-conquest Mexico the philosophies of the native Mexica people and the Spanish friars united collectively in a unique way. The town of Malinalco, Mexico boasts a superior example of this distinctive vision, contained in the lower cloister walls of the Augustinian monastery built in the 1570’s. Monochromatic in color, the garden paradise murals depicted in the inner passageways of the monastery, combine both European and Nahua artistic styles as well as iconography important to both cultures. Flora and fauna native to both places are included in the iconography of the garden murals and highlight the imagined utopian world that represented Heaven for both the native and European contingencies that inhabited the area.

The native painters, in collaboration with the Augustinian friars, used the iconography sacred to the Aztec people in the space where the Catholic friars lived and worked. Close study of the images help define the hybridity of both the religious and cultural iconography that created a representation of heavenly paradise for both the Nahua and the Spanish. Color, so prevalent in examples of Heaven depicted in Spanish art, is rendered down in these murals to four basic colors. The selection of a restricted palette of colors from the perspective of the Aztecs is used to support the reasons why the murals encompassed so much of the Aztec iconography and symbols.
Green Peas are young, rare, compact starburst galaxies characterized by highly ionized gas. They are some of the only known galaxies with escaping hydrogen-ionizing, or Lyman continuum (LyC), radiation. The Lyman-alpha (Ly$\alpha$) transition is one indirect diagnostic of ionizing radiation escape, and is therefore the primary tool we use to investigate these galaxies. We calculate a variety of nebular and physical properties of the Green Peas to determine which parameters correlate best with particular Ly$\alpha$ spectral features, including equivalent width, escape fraction, and peak separation. Our findings show that ionizing photon production correlates strongly with Ly$\alpha$ equivalent width and that peak separation is particularly sensitive to the ionized vs. neutral gas content of the galaxy. We will discuss the implications of these properties for ionizing radiation escape in the context of LyC-leaking galaxies as a whole.
Stars are formed through the collapse of molecular gas clouds. The collapse is triggered when hydrostatic equilibrium is disrupted. Hydrostatic equilibrium is the requirement of a cloud to remain stable. It describes the state in which the kinetic energy of the gas pressure is equal to the gravitational potential energy. The critical mass limit of the cloud is defined as the Jeans mass. As soon as the mass of the cloud exceeds the Jeans mass, in theory, it is prone to collapse.

However, if the mass of a cloud does not exceed the Jeans mass, it still has the potential for collapse, and therefore star formation via induction. If a cloud is in near enough proximity to a massive star, as the star dies, it will produce a Type II supernova which propagates in all directions as a shock wave. This is a sudden change in pressure accompanied by other ejecta. When the blast front comes into contact with the cloud, star formation can be induced.

In this research, the phenomenon is explored in the setting of the early universe at $z = 15-16$, or approximately 300 million years after the Big Bang. Simulation data in conjunction with visualization software was used to analyze a molecular cloud near a Population III star to investigate the factors which are distinct in each dataset (for a hypernova, supernova, and no supernova) and point to whether or not collapse and subsequent star formation is induced.
Biocompatible Polymer Scaffolds for Mammalian Cell Adhesion and Growth

Introduction: The hierarchical assembly of mesoscale structures, such as filaments, fibrils, and fibers, plays a vital role in the development of high-performing biological tissues. Furthermore, the production of these mesoscale building blocks from synthetic, polymer-based materials provides tunable mechanical properties and tailored functionalities, however, their assembly is challenging.

Flowcoating, a ‘stop-&-go’ evaporative self-assembly method, has recently demonstrated an ability to synthesize mesoscale polymer ribbons that adopt predictable three-dimensional structures when released from the substrate. Thus, new opportunities exist to employ the uniquely tunable and scalable properties of flowcoating with biocompatible polymers in order to manufacture synthetic scaffolds for the development of biological tissues.

The goal of this study was to flowcoat mesoscale biocompatible polymer ribbons that could mediate cellular adhesion and growth, and adopt unique three-dimensional conformations upon being released from the underlying substrate.

Methods: Sterilized glass substrates were flowcoated with poly(maleic anhydride-alt-1-octadecene), an inexpensive polymer capable of covalently binding proteins. These flowcoated polymer ribbons were then microcontact printed with fibronectin, an extracellular protein, and subsequently cultured with rat embryonic fibroblast cells.

Results: As anticipated, these polymer ribbons were capable of covalently binding fibronectin, and the resulting protein-polymer ribbons exhibited an ability to mediate rat embryonic fibroblast adhesion through the bound fibronectin’s RGD cell-binding domain.

Conclusion: Having observed the successful adhesion of rat embryonic fibroblasts to these protein-polymer ribbons, future research will test the adhesion of contractile cardiomyocytes to explore the viability of artificially engineering chemoresponsive tissues using flowcoated polymer scaffolds.
Fabry disease is an inherited X-linked recessive disorder caused by mutations in the galactosidase alpha (GLA) gene, leading to deficiencies in α-galactosidase A (α-GAL) enzyme production. α-GAL, a lysosomal glycosidase, catalyzes the removal of a terminal α-galactose; however, loss of α-GAL activity leads to accumulation of globotriaosylceramide (an endogenous substrate) and the eventual onset of the disease. Approved treatments for Fabry disease include enzyme replacement therapy and pharmacological chaperone therapy. In the latter treatment, 1-deoxygalactonojirimycin (DGJ), a pharmacological chaperone, is administered to Fabry disease patients, leading to increased enzymatic activity. The DGJ iminosugar acts as a competitive inhibitor of α-GAL, and upon addition at sub-inhibitory concentrations, the α-GAL activity in the cell increases. At pH 7.5, the DGJ binds and stabilizes both wild type and mutant α-GAL and can thus drive the folding of the α-GAL protein. DGJ has been clinically approved to treat a subset of the more than 800 known mutations in the GLA gene. Using molecular dynamics energy calculations in the Schrödinger software package, we developed an algorithm to predict which GLA mutations will respond to DGJ treatment. Starting with a database for disease-causing mutations in GLA, energy calculations identified parameters that correlated with successful chaperoning of α-GAL by DGJ, including statistical weighting. Overall, the results are directly applicable to Fabry disease, but can also be applied to the much larger family of protein folding diseases, including Alzheimer's, Parkinson's and Huntington's diseases.
Allosteric Relationships between Human Hsp70 and Its Mutants

The Hsp70 family, a group of heat shock proteins present in almost all living organisms, are essential molecular chaperones responsible for a wide range of protein related cellular functions. For bacterial Hsp70, termed DnaK, the allosteric mechanism, whereby substrate binding is modulated by nucleotide binding, is well understood and consists of interconversion between a docked and an undocked state resulting from interactions of the two functional domains. However, the allostery of human inducible cytoplasmic Hsp70, termed HspA1, although extremely similar in sequence to DnaK, is not as well understood and has been shown to behave differently than that of bacterial Hsp70. HspA1 has been implicated as a possible drug target in several severe neurological disorders and cancers, although not enough is known about the protein’s dynamics to enable development of an appealing drug target. In this poster, the behavior of DnaK is studied by observing the effect of single point mutations in locations throughout the protein which are thought to be allosterically critical. Through biochemical studies and structural analysis by nuclear magnetic resonance, the effect that these mutations have is observed providing greater insights into critical amino acid residues in DnaK. In this poster, various mutants of DnaK are studied displaying how tunable the allosteric landscape of this protein is, along with uncovering residues which account for differences in function between DnaK and its homologue, HspA1. This research highlights the amino acids that contribute to structural and functional differences between these seemingly similar proteins and ultimately, a greater picture into the allosteric landscape of HspA1.
It is essential for the health of cells that the proteins within them fold properly, as proteins that fail to do so suffer a loss of function. If these proteins misfold, they may become toxic to cells or clump together and form harmful aggregates. Many diseases have been attributed to abnormal protein folding, including Amyotrophic Lateral Sclerosis (ALS). ALS is a progressive neurodegenerative disease characterized by degeneration of motor neuron cells. Despite decades of research, the disease has no cure. Mutations in the gene SOD1, which encodes the enzyme superoxide dismutase 1 (SOD1) have been implicated in ALS, with aggregates of this protein observed in the brains of ALS patients. Disease-linked mutations span the entire sequence of SOD1 and encode SOD1 variants with a wide range of biophysical properties. I am probing the aggregation propensities of several ALS-linked SOD1 mutants with the goal of gaining a molecular understanding of the folding defects of various SOD1 mutant proteins, which could reveal strategies for therapeutic intervention. Aggregation propensities were measured for each mutant protein when expressed in E. coli cells and in more defined cell-free in vitro translation system. Baseline aggregation propensities were established and molecular chaperones were supplemented to the cell free system to observe the effects that individual chaperones have on the folding fates of translated protein. These studies have enabled a better understanding of SOD1 and the mechanisms behind the misfolding of ALS-linked mutants.
Colorectal cancer (CRC) remains the third most commonly diagnosed malignancy for both women and men in the United States. One of the genetic pathways highly implicated in CRC is the Epidermal Growth Factor Receptor (EGFR) and its downstream effectors. To build better therapies, it is necessary to study how this pathway interacts with other pathways involved in tumorogenesis. Here we demonstrate EGFR plays a surprising role in a CRC model driven by constitutive activation of the downstream Rapidly Accelerated Fibrosarcoma (Raf) kinase.

Our work takes advantages of the *D. melanogaster* model system to manipulate gene expression in intestinal stem cells. This method allows us to create tumors based on expression of Raf\textsuperscript{gof}. Because EGFR lies upstream of the Raf kinase, we expected the tumor to be EGFR independent. However, we found these Raf\textsuperscript{gof} tumors require EGFR for continued growth. We present data here suggesting that EGFR is required in the parallel Akt pathway.

Studying these signaling cascades in an *in vivo* model can provide insight to how they interact, perhaps in a more complex fashion than in proposed classical models. These results suggest that humans with constitutively active mutations in Raf may benefit from therapies targeting upstream EGFR.
The Effects of Palm Fruit Extract on the Expression of SREBP-1c as It Relates to Adipogenesis and the Progression of Prediabetes to Type II Diabetes in the Obese State Using a *C. elegans* and GFP Reporter Fusion Protein Model

Type II Diabetes Mellitus is a metabolic disease characterized by insulin resistance and hyperglycemia. Hypertrophic obesity has been strongly associated with a reduced capacity to store lipids in adipose tissue compared to hyperplastic obesity. It is believed that reduced lipid storage capacity effectively results in ectopic lipid accumulation, a major contributor to insulin resistance through the mechanisms of lipotoxicity and lipid induced insulin resistance. Increased lipid storage capacity through increased adipogenesis is thus an area of interest in the prevention of type II diabetes. Adipogenesis is under regulation by a host of transcriptional regulators including PPAR-γ and C/EBP-α and SREBP-1c. This study aims to determine if the phytochemical rich palm fruit extract affects the expression of SREBP-1c using a *C. elegans* and GFP reporter fusion protein model.
Type II Diabetes Mellitus is a metabolic disorder characterized by the inability to regulate blood sugar, resulting in high blood glucose. This disease has become an epidemic over recent years, and factors affecting the onset of diabetes are not fully understood. Studies indicate that phytochemicals isolated from plants may play a role in preventing the advancement of prediabetes to the diabetic state. Sirtuin-1 is a gene whose expression is linked to increased inflammation, control of energy homeostasis, and other effects on the cell cycle. It is known that there is a characteristic inflammation associated with the onset of diabetes, and that the Sirtuin-1 gene could potentially be regulated in a way that prevents this inflammatory response. One potential mechanism whereby phytochemicals prevent progression of diabetes is through regulation of Sirtuin-1 expression. In order to test this theory, strains of C. elegans containing the promoter of the Sirtuin-1 gene fused to GFP were treated with increasing concentrations of phytochemical extracts from palm fruit juice and measured for changes in fluorescence. Changes in the level of fluorescence are indicative of changes in the expression of the Sirtuin-1 gene.
Myoglobin is a protein found in muscle tissue and is released into the blood stream when muscle damage is induced. Because of this, myoglobin serves as a biomarker to assess muscle damage. The method that was chosen to detect myoglobin involves using liquid chromatography to analyze urine. Urinary analysis is non-invasive and multiple analyses can be performed on a single sample. However, myoglobin can degrade once excreted and is present in lower concentrations than in blood. Here we assess whether this method is a viable approach for quantifying urinary myoglobin in college athletes.
The enzyme polyphenol oxidase (PPO) can be found in many organisms. It catalyzes the reaction that results in the browning of fruits and vegetables, leading to changes in the nutritional value of these organisms. In this research, *Hordeum vulgare*, or barley, was chosen as the organism of study. In barley cells, PPO exists as isoenzymes in multiple forms. When cut or bruised, the cell membranes and cell walls of fruits, vegetables, barley, and a range of other organisms are damaged. Thereafter, upon exposure to the oxygen in the air, PPO isoenzymes catalyze the oxidation of catechols (phenolic compounds) to quinones. Quinone products polymerize or interact with amino acids, resulting in the production of the dark oxidation products. The varying PPO isoenzymes were extracted from barley plants and separated through ammonium sulfate precipitation, re-suspension, dialysis, centrifugation, ion exchange chromatography, and gel electrophoresis. The activity of PPO was measured through the oxidation of dihydroxyphenylalanine (DOPA), specifically focusing on the conversion of L-Dopa to Dopachrome. The PPO isoenzymes were separated by electrophoresis and visualized by activity staining with DOPA. One of the PPO isoforms was found to be a cation at pH 8.0. Results will be discussed in further detail. Researching PPO in organisms and its function in the plant and in chloroplasts could make way for possible solutions preventing produce browning.
Bacteria, like the uropathogenic (UPEC) strain of *Escherichia coli* used here, are able to sense and adapt to a changing environment; conditions may include temperature, acidity, oxidative stress, and nutrient availability. They alter their gene expression and virulence accordingly, so they may survive, proliferate, or conserve resources when needed. There are a number of mechanisms by which this regulation occurs, including the signaling molecule cyclic di-GMP. This molecule enhances biofilm formation (groups of cells stuck together via secretion of polysaccharides) while inhibiting motility, ultimately affecting virulence. We focused on temperature as the environmental “cue,” emulating the transition from an outside environment (23°C) to one inside a human host (37°C), to see if c-di-GMP levels were thermoregulated. UPEC *E. coli* was grown at 23°C, then split so half stayed at 23°C and the other half shifted to 37°C. Cells were harvested at various time points after the shift, nucleic acids extracted, and then run on a High Performance Liquid Chromatograph (HPLC) in comparison with cyclic-di-GMP standards. Our results showed a significant increase in cyclic di-GMP concentration as early as one hour, and continuing at four hours, post-shift. These results imply that in UPEC, the shift to human body temperature may serve as a “cue” for the bacteria to form a biofilm, which may aid in protection and survival in the human host.
According to the American Cancer Society, breast cancer is the most common form of cancer in women in the US and worldwide. Breast cancer is also a leading cause of death in middle-aged women [1]. Prolonged exposure to increased levels of estrogen is known to lead to a higher risk of breast cancer in women [2]. Recent concerns have emerged amongst the public about the possible negative effects of environmental chemicals that may have estrogenic effects. Benzophenones and parabens are known xenoestrogens, and are believed to exhibit some estrogenic effects [3,4,5]. Both are common environmental chemicals used in pharmaceuticals, fragrances, plastics, cosmetics, and more [3,4]. These compounds are detectable in women at higher concentrations than in men, specifically benzophenone-3 (BP3) and propylparaben (PP) [4,6]. Therefore, these xenoestrogens have the potential to contribute to breast cancer risk.

My hypothesis is that treatments with BP3 and PP will elicit proliferation and other estrogenic effects. Therefore, our objective is to compare the proliferative responses of orally administered BP3 and PP relative to 17-b-estradiol (E2) and control oil in the mammary glands of ovariectomized mice. Our preliminary data show that treatment with E2 increases serum levels of estrogen and the expression of progesterone receptor and amphiregulin in the mammary gland relative to control oil. Surprisingly, neither BP3 nor PP treatments increased these proliferative markers. We conclude that BP3 and PP do not induce the expression of these two common estrogen receptor target genes.
Monoamine oxidase (MAO) performs deamination of amines and is located at the outer membrane of the mitochondria at high-concentration in neuronal cells. There are two isoforms of MAO: MAO_A which oxidizes serotonin, noradrenaline and adrenaline, and MAO_B which oxidizes dopamine, b-phenylethylamine (PEA), and benzylamine. Changes in MAO activity occur in some central and peripheral nervous system diseases. More specifically, heightened MAO_B activity in the brain occurs in Alzheimer’s, Huntington’s, and Parkinson’s disease as well as normal aging. Abnormal MAO_A activity has found to be associated with depression, anxiety and other psychiatric disorders. Drugs have been developed and continue to be developed for both MAO_A and MAO_B as targets. MAO_A is inhibited potently by clorgyline and MAO_B is inhibited by pargyline. Using these inhibitors as controls, a fluorescent activity assay was performed with commercially available catechins (green tea extracts). p-Tyramine substrate was used for MAO_A and MAO_B. The assay was performed to investigate and confirm recent studies that suggest that green tea catechins (polyphenols) may be preventative for certain degenerative diseases and emotional illnesses. The commercial catechins tested were found to have IC50s in the low-to-mid µM range (~50-750 µM). Efforts to purify catechins are underway to repeat these studies. Molecular docking of specific catechins into the MAO_A and MAO_B active sites resulted in binding constants in the low µM range (in agreement with experimentally determined Km values for natural substrates). Crystallization studies of MAO/catechin complexes are in progress.
The study of legumes - plants capable of entering into symbiosis with nitrogen-fixing bacteria to manufacture their own nitrogen fertilizer and enrich their environment - is a step forward on the path towards more sustainable agricultural practices through a decrease in reliance on chemical fertilizers.

Legumes form root organs called nodules to house their bacteria symbiont (rhizobia). The host plant supports the nodules with photosynthates and nutrients from the phloem and with leghemoglobin, a protein which circulates in the nodule maintaining the necessary oxygen levels for nitrogen fixation. Free-living rhizobia enter the nodule through tunnel-like structures called infection threads. Once inside host cells they elongate and differentiate forming symbiotic organelles known as bacteroids and produce ammonia which is exported from the roots to support the host plant.

To study legume-Rhizobium symbiosis, a genetic approach in the model plant *Medicago truncatula* is employed. *M. truncatula* fix-minus mutants have the capacity to form nodules when inoculated with rhizobia, but failure at any point in the process of symbiosis precludes them from fixing nitrogen. Fix-minus mutants typically have small white nodules unlike the large pink nodules seen in wild-type, as once the host plant senses the nodules are nonfunctional it stops supporting them with nutrients and leghemoglobin.

Recently, we discovered certain fix-minus mutants will maintain large pink nodules outwardly similar to wild-type when grown with low levels of exogenous nitrogen, despite symbiosis having failed and the nodules being incapable of producing nitrogen.
Increasing frequency of antibiotic resistance in bacterial species is a cause for global health community concern. Traditional high throughput attempts are costly and yield relatively few promising compounds. Using a unique collection of plant cultures, we have developed a transwell plant–microbe co-culture system to provide environment that induces production of antimicrobial phytochemicals. Thus, callus cultures were tested against gram-positive *Staphylococcus aureus* and gram-negative *Escherichia coli* to identify plant cultures capable of the most effective antimicrobial activity. *Morus* (mulberry) derived cultures (*M. nigra* and *M. alba*) emerged as the effective sources of antistaphylococcal metabolites, which were produced upon co-culture elicitation. Mulberries are known to produce benzofuran compounds, moracins, some of which are effective in lysing methicillin-resistant *Staphylococcus aureus*. However, it is not known which of more than 30 moracins are produced as a response to a direct microbial stress from *S. aureus*. The hit cultures grew too slow for any scale-up work, and we, thus, attempted *de novo* callogenesis of several *Morus species* using sterilized intact seeds and high auxin/cytokinin concentrations. To report on selectivity trends in both elicitation and antimicrobial effects, the co-culture secretions were tested against both the bacterial species used in the co-culture elicitation (i.e., *S. aureus*) and a control organism (*E. coli*). The resulting broad-spectrum and gram-selective compounds were characterized structurally using mass spectroscopy and high-performance liquid chromatography. We anticipate that the compounds identified in these assays will be used to develop novel therapeutics to combat bacterial infections in the post-antibiotic era.
With growing threat of antibiotic resistance in bacterial pathogens of clinical importance, plants are re-emerging as an ancient non-microbial source of antibiotic substances. Plant-derived antimicrobials could be particularly useful for their synergistic effects, whereby the potency of a phytochemical mixture is greater than the sum of those from individual components. High-throughput assays have established mulberry plants - specifically Morus nigra and Morus alba - as potential candidates with antimicrobial activity against the gram-positive bacterium Staphylococcus aureus. These plants contain a plethora of benzofuran variants, including moracin compounds, which have already been established as agents for antimicrobial applications. In particular, certain moracin compounds have shown antimicrobial activity against methicillin-resistant Staphylococcus aureus (MRSA). Extracts derived from the leaves of the Morus rubra and Morus nigra plants are first applied in secondary bioassays to compare the potencies of the isolated and combined extracts. Fractionation of extracts of interest, through techniques, such as liquid chromatography, then separates the constitutive elements within each extract. A combination of mass spectrometry and high performance liquid chromatography can then be used to isolate and identify each of these benzofuran compounds from the leaf extracts of both plants. Separated fractions are then tested in either isolation or in combination with one or more fractions through viability-based antimicrobial screens to detect any synergistic effects against S. aureus. The synergistic property of plant antimicrobials, specifically Mulberry moracins, is expected to render these antibacterial candidates with resilience to resistance against bacterial pathogens.
Ca2+/Calmodulin dependent protein kinase (CaMKII) is a serine/threonine protein kinase that is known to play a major role in long-term potentiation (LTP), which is the cellular basis for memory. When CaMKII is knocked out in mice, they have significant difficulties learning and maintaining information. As a multimeric protein, each CaMKII molecule has twelve to fourteen kinase domains which serve to phosphorylate downstream binding partners. Without functional kinase domains, CaMKII loses its main function - to regulate the activity of substrates found in the signaling pathway that leads to LTP. Thus, understanding the affinities with which substrates bind the CaMKII kinase domain and what residues are necessary for the stability of these interactions is essential for gaining a molecular-level understanding of long-term memory formation. The main focus of this investigation was a substrate named T-lymphoma invasion and metastasis factor 1 (Tiam1). Tiam1 is a guanine nucleotide exchange factor for the Rho family of GTPases that activate Ras-related C3 botulinum toxin substrate 1 (Rac1). Rac1 has been shown to play an important role in promoting spine formation in neurons. The binding region of Tiam1 to CaMKII has been found to have similar homology to other known binding partners of CaMKII including part of the NMDA receptor and the regulatory segment of CaMKII. Using techniques like fluorescence polarization and x-ray crystallography, I have characterized important behavioral and structural properties of the CaMKII kinase domain substrate binding pockets.
Thioredoxins (Trx) are small proteins found across all three domains of life that have highly conserved, active site cysteine residues. They are integral players in redox signaling pathways where they participate in protein thiol-dithiol exchange via oxidoreductase activity. By supplying electrons to protein thiolate moieties, they help to maintain other cellular proteins in a predominantly reduced state. Interestingly, most biological systems rely on a small set of Trx isoforms, while the number of Trx isoforms in plants is extensive; at least 20 isoforms have been identified. Thioredoxin h4 (Trx h4) in Arabidopsis thaliana (Arabidopsis) is a relatively uncharacterized Trx isoform. Trx h (heterologous) type isoforms are localized to the plant cytosol where they are believed to take part in oxidative stress attenuation by preventing irreversible protein oxidation caused by chemical species such as hydrogen peroxide (H2O2), superoxide (O2·−), and possibly nitric oxide (NO). Levels of Trx h4 mRNA are relatively high compared to levels of housekeeping transcripts in reproductive organs (i.e. pistil and stamen) and in seeds after imbition. Trx h4 is thought to influence the initiation of reproduction, with one possibility being that Trx h4 modulates transcription factor signaling as it has been shown for other Trx h isoforms. Another putative role of Trx h4 is in the activation of starch degrading enzymes in germinating seeds, though these functions need to be tested. To better understand the role of Trx h4, an Arabidopsis trx h4 null mutant (T-DNA insertion line) has been identified and is being grown to be observed for phenotypic effects. Trx h4 protein will be synthesized in E. coli and isolated for subsequent activity assays to determine possible denitrosation and other redox activities.
Proteins have a wide array of essential functions within cells such as DNA replication, catalysis of metabolic reactions, and transportation of molecules. In order to complete its function, a protein must fold into a specific three-dimensional shape. The site of folding and maturation for approximately one-third of the proteome that is targeted to the secretory pathway is the endoplasmic reticulum (ER). An important chaperone pathway within the ER is the calnexin (CNX)/calreticulin (CRT) pathway\cite{1}. Most of the proteins targeted to the secretory pathway receive N-linked glycans, a structure composed of multiple carbohydrates, as they are translocated into the ER\cite{2}. CNX/CRT bind to proteins with monoglucosylated glycans and play an important role in ensuring protein folding efficiency, minimizing non-productive interactions, decreasing aggregation, retaining immature proteins in the ER, and possibly targeting terminally misfolded proteins for degradation. UDP-glucose:glycoprotein glucosyltransferase 1 (UGGT1) is known as the central gatekeeper in the CNX/CRT pathway since it determines which proteins are retained in the ER by monoglucosylating the protein’s glycans, leading to CNX/CRT binding. Prosaposin (PSAP), a glycoprotein consisting of four domains (A, B, C, D), is an obligate substrate of UGGT1 and contains five N-linked glycans. Each domain has one glycan except for A, which contains two. The domains closer to the C-terminus (saposin C and saposin D) contain hydrophobic patches proposed to be associated with UGGT1 recognition.

In our lab’s working model for prosaposin maturation it is predicted that the domains closer to the C-terminus undergo reglucosylation more than N-terminal domains. The N-terminal domains (A and B) are translocated into the ER first and therefore begin folding first, to allow for folding of N-terminal domains unencumbered by immature, unfolded C-terminal domains. Persistent reglucosylation of C-terminal domains would lead to CNX/CRT binding and therefore aid in sequestering these domains from the actively folding N-terminal domains\cite{1}. The objective of this study is to further understand the role of UGGT1 with respect to protein folding by testing the prediction that the C-terminal domains of PSAP are reglucosylated more than the N-terminal domains. Understanding which domain of PSAP is best reglucosylated may also improve understanding of how UGGT1 recognizes substrates. This will aid further studies which seek to examine UGGT1 activity with spatio-temporal resolution.
ER degradation-enhancing α1,2-mannosidase-like 1 protein (EDEM1) is implicated in quality control within the ER as an acceptor of misfolded glycoproteins and as a link to degradation machinery. EDEM1 possesses a signal peptide at the N-terminus, which targets the protein to the ER, a conserved mannosidase-like domain (MLD), and five N-linked glycosylation sites. The EDEM1 MLD contains four glycosylation sites, three putative acidic catalytic residues, and six cysteine residues. We have previously demonstrated through mutagenesis and through the use of mannosidase inhibitors that the MLD is implicated in protein quality control through ERAD. While the mechanism by which EDEM1 interacts with misfolded substrate is unknown, we have acquired preliminary data to suggest an oxidation-dependent interaction. Through site-directed mutagenesis, we mutated the cysteines (Cys) to serines (Ser) on wild-type EDEM1 and determined that EDEM1 possesses four reactive thiols and four cysteines involved in disulfide bonds. The objective of this study is to further characterize the involvement of the Cys residues present in the MLD in substrate binding. We created the MLD construct and confirmed its ER-targeting and ER localization using biochemical and cell-based approaches. Additionally, we created MLD constructs lacking: each Cys residue, putative unpaired Cys, putative disulfide pairs, and all cysteines (MLD Cys-less). The predicted disulfide map will be determined through Peg-Maleimide modification, while binding interactions with ERAD-clients will be tested using the secretory protein α1-antitrypsin (A1AT) and the A1AT misfolded variants NHK and Z.
Postpartum depression is a significant public health concern and affects up to 20% of new mothers and their babies through adverse impacts on a mother’s parenting capacities. Strong evidence implicates a role for altered monoamine neurotransmission in the pathophysiology of depression. This Honors Thesis aims to help determine the relationship between monoamine signaling in the medial preoptic area (mPOA), a region that plays a major role in orchestrating cognitive and motivational aspects of parenting, and the depressive phenotype using in vivo microdialysis, a neurochemical sampling technique. The Wistar-Kyoto (WK) rat model of postpartum depression is used as it closely models major clinical features of depressed human mothers, including cognitive, motivational, and parenting disturbances. Ongoing experiments are measuring extracellular levels of the monoamine neurotransmitters dopamine (DA) and serotonin (5-HT) in maternal mPOA during social interaction with the young. This study employs a novel approach combining detailed analysis of maternal responding toward pups with simultaneous, rapid in vivo microdialysis. It is hypothesized that WK mothers will show altered release of DA and 5-HT in the mPOA when compared to the control group during specific maternal behaviors. Thus, the results of this work will help characterize the role of extracellular monoamine levels in the depressive phenotype and associated parenting disturbances.
The ability to engineer and control how living bacterial cells sense and respond to their surroundings would be useful for a variety of applications. This cellular programming can be accomplished through the use of genetic circuits. Genetic circuits, while analogous to electrical circuits, experience biological issues, such as genetic dependent effects or off target bindings, which affect the way a signal is transduced through the circuit. Signal matching is a new algorithm that employs the idea that upstream gates produce output signals that are strong enough to act as input signals on downstream gates, ensuring proper propagation of the signal. However, this algorithm has only proven successful in about 75% of circuits tested (of a set of 60). It is not fully understood how the layering or position dependence of gates affects the full functionality of a circuit. In order to investigate the cause of inaccurate predictions made by the signal-matching algorithm, a complete combinatorial library of repression cascade circuits was constructed using four TetR homolog repressors, and signal propagation was tracked using flow cytometry. A YFP-reporter plasmid was used to signal the passage of logic through each gate within the cascade circuits. Time points were taken every 2, 4, and 6 hours, so that propagation of the signal through the circuit can be observed. It is expected that the effectiveness of signal propagation through a genetic circuit depends significantly on the layering of gates, but also the positional context of the gates.
Mitochondrial ATP Synthase Subunit D, a Component of the Peripheral Stalk, Plays a Key Role in Normal Growth and Male Gametophyte Development in Arabidopsis thaliana

As global temperatures rise and crops are threatened by a changing climate, a thorough understanding of plant development, stress response, and energetic allocation is increasingly relevant. As a major site of energy production in all cells, mitochondria play a crucial role in these processes, even in plants, where chloroplasts also produce energy. Mutations in mitochondrial enzymes can have advantageous and deleterious effects on development and stress response. We investigated the role of the d subunit of mitochondrial F1FO-ATP synthase in the modulation of pollen development and abiotic stress response. F1FO-ATP synthase is a large protein complex comprising multiple subunits, and produces ATP for use in other parts of the cell. The d subunit (gene name: ATPQ) is a structural component of the "peripheral stalk", linking the rotary and catalytic sections of ATP synthase. We isolated a T-DNA knockout and generated RNAi knockdown mutants of ATPQ in Arabidopsis thaliana, and characterized transmission of the knockout allele between generations, its effect on pollen development, and its impact on the growth phenotype of Arabidopsis. We also investigated the effect of the knockdown mutants on heat and oxidative stress responses. Without exception, the T-DNA knockout causes premature death in the male gametophyte, and the RNAi mutation impairs normal growth significantly. These results confirm the essential role played by the d subunit in plant growth and development, particularly of the male gametophyte.
Hsp70s are a family of highly conserved proteins that assist a large variety of protein folding processes and help deter the onset of neurodegenerative disease. Hsp70s consist of a nucleotide-binding domain (NBD) and a substrate-binding domain (SBD) joined together by a flexible linker. Substrate accessibility to the SBD binding pocket is determined by the nucleotide-binding state of the NBD. In vivo, Hsp70s interact with nucleotide exchange factors (NEFs), which facilitate the exchange of ADP for ATP, and consequently peptide release.

The structural details of the interactions between Hsp70s and NEF’s have been extensively studied by x-ray crystallography. However, this method lacks the ability to observe conformational changes that occur within the proteins because of their interaction. Using solution NMR spectroscopy our goal is to identify the conformational changes that the NBD experiences. To study these interactions, we use DnaK, an E. coli Hsp70 homolog and its NEF GrpE.

Surprisingly the results from our NMR experiments suggest that the interaction between the chaperone and its NEF is different from observations in a previously published crystal structure of the DnaK-GrpE complex (PDB ID: 1DKG), pointing to an alternative mode of binding. To explain these discrepancies, we created single residue mutations in the NBD to observe their effect on the ability of DnaK to bind GrpE. Interestingly one of our mutants, A288E, which is located both away from the GrpE-NBD interface and the nucleotide-binding site of the NBD appears to inhibit ATP association. We are carrying out experiments to test how this residue affects GrpE-NBD complex formation and ATP affinity for the nucleotide-binding pocket.

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Why Tuberculosis Won't Just Fade Away: The Rise of Multi-drug Resistant Tuberculosis

This thesis aims to raise awareness of the growing need for further research and funds dedicated to curbing the global tuberculosis epidemic. The Centers for Disease Control (CDC) has developed a mathematical model published in July 2017 that projects that India, Russia, South Africa, and the Philippines – four of the highest burden tuberculosis countries – will be faced with an increasing portion of multi-drug and extensively drug resistant tuberculosis, even as the overall tuberculosis infection numbers are projected to drop. This model assumes that the level of detection and treatment efficacy remains constant in these countries. This thesis will offer a critical analysis of this model, and contrast what it offers to the fields of medicine and public health with what is needed to improve the management of tuberculosis. This thesis will also investigate the perception of tuberculosis in the United States via a systematic analysis of media coverage of tuberculosis. The key to controlling tuberculosis at this point, seems to me to be raising awareness of the magnitude of the disease’s burden globally and to translate increased awareness to increased funds for research and development.
Prescription Medications in the Treatment of Parkinson’s Disease

This Research will provide an explanation of the pathophysiology of Parkinson's Disease (including epidemiology) and the pharmacokinetics of the current treatments available. Parkinson's Disease is a neurodegenerative condition that affects the dopamine producing neurons in the substantia nigra. Researchers have gathered data about cross reactions and side effects of treatments. This information is reviewed in textbooks, research studies, and current information provided by a practicing pharmacist along with other resources. This research project is part of a directed study through Greenfield Community College. This information is relevant in my path to become a Pharm-D major, and to my current work as a pharmacy technician. This research project has been a useful opportunity to expand my knowledge on a current topic. According to the Parkinson's Foundation approximately 60,000 Americans are diagnosed with PD every year. With a growing population of people with PD it is important as a healthcare worker to understand the disease and what treatments options are available.
In recent times, we find ourselves surrounded by a continuous evolutionary understanding of therapeutic procedure which seeks to protest and subvert the status quo. Breakthroughs like that of epigenetics begins to change the perspective on just how much we have yet to know about ourselves. By utilizing this new approach, strides can be made to understand the nature of diagnosing and treating pediatric illnesses. With epigenetics, more efficient and substantial improvements in methods of remedying situations such as neonatal and prenatal stress can be achieved, allowing us to better serve our future generations. With this research, we can form an understanding of how our current methods truly impact our children, from prenatal vitamins to the food or environment we are exposed to. It is crucial that we pursue the exploration of these new methods while there is still time. Not simply pushing something because of high success rating, rather curating practices to include everyone in the process. As Nikki Kiyimba states in "Developmental Trauma and the Role of Epigenetics," fifty years of animal studies have shown that maternal stress during pregnancy can have long-term effects on the offspring, including learning deficits, altered immune function, more anxious behavior, reduced attention, glucose intolerance and altered cardiovascular responses to stress. By focusing on environmental factors such as stress in pregnancy we can allow the future medicinal practices to better prevent or reverse such illnesses.
The Isolation of Antibiotic-Producing Soil Bacteria

One of the main issues facing medicine today is the growing threat of antibiotic resistance. As bacteria evolve and develop resistance to many current antibiotics, there is a growing demand for novel antibiotics, especially ones to combat the highly-resistant ESKAPE pathogens. The goal of this project was to find and analyze novel sources of antibiotics from the soil as part of the Small World Initiative. The bacteria colonies were isolated from the soil by serial dilution and the colonies with promising signs of antibiotic activity were then selected. One strand of bacteria was isolated and was found to be effective against two of the ESKAPE pathogen safe relatives which is a very promising result. The safe relatives it was effective against were *Staphlococcus epidermis* and *Escherichia coli*. Further tests concluded that this bacterium was a Gram negative coccobacillus. 16S rDNA PCR and sequencing will be carried out to identify the genus of the strand. Biochemical tests revealed that the isolate has a β-hemolysis reaction to red blood cells, no reaction to the starch plate, was able to digest the gelatin in test tubes, produced the enzyme catalase, and had no reaction to the oxidase test. The isolate was sensitive to the antibiotics kanamycin, tetracycline, and chloramphenicol. It was resistant to erythromycin, penicillin, ampicillin, and streptomycin. The antibiotic produced by this bacteria strand has promising results and could eventually be used in medicine.
Isolation of Soil Microbes That Produce Antibiotics

Antibiotic Resistance is one of the largest threats to global health, food security, and development, and it is on the rise. Since pharmaceutical companies have reduced investment in the search for new antibiotics, I am partnering with the Small World Initiative, which aims to crowdsource discovery of bacteria that yield antimicrobial activity. As part of the SWI, I performed a series of tests to obtain a bacterial isolate that is antibiotic-producing from the Town Of Longmeadow Wildlife Refuge. The 16-S rRNA gene was amplified by PCR and sent to Yale University to be sequenced. The sequence analysis indicated that the isolate is a *Pseudomonas* strain, which is known to be antibiotic producing. The isolate showed antibiotic activity against 6 of the 8 safe relatives of ESKAPE pathogens that it was tested against: *S. epidermidis*, *E. coli*, *A. baylyi*, *P. putida*, *Es. coli*, and *B. subtilis*. In a test to determine antibiotic sensitivity, the isolate appeared sensitive to antibiotics *erythromycin*, *penicillin*, *ampicillin*, and *streptomycin*, but was resistant to *kanamycin*, *tetracycline*, and *chloramphenicol*. In further tests, I determined that the isolate is Gram negative, a catalase and oxidase producer, and is β-hemolytic. Further analysis of this isolate’s antimicrobial properties will be presented, along with the antimicrobial properties of 4 other isolates that show signs of antibiotic-producing activity.
As the national rate of vaccination decreases for both animals and humans, the United States becomes a vulnerable target for a zoonotic-like disease outbreak. This research proposal examines the threat of a newly emerging strain of *Morbillivirus* which incorporates features of Measles (MeV) and Rinderpest (RPV), the cattle version of measles. This study builds upon the fact that MeV and RPV are genetically similar, allowing RNA recombination events to occur and generate a functional progeny, nicknamed Rindee. This progeny could then evolve into a cross-species disease that could be catastrophic.

This research project is time sensitive because roughly 25 states have less than 80% of their children vaccinated for the Measles-Mumps-Rubella (MMR) vaccine, no livestock in the United States is currently vaccinated for Rinderpest, and the vaccine stockpile is pending destruction. This thesis seeks to explore the question of whether the US government's program "Preventing Emerging Pathogenic Threats" (PREEMPT) in the Defense Advanced Research Projects Agency (DARPA) should undertake research into the feasibility of creating Rindee in order to advance understanding of viruses and their interaction between animals and humans. I argue that this research is necessary to accurately study the symptoms, pathogenesis, and transmission of this hybridized virus. In addition, this project will aim to identify possible target locations in the United States, identify potential agents who could synthesize and disperse the virus, and identify appropriate political and military response plans.
In 2002, a plot of soil at Harvard Forest was warmed to 5 °C above ambient temperature in the hopes of understanding how microbial processes contribute to climate change. Since then, microbial respiration and carbon cycling have been observed as well as changes in microbial diversity. Previous data has suggested serious disruptions of cycles due to changes in the soil community. In an effort to better understand these changes, we have been using metagenomics in order to gather genomic data from the soil. However, this method has left us with only a rudimentary understanding of soil biodiversity. In an effort to understand more, we have been assessing the use of cell sorted environmental genomics by comparing it to our metagenomic data sets.
The kingdom fungi is a mysterious frontier of research waiting to be explored. The potential untapped applications that may exist in this kingdom’s the vast expanse provide a valuable motive for better understanding the biological functions of these amazing life forms. As the fields of health care, biotechnology and environmental science continue to search for natural innovations and solutions to modern problems, the compelling need to understand this valuable, renewable resource becomes apparent. In this pilot study, a bioluminescent variety of basidiomycete, Panellus stipticus is cultivated in a laboratory with the goal of observing the process of mycelial growth, proliferation and maturation. Determining ideal growing conditions, preferred substrate, nutrient source and proper environment contributed to the successful life cycle of the Panellus stipticus and were achieved resulting in brilliantly bioluminescent mycelium followed ultimately by fruiting bodies. Chemical process, biological function and evolutionary development of bioluminescence is discussed along with theoretical speculation for why a fungi might have this biologically rare and energetically expensive trait. This wondrous phenomenon occurs as a by-product of a complex luciferin based chemical reaction. One strong theory for bioluminescent fungi relates to the evolution of these species at a time when the atmosphere was drastically different from today. The chemical process of bioluminescence is an oxygen dependent reaction that possibly developed as a way to utilize excess oxygen, emitting light as a byproduct.
Cilia are important eukaryotic organelles. *Chlamydomonas* is a unicellular green alga with two cilia to help it swim. *Chlamydomonas* is useful to study cilia motility and assembly since its cilia are easily manipulated and regrow quickly when lost. This research was conducted to better understand the mechanisms of how *Chlamydomonas* cells regulate cilia assembly. Cilia growth rates were analyzed for mutant strains with a delay in regrowth after being experimentally induced to excise their cilia. Growth rates of mutant and wild-type strains were monitored to make regeneration curves to see if there were differences among strains. Levels of gene activity during regeneration were also examined using a luciferase assay. For both methods, *Chlamydomonas* cells were deflagelated by a pH shock and then isolated at different times during their regeneration period. The luciferase assay used a *Gaussia* luciferase reporter and a luminometer to measure the activity of the *FLA14* dynein light chain gene promoter, that is upregulated during cilia regeneration. Cells were fixed in glutaraldehyde at different times during regeneration and imaged with phase contrast microscopy. FIJI software was used to measure cilia lengths on the resulting images to create regeneration curves for each strain. The end goal was to characterize and compare the rate at which the wild-type strains and the mutant strains of *Chlamydomonas* cells regrow their cilia. This data, combined with the gene activity data, will allow us to gain a better understanding of the mechanisms of cilia regeneration in eukaryotes.
Cilia are microscopic brush-like structures found on the surfaces of cells. *Chlamydomonas reinhardtii* is a model organism used in ciliary research. While the motility and assembly of cilia in this organism has widely been studied, currently there is a lack of information on the regulation of genes that encode ciliary proteins. Previous studies have shown that *Chlamydomonas* initiate cilia regeneration immediately after an experimentally induced amputation and return to normal length and function by 90 minutes after amputation. To better understand molecularly what occurs during this regeneration process, *C. reinhardtii* mutants were generated by random insertions of Aph VII selectable marker. About 3000 drug-resistant colonies were generated. Phenotypic screening of these strains identified 42 cilia mutants, 14 of which exhibited delays in cilia regeneration. To further define the genes responsible for the delay in ciliary regeneration, genomic DNA was extracted from each strain and amplified with the RESDA protocol using PCR primers specific to the hygromycin cassette and different degenerate primers. Bands of DNA from secondary PCR reactions were purified and sequenced. Seven of the affected genes have been identified that could be required for normal assembly and function of cilia by analyzing the sequences. This study should help provide a better understanding of how the *C. reinhardtii* cell is able to detect the presence of cilia, and how it regulates the ciliary assembly process after deflagellation.
A song system is a species-typical pattern of song use. Song bird species often have song repertoires that contain subsets of songs used in different situations and that may be specialized for different functions. By studying song systems within a species, the evolution of songs can be analyzed without the ecological differences present when comparing different species. Many species of warblers primarily use two categories of songs, first category and second category. Second category songs are usually sung at a faster rate than are first category songs and only second category songs are commonly mixed with chip-like call notes, called chek calls. Cheks are short, rapid series of notes that have yet to be adequately described in literature surrounding warbler song. I will be analyzing the function or purpose of such chek calls in wood-warbler song systems, to achieve a greater understanding of wood-warbler behavior and communication systems. To do this, I will be determining if and why there is an evolutionary relationship regarding the use of chek calls by wood-warblers as well as analyzing the bioacoustics characteristics of chek calls for both the Prairie Warbler (Setophaga discolor) and the Chestnut-sided Warbler (Setophaga pensylvanica), and describing any variation between the two species.
The demand for alternative fuel sources has led to a rise in the use of plant-based biofuels. Cellulosic biofuel is one of these fuel alternatives and is the result of the fermentation of cellulose and hemicellulose, sugars primarily found in the secondary cell wall. Understanding the regulatory network governing grass secondary cell wall biosynthesis is a vital step to maximize cellulosic biofuel yields. Herein, two transgenic plant lines of the model species, Brachypodium distachyon, are used to elucidate the role of WALL REGULATOR INTERACTING bHLH (WRIB) in the regulatory network. Previous research in yeast demonstrated that WRIB is a putative transcription factor that binds to important secondary cell wall promotors and proteins. To determine if these interactions result in a change in secondary cell wall composition in planta, a WRIB overexpressing line (WRIB OE) and a mutant, wrib-1, were used for qualitative and quantitative phenotypic comparison. No significant differences were observed for flowering time, height, or mass between the controls and the transgenic plants. However, changes in stem across sections were observed. Phloroglucinol staining of WRIB OE plants showed a lighter red hue in their interfascicular fibers indicating a decrease in lignin. wrib-1 plants stained with phloroglucinol did not show a consistent stain phenotype but showed altered stem anatomy. These results will be used to improve our understanding of WRIB and the functional role it plays in secondary cell wall synthesis.
Utilizing Permaculture as an Insight into Local Ecology

Permaculture is the utilization of natural systems in agricultural techniques. The goal of permaculture is to create agriculture systems that are in tune with natural ecosystems, establishing more sustainable forms of agriculture, and understanding local ecosystems. The garden or farm becomes its own self-sustaining ecosystem, that benefits the local ecosystem. This term, permaculture, was first coined in 1978 and is a term influenced by the philosophy of natural farming. The intensive farming practices utilized in recent human history were born out of the industrial revolution. These new technologies enabled farmers to increase their yield many times per area of land. However, it’s come at a high price. Some of the problems of industrial agriculture include: habitat destruction for farmland, decreased soil quality from intensive farming practices, pollution caused from fertilizers and pesticides, and decreased genetic diversity due to planting only certain selectively breed varieties of crops. Those who criticize natural farming claim it cannot produce enough to match the production of established agriculture practices. However, a counterpoint contends that the low-yield production in organic agriculture is due to growing plants that aren’t well adapted to the local ecosystem, and the restrictions conventional agriculture places on available seeds. My research will detail my efforts and results in utilizing permaculture techniques in my garden and what I have learned about the local ecosystem, as well as address the philosophical and ethical debate surrounding the continued use of industrial farming practices over sustainable ones.
Importance of Amphibians: A Synthesis of Their Environmental Functions, Benefits to Humans, and Need for Conservation

In this study we conducted a comprehensive literature review to investigate the importance of amphibians in every dimension from medical applications such as tissue regeneration, pharmaceutically-useful compounds, direct socio-economic benefits, to overall ecosystem values. Amphibians have astounding tissue regenerative abilities, including the ability to regrow entire limbs as adults, and heal cardiac, brain, spinal, and retina tissue. Study of these processes will allow the medical industry to restore sight and mobility, and to remedy neurological defects, along with countless other medical discoveries, including amphibian polypeptides that release insulin, raise and lower blood pressure, and regulate the digestive system showing the full scope of their pharmaceutical value is just beginning to be explored. Migration from aquatic to terrestrial environments cycles essential nutrients such as P, C, and N between environments improving the overall health and resilience of the ecosystem. In many northern forests and vernal pools, amphibians account for greater biomass than birds, mammals, and reptiles combined. Amphibians are a central part of many food webs being both predators and prey. Amphibians are poikilothermic turning a greater portion of calories into biomass compared to homeotherms, providing many predators with a stable food and nutrient source. Constant feeding patterns of amphibians make them excellent regulators of biomass in lower trophic levels, contributing to ecosystem stability, as well as making them good biological control agents against pests such as mosquitos, biting flies, and crop-damaging arthropods. Thin skin and superficial vasculature make amphibians sensitive to environmental pollutants making them excellent indicator species as well.
Concerns have escalated regarding the welfare of captive animals, especially carnivores. Time budget studies are extremely valuable to assess an animal's welfare because abnormal repetitive behaviors (ARBs) can be identified. We performed a summer long study of a 13-year-old male red fox (Vulpes vulpes) that was once a house pet but has spent the past 11 years residing at Mass Audubon’s Drumlin Farm Wildlife Sanctuary. The fox was retired at the end of the study. Every night, the fox was put in a two-room indoor enclosure and his night behavior was observed by means of a camera system for 31 days, 16 hours per night, over 3 months, with a total of 496 hours observed from April-August 2017. Behavior was compared with feeding enrichment, temperature, and moon phase. The fox exhibited scratching at the door as the only stereotypic behavior observed and it accounted for 2.70% of the time budget. Sleep decreased significantly when enrichment was present. However, the relative frequency of each behavioral category in the time budget, as a whole, did not change significantly with the presence of enrichment. Activity levels were not affected significantly by temperature or moon phase. The red fox was found to be lunar neutral.
White-tailed deer, Odocoileus virginianus are a member of the cervid family and are endemic to North and South America. According to local sources, the population of deer in Nantucket Massachusetts was founded by a lone male on the island and two females shipped in from Michigan. This study explored the validity of this claim by comparing mitochondrial DNA of white-tailed deer from various locations in the Eastern United States. Two of the haplotypes found in Nantucket deer are identical to those found in Michigan, providing evidence for this historical account. However, a third haplotype on the island is more similar to deer from Connecticut, Rhode island, and Maine. This suggests that at least one other female of local origin founded this population. Further research into the haplotypes of deer from these states is warranted in order to gain a better understanding of the population dynamics of this species.
Canine pyoderma is a pyogenic skin infection caused by the colonization of *Staphylococcus Pseudintermedius* within open wounds or lesions in the skin. The symptoms of canine pyoderma differ among individuals but are characterized by both the depth of infection, deep or superficial, as well as the underlying cause, primary or secondary. Majority of canine pyoderma cases are recurrent in nature requiring long-term antibiotic use. However, prolonged use of antibiotics for treatment of canine pyoderma has led to increasing concentration of antibiotic-resistant strains and ineffectiveness of commonly prescribed antibiotics in both veterinarian medicine and human medicine. Therefore, it is imperative for scientists to focus on vaccine development as a means for prevention rather than treatment. In this literature review, possible vaccine candidates are investigated to formulate an effective vaccine. Many of these antigenic candidates pertain to both the physical or chemical components of various staphylococcus species. Also, in this literature view, efficacies of vaccines composed of various antigenic candidates are discussed to determine whether they induce a long-lasting immune response. Furthermore, because many cases of canine pyoderma cases are a result of various underlying immune issues, prompting the need to analyze the role of the immune system using extensive scientific research. By understanding the relevance of prevention via vaccination, antibiotic use can become infrequent.
Many cancer cells have an altered glucose metabolism where they generate their energy through anaerobic conditions, which is dependent on the amount of available glucose. AMP kinase plays a role in glucose uptake in cells through the activation of the GLUT-4 glucose transporter. AMPK is activated when the cell senses high levels of AMP, which indicate low stores of ATP. AMPK has also been previously shown to mediate autophagy. Autophagy is the degradation of cellular components by the lysosome during various conditions, such as cellular starvation. Resveratrol, a phytoalexin found in fruits activate enzymes that respond to conditions of starvation such as Sirtuin 1 and AMPK. However, in most previously conducted studies, resveratrol has been used in high concentrations that cannot be attained \textit{in vivo}. In this study, we instead use long-term exposure of low, physiologically relevant, concentrations of resveratrol. Activation of the AMPK pathway with physiologically relevant conditions of resveratrol has the potential induce autophagy of cancer cells when available glucose is limited.
This study brings attention to the prevalence of tetracycline resistant bacteria in soil from a local, urban environment. Soil hosts a vast diverse group of bacteria, including pathogens. Tetracycline is often used in both humans and animals to treat bacterial infections. Soil sample collections from local, urban sites were plated at low and high tetracycline concentrations. Tetracycline resistant bacteria showed viable colony growth on both concentrations of tetracycline. Total colony forming units per gram of soil were calculated for each sample and compared to soil bacteria grown without tetracycline. Tetracycline resistant bacteria were detected within a percentage range of less than 14.08%. Isolated resistant bacteria were identified as gram-negative with bacillus morphology. Physiologic examination with differential and selective media plates showed metabolic differences, which indicate different species. Biochemical analysis of resistant bacteria showed different oxygen metabolism, also indicating different species. Sequence analysis of 16S rRNA gene indicated different species. This study identifies the presence of a diverse population of tetracycline resistant bacteria that exist in our local communities.
The primary objective of the project is to create a shortlist of the most abundant planktonic species in the Bristol Community College Fall River Campus pond. Time and resources allowing, a more in-depth guide to these species will be produced. This guide will be available to future students in classes (e.g., biology, field biology, and ecology) who can utilize the list to inform their own attempts to identify organisms in a typical two-hour lab period. Additionally, the project will provide a foundation for other students who may wish to take this work further to examine quantitative data. Methods and resources used in research will include field and laboratory equipment such as a plankton net to collect samples from the pond and compound and dissecting microscopes for identifying the organisms at various magnifications. Additionally, print and online academic references, including peer reviewed journal articles, to aid in identification of organisms and information regarding biology and life history will be used. The end product will be a species (group) list for the pond, along with a laboratory/field notebook cataloging observations and scientific process. A customized taxonomic key for the BCC pond may also be included.
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HNPP: An Overview of Current Testing Methodologies Focusing on Using PMP22 as an Identifier  

This study strives to answer the question "Is using detection of the mutant PMP22 gene a reliable way to identify the potential for Hereditary Neuropathy with Liability to Pressure Palsies (HNPP)?" This study is split into two parts. First, a meta study that reviews current literature on testing methodologies available for the HNPP will be performed. Second, we will attempt to amplify the PMP22 gene from human cheek cell DNA and examine its association with characteristics attributed to HNPP. Gaining further insight into inexpensive predictive assays for HNPP and related genetic disorders is necessary because the current testing methods are usually expensive and/or are not covered by insurance. This study aims to identify the most cutting edge tools and technologies being used to identify HNPP patients and to potentially find a cheaper way to identify the potential for HNPP, with the hope that insurance companies would request additional, more comprehensive testing if positive.
Protein hormones usually act via cell surface receptors linked to intracellular transduction pathways. Earlier studies suggested proteolytic fragments of protein hormones may have additional functions. Protein hormones seem too complex and energetically expensive to synthesize and regulate to be economical as single-message molecules. But, if telescoped secondary functions are released during proteolytic processing at the synthetic cell, in circulation, or at the target cells, organisms might gain efficiencies by using proteins instead of smaller molecules. We use programs (e.g., PROSPER) to find residual peptides left after 24 known proteases act on each of a list of ~1000 known soluble human protein hormones. Residual peptides are compared to other proteins in the human database to see if the hormone fragments match surface motifs of other proteins. Matches could allow the peptides to modulate protein-protein interactions as non-canonical hormone signals. So far, ~40% of the protein translation products examined have proteolytically resistant peptides of > 10 - 15 residues, many are lysine or glutamic acid rich. NCBI BLASTp sequence alignments with other proteins showed ~60% of the fragment matches are non-parent/family proteins. When matched peptide containing proteins were seeded as central nodes in the network neighborhood program STRING, ~30% of the network neighbors have a PDB structure that will allow mapping of the matched peptide relative to the protein-protein interaction surfaces; the PDB for a co-crystal of BMP7 and Noggin shows that a surface sequence in BMP7 directly involved in Noggin contact is a match for a proteolytic peptide from TGFβ1.
Previous work showed suppressed immunoreactivity among northwest Kenyan pastoralist children and suggested low levels of all four immunoglobulin (IgGx) subtypes in adult male blood samples collected on Schleicher and Schuell #903 paper. The findings imply genetic or environmental immune suppression, possibly from early supplementation of lactation with non-sterile solid foods. Tests of IgG recovery from paper using a fluorescein-labeled mixture of human IgGs gave 99.6 +/- 7.0% for IgG1, 102.6 +/- 9.4% for IgG3, and 101.4 +/- 15.3% for IgG4. Recovery of IgG2 was concentration dependent in the physiological range, 63.4 +/- 8.7% at 0.1 mg/mL rising to 105.9 +/- 1.7% at 10 mg/mL. This project rechecked IgG2 recovery via an IgG2 specific immunoassay (mouse monoclonal capture antibody (Clone HP-6001), 1:16000; fluorescein-labeled goat anti-human IgG (ThermoFisher 62-8411) reporter antibody, 1:167). Serial dilutions of unlabeled pure IgG2 (0.01-10 mg/mL, Sigma I-5404) and human mixed IgG (0.017-70 mg/mL, Sigma I-4506, ~15% IgG2) were dried as 62.5 uL aliquots on 12.5 x 12.5 mm pieces of #903 paper. Dried papers were extracted with 5 mg/mL of cellulase, washed and the extracts brought to 625 uL with water. Identical aliquots of the starting IgG solutions were similarly diluted in extract from papers with no dried IgG as unextracted controls. Immunoassays of extracted and unextracted IgGs gave parallel results indicating IgG2 recovery of 97 +/- 0.94% in agreement with other IgG subtypes. The findings support loss of fluorescein from directly labeled IgG2 during cellulase extraction and affirm immunosuppression in the Kenyan pastoralists.
Radiotherapy or chemotherapy suppresses spermatogenesis temporarily or permanently. Sperm are normally observed during urinalysis of men during and after puberty. Urine and urine sediments are easily obtained noninvasively. Examining the recovery of sperm in patient sediments from before and after treatment could track patient fertility. Current methods for evaluating spermatogenesis are expensive, invasive and inappropriate for the longitudinal serial sampling needed to follow restoration of sperm production. This project explores sperm counting by hemacytometer, separation by fluorescence activated cell sorter (FACS), and quantitation by microplate fluorimetry using washed, aldehyde fixed, volunteer sperm samples before and after selective enrichment by “panning” on immobilized peanut agglutinin (PNA). Samples also include washed, fixed volunteer female epithelial cells evaluated in parallel with pure sperm or in admixtures. Microscopy and early FACS runs of urine sediment samples indicate optimal counting requires separation of sperm cells from epithelial cells and debris. PNA binds preferentially to carbohydrate sidechains containing galactosyl-β(1-3)-N-acetylgalactosamine on cell surface proteins of spermatozoa. Immobilized PNA can separate sperm cells from epithelial cells and debris; ~50%-80% of sperm samples with 7,250-116,000 sperm cells in 1 mL of PBS buffer can be recovered after panning in microtiter wells by incubating with 500 mM galactose. Released cells can be labeled with fluorescent PNA and the sperm cell density determined using fluorimetry. Using longitudinal samples the sperm counts can be compared to population or pretreatment norms to evaluate rate of loss or recovery of spermatogenesis in male patients.
Amphibian populations have been impacted by two pathogenic fungi, *Batrachochytrium dendrobatidis* (*Bd*) and *B. salamandrivorans* (*Bsal*). *Bd* has been attributed to hundreds of amphibian extinctions globally. Growing research on disease mitigation strategies involves applying naturally occurring skin bacteria as a probiotic therapy to fight infections. Past research has shown that probiotics applied to amphibian skin can remedy the disease chytridiomycosis, caused by both *Bd* and *Bsal*. Our aim is to test potential bacteria for use in probiotic field trials in advance preparation for a *Bsal* invasion and disease emergence in the USA. Our research included an 11-week study using 21 Eastern newts, *Notophthalmus viridescens*, a highly susceptible species to *Bsal*. From skin swabs we were able to determine infection prevalence and infection intensity of each newt over time to explore infection dynamics. We first used heat treatment to cure newts of natural *Bd* infections and showed by qPCR that this treatment was effective. We compared survival curves to test for differences among newts exposed to *Bsal* in a biosecure facility (n=8), controls (n=5) or newt exposed to *Bsal* and treated with probiotic *Rhodococcus fascians* (n=8). We tested for mucosal defenses of surviving newts to determine if they have protection against infection; immunity has not been observed in infected animals so this information is valuable for helping to understand potential responses to *Bsal* infections in the wild. Eleven weeks post-exposure to infectious *Bsal* zoospores chytridiomycosis was not significantly reduced by the probiotic treatment indicating that alternative therapies are needed.
Carbon dioxide is one of the main components that any kind of plant needs in order to fully grow and function properly. In this research, we wanted to determine how elevated CO$_2$ impacts leaf growth and function in a variety of *Manihot esculenta* (Cassava) cultivars relative to cultivars grown in ambient CO$_2$. Difference in leaf thickness, cell number and size, vein spacing, as well as the number and size of laticifers (specialized latex producing organelle) will be compared. This study will help us determine how elevated CO$_2$ will affect Cassava plants.
Plants are able to survive on their own through photosynthesis, the process where plants utilize sunlight energy to convert carbon dioxide and water to produce sugar and oxygen. Photosynthesis takes place in the chloroplasts located on the leaves of plants. Light absorption and utilization by the chloroplast are part of a signalling cascade regulating plant developmental responses. Knowing how the chloroplast influence plants growth and development, we can propose further experiments and apply those to real life agriculture. In this experiment, we predict that differences in chloroplast sizes could influence plant growth and development due to changes in how much light is absorbed by the leaves. To support our hypothesis, *Arabidopsis thaliana* plants with artificially enlarged chloroplasts were grown in the greenhouse under the same environmental conditions. Growth rate and development between the mutant lines and the wild-type plants will be measured as well as chloroplast size, leaf thickness, cell number and vein spacing.
Macroalgal wrack is a key resource subsidy to sandy beach ecosystems along the Pacific coast of North America, providing habitat and food for a remarkably diverse assemblage of intertidal consumers. Four talitrid amphipod species (*Megalorchestia*) and an herbivorous beetle (*Phaleria*) co-exist on many beaches. To allow coexistence, these species may utilize common resources differentially. We investigated the degree to which differential wrack resource use provides niche separation by measuring individual consumption rates of each invertebrate species on two abundant brown macroalgae, *Macrocystis* and *Egregia*, a green alga, *Ulva*, a red alga, *Porphyra*, and on surfgrass, *Phyllospadix*. Invertebrate consumption rates differed significantly among wrack species. Three of the *Megalorchestia* species exhibited significantly different consumption of the two brown macroalgae, preferring the less abundant *Egregia*. One of the larger talitrid species and the beetle exhibited no significant differences in consumption of macroalgae, indicating potential for generalist feeding in these consumers. In choice experiments, the two smaller talitrid species exhibited no preferences when offered combinations of algae while the two larger species demonstrated significant preferences. This suggests differential consumption of wrack types may represent an important mechanism for niche separation in this diverse guild of intertidal detritivores.
A central goal of modern neuroscience research is to obtain an understanding of how the molecular and anatomical architecture of the brain leads to brain function. I am currently working on a project to develop a 3-Dimensional gene expression atlas for the adult zebrafish brain, which is currently ongoing in the Karlstrom and Bergan labs. Our goal is to use lightsheet microscopy and tissue clearing techniques to image the intact brains of transgenic zebrafish. By aligning the resultant images to a reference brain image, we aim to create a publicly accessible “expression” atlas of the adult zebrafish brain that can be used by other researchers to quickly examine relative gene expression in relation to defined anatomical structures, as has been done for larval zebrafish. We will create brain atlases at four ages throughout the life of the fish to create the first life-stage brain atlas for any vertebrate, choosing ages from 6 months (young adult) to 3 years (old age), and beyond. This atlas would be very helpful to researchers who use the zebrafish as a model organism to study adult brain function, as well as neurological disease. By creating an online atlas modeled after the Virtual Fly Brain, we hope to create community resource and expand the use of zebrafish as a model to understand changes associated with the aging vertebrate brain and processes underlying neural degeneration.
The American population has an annual growth rate of approximately 0.7%, and with this growth comes increasing need for food. American agricultural practices have become much more specialized, mechanized and drastically larger in size. These qualities have coined the nickname of factory farms as they operate similar to that of a mass production factory. However, this growth has led to various ethical and economic complications. In 2015 American agriculture and agriculture related businesses were determined to contribute approximately $992 billion to the U.S. gross domestic product (GDP). With most of our livestock concentrated into very small portions of our country, it would be very simple to wipe out a large majority of them. Therefore causing tremendous losses to our economy. This thesis analyses past research on U.S. agriculture, U.S. population, animal ethics, and reviews a case study of the UK Outbreak of Foot and Mouth Disease in 2001. By reviewing this analysis this paper will attempt to approach the controversial issue of “factory farming” from the standpoint of economics and biosecurity. Potential solutions to these problems were found to be the de-monopolization of factory farms, the increase of small local farms, as well as potentially alternative meat production methods. By eliminating factory farms and reverting to traditional farming practices, animals will be allotted more space and more attentive veterinary care which decreases the likelihood of major disease outbreaks such as foot and mouth from wiping out our livestock and disrupting our national economy.
Sexual selection can arise through the preference of certain characteristics by one sex in individuals of the opposite sex. Secondary sexual characteristics appear as an animal reaches sexual maturity, and they play a role in mate choice and male-male competition. Ornamentations are one example of a secondary sexual character that provides an advertisement of male reproductive quality as they are typically costly to produce and maintain. Sunfish (family Centrarchidae), greatly enlarge the bony tissue surrounding their gills. These bones, known as the operculum, typically function to protect the gills, however, in sunfish they may become enlarged and adorned with bright color patterns. I assessed the sunfish opercle ornament in two ways. I first used geometric morphometrics and phylogenetic methods to characterize head and opercle shape evolution. Then, I selected a suite of candidate genes typically implicated in ornament development (i.e., insulin growth factor, androgen, estrogen) and used quantitative PCR to compare their expression levels. My morphological assessment found exaggerated opercles develop only in one genus of sunfish, Lepomis, and this group exhibits a range of opercle sizes and colors alongside elevated rates of morphological evolution. My assessment of candidate genes is still ongoing to determine if higher levels of expression appear in opercle tissues derived from species with exaggerated shape or colour.
Primary cilia are sensory, nonmotile organelles that are ubiquitous across cell types. They serve as a hub for developmental signaling proteins and help to convert intercellular chemical and mechanical stimuli into intracellular biochemical signals. The targeted disruption of primary cilia has revealed a host of basic functions associated with this organelle. The ciliary rootlet anchors the organelle to the cell and is composed of ropes of a polymerized protein called ciliary rootlet coiled-coil protein 2 (Crocc2). Missense mutations in the zebrafish *crocc2* gene result in interesting but poorly characterized phenotypes, including altered craniofacial shape and reduced bone integrity. We hypothesize that the absence of Crocc2 results in reduced integrity and degenerative function of the primary cilia. To test this, we performed an immunohistochemical analysis on wildtype and mutant sibling fish using common ciliary markers to quantify differences in the presence and distribution of cilia over time. Preliminary results suggest that such a difference exist, which is consistent with our hypothesis that Crocc2 is necessary for the maintenance of cilia structure integrity. However, more testing is needed to determine the exact nature of the defect.
One major feature of the vertebrate body plan is the skeletal apparatus and its development is regulated in part by the Hedgehog (Hh) family of signaling proteins. Skeletal defects are known to arise in Hh deficient vertebrates, however, Hh genes are required throughout ontogeny, therefore elucidating its bone regulatory function in this context remains a challenge. Using transgenic zebrafish whereby the Hh pathway may be up- or downregulated via heat shock, we were able to regulate global expression of the Hh pathway in a time specific manner. Transgenic fish were outcrossed with a wild-type strain to produce transgenic and non-transgenic offspring which could be distinguished by the presence or lack of green fluorescence protein expression. Zebrafish were heatshocked starting after the completion of the hatching stage for one week then cleared and stained using Alizarin Red and Alcian Blue followed by imaging with light and fluorescent microscopy. Differences in bone development were observed by measuring length, area, and number of several prominent bone structures including the cleithrum, opercle, branchiostegal rays and vertebral central. Downregulating the Hh pathway reduced the lengths and sizes of early forming bones, and delayed the formation of later forming ones. While measurement data for Hh upregulatory transgenic fish are less clear, the appearance of fusion events between branchiostegal rays in multiple fish suggest an undiscovered pathological role for this pathway.
In an increasingly urban world, birds are being faced with new reproductive challenges. This study focused on examining how anthropogenic nesting materials and ectoparasite levels are affecting the health levels of House Wren (Troglodytes aedon) nestlings on an urban to rural gradient. Anthropogenic nesting materials were observed to decrease with increasing levels of urbanization, likely due to differences at the microhabitat level between urban and rural sites. Urbanization had no significant effect on nest ectoparasite levels. Nestlings tended to have slightly higher growth levels in nests with higher amounts of anthropogenic nesting materials. Ectoparasite load was observed to be positively correlated with nestling growth levels, suggesting that nestling health could be determining ectoparasite load, as nests with larger nestlings provide increased food availability for ectoparasites. Further study is necessary to determine the net effects of anthropogenic materials and ectoparasite loads on the health levels of nestlings in highly urbanized areas. This information holds important conservation value for various avian species, as it would determine how increasing interactions between humans and wildlife are affecting the reproductive success of native bird species.
Macrophages are an important part of the innate immune system. Macrophages can be divided into different subtypes with a broad spectrum of functions, such as clearance of infection, chronic inflammation and wound healing. Many laboratories use the THP-1 monocytes cell line to study these macrophage types, but within the scientific literature there is no “standardization” across laboratories of growth conditions or maturation protocols. Thus, potentially accounting for experimental differences in macrophage polarization studies across this and other cell lines. Here, two widely used methods of cell culturing and macrophage maturation were coupled with polarization treatments in order to assess their affects on morphology, protein expression and phagocytic capabilities. The overall goal is to provide a best-practice guidance for culturing this cell line for not only experimental reproducibility, but also mimicry of sub-type associated characteristics observed in primary macrophage culture.
Antibiotics are common treatments for bacterial infections caused by both Gram positive and negative species such as *Staphylococcus aureus*, *Streptococcus pyrogenes*, and *Escherichia coli*. These species of bacteria can cause medical conditions including "strep" throat, "staph" infections, and urinary tract infections (UTI). With the increased use of antibiotics for treatment of infectious disease, as well as antibiotics in animal feed, many microbes are becoming increasingly antibiotic resistant. There is a growing need to identify novel compounds with antimicrobial properties that are not subject to this resistance. For example, natural compounds found in food and plants have been shown to have antimicrobial properties. One of the key components of homeopathic remedies is garlic. The exact mechanisms of all the chemical compounds within garlic have not been identified, however, the antimicrobial effect it has is mainly associated with allicillin. Allicin is a part of the garlic plants defense mechanism against attacks by pests. Extracts of garlic have been shown to decrease oxygen uptake, reduce the growth of organisms, inhibit the synthesis of proteins, lipids, and nucleic acids, as well as damage membranes. This study tested the effects of a panel of home remedies compared to standard antibiotics on bacterial growth using both a disk diffusion model and standard dilution and plating techniques.
Currently there are many antibiotics available to treat bacterial infections; however, antibiotics are often overused ultimately resulting in the development of antibiotic resistant bacteria. Antibiotic resistance has become a global healthcare problem causing severe health complications and increased healthcare costs. In order to overcome this problem, alternative measures should be identified to fight certain infections. Flavonoids, like quercetin, have been shown to have antibacterial activity in vitro by inhibiting bacterial growth for strains like methicillin resistant \textit{Staphylococcus aureus (MRSA)}. This study examines the effect of quercetin, in combination with a panel of commonly used antibiotics on their activity against \textit{Staphylococcus aureus, Streptococcus pyogenes, Pseudomonas aeruginosa, and Escherichia coli}. Antibiotic sensitivity was determined by measuring the zone of inhibition using a standard Kirby-Bauer disk diffusion method.
Hyperglycemia, or excess glucose in the blood, is often associated with Type 2 Diabetes. Hyperglycemic conditions can cause cardiovascular problems, kidney damage, and other long term negative effects. When exposed to high glucose conditions, cells are subjected to oxidative stress and their ability to survive or grow may dramatically decrease. After growth in hyperglycemic conditions, cells are altered by the process of glycation and glycoxidation which performs a pathogenic role in the complications of oxidative-based diseases like diabetes. Cells of the gut are exposed to a variety of both pathogenic and non-pathogenic microbes. It is not well understood how hyperglycemia can effect the interactions between host cells and these microbes. This study will quantify bacterial invasion of CaCo-2 colorectal epithelial cells after exposure to hyperglycemic conditions. CaCo-2 cells will be exposed to high glucose conditions for various time points and then infected with a panel of enteric bacteria. Bacterial uptake of CaCo-2 cells will be quantified by standard gentamicin protection assay. Though not well understood, studying the effects of long term hyperglycemic conditions in vitro and how it effects bacterial uptake into the CaCo-2 cells will give insight on the diseases that more than 30 million people face today.
The Effect of Vitamin C on TNF Release and Cell Viability in THP-1 Differentiated Macrophages

Macrophages are immune cells that reside in our tissues and express receptors that detect pathogens and foreign particles as well as drive immune responses through secretion of pro-inflammatory cytokines. Macrophages are one of the cell types necessary for an immune response to bacterial infection. Compounds that increase their effector function would result in a more robust response. Previous studies have shown that vitamin C enhances the effector function of macrophages by producing genome wide changes in the cell as early as 48 hours upon treatment. The aim of this study is to determine the effect of vitamin C treatment on macrophage function. As previous reports show that vit C functions as both an antioxidant and immune booster, vitamin C has been promoted to help prevent and treat numerous health conditions, not only the common cold but also certain cardiovascular diseases and cancers. The goal of this study is to determine if there is a difference in cytokine secretion in THP-1 macrophages exposed to vitamin C. Previous reports suggest that macrophages exposed to vitamin C in vitro have enhanced cytokine secretion, such as TNFα, in response to LPS. This study will also examine the cell viability in different treatment groups in order to determine if there is an optimal nontoxic level of vitamin C to heighten immune function.
The Effects of Zinc on Cell Viability and Cytokine Release of Astrocytes

Astrocytes are the most abundant and diverse neuralgia cells in the central nervous system (CNS). Astrocytes create the brain environment, build up the micro-architecture of the brain parenchyma, maintain brain homeostasis and store and distribute energy substrates, control the development of neural cells, synaptogenesis, synaptic maintenance and as well as provide for brain defense. Zinc, an essential trace element, plays an important role in neurotransmission. Several studies have addressed the effect of extracellular zinc on astrocyte function. In previous in vitro studies, macrophages and astrocytes exposed to zinc at doses greater than 100 micromolar (µM) was found to be toxic and resulted in significant cell death. The authors also assessed intracellular signaling pathways and nitric oxide release, and showed that zinc enhanced the response to LPS, a molecule associated with infection. This study explored the effect of zinc on astrocyte viability and assessed proinflammatory cytokine release following LPS exposure.
Antibiotics are essential to treating many types of bacterial infections, with the goal of targeting specific pathogenic bacteria in hopes of eliminating them from the body. However, antibiotics do not differentiate between the body’s own microbiota and the pathogenic bacteria that it is trying to eliminate. Microbiota cohabitates within the body, providing a mutualistic relationship. Healthy microbiota provides protection as well as assists in digestive functioning and immune health, among other roles. This study hopes to highlight the adverse effect of antibiotics on the body’s natural microbiota by determining how much antibiotics can affect microbiota. Streptococcus pyogenes, the causative agent of “strep” throat, and samples of natural oral microbiota will be cultured together and exposed to a panel of antibiotics over a period of time. Samples of culture fluid will be sampled and assessed for numbers of both viable Streptococcus and isolates of microbiota. This study will address whether the presence of microbiota is negatively impacted by antibiotics, as well as whether microbiota populations can affect the efficacy of antibiotics against S. pyogenes.

Susan Al Mahrwuth, Alexander Miner, Melanie Russo, Tawana Jewell, and Kimberly Pouliot
Effects of Treatment Administration Relative to Time of Infection in the Common Eastern Bumblebee

With pollinators declining worldwide due to the potential combined effects of pathogens, habitat destruction, parasites, and pesticides, understanding the reasons behind their decline is essential to conserving their populations. It is imperative that measures are taken to maintain their numbers, especially for those pollinators that crops rely on for their services. I examined the effects of pollen consumption relative to time of infection in the bumblebee *B. impatiens* infected with the gut parasite *Crithidia bombi*. Prior studies have shown that sunflower pollen dramatically decreased parasite loads in *B. impatiens*, though its lower protein content suggests that the beneficial effects would come with an added cost to bee health. I asked how the timing of administering sunflower pollen affected pathogen loads with four diet treatments. Bumblebees were either given seven days of sunflower pollen after infection, seven days of wildflower pollen mix, or a combination of the two for 3.5 days each, with either sunflower or wildflower pollen given first. There were no significant differences in infection by treatment, although the ‘sunflower first’ treatment had lower median and mean infection than the ‘wildflower first’ treatment. Although not statistically significant, bumblebees that were inoculated on one specific date had higher counts of *C. bombi* than other dates. Furthermore, bees in the treatments ‘wildflower’ and ‘wildflower first’ died significantly faster than the bees in the ‘sunflower’ treatment. More studies should be done to determine the best way to maximize the beneficial effects of sunflower pollen, while also maintaining a healthy diet for bees.
Since the modern creation of green roofs in Germany in the 1960s, the vegetated roof movement has been gaining traction and begun establishing in North America. Expansion and application of green roofs have branched into new climates, buildings and products. As the industry grows quickly, little research is available about the performance of vegetated rooftops in the cold, variable New England climate. This research study assessed the performance of 14 plant varieties planted on a green roof in Amherst, Massachusetts, and investigated the effect on performance of adding different levels of mineral nutrients.

Cover of each species was measured in each of 10 pairs of 50 x 50 cm plots in each of four planting types in April 2017. A slow-release fertilizer containing 5, 10, 15, 20, or 25 g N/m² was applied to one plot in each pair. Five months later, cover was remeasured and fertilizer reapplied.

Varieties of *Sedum hybridium* had the highest cover, followed by varieties of *S. spurium*. Species with low cover included *S. reflexum, S. album, S. sieboldii, S. sexangulare, S. ochrolecrum, S. rupestre, S. stefco*, the grass *Festuca elijah* blue, and the sedge *Carex pennsylvanica*. Nutrient addition did not affect the cover of planted species, but did increase the cover of species regarded as weeds.
Evaluating the Activity Rates of Loggerhead Sea Turtles (*Caretta caretta*) when Encountering Turtle Exclusion Devices in Trawl Nets

Shrimp fisheries are the primary cause of sea turtle mortality. Turtle Excluder Devices (TEDs) are implemented into inshore and offshore shrimp trawls to decrease the mortality rate of sea turtles. TED testing is conducted to ensure the efficiency of TED designs and the accuracy of current regulations on shrimp trawls. Such regulations only include tow time limits for skimmer trawls, which are often exceeded in the absence of an observer. This negligence of tow time limits is detrimental to sea turtle populations and hastens the need for proper TED testing and implementation. This research compared the activity rates of captive-reared, one-year-old loggerhead (*Caretta caretta*) sea turtles over 4 years of TED testing off the coast of Panama City, Florida. Two separately-reared groups of turtles were also compared: open water conditioned and unconditioned. The results showed there was a difference in activity among the 4 years of TED testing due to differences in straight carapace length and body depth. There was no significant difference in activity between conditioned and unconditioned groups, although it is suspected that this is due to a relatively small sample size. Future TED testing with uniform sized turtles and larger sample sizes needs to be conducted to ensure the accuracy of TED Certifications and correct implementation of TEDs in shrimp trawls.
Greenfield Community College (GCC) is a member of the Salamander Population and Adaptation Research Collaboration Network (SPARCnet). SPARCnet’s mission is to advance our understanding of environmental change on salamander ecology. To study the Eastern red-backed salamander, a noninvasive method of mark and recapture is utilized. Captured salamanders are marked with inert elastomer that is injected subdermally and glows under ultraviolet light. Each salamander is given a unique color combination and specific data is collected at each capture. Sex, number of eggs, if female, the presence/absence of cirri, if male, length, unique ID and recapture status are recorded during both spring and fall sampling sessions. Environmental measures of soil temperature at every 10 cm from surface to 50 cm, soil moisture, and air temperature are also recorded. To optimize data collection outcomes, we are asking: what are the ideal conditions for salamander capture success at GCC? The campus hosts six 5m x 10m arrays each with 50 10cm x 10cm coverboards which serve as capture sites. Variables such as soil conditions, tree cover, time of day, and ambient temperature will be compared to number of individuals captured within and between the arrays. New data will be collected in spring of 2018 and four seasons of existing mark and recapture and environmental data will be analyzed. We expect to find correlations between number of individuals captured and environmental variables such as soil moisture and ambient temperature. Once optimal environmental conditions are identified, spring 2018 data collection will be used to verify trends.
Ambystoma maculatum, the spotted salamander, is a species of moist forested habitats across eastern North America. In early spring, adults migrate to breed in vernal pools or other fish-free wetlands, which may be located hundreds of meters from adult habitat. In October 2017, two juvenile A. maculatum were found during routine monitoring of Greenfield Community College’s SPARCnet plots. These were the first recorded individuals of this species at GCC, and they indicated the presence of an actively breeding local population. The lack of known vernal pools in the vicinity led to the identification of an on-campus wetland as a possible breeding site for this population.

To determine if the wetland is being utilized for breeding by A. maculatum, and to further document the biodiversity of the GCC campus, a preliminary taxonomic survey of the wetland will be conducted during early spring. Vertebrate and invertebrate taxa will be identified and inventoried, with the presence or absence of fish used as an indicator of breeding suitability for A. maculatum. Special attention will be given to any evidence of breeding amphibians. The results of this study will help inform future conservation planning and wetland preservation efforts at Greenfield Community College, since the on-campus presence of migratory amphibian species such as A. maculatum will necessitate identifying and protecting their critical migration corridors.
Examining the Role of Twist1 Phosphorylation in Triggering the EMT in MDCK Cells

Metastasis is the spread of cancerous cells from a primary tumor to a second site within the body. The transition from the epithelial to the mesenchymal state (EMT) makes cells mobile and gives them metastatic potential. The EMT is controlled by several transcription factors, including Twist1, which is a member of the basic helix-loop-helix (bHLH) family. Twist1 has been shown to be phosphorylated on several amino acids, and it can form both homodimers and heterodimers with another bHLH protein, Hand2. Studies have shown that phosphorylation affects Twist1 dimerization and that altered balance between these two factors affects limb development in mice. The initial goal of this research will be to optimize an RT-PCR procedure to assess expression of epithelial and mesenchymal marker genes in Madin-Darby Canine Kidney Epithelial (MDCK) cells vs. MDCK cells in which the EMT has been triggered through expression of Twist. Different PCR conditions will be tested to achieve consistent differences between RNA levels for two epithelial markers (E-cadherin and α-catenin) and two mesenchymal markers (vimentin and N-cadherin). To examine the role of Twist1 phosphorylation in triggering the EMT, plasmids encoding phosphorylation site mutant versions of Twist1 (Twist1T125;S127A and Twist1T125;S127D) will be transiently transfected into MDCK cells. Cell morphology will be observed by microscopy, while marker genes expression will be analyzed using the optimized RT-PCR assay. Similar experiments will be used to investigate the effect of co-expression of Hand2 in MDCK/Twist1 cells.
USDA studies have ranked wheat third among U.S. field crops in planted acreage and production. Ability to exploit grain development will allow for increased production per plant, leading to decreased required farm acreage, and increased profit per acre. Grass flowers are contained within specialized branching structures called spikelets and an artifact of many grass spikelets is a bristle projected from the lemma, called an awn. Awns have been noted to contribute to photosynthetic to seeds among other functions (Schrager-Lavelle et al, 2017). To understand awn function in the context of agricultural crops the model system Brachypodium distachyon was studied due to the known close relation to wheat and barley. Experiments analysing whether awns contribute to grain loading in Brachypodium, and mapping the presence and function of awns within the Pooideae have led to intriguing results. In a larger context, once awn function is understood it may be manipulated to optimize floral development in grass crops. This can impact grain weight, seed nutritional content, and the number of seeds produced per plant. Understanding developed in a model is also significant in context because strong phylogenetic signal has been seen linking awn length across the Poaceae. Awn length has been described to be variable across the Poaceae however, large analysis of awn length has not been directly studied. Globally, the optimization of grain production would have effects in every major nation due to grain consumption.
Crithidia bombi, a common parasite of the bumblebee hindgut, has many negative effects on Bombus impatiens, the common eastern bumble bee. However, there are few solutions to reduce its impact. A study revealed that a diet of sunflower pollen has medicinal effects that dramatically reduce Crithidia infection in bumblebees. We further explored the effects of different pollen species diets on the infection of Crithidia bombi in Bombus impatiens, with hopes of finding additional medicinal pollen species. A diet of Nelumbo nucifera (lotus), Papaver somniferum (poppy) or Camelia sinensis (tea) pollen was compared to a positive control of Helianthus annuus (sunflower) pollen and a negative control of mixed wildflower pollen. We hypothesized that poppy pollen would reduce Crithidia infection, as poppy seeds have medicinal uses as an analgesic, while lotus and tea pollen would not. Lab reared bees were infected with Crithidia, randomly assigned a pollen treatment, and kept in containers with access to treatment pollen and a nectar solution. Crithidia cells were counted from gut samples after one week. Crithidia infection did not differ between lotus, tea, poppy and the negative control of wildflower pollen, but all these treatments had higher Crithidia than sunflower, the positive control. In conclusion, the novel pollen treatments did not have the medicinal effects of sunflower pollen in reducing the infection of Crithidia in bumblebees. These findings may be useful in furthering the search for medicinal pollen species that help reduce Crithidia infection in wild bumblebee populations.
Zebrafish are an excellent model for a wide variety of neuroscience-based research. The inhibitory neurotransmitter called GABA, found in the central nervous system, is involved in regulating locomotion. The purpose of this study was to observe the behavior of embryonic zebrafish using kinematic analysis after knocking out 3 GABA\(\alpha\) subunits via CRISPR/CAS9 techniques. The subunits- \(\alpha_1\), \(\alpha_4\), and \(\alpha_5\)- were selected because they were suspected to alter locomotive response. It was found that this particular combination of 3 subunits did not have a significant effect on the locomotion response in the zebrafish. Further research on all the possible GABA\(\alpha\) subunit combinations will be conducted in the Downes laboratory.
Presentation Details

129  Auditorium  4:30-5:15  Board 31
Matthew Loring
Rolf Karlstrom (Faculty Sponsor)
Department of Biology, UMass Amherst
Sonic Hedgehog Regulates Neural Stem Cells in the Vertebrate Hypothalamus

Adult neural stem cells (nSCs) hold great promise for the treatment of neurodegenerative diseases. However, before stem cell treatments can be truly contemplated, we must first learn the molecular and cellular mechanisms that control nSC proliferation and proper differentiation. Stem cell proliferation and differentiation is tightly controlled throughout life, and is vitally important for brain formation, growth, tissue maintenance and renewal, as well as adult brain function. Sonic hedgehog (Shh) is a developmental morphogen that is known to play a central role in nSC proliferation in the adult mammalian brain, and recent work showed that Shh-regulated proliferation can lead to complete repair after spinal cord lesion in zebrafish. We have identified a role for Shh in regulating proliferation of a subset of radial glial cells in a region of the ventral forebrain, namely the hypothalamus. Using fluorescent transgenic zebrafish lines we show that Hedgehog-responsive radial glia comprise a distinct subset of radial glia in the hypothalamic ventricular zone, or neural progenitor niche, similar to the situation in the dorsal mammalian brain. We have used transgenic conditional gene regulation systems to demonstrate that Hh is necessary and sufficient to regulate cell proliferation. My project is to examine how transgene-mediated Shh signal manipulation correlates with changes in cell proliferation, and to begin to examine how Shh affects the nSC cell cycle. We hypothesize that Shh may be acting non-cell-autonomously to modulate proliferation levels in the larval zebrafish brain, unlike the situation seen in the adult zebrafish brain. Our data provides the first evidence of a role for Hh signaling in regulating proliferation in the vertebrate hypothalamus and promise to shed light on the cellular and molecular mechanisms that underlie the coordinated regulation of proliferation needed for normal hypothalamic growth, tissue maintenance, and function.
Phenolic compounds and other environmental pollutants are often complicated to deal with and require expensive cleanup. One emerging and highly successful way of breaking down complex molecules is by using proteins present in living organisms such as plants, animals and fungi to biologically metabolize the chemicals. *Sclerotinia homoeocarpa* is one of the most economically important fungal pathogens on turfgrass and causes the disease dollar spot. Decades of repeated chemical treatments have created strains of *S. homoeocarpa* resistance to multiple classes of fungicides. The Jung Lab discovered three CYP450 proteins in a strain of *S. homoeocarpa*, which play a vital role in detoxifying xenobiotics such as fungicides. This study was conducted to investigate the substrate specificity of three P450 monooxygenase proteins from *S. homoeocarpa* to biotransform various phenolic compounds. Three strains of *S. homoeocarpa* that overexpress three different monooxygenases CYP 561, CYP 65 and CYP 68 were developed. Each one of these strains were grown in nutrient rich broth that had the phenolic compounds dissolved at a concentration of 10 ug mL⁻¹. Samples were taken from the broth of each strain after 36 hours and the phenolic compound was extracted. The concentration of each compound was then analyzed using High-Performance Liquid Chromatography (HPLC) and a profile of substrate specificity was created for each monooxygenase and compared.
When performing experiments that replicate functions within a cellular environment many crucial aspects are often ignored. For instance, single molecule experiments in dilute solutions on motor proteins to understand their roles as the transport system for intracellular transport, but the cell is actually inhomogeneous and crowded. In order to understand how motor proteins behave in the cell we have performed a single molecule assay with varying concentrations of the crowding agent, methylcellulose, to test the dynamics of the kinesin-1 motor protein. By introducing the methylcellulose and measuring the velocity, run length, and association time of kinesin-1 we can test how the cellular environment affects the travel of motor proteins. We initially expected that an increase in the viscosity from crowding agents would slow down the kinesin-1, as we previously observed with glycerol. Interestingly, when using methylcellulose as a crowding agent, the increased viscosity does not slow motors. Other crowding agents, such as poly-ethylene glycol (PEG), increase the viscosity, but do not affect the velocity of the kinesin. The biological relevance is that kinesin-1 motion could be unaffected by crowding within the cell. This would be important to enable motor protein navigation despite the viscosity and crowding.
Tuberculosis is a widespread, infectious disease caused by the bacterial pathogen, *Mycobacterium tuberculosis* (*M. tuberculosis*). As one of the leading causes of death worldwide, this disease is becoming increasingly difficult to treat as antibiotic resistant strains become more prevalent. With limited new antibiotic options, research must turn to alternative intervention options. Proteinaceous molecules naturally synthesized by bacteria act as targeted missiles that deliver a drug-based mechanism to inhibit close relatives. Bacteriocin typing of close relatives of *M. tuberculosis* may reveal novel peptides that may be used as potential therapeutic treatments for multidrug resistant and extensively drug resistant strains. Screening assays of sixty strains of rapidly growing species (*M. abscessus*, *M. chelonae*, and *M. fortuitum*) consisted of spotting liquid cell growth of all strains on a lawn of every strain. Each spot was scored individually for killing activity as zones of lawn inhibition are indicative of bacteriocin presence. Preliminary results suggest at least seven promising candidates for bacteriocin producers out of the sixty different strains tested. Induction to improve bacteriocin production is assessed by varying growth conditions and treatments as well as exposure to mutagens and ultraviolet radiation. Crude lysates will be subjected to a conventional assay of enzymatic digestion, filtration, and exposure to freezing temperatures that will differentiate between bacteriocin and bacteriophage presence. Standard protein purification methods will also be attempted to isolate the confirmed bacteriocin. Early signs demonstrate promising support for the use of bacteriocins as a novel approach for treatment of tuberculosis.
The United States is currently experiencing one of the worst seasonal influenza epidemics the country has seen in the last decade. Hospitals in the United States are also experiencing a significant increase in visits to the emergency room, contributing to overcrowding and misuse. You would think the first statement would be causing the problem presented in the second statement. However, you would be wrong. Unless someone infected with influenza is consistently vomiting for more than a day or spikes and maintains an elevated fever, there is not much the emergency department could do. Contrary to what much of the public believes, influenza cannot be successfully treated with antibiotics. Influenza is a virus and viruses do not respond to antibiotics. The identity of influenza is just one of the many sides of the misinformation storm raining down on the United States right now. The internet is one of the biggest contributors to the storm, allowing anyone to post their views. In most other fields, that is okay, however, furthering the spread of medical misinformation can be lethal. There are websites that give you a list of possible diseases with symptoms and there are websites that provide good medical information. However, there is not a website that excels at both. This thesis seeks to identify and direct the public to a website with a symptom checker that presents reliable medical information in order to decrease the unnecessary spread of infectious disease and prevent unnecessary trips to the ER.
The objective of this project was to conduct photogrammetry on living frogs and preserved eggs, create their digitized 3D models and record their morphometric measurements. These measurements were then compared to the measurements taken on the real specimen, which provided us with data to know the accuracy of photogrammetry. With the decrease in accessibility to specimens, and a reduction in the private and public funds, natural history museums face budget cuts. By uploading 3D animal and inanimate models on a website along with their morphometric measurements and metadata, people all around the world will gain access to valuable information. The frog specimens were photographed by Duncan J. Irschick in the Philippines and continued in UMass Amherst, along with egg models from the Natural History Collection. The photographs for the 3D models were obtained using the Beastcam ARRAY. It is a 15-arm system with connecting rods containing many attachment points for cameras to mount (around 40 cameras). Wireless triggers are used to make sure cameras click pictures in sync. A central rotatable platform was used as it provides additional shots of animals. The morphometric measurements of the produced 3D models when compared to their live specimens showed that photogrammetry is 98% accurate. The models are uploaded on the Digital Life website (www.digitallife3d.org) and can be viewed by the public. Photogrammetry can increase the focus on collection-based museum research and especially in the area of biodiversity.
The behavior of microparticles in flow and their adhesion on walls is a topic of key interest within the medical field, specifically due to the applications for drug delivery. Recent research suggests a significant advantage to using non-spherical particles in drug delivery compared to spherical particles, but little is known about the behavior of non-spherical particles in flow. This work addresses the near-surface flow behavior and adhesion of rod-shaped microparticles. Silica rod microparticles with varying aspect ratios but similar diameters were synthesized and their behavior was compared to that of silica microspheres of comparable hydrodynamic diameters. The microparticles were run through a laterally mounted microfluidic device, and electrostatic attractions were manipulated to adhere particles to the surface of the flow cell. The surface capture rate and adhesion threshold of the different shaped microparticles was studied and compared. Preliminary data suggests that rod-shaped microparticles, even with small aspect ratios, exhibit no adhesion threshold in flow compared to spherical microparticles of similar size. This phenomena is further investigated, alongside the potential for rod shaped particles to deliver more material to the surface.
The mechanical properties of the cellular microenvironment directs processes including spreading, migration, and differentiation. Cells transmit force and regulatory signals via linkages to the ECM called focal adhesions, which allow them to exert force on their external environment creating cell-induced material deformations. Many current analytical methods of matrix displacements and cellular tractions are restricted to 2D platforms even though cells in native tissue are in 3D environments. There are a variety of 3D hydrogels available for cell culture, and some have been adapted for traction measurements, however no group has explored in depth how cellular traction changes as a function of properties of the material. Here, we employ a poly(ethylene) glycol-based hydrogel, which can be independently tuned in stiffness, adhesivity, and degradability, unlike conventional collagen-based gels. To measure cellular traction, we embed 0.5μm fluorescent microspheres and cells into the hydrogel and use 4D confocal microscopy to render spatiotemporal models of cellular environments. These are processed with digital volume correlation to compute cell-generated displacements and further manipulated by a large deformation formulation to compute precise cellular traction data. To validate the measurement of cell generated traction, cells were drugged with CytoD to prevent actin polymerization, which decreased the ability for cells to exert force via focal adhesions. Properties were altered in a multivariate fashion, ranging from 0.5-2mM RGD, 5-20 weight percentage, and 0-50% degradability, using MMP14, to study cellular response. This project aims to understand which features of the extracellular environment contribute most to cell forces, so we can measure how cells interact with their environment in the context of disease.
Cancer is the second biggest killer in the U.S. One of the biggest reasons that cancer, especially late stage, is such a brutal disease for patients to push through, is the fact that each treatment depends on not only the tolerances of each person, but also on the specific cell lines that are being effected. Often for patients, the treatments and the ups-and-downs that come with them can be the roughest part of the disease. Each type of cancer and each person responds to treatments differently. In order to address these situations, doctors often have lab technicians run patient cell samples through lab tests to determine which drugs or drug combinations will be the most effective in combatting the disease. Ovarian Cancer has a 70% chance of recurring after the initial treatment, making it difficult to treat into remission. Often the second-line therapy requires a new set of drugs, as a tolerance has been built up to chemotherapeutics in prior treatments. Through the use of biomimetic hydrogels, the viability of multiple chemotherapy drugs used to treat other forms of cancer were tested. Those drugs being cisplatin, taxol, sorafenib, mafosfamide, and a newer drug, called LY2606368. Each drug was used in combination to determine the most synergistically optimal dosings and combinations, in hopes of eventually adding to the potential treatments for recurring ovarian cancer.
Keratoconus is a rare condition, affecting 1 in 2,000 people, describing a conical shaped anterior cornea caused by thinning and weakening of the corneal collagen layers that would typically allow the cornea to hold its dome shape. In this paper the chemical mechanism behind the crosslinking polymerization of a novel medical procedure is examined. In this procedure, UV-radiation and riboflavin are utilized to generate a singlet oxygen radical which reacts with amino acid chains on the fibrils in the corneal collagen matrix-- allowing for crosslinking between collagen fibril packets, stiffening and constraining the anterior cornea to its healthy, spherical shape.
Materials formed from biopolymers are promising candidates for applications, such as tissue engineering and wound healing, due to their innate biocompatibility and unique functionality. One method of processing these materials is electrospinning, which produces sub-micron diameter fibers with high porosity and surface-to-volume ratio. A roadblock to their widespread usage is the shortage of effective solvents that will not impart cytotoxicity to the finished product, or the necessity of post-treatments such as crosslinking which carries similar risks. A previous study demonstrated the possibility of electrospinning solutions containing two synthetic polyelectrolytes using water as the solvent and salt. The stability of the resultant polyelectrolyte complex in a range of solvents without the need for post-treatment eschews the need for cytotoxic crosslinking agents. In this study an aqueous complex coacervate was prepared from the polyelectrolytes, chitosan and poly(4-styrenesulfonic acid, sodium salt) and electrospun into a chemically stable nanofiber mat. Salt concentration and polymer ratio were adjusted to maximize coacervate yield at the microscale. The system was scaled up and tuned to ensure that the solution viscosity was within a range that allowed for electrospinning of consistent fibers to ensue. Electrospinning processing parameters such as voltage and spinning distance were methodically varied to investigate effects on nanofiber morphology, which was then characterized by scanning electron microscopy and ImageJ software. The entirely green processing and chemical stability of these chitosan nanofibers make them powerful prospects for biomedical applications.
Randomly Aligned, Mechanically Robust Nanofiber Mats Increase the Flux of Ultrafiltration Membranes

The reliability and ease of operation of membrane-based water purification systems has led to their increased use in water and wastewater treatment. However, water and energy are mutually-dependent critical resources; to produce clean water requires energy and the production of energy requires large volumes of water. In this study, nanofiber mats consist of randomly-aligned electrospun cellulose or polysulfone nanofibers that have an average diameter of 1.0 µm. Modifying the surface of ultrafiltration membranes with a cellulose or polysulfone nanofiber layer resulted in membranes with the same molecular weight cut-off (selectivity) and improved flux over control membranes. Nanofiber-enhanced membranes exhibit increased flux properties, maximizing pure water product while minimizing energy consumption. Hydrophobic nanofiber mats (polysulfone) have a greater flux increase over hydrophilic nanofiber mats (cellulose), potentially due to their higher mechanical robustness. Thinner nanofiber mats (508 µm) exhibited improved flux over thicker nanofiber mats (1250 µm), demonstrating that there is an optimal bulk thickness to the added top-layer. This work focuses on identifying the cause of the increased flux relationships. This investigation into the desirable properties of nanofiber-enhanced membranes is driven by the prominent need to improve water and energy availability.
Hydration is fundamental for reducing surface fouling by microorganisms. Immobilization of hydrophilic polymers on a surface aids in the retention of water, which prevents foulants from adhering. While most reported mechanisms of surface modification are substrate-specific, inspired by the adhesive proteins in mussels, dopamine can be used as an effective universal coating platform for surface modification. Using a one-step coating method, hydrophilic antifouling coatings can be synthesized by simultaneously depositing dopamine and polymer zwitterion poly(methacryloyloxyethyl phosphorylcholine) (polyMPC) onto virtually any surface. Coatings with polyMPC have an enhanced antifouling performance compared to polydopamine (PDA) alone. In my work, I am imaging both PDA and polyMPC/PDA coatings, which are only about 5 nm in thickness, using atomic force microscopy (AFM). AFM allows us to analyze the surface topography quantitatively by calculating the surface roughness to help quantify the adherence preferences of bacteria as it is hypothesized that polyMPC/PDA coatings are smoother than PDA coatings. The substrate-independent nature of PDA-based coatings gives it great potential as a surface modification platform to co-deposit polyMPC, or other functionalized polymers, and increase the antifouling properties of any underlying material.
Green electrospinning of aqueous complex coacervates into solid nanofiber mats potentially enables a new material platform that can serve as drug carriers or wound dressings. Complex coacervates are responsive materials made via the complexation of oppositely-charged polymers in the presence of salt. The key parameters to facilitate coacervate formation are chain lengths and salt concentration. Previously, Meng et al., has demonstrated that nanofiber mats can be electrospun using aqueous coacervates, which eliminates the need to use toxic organic solvents. In this study, we explore the effect of the length of the polymer chains and salt concentration on subsequent coacervation and fiber formation. We used two strong, synthetic polyelectrolytes (4-styrenesulfonic acid, sodium salt) (PSS) and poly(diallyl dimethylammonium chloride) (PDADMAC) of different chain lengths, in potassium bromide (KBr) solution to form coacervates. We analyzed the effect on forming PEC fibers by varying the polymer solution properties, such as the polymer chain length and salt concentration, as well as characteristics of the electrospinning apparatus, such as the electric field strength (8 kV, 12 kV, and 16 kV), and spinneret-to-collector distance (15cm, 20 cm, and 25 cm). While short chain polymers (PDADMAC degree of polymerization=53) were difficult to electrospin into nanofibers, our preliminary data suggests that coacervates consisting of short chain polymers can be spun into fibers successfully under mild solution (solvent free) and spinning conditions (6 kV) and potentially, the temporary electrostatic interactions facilitate fiber formation.
Bacterial Pickup with Polymer-Stabilized Emulsions

With the rise of antibiotic resistant bacteria, there is a dire need to develop new methods of removing bacteria that slow or prevent the development of resistance. Potentially, emulsions stabilized by polymers can physically pick up and transport bacteria by taking advantage of their charged outer membranes. The polymer investigated in this study consists of a hydrophobic backbone with pendant zwitterionic phosphorylcholine (PC) that prevent adsorption to the substrate and other functional groups that stabilize the emulsion and promote bacterial pickup. Commercial surfactants with a variety of charges and properties were used as controls to investigate the effects of different functional groups and charges. Highly uniform oil-in-water emulsions droplets were created using a T-junction in a polydimethylsiloxane (PDMS) microfluidic device. *Staphylococcus aureus* SH1000 bacteria were seeded onto the device and quantified with fluorescence microscopy and ImageJ before and after flow of the emulsion. The sinusoidal microfluidic channel increases shear force on the walls and induces convection within the droplets, increasing bacteria-interface contact and encouraging removal. This method of physical bacterial removal can be easily tailored to be specific to different types of bacteria or environmental conditions. Through the use of other chemistries downstream, attached bacteria can also be “dropped off”, creating a customizable method of controlled bacterial transport that could be implemented in a variety of technologies for cleaning, medicine, or analysis.
Demineralization of the bone involves submerging the bone in a 1.2M solution of Hydrochloric acid. This removes the calcium and other minerals of the bone and leaving collagen as well as preserving the overall structural features of the bone such as the blood vessels. The process of fully demineralizing a piece of bone usually takes 4 to 5 weeks. This process can be significantly sped up with the use of hydrostatic pressure. In this experiment, bovine bone was used and the organic material such as fat is cleared off using a 1 to 1 mixture of chloroform and methanol. The bone is then submerged in a 1.2M solution of hydrochloric acid and subjected to hydrostatic pressure of 1.5 bar with a cycle of 10 seconds of pressure and 10 seconds without pressure using a custom-made pressure chamber. This method is compared with a separate piece of bone exposed to the same conditions but without pressure. After 24 hours of acid treatment, the bone in the hydrostatic pressure chamber showed a significant increase in demineralization compared to the bone without pressure. With the use of hydrostatic pressure, the time taken to fully demineralize a bone can be significantly reduced to just 4 to 5 days.
Complex coacervation is a liquid-liquid phase separation driven by electrostatic and entropic interactions, resulting in a dense, polymer-rich phase that can be used in applications ranging from food additives to cosmetics. Formed from aqueous solutions of oppositely charged polymers, coacervate properties can be altered by changing the ratio of polycation-to-polyanion, temperature, pH, and salt concentration. However, due to previous limitations in available polymers, the effect of polymer architecture on coacervation has only recently become an accessible topic for study. A model polymer system based on polypeptides was utilized to compare the effects of polymer architecture on complex coacervation in systems of linear vs. comb polymers. We characterized the phase behavior of coacervates using turbidity measurements of the amount of light scattered by the sample, along with optical microscopy. Experimental results, supported by simulations, find that the introduction of comb architecture does not affect the preferred stoichiometry of interaction. However, converting the long, continuous chain of charges from a linear polymer into a comb architecture affects the entropic driving force for coacervation from counterion release, as described by a ‘critical salt concentration,’ above which coacervates no longer form. However, the comb architecture establishes well-defined areas of local charge density that allow for the incorporation of a significant quantity of other functional comonomers, such as zwitterionic groups, without dramatically altering the resultant phase behavior. This work has identified polymer architecture as a new design parameter for the creation of complex coacervate materials.
Microporous aluminosilicate crystalline structures, called zeolites, are being used in the industry as catalyst. It has been found that small pore zeolites can act as an efficient catalyst for certain chemical processes such as methanol to olefin processes and catalytic reduction of Nitrogen Oxide compounds (NOx). One of the proven structure is high silica CHA (SSZ-13) zeolite. It is being extensively used in the industry in NOx reduction from diesel engines emission. The main limitation on the usage of this zeolite is the requirement of an expensive organic structure directing agent in the synthesis process. High cost makes CHA a non-viable option for methanol to olefin processes in industry. As a result, the study to find a cheap alternate organic structure directing agent has gained much importance. Upon study, it has been found that TEA+ ion is able synthesize CHA zeolite with good quality and it considerably lowers the raw material cost. In order to optimize the synthesis, three parameters have been investigated in this study: yield, purity and quality. By optimizing this synthesis with TEA+ as the organic template, we can significantly improve the use of this zeolite in the industry and make CHA a viable option as the catalyst for methanol to olefin process.
During cell division, dynein anchors to a cortical attachment protein, Num1, before pulling the mitotic spindle into the mother-bud neck. Num1 localization, dependent on the cortical attachment of the endoplasmic reticulum (ER) to the cell membrane (PM), helps guarantee that the mitotic spindle is oriented correctly. This study aims to determine whether or not the tricalbin family of ER-PM attachment proteins, specifically Tcb1 and Tcb2, affect Num1 localization and subsequent mitotic spindle function. Tcb1/2Δ double mutants were generated through PCR product-mediated homologous recombination. With fluorescent proteins tagged to Num1 and the ER, wide-field fluorescence microscopy was used to observe any resulting changes in ER-PM attachment and Num1 localization. Deletions of Scs2 and Scs22 ER attachment proteins have been found to affect Num1 localization, while the loss of Ist2 has no effect. ER-PM attachment is expected to decrease in tcb1/2Δ mutants. As tricalbins are involved with regulating cortical PI4P levels, which are bound by BAR-domains as in Num1, it is hypothesized that they are involved with the recruitment of Num1. Conversely the deletion of tricalbins may not affect Num1 localization, as preserved Scs2, Scs22 and Ist2 ER-PM attachment proteins could recover the wild-type phenotype. This study aims to understand how ER-PM tethering impacts Num1 localization and subsequent dynein pathway function, along with providing insights into cellular homeostasis and cellular signaling as a whole.
In the United States, approximately 600,000 people are predicted to die from cancer this year. The majority of cancer deaths are due to metastasis, where cells from the primary tumor travel through the bloodstream to a new site in the body. Understanding how cancer cells travel through the vasculature and invade through blood vessels can be characterized \textit{in vitro} using biocompatible, synthetic materials to mimic the native tissue environment of the body. For this project, a cylindrical channel is created within a tissue mimic and lined with human umbilical vein endothelial cells (HUVECs) to model a vessel. A 3D poly-ethylene glycol (PEG) hydrogel system is used as the tissue mimic because of its tunability. The stiffness of the hydrogel can be altered to mimic different tissue types, and different adhesive peptide sequences corresponding to different extracellular matrix proteins can be incorporated. The goal of this study is to optimize the adhesion molecule cocktail of collagen 1, fibronectin, and laminin \(\alpha\) added to the PEG system to maximize the number of cells that adhere to the hydrogel. To determine the optimum mixture, (3-aminopropyl)triethoxysilane (APTES) functionalized glass coverslips with different combinations of adhesion peptide sequences were made and incubated with HUVECs. Fluorescent images of the coverslips were used to quantify the number of adhered cells and cell counts from the different conditions were compared to determine the best combinations to be translated into the 3D hydrogel system. The adhesive peptide cocktail containing only the fibronectin-corresponding sequence and the fibronectin and collagen 1 combination resulted in the greatest number of adhered cells. By optimizing this mixture, a more confluent channel can be created, increasing the similarity of the model to a native endothelial vessel and reducing the time it takes to create the model.

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Scale Up Methods for Creating PEG-PC Hydrogels

The rise of the amount of drug clinical trials today has tripled over the past ten years, most of which have led to non-conclusive or misleading results due to ineffective testing methods. These methods usually involve studying diseases using tissue-culture polystyrene (TCPS), a hard and rigid substrate that does not accurately represent the native tissue environment of cells. However, other alternative synthetic model systems can produce better results if a mesh-network is involved. PEG-PC hydrogels form an extensive extracellular matrix-like mesh network to simulate native tissues in vitro to provide authentic interactions. In order to produce these hydrogels in a high-throughput fashion for industrial uses, the automation of the hydrogel process is an important feature for producing consistent gels. A biomek NXP automated liquid handler will be used to automate this hydrogel process for 384 and 1,536 wellplates. In addition to this process, the lifetime of these hydrogels will be quantified to estimate the thickness of silane deposition on glass coverslips upon treatment, as well as the stability of this layer in respect to degradation.
A Portable, Low-Cost Method of Producing Medical-Grade Water for Intravenous Solutions

When Hurricane Maria devastated Puerto Rico, 3.4 million residents were left without power - disabling infrastructure vital to producing water for medical use. Thereafter, a shortage of intravenous (IV) bags in the US mainland resulted due to the shutdown of facilities in Puerto Rico. Even when there are no disasters, IV solutions often run out in field settings and are a chronic need in well-resourced areas.

Previously, a patent for a medical-grade water filtration device was submitted by Philip Scarpa of NASA to create a portable, low-cost method of producing medical-grade water from available water. The NASA water filter uses a mixed ion bed resin filter and a semi-permeable reverse osmosis membrane filter and is designed to use general potable water to make medical-grade water safe for injection. Building upon the NASA design, a novel water filtration system will be created to be more specialized by turning bottled water or public municipal tap water directly into IV solutions.

The system will be designed to facilitate on-site production of 500mL IV solution bags using minimal energy through car battery chargers or diesel generator systems. Furthermore, empty IV bags can be prepared as ‘pre-mix’ bags that contain the prescribed salts, sugars, and electrolytes that make up commonly-used IV solutions. Ideally, the system will fit into a backpack of a relief worker or a medic - allowing effective and reliable deployment into field hospital situations. This could save lives in situations like Hurricane Maria where IV solutions are hard to deliver or produce.
Visualizing the barrier function of mucous membranes to represent in vivo intestinal microenvironments is essential for understanding the mechanisms of nutrient absorption and pathogen protection. We previously demonstrated a novel extraction technique of Porcine Small Intestine Mucin (PSIM) and characterized it to be consistent with properties that mimic the intestinal mucous in its ability to aggregate and form a gel at high acidic and calcium solutions. In this study, we designed and fabricated a simple, two-channel microfluidic device to visualize the aggregation of PSIM with calcium solutions. The calcium concentration-dependent mucin layer forms within the microfluidic device with high barrier integrity and physiological relevance to the small and large intestines. FITC-dextran was added to demonstrate the diffusion of passive particles across the mucin layer in real time. Salmonella typhimurium was then added to mimic pathogenic infection with fast swimming bacteria and to quantify the integrity of the mucin barrier. Thus, this microfluidic model recapitulates dynamic physical and functional features of intestinal mucus and can be applied further to understand a multitude of the gastrointestinal phenomenon.
Three-dimensional hybrid organic-inorganic perovskite semiconductors of the form ABX$_3$ (A = small organic cation, B = divalent metal, X = halide) have attracted much attention recently in the solar energy field due to their remarkable inherent photovoltaic properties. Methylammonium lead iodide (MAPbI$_3$) is one such material. Unlike silicon, the semiconductor currently used in solar cells, MAPbI$_3$ and other perovskites are solution processable, allowing for low-cost fabrication, compatibility with flexible substrates, and roll-to-roll manufacturing. Despite its popularity, little is known about the fundamental charge transport properties of MAPbI$_3$, such as its electron and hole mobilities; one way to determine this information is to create a transistor using the perovskite. This has been attempted previously, but other groups had difficulty growing high-quality perovskite layers on the silicon dioxide (SiO$_2$) surface of a heavily doped silicon wafer. In this work, a novel self-assembling monolayer (SAM), composed primarily of NH$_3$I groups, was used to modify the SiO$_2$ to allow for a surface conducive to growing the perovskite. Multiple transistor architectures were tested to determine which yielded the highest device performance. The best performing architecture was then used to investigate the fundamental charge transport properties of MAPbI$_3$. This same approach will hopefully be used in the future to study the charge transport properties of more perovskite materials that other research groups are using in the field.
Paint and coatings add value wherever they are applied. They provide protection, durability, and customization for individual preferences. Paint research was popular from the 1950s to the 1980s, since then paint research projects have become scarce. Therefore, there is much room for additional research involving latex based paints. The objective of the proposed study is to develop a characterization technique to monitor the progression of the drying process in latex-based paint coatings on a flat substrate. While the structural evolution in a drying film is well known, there remains significant difficulty in the prediction of drying time scales and the evolution of viscoelastic properties in such a material. My experiments consist of utilizing a rotational rheometer to investigate the drying transition of water-borne latex paints as a function of applied stress and strain. We test 5 applied stresses (10, 15, 25, 35, and 45 Pa) in two drying environments (50 mm and 100 mm diam. Petri dish). We verify the response with drying experiments at 10% applied strain in both drying environments. During all stress controlled drying experiments, we observe an increase in the stiffness. We use raw experimental data to recalculate meaningful viscoelastic material properties according to the new geometry. Alternatively, the strain controlled and small dish experiments produced data that did not seem realistic. We use our approach to simulate the drying of a “real” paint coating and measure its drying transition in-situ.
Polyelectrolyte complexes are materials that form between oppositely charged macroions and have unique properties including enhanced chemical stability compared to traditional polymers. The process that forms these complexes creates a polymer-rich phase, the complex, and a polymer-poor liquid phase, the supernatant. This complexation process is driven by electrostatic interactions between the polycation and polyanion, as well as entropic gains from the release of bound counterions. The solid or liquid nature of the resulting complexes can be modulated based on the length of the polymers, pH, salt concentration, and other parameters. To date, most research has been done using a stoichiometric mixture of oppositely-charged polymers. While this is beneficial for certain applications, it limits the utility of the complexes for other purposes. Here, we present the first systematic investigation of the phase behavior and properties of off-stoichiometric mixtures of complexes formed from the anionic polymer poly(styrene sulfonate) and cationic poly(diallyldimethylammonium chloride). We will use a combination of optical microscopy, UV-Vis spectroscopy, $^1$H-NMR, and conductivity measurements to determine the state of the material, and the concentration of the two polymers and salt in each phase. We will also investigate the potential for non-stoichiometric polyelectrolyte complex materials for use as conductive membranes in batteries and fuel cells by characterizing the conductivity of thin films via electrochemical impedance spectroscopy.
Polyelectrolyte solutions can produce solid complexes and liquid complexes, known as complex coacervates. Coacervates have been used in various industries due to their strong ability to encapsulate cargo molecules. Recent work has shown that complex coacervates can be used as a processable form of ultra-stable polyelectrolyte complexes, enabling spin coating of thin films. Here, we look to examine the potential for spin coated polyelectrolyte complex films as semipermeable membranes. While polyelectrolyte-based membranes have been utilized previously for separating gases via permeation, we look to dramatically improve the performance of such membranes through the incorporation of zeolites as an ultra-selective secondary component. In particular, we hypothesize that synergistic electrostatic interactions between zeolite particles and the charged polymer components of the coacervate membrane will allow for incorporation of the zeolites without voids. We evaluated the selective permeability of these polyelectrolyte complex membranes, both with and without zeolites.
Planar cell polarity (PCP) is the collective coordinated alignment of cell polarity across a tissue plane. This phenomenon can be observed in natural settings such as the alignment of hairs across the surface of the skin of a mammal. The study of planar cell polarity can provide insight into certain developmental processes in organisms. The mechanism for regulation of PCP signaling in humans is not fully understood and has not been directly investigated due to difficulties in achieving an effective model for a human embryo in development. Understanding PCP in the context of human systems is important for the study and development of drugs that can target diseases relating to PCP, such as neural tube defects. This research aimed to investigate the regulatory mechanisms of PCP with regards to development of human neural cells and structures. The research focused on developing the engineered *in vitro* model system and studying the effect that tissue curvature and matrix stiffness have on how PCP is acquired and coordinated. Systems with various shape configurations were seeded with human pluripotent stem cells and the cell alignment was analyzed using a MATLAB program, displaying unique effects on cell alignment for each configuration. Developing an alternative to *in vivo* models for PCP research will allow for further advancements in the field of PCP study, which in turn will enhance understanding of PCP regulation in humans and the key role that PCP plays in early human development.
Breast cancer occurs when healthy breast epithelial cells begin to grow out of control and form a solid tumor. Breast tumor cells can invade surrounding tissues and spread to other parts of the body, a process called metastasis. Cancer metastasis is the result of migration, affected by both properties of the cell and the surrounding matrix, such as microenvironment stiffness. As cancer progresses, the extracellular matrix (ECM) stiffens, and because of this, cancer cells in the body can experience dramatically different stiffnesses that drive differences in migration and proliferation. By studying breast cancer migration and proliferation, two of the fundamental behaviors of cancer cells, we hope to identify the characteristics associated with ECM stiffnesses that affect when and where the cells will metastasize. To study the effect of stiffness on breast cancer cells we cultured a highly metastatic breast cancer cell on the surfaces of hydrogels of stiffnesses 1 kPa, 41 kPa, and hard plastic tissue culture surfaces for 17 weeks. Cells cultured on the 3 environments (1 kPa, 41 kPa, or plastic) were each plated onto new surfaces with a different stiffness, and average cell speeds were manually tracked. Additionally, we measured cell growth over the course of 4 days to examine the proliferation rates of the three different cell cultures. The results show that cells cultured on soft hydrogels migrate faster when they are seeded back onto hydrogels relative to cells grown on plastic. This suggests that cells originating from soft environments have “memory” of that environment, and they may be more likely to migrate and invade into soft tissues during metastasis. Interestingly, cell growth on plastic and migration on hydrogels appear to be inversely correlated: culture environments that promoted fast movement had low growth rates. To study cell memory the three individual cell cultures (1 kPa, 41 kPa, plastic) were all put back on plastic for long-term culture. The cells originally cultured on the soft hydrogels still migrated faster on surfaces mimicking their original environment compared to new environments, suggesting that cells retain a memory of their original culture stiffness, even after 14 weeks back on plastic. Future work will involve examining gene and protein expression to understand what causes functional differences in cell migration and proliferation. By understanding the relationship between a protein’s activity, cell migration, cell proliferation, and metastatic potential, this protein could be targeted for breast cancer therapy.
Dialysis Related Amyloidosis (DRA) is a disease with symptoms of osteoporosis and discomfort in dialysis patients. This disease is caused by the amyloid fibrils of the protein Beta-2-microglobulin (b2m), which deposit in the joints of patients, resulting in DRA. Previous experiments have found that the compound polyphenol (-)-epigallocatechin gallate (EGCG) can inhibit amyloid fibrils formation of b2m. However, the optimal concentrations of EGCG as well as the mechanism of aggregation have not been studied. In this study, experiments were conducted using size exclusion chromatography (SEC), liquid chromatography-mass spectrometry (LC-MS), and transmission electron microscopy (TEM) to better understand how EGCG inhibits b2m amyloid formation. SEC experiments were used to determine the effect of the concentration of EGCG on the rate of formation of the initial aggregates as well as the sizes of the off pathway aggregates. LC-MS was used in order to determine how EGCG influences the aggregation of b2m by separating the compounds by reverse phase chromatography. Lastly, TEM was used in order to observe the structure of an off-pathway aggregate of b2m with EGCG and compared with the normal amyloid fibrils formed by b2m. The information from this study will help further understand how EGCG interacts with b2m and whether it or derivatives of this molecule could act as therapeutics for DRA.
The Effects of Shear Stress on Aβ1-40 Aggregation Using a Simple Flow Injection System

In vitro studies of peptides and anecdotal evidence have suggested that shear flow could be a factor in the aggregation and amyloid formation of the Aβ peptides involved in Alzheimer’s disease. We designed a capillary system to quantitatively investigate the effects of shear on oligomerization and fibrillogenesis. Unlike Couette cells used in other analyses, our system uses laminar shear to induce aggregation to mimic the laminar shear found in the human brain arteries, which is suspected to participate in the formation of toxic Aβ aggregates found in Alzheimer’s disease patients. The effect of shear forces on the aggregation of various peptides, including Aβ1-40, was studied by flowing small volumes of peptide-containing solutions through our capillary system to mimic the passage through the human brain parenchyma. The presence of aggregates was monitored using mass spectrometry and UV-Vis spectroscopy.
A procedure has been developed to precipitate manganese oxide salts inside the cells of white oak wood. The treated wood was added to an aqueous sodium percarbonate solution and a reaction was observed. Microscopic analysis of the reaction indicated gas evolution occurred inside the wood as well as on its surface. To determine if the reaction caused damage to the cell wall of the wood, samples of wood were sectioned, stained with phloroglucinol, and analyzed under the microscope. Our observation indicated a possible thinning of the cell wall as a result of the reaction. HPLC analysis was then used to determine if chemical composition of the white oak changed as a result of the observed reaction.
Evaluating the Phenolic Content, Profile, and Alpha-glucosidase Inhibitory Activity of Black Tea and Its Waste Byproducts

The way in which different types of teas are manufactured, especially their fermentation process, is responsible for the differences in their phenolic phytochemical makeup. These phenolic phytochemicals have been shown to inhibit carbohydrate hydrolyzing enzymes that break polysaccharides and disaccharides into glucose, raising blood sugar levels. In this study, the total phenolic content of black tea and the byproducts from brewing tea will be determined. High performance liquid chromatography (HPLC) will be used to identify the phenolic profiles. This information will then be used to understand the mechanism of the tea and its byproducts and their phenolic constituents relevant to the inhibition of the carbohydrate hydrolyzing enzyme, alpha-glucosidase.
The photoreactivity of the compound tetrachloroaurate ($\text{AuCl}_4^-$) is well documented and several studies have been performed to determine its rate of decomposition when exposed to UV light in a multitude of substances. Previous studies have generally focused on specific, single cosolvents in aqueous solution (e.g. methanol and ethylene glycol) and have indicated that increasing the concentration of the cosolvent increases the rate of $\text{AuCl}_4^-$ photodecomposition. Our study uses UV-Vis spectroscopic analysis to determine how factors such as the concentration and identity of the alcohol cosolvent affect the rate of $\text{AuCl}_4^-$ photodecomposition. Preliminary trends from our analysis indicates that photodecomposition rates are largely influenced solution viscosity and is not strongly dependent upon the specific alcohol cosolvent used.
Reaction development for the one-pot Pd-catalyzed $N$-substitution of aromatic imidates was investigated using allylic carbonates. The goal of the project is to optimize the reaction to allow for a wide range of nucleophiles to be used to alkylate the nitrogen of aromatic imidates.
One of the most important topics covered in Physical Chemistry is chemical equilibrium. A laboratory experiment was developed for Physical Chemistry I in which students study the effect of environment on heterogeneous phase-transfer equilibrium. The experiment took place over two laboratory periods, and students were assessed based upon their data analysis and written responses to a series of questions with reflect the learning objectives developed for the experiment. The efficacy of the experiment was mixed as only three of the five objectives were achieved by most students. Student responses show a variety of reasons explaining why certain objectives were not met, including confusion regarding the meaning of questions and common misconceptions that were not dispelled. A series of changes to the experiment are proposed including revision and clarification of two questions for student response and inclusion of additional sections relevant to the experiment. The experiment will continue to be modified to suit the needs of the Physical Chemistry I course as well as the students enrolled in it.
While azetidines have always been known to be structurally strained and difficult to synthesize, a new reaction has been invented that shortens their preparation time significantly. Out of the top 200 marketed drugs, only two have azetidine-based functional groups. Thus, the untapped prevalence of azetidines in drug discovery was one of the driving forces to pursue this project. The proposed synthesis allows for the regioselective preparation of functionalized azetidines. Previous syntheses of azetidines are generally 3-5 steps, while this proposed synthesis can be performed in one-pot and is operationally simple. It is envisioned that this method will be adopted by medicinal chemists to expand chemical space and improve structure-activity relationships (SAR).
A pot, atom and step economic (PASE) synthesis of polycyclic spirooxindoles via diastereoselective [3+2] cycloaddition is introduced. Recyclable montmorillonite K10 is used as a solid acid catalyst to activate α-C–H of cyclic amines to form azomethine ylides for the [3+2] cycloadditions. This synthesis has significant green chemistry advantages by conducting pot-economic multicomponent reactions, using recyclable catalyst, and only generating water as a byproduct.
Scorpions are arthropods which produce the fluorescent molecule 4-methylumbelliferone in their cuticle tips in combination with carboline 1 and 2. 4-methylumbelliferone is considered a coumarin due to its core benzopyrone ring. Coumarins are capable of producing visible fluorescence when irradiated by UV light in the range of 300nm - 400nm wavelengths. Differently substituted coumarins were synthesized through Pechmann condensation reaction involving resorcinols with varying substituents and ethyl acetoacetate under acidic conditions. The reaction was also extended to replace resorcinol with substituted phenols to afford a more diverse class of coumarin derivatives. Reactions involving resorcinol derivatives and phenol derivatives with activating groups attached to the phenyl ring were carried out in the presence of acidic amberlyst resin and required shorter reaction times ranging from 1-2 hours. Reactions involving other phenol derivatives that were not activated enough required harsher acidic conditions and longer reaction times. Several acidic conditions were tested to synthesize compounds derived from less activated phenol derivatives. Finally, ethyl acetoacetate used in the original synthesis was replaced with ethyl benzoylacetate to synthesize coumarin derivatives with a phenyl substituent. The structures of all synthesized coumarin derivatives were confirmed by performing proton NMR spectroscopy. UV absorption spectroscopy was performed on the coumarin derivatives under neutral, acidic, and basic conditions. Coumarins are known to exhibit fluorescence when irradiated with UV light under basic conditions and show no fluorescence in neutral and acidic environment. The fluorescent properties of all coumarin derivatives synthesized in this project were also evaluated under acidic, neutral, and basic conditions. This property can be utilized to detect bed bugs and other common household insect pests.
A study was performed regarding metabolites with antimicrobial properties originating from endophytes associated with the European High Bush cranberry tree, *Viburnum Opulus*. The study was done with green chemistry methods and recyclable materials. The experiment used LC-Mass Spectroscopy to identify molecules excreted by the endoohyte that match known medicinal compounds. The compounds’ structures and general functions were recorded. The extracted metabolites and direct endoohyte were tested for bio activity against gram negative and gram positive bacteria. The results showed that *Viburnum Opulus* grew endophytes with antibiotic properties. Spectral data also matched numerous different compounds containing medicinal potential. Over fifteen compounds were recorded at high intensities, ranging from anesthetics to components in anti-cancer medications.
Bacterial chemotaxis receptors enable bacteria to sense chemical gradients and direct their movement towards favorable environments. This is interesting because if bacterial chemotaxis is understood, future antibiotics could take advantage of this and control bacterial movement. The aspartate chemotaxis in *E. Coli* forms trimers of receptor dimers that bind a kinase CheA and a coupling protein CheW. Assembling this complex *in vitro* with native structure and function is challenging but essential to test theories about the signaling mechanism of the receptor complex. The goal of this project is to use DNA origami to assemble the complex by attaching the receptor to a DNA tetrahedron to better test a proposed trimer expansion signaling mechanism. This will be done using mutated receptors with an N-terminal cysteine that can link to DNA using a bifunctional reagent and amino-functionalized DNA. Once the receptor and DNA are linked, the tetrahedron can be formed to make functional trimer of dimer receptor complexes. Currently, this cysteine-mutated receptor has been made and purified, and a strategy for construction of the DNA tetrahedron has been designed. To determine whether complexes have formed we will measure kinase activity and test for high molecular weight complexes on native PAGE gels. Such validation of this assembly method will open the door to future experiments where receptor dimers can be selectively mutated. This control is crucial because position of altered receptors, not just stoichiometry, can be controlled in future experiments.
In copper electro-refining processes, brasses are subjected to chrono-potentiometric studies in order to study the anodic dissolution and passivation of brass at varying current densities and electrolyte concentrations. The aim of this investigation is to determine the best conditions to recover pure copper and zinc from brass by refining electrolysis. The brass is made of copper and zinc. The main purpose of this project is to build a recycling machine. Doing so requires an understanding of the electrochemistry and physics of the power supply, wave driver, Aftermath graphing software, sulfuric acid, distilled water, brass, electrochemical cell, thermometer, auxiliary electrode, working electrode (sample), reference electrode, and pure copper and zinc to compare to the sample. Recycling machine should be functional and demonstrate the electrolysis of brass. The desired outcome would be pure copper.
Redox-neutral synthesis, a valuable method for amine α-C–H functionalization, has inherently efficient because it avoids using oxidants or reductants and often does not generate unwanted byproducts. Condensations of fully or partially saturated cyclic amines with aldehydes or ketones can lead to the functionalization of relatively unreactive C–H bonds at α-position of the amine nitrogen through the formation of azomethine ylide. In this project, a pot, atom, and step economic (PASE) synthesis through 1,3-dipolar cycloaddition-based reaction is developed for the preparation of novel heterocyclic compounds with biological interest. No additional oxidants are required and water is produced as the sole byproduct.
The concentration of contaminants in public waters has become a focus, especially if the level of contamination is dangerously elevated and it remains untreated. The goal of the project was to assess the levels of nitrate, chloride and heavy metals in soil and surface water adjacent to well-traveled roads within Worcester, MA. All samples were collected in pre-rinsed screw-cap polypropylene test tubes. Immediately after returning to lab, nitrates and chlorides in the water were measured using ion-selective electrodes. There did not seem to be a trend in these levels except that they increased from 1.7-4.4 ppm nitrate and 152.5-196.6 ppb chloride before to after the water treatment plant. Soil samples were treated with nitric acid followed by filtration and water samples were acidified with nitric acid to pH<2. Determination of lead, nickel and cadmium was done using graphite furnace atomic absorption. The water samples had varying heavy metal concentrations. Cadmium and Nickel levels were too low to be recorded, while Lead had a concentration range from 2.3-30.7 ppb. In comparison, the soil levels were much higher, from an average of 12.5 ppb in water to 35.53 mg/kg in the soil. Analysis of the lead samples with flame atomic absorption confirmed the furnace data. It is likely that the traffic from the near-by roads contributed to the elevated levels of lead. Further research could focus on producing better percent recovery of spiked soil samples and assess levels of hydrocarbons.
Hexavalent chromium (Cr (VI)) is a known carcinogen and has been detected in US drinking water. Aqueous biphasic systems are two-phase separation systems formed when a water-soluble polymer is mixed with a water soluble ionic salt, for e.g., polyethylene glycol and K3PO4. These liquid-liquid systems have been previously used to effectively partition metal contaminants from water, however, it is difficult to remove chromium with the use of a liquid-liquid separation system. Alternatively, the use of an ionic liquid (IL), cellulose, and a water soluble ionic salt can parallel the aqueous biphasic system separation process while providing the added advantage of easy recovery. Chromium removal was monitored using UV-vis spectroscopy. The effects of various salts (ammonium nitrate, sodium carbonate, potassium phosphate), differing concentrations of the salts, and the concentration of chromium on the removal process of Cr (VI) were studied.
Telomeres are vitally important terminal structures of chromosomes function in mitigating the loss of genetic information during DNA replication. These structures are fundamental to genomic stability and act as a barrier against tumorigenesis and cancer development. They are composed of guanine (G) rich sequences which form G-tetramer complexes in vivo that are stabilized by eight G-G hydrogen bonds and ligand bonds to a central cation. While previous investigations utilizing ab initio approaches have provided insight into the interactions that contribute to G-complex stability, they were not able to identify the contributions the individual bonds have within the complex or the cation contribution to the overall stability. A computational methodology is presented that has facilitated the characterization of each individual hydrogen bond's energy contribution to the complex's stability when cations are stabilized at varying bond intervals above the molecular plane. The investigation concludes that the internal and external hydrogen bond energies contribute disproportionately to complex stability and very dependent on cation identity and their distance above the complex plane. This methodology will be utilized to elucidate the formation dynamics of G-tetramers. Further investigation of internal and external bond energies involves investigation of G-tetramer complexes composed of two superimposed molecular planes with a central cation referred to as "sandwiches".
Quantification of Pharmaceuticals in Surface Water for the Classroom Laboratory

Pharmaceutical pollution in wastewater is a growing concern in the fields of analytical and environmental chemistry. Caffeine is a common active ingredient in pharmaceuticals, a favorite beverage of our population, and an indicator of pharmaceutical pollution. Concentrations of caffeine can be analyzed by High Performance Liquid Chromatography (HPLC). This technique was developed as a classroom laboratory procedure to enhance the skills of students interested in analytical and environmental chemistry. Surface water samples were collected and analyzed from the Patch Reservoir and downstream Upper Blackstone Wastewater Treatment Plant in Millbury, MA. The objectives of the classroom procedure are for students to create standard curves, implement spike and duplicate samples, concentrate water samples by solid phase extraction, and analyze samples by HPLC using this methodology.
Use of biodiesel in combustion engines has proven to be more environmentally friendly than traditional diesel, benefiting both humans and plants. Previous research has shown that biodiesel has lower overall emissions of particulate matter and of reactive oxygen species (ROS) than regular diesel. To date, research show the side effects of these fuels on a plants health is limited. The aim of my research is to explore the effects of diesel and biodiesel exhaust on plant health. The coleus plant was chosen for this study because it is rich in both anthocyanin (red) and chlorophyll (green) pigments. One of the roles of anthocyanins in plant physiology is as an antioxidant against ROS caused by abiotic stresses.

My working hypothesis is that exposure to both types of diesel exhaust will oxidatively stress the plants and in response, anthocyanin production in the leaves will increase. Exposure to regular diesel exhaust is expected to cause the plants to produce more anthocyanins than biodiesel due to its higher ROS content.

The plants will be exposed to fumes generated by combustion, and thin layer chromatography will be used to semi-quantitatively monitor changes in pigmentation due to exposure to exhaust. Chlorophyll content will be used as a general stress marker, as well as other changes in the physical appearance of plants. The results of this experiment will contribute to the body of knowledge concerning plant stress induced by biodiesel and diesel, especially effects on anthocyanin production.
Heavy metal ions, such as Cu\textsuperscript{2+} and Pb\textsuperscript{2+} are water contaminants that can be introduced to a water supply in a number of ways, such as leaching from waste or from the piping used to transport the water. Copper(II) also may enter water via the application of copper(II) sulfate pentahydrate as a fungicide in organic and conventional farming, and from the use of the compound as an algicide and root killer. If left untreated, the metal ions can accumulate in animals that ingest the contaminated water, which may cause severe health problems. Tannins are polyphenolic compounds found in a wide variety of plant life. Using the tannins from plant life to complex with metal ions in contaminated water could be an inexpensive and eco-friendly alternative process for purifying water. In this research, tannic acid is used as a model tannin to complex copper(II) ions. This is the first step to developing a process for removing the ion from water. The absorbance of aqueous tannic acid solutions (.0420 M) and oak bark extracts after adding copper(II) ions (.0400 M) in the visible wavelength range (610nm, 710nm, 810nm). Differences in absorbance were recorded to see if a change was detected. It was noted that absorbance of dissolve copper(II) + tannic acid and dissolve copper(II) + oak bark extracts appears to be additive. Future work includes allowing solutions more time to react as well as treatment of an aqueous copper(II) solution with a bed of oak bark.
As post-translational modification (PTM) biomarkers become increasingly relevant in the field of biomedicine, the need for a quick and accurate method for characterizing protein modifications has become apparent. Of PTMs, glycosylation holds significant potential for use as a biomarker, due to its known modulation in many pathologies, including cancer, Alzheimer’s, immune disorders, and diabetes. The traditional analytical technique for measuring protein glycosylation is to enzymatically cleave the glycans from the protein, and detect the glycans using mass spectrometry. This “bottom-up” approach has associated drawbacks, including an increased risk of artifact introduction. A more favorable approach is to obtain information about a PTM by observing the mass distribution of the whole protein of interest. This “top-down” approach has limitations; large proteins with extensive heterogeneity cannot be resolved at the level required for PTM characterization. In the case of glycosylated proteins, extensive heterogeneity is common due to the enzymatic nature of the glycosylation process. Fortunately, many glycosylated proteins that are relevant as biomarkers consist of subunits connected by disulfide bonds. In this work, top-down characterization of the plasma protein haptoglobin is performed to measure its fucosylation levels. This novel method that is presented employs a cross-path reactive scheme, where the injection of protein into a size exclusion chromatography column is delayed relative to the injection of a reactive plug. This allows reactions (reduction of disulfides in this case) to be performed inside the column for a limited and controlled amount of time.
Polymer semiconductor materials possess thermoelectric properties that provide a means to transform waste heat to electricity from a temperature gradient. Therefore, they serve as a possible solution to the current environmental and energy problems. However, many of these materials have not reached commercial scale due a lack of fundamental understanding of the charge-transport properties in these disordered materials. To probe the nature of conduction, polymer semiconductors were prepared by varying levels of chemical dopant and examined using analytical tools including electrochemical impedance spectroscopy, infrared spectroscopy and Seebeck coefficient measurements. The dual chemical and analytical tools are important because they can suggest key principles (e.g. density of states) responsible for charge-transport in specific disordered materials and serve as a propellant to the development of optimized polymer semiconducting materials. This poster will present results from our recent investigations of polymer semiconductors at varied dopant distribution, corresponding thermoelectric and conductivity values, and how these experimental conclusions relate to current charge-transport models of semiconducting materials.
Before society can benefit from the diverse applications of organic electronics, first researchers must improve tunability and reproducibility of organic semiconducting materials and devices. The implementation of organic nanoparticles has improved consistency via increased predictability of heterojunction between n-type and p-type nanoparticles, which pack predictably due to their controlled shape—round, oblong, or cubic, for example. This improvement falls in the realm of the mesoscale—100 nm to 100 µm. Little remains understood, however, about self-assembly on the nanoscale (<100 nm). That is: there is little understanding of the alignment of semiconducting molecules within these nanoparticles. This nanoscale organization affects the optoelectronic properties of the material. Understanding the phenomenon of aggregation is therefore important to achieve tunability, and ultimately highly tailored devices. This study focuses on the role of surfactant in self-assembly. Surfactants are used to achieve femtoliter droplets of dye solutions, which crystallize into nanoparticles upon heating and boiling of the solvent within the droplet. This yields a water suspension of surfactant-decorated solid dye nanoparticles. The goal of this work is to achieve selectivity in H- versus J-aggregation (determined by the alignment of dye molecules), as well as nanoparticle morphology such as spheres versus nanowires. Materials are characterized using UV-Vis and photoluminescence spectroscopies and conductivity measurements to determine optoelectronic properties. Powder X-Ray Diffraction is also used to probe orientation and aggregation type within the crystal.
Magic-sized quantum dots are a special class of semiconductor materials that are of interest for their small size and subsequent high energy band gap transitions. Despite this, the factors effecting the growth and synthesis of these understood about the growth of these materials have not been extensively studied. Here we present the results of the investigation of the effects of surface ligands on the growth, kinetics, and stability of magic-sized quantum dots. We find that the surface ligand chosen in part determines the energy of the band gap transition, implying that it also determines which magic size crystals are allowed.
Many published results are based on the analysis of as little as 500 mg, which corresponds to about 25 grains. Researchers clearly assume that the arsenic concentration in each rice grain is the same. They also assume that no arsenic is lost during the sample pretreatment, which always includes grinding and heating (sometimes in multiple steps), and that all arsenic species can be completely solubilized by heating with a few mL of concentrated nitric acid in a sealed vessel in a microwave oven. We have developed and validated (by the analysis of a certified reference material) a hydride generation atomic fluorescence spectrometry method for individual rice grains that shows that the first assumption is false: some grains contain much higher arsenic concentrations than others. Replicate analysis of well-mixed rice flour, by a procedure in which 500 mg is digested with 2 mL of nitric acid, can show precisions as poor as 25% relative standard deviation when the concentrations are measured by inductively coupled plasma mass spectrometry, which means evidence for the loss of arsenic compounds when rice is dried is inconclusive. But we have shown that the arsenic concentration found depends on the range of particle sizes taken for analysis, which we interpret as heterogeneous distribution of arsenic among the various particles formed when grains are blenderized to flour. We are investigating the extent to which the errors (both random and systematic) in sampling and sample preparation contribute to the overall precision of the method.
Determination of Arsenic Compounds in Rice with a Field Test Kit Procedure

Much of the world’s rice contains concentrations of inorganic arsenic, a class I carcinogen, that may cause long-term health problems. As the demand for information grows, a simple and inexpensive measurement procedure is required. Our approach is to adapt field test kits developed for drinking water analysis. There are two critical stages: extraction and hydride generation (HG), namely the formation of arsine gas that reacts with the test strip giving the yellow/brown color. We find that results for HG with zinc are inaccurate in the presence of the co-extracted rice matrix material, and we are investigating sodium borohydride (BH) as an alternative. To control the reaction kinetics, the BH is encapsulated in an agar gel stabilized with sodium hydroxide and xanthan gum. We are also investigating adding iron, nickel or cobalt to catalyze the HG reaction at the zinc surface. To improve the detection capability, we are investigating increasing the sample volume (and thus the sample mass needed) by as much as 10-fold, which could allow the detection of inorganic arsenic at low double-digit µg per kg (ppb) values in the rice. Sample preparation involves grinding and extraction with boiling acid solutions. Both mineral acids and relatively strong organic acids will extract the arsenic species, but prolonged heating may be needed in open vessels. The type and concentration of acid is currently being studied. For validation, we are preparing both grains and flour contaminated with known concentrations of arsenic.
Tracking Circadian Rhythms in Breast Cancer

The circadian rhythm is a 24-hour time tracking system that controls essential physiological functions including sleep-wake cycles, hormone levels, body temperature, and others. Epidemiological studies have shown that the alteration of circadian rhythms can increase the potential for developing several different types of cancer, including breast, prostate, colon, lung, and ovarian cancers. Work in the Farkas group is focused on tracking circadian rhythms as they occur in cancer. Our aim is to track the core clock proteins Bmal1 and Per2, in cellular models of breast cancer. To this end, we use different breast cancer subtypes to assess how these proteins are expressed, in non-malignant to very aggressive, triple negative breast cancers. Using luciferase constructs and real-time luminometry in addition to real time PCR, our aim is to study the patterns of expression of BMAL1 and PER2 in the well-known breast cancer cell line, MCF-7, which is classified as “luminal A” subtype (ER+, PR+). The MCF7 cell line is a widely used in vitro breast cancer model, which is derived from breast adenocarcinoma. We will compare this data to those obtained from non-malignant MCF10A cells and aggressive MDA-MB-231 cells. We hypothesize that the more aggressive the breast cancer subtype is, the more disrupted the circadian rhythm will be. These studies are important to elucidate the correlation between circadian rhythm and cancer, and to inform future studies that attempt to re-normalize the circadian rhythm for treatments. Jessica Furtado¹, Hui-Hsien Lin¹, L. D. Sujeewa Sampath¹, and Michelle E. Farkas, Ph. D.¹
T7 RNA Polymerase (T7RP) is a single subunit, extensively studied and characterized protein, commonly used to produce synthetic RNA for a wide variety of systems and applications. The problem faced with this enzyme is that it produces a large number of unwanted sequences. Further research focuses on preventing the transcription of these unwanted transcripts.

Recent research uses a new tool to investigate the transcription landscape of T7RP. This tool, RNA-Sequencing of in vitro transcription, showed that run-off RNA products are extended through a 3' loop and extending mechanism. This research aims to prevent the formation of long sequences by preventing the enzyme from binding back to the 3' end of the run-off RNAs.

RNA will be produced using T7RP and radiolabeled with an α-P32 isotope. Magnetic streptavidin functionalized beads carrying DNA strands complementary to the target 3' end of the RNA will collect full length desired RNA before the 3' end of the transcript loops back and extends on the RNA. The RNA bound to the beads will be removed by increasing temperature or toehold-mediated strand displacement. The collected RNA can then be analyzed by gel electrophoresis.
Proteins are one of the main building blocks of cells. However, not all proteins are structurally ordered. So-called intrinsically disordered proteins (IDPs), do not have stable tertiary structures under physiological conditions; yet they have been associated with many important body biological functions. Modeling and characterizing these IDPs through experimental methods have been extremely difficult, thus computational techniques are required for better understanding of the functionalities of these proteins.

The p53 protein, whose transactivation domain (TAD) is intrinsically disordered, has generated specific interest due to its function as a tumor suppressor. Mutations in its TAD, specifically the E17D and K24N mutations, result inactivation of the protein and have been strongly linked to female genital cancers. Studying p53 in its unbound state through phosphorylation is also important, as unphosphorylated p53 binds with its negative regulator MDM2 stronger, degrading p53 more rapidly. This regulates the concentration of p53 within the system, keeping it at a standard low level until action is needed.

The phosphorylation and both the K24N and the E17D mutations are explored computationally through simulations in order to fully gauge the mechanisms behind this disordered protein. These simulations were compared to a wild type p53 model, and our results demonstrate that mutations could cause structural changes, especially at the secondary structure level in the unbound ensemble. Further exploration could indicate how these mutations and phosphorylation modules the protein functions.
Determining the Tolerance in Substrate Specificity of Factor Inhibiting Hypoxia Inducible Factor-1α (FIH)

Protein interactions are the basis for all processes in living organisms. They play many important roles within the body such as the maintenance of homeostasis, cell growth, and differentiation. Several factors such as protein location and activity can affect cellular health, and any disruption can cause disease. Factor Inhibiting Hypoxia Inducible Factor-1α (FIH) is an Fe^{2+} α-ketoglutarate (αKG)-dependent oxygenase that is selective for certain peptides, such as C-Terminal Transactivation Domain (CTAD) of the Hypoxia Inducible Factor-1α (HIF-1α) and the Ankyrin Repeat Domain (ARD). It hydroxylates the β-carbon of its various target residues such as asparagine, histidine, serine, leucine, isoleucine, and aspartate (Yang, 2013). FIH is known to react with variations of these domains and because of this it is important to know how selective FIH is with its substrate.

This project measures the tolerance of substrate selectivity of FIH using enzyme kinetics. Different residues of the ARD and CTAD were varied to create multiple potential substrates for FIH. Then fluorometric analysis was used to determine the different kinetic characteristics of FIH and its substrate, including the dissociation constant, K_D, of the substrate enzyme complex. Knowledge of this information provides assistance in determining FIH’s ability to bind to mutated substrate in vivo and the concentrations of reactants to obtain a maximum yield of hydroxylation for further applications such as substrate labeling in vitro.
Resilience, which can be defined as the ability to withstand or recover from a perturbation, has become a key consideration in modern water resources planning and management. Urban water distribution systems depend on reliable functionality of infrastructure coupled with favorable hydrologic and climatic conditions to ensure consumptive demands are met. Mexico City’s susceptibility to flooding and earthquakes, lack of sufficient water supply, and deteriorating water infrastructure necessitates a need for resilience-based solutions in system recovery from such failures. This research explores the relationship between several graph theory metrics and attributes of resilience utilizing a network model of Mexico City’s potable water distribution system, comprised of nodes (sources, demands, junctions, etc.) and links (buried pipelines and aqueducts). Three centrality metrics pertaining to individual nodes are used to develop post-perturbation recovery sequences that seek to restore deliveries to demand as quickly and efficiently as possible. Additionally, this study evaluates whether maximizing system-wide centrality metrics leads to optimized water delivery. Scholarly articles accessed via the UMass libraries online database in conjunction with government reports provided by the City of Mexico were used to gain an understanding of various resilience metrics and develop a simplified model of the distribution network. The results are intended to help guide municipalities in prioritizing repairs to water infrastructure when constrained by resource limitations, and promote consideration of resilience metrics when expanding network features.
Behavior of Cold-Formed Steel Structures under Hurricane Loading Conditions

This research is focused on understanding the behavior of cold-formed steel metal buildings during Hurricane Harvey. The Geotechnical Extreme Event Reconnaissance (GEER) association, which is funded by the National Science Foundation, constructed a team of structural engineers and researchers to perform rapid and detailed assessments of the structural damage caused by the hurricane. The team collected a multitude of data, such as photographs, damage assessments sheets, and three-dimensional laser point cloud data of structural damaged buildings. The fundamental sections of this research are based on data collected from the laser point cloud data files of the Port Aransas County airport’s cold-formed steel aircraft hangars. These hangers experienced extensive structural damage during the Hurricane. The failure of one of the cold-formed steel aircraft hangers is the basis of this research. The laser point cloud data was utilized to create a working model of the hanger structure in MASTAN 2. Multiple analyses utilizing the American Society of Civil Engineers (ASCE 7) design wind loads and standards were completed in MASTAN 2 to determine the mode of failure. Further analyses were completed to determine the behavior of the enclosed structure (undamaged structure with the door attached), and the partially enclosed structure (damaged structure without the hangar door). The objective of this research is to determine the behavior of pre and post damaged cold-formed structures under extreme loading conditions to form recommendations for future construction.
Ridesharing apps have revolutionized the way individuals interact with traditional transportation modes. These app-based ride services such as Uber have allowed individuals the ability to request a taxi through an app on their cell phone with just a few taps. Since Uber launched in New York City (NYC) in May 2011, it has become a major competitor to the conventional forms of street hailing taxi. The use of taxis as a transportation method has been extremely important in city. The New York City Taxi & Limousine Commission released over 1.1 billion individual taxi trips from January 2009 through June 2015. Uber released 19 million Uber rides from 2014 and 2015. With the release of new data and information about taxis and Uber, the trends were further analyzed with the use of ArcGIS, a mapping software. Visual representations of the number of pickups for yellow taxis, green taxis, and Uber cars were used to interpret how the patterns of taxi usage have transformed. The objective is to analyze how Uber played a role in which mode of transportation passengers choose to take. Identifying the regions in which individuals are shifting from traditional methods to ride-sharing modes is important for understanding where and when people are using Uber. By analyzing the trends and influence of Uber in New York City will help further predict the trend in other large cities such as Chicago.
Oxidative stress is thought to be an important mechanism through which PM$_{2.5}$ causes adverse health effects. Therefore, a metric that captures variation in PM$_{2.5}$, oxidative burden, can provide important information regarding the toxicity of source emissions found in indoor and outdoor environments. Any identified differences can help identify important sources and direct the development of indoor air quality guidelines. I measured the oxidative burden of PM$_{2.5}$ samples collected from inside and outside homes and through the results of the depletion of glutathione and ascorbate in the samples, a correlation between the level of ascorbate depletion and arsenic and rubidium, and the level of glutathione depletion and chromium and barium in the ambient air became evident.
The proliferation of silver nanoparticles (AgNPs) in the environment and resultant transport into aquatic systems have caused ecological concerns, which suggests the need for reliable methods to measure environmentally relevant AgNP quantities. This study couples a rapid pump filtration technique with a portable Raman spectrometer to achieve on-site detection of ultra-low AgNP levels in typical and complex aquatic systems. To extract and detect AgNPs, aluminum chloride and the fungicide ferbam were added for AgNP aggregation and labelling, respectively. This optimized method enabled detection of 1 µg/L AgNPs in ultrapure water and seawater. However, interference from natural organic matter (NOM) hindered sensitive detection in freshwater. This study seeks to optimize the aggregating salt for the surface-enhanced Raman spectroscopic (SERS) detection of AgNPs in freshwater with high NOM concentrations. The cations of sodium, calcium, and aluminum are being tested, with valency expected to affect aggregation ability. Our data suggest that AgNP aggregation is dependent upon salt concentration. In ultrapure water, aggregation "stabilized" and the highest SERS signals occurred when 10 mM to 50 mM calcium chloride was used, while 1 M calcium chloride decreased detection performance. Furthermore, calcium chloride (10 mM) performed better than aluminum chloride (10 mM) for detection in freshwater. Future studies will focus upon the mechanisms underlying the differences among aggregating salts. Evaluating the aggregation performance of these salts in samples of local NOM-rich environmental waters will assist in the method development for real aquatic systems.
Unmanned aircraft systems, better known to the general public as “drones,” were once reserved for military applications. In recent times, though, their popularity has exploded among hobbyists and civilian users. As their popularity has increased, their potential applications have expanded to include new possibilities such as package delivery and firefighting. The number of unmanned aircraft systems operating at low altitudes is rapidly increasing, and new methods of air traffic management will soon become necessary to control their flights. Previous studies have proposed implementing pre-planned flight paths modeled after land highways. This study focuses on the optimal allocation of airspace for these paths to maximize the safety and efficiency of the system; the study presents an algorithm for optimized network design. This algorithm models a given airspace as a grid of discrete cells, and plans flight paths based on the "costs" associated with each cell. Costs include distance from the closest destination point, wind and weather conditions, and likelihood of damage to people and property below in the event of vehicle failure. Finally, as a case study, this algorithm is implemented to solve a theoretical last-mile drone delivery problem in a selected section of Amherst, Massachusetts.
Language impacts our ability to feel belonging-- from an emotional sense of ease to physical indicators of intimacy, such as kisses on the cheek. Belonging, specifically though language, allows us to participate in cultural dialogue and feel our place in a society. Learning a second or third language -- from its formal dictionary definitions, to its everyday, spoken vernacular, as well as its historical origins-- increases our ability to feel belonging in multiple spheres. In my own personal experience that belonging only reaches a certain extent.

This essay is a study of language and belonging through my own experiences and observations using both Haitian Creole (Kreyol)-- in Haiti as a service learning advocate for YourStory International, and French-- in Paris as a study abroad student. Between January 2016-December 2017 I spent approximately four months in both Haiti and Paris. What I observed within Kreyol led me to consider the colonial connection with French. Through intercultural engagements, I observed and experienced varying levels of belonging.

In this essay I use communication qualitative and autoethnographic methods to consider belonging in and through language. I show how cultural mobility allows us to enter a society as an outsider and adopt certain cultural customs, whereas other times, aspects of our identities that label us as foreigners are not easily hidden. This research study creates a dialogue about the social hierarchies that exist within and which are perpetuated by language, which in turn impact our ability to feel various levels of belonging within these societies.
Disordered eating can be categorized as any type of eating behavior that is irregular and causes issues in one’s daily life. Some characteristics of disordered eating include fasting, binging, obsessive calorie-counting, emotional eating or using compensatory eating. While recovering from an eating disorder, in-person interactions are essential with therapists and support systems. In addition, there are other supplemental tools that people use in order to aide their recovery, including social media as a support community. While social media has many benefits for certain populations, some therapists and eating disorder recoverees have proposed the question of whether being active on social media is beneficial during the recovery process. In this experimental study, I will explore the impact of social media throughout eating disorder recovery and mental health treatment. This is important because social media has become an ever-present aspect of the lives of women between the ages of 12-25, a group that is especially vulnerable to eating disorder characteristics and mental health issues. Some studies emphasized the importance of abstaining from social media during recovery, while others encourage the use of social media for a body-positive community environment. This study seeks to explore these studies and make a health recommendations based on empirical findings from the literature and interviews of those who have recovered from eating disorders.
The purpose of this research is to attempt to understand gender stereotypes and their relationship to the public’s perception of women in politics. Specifically, I attempt to understand how United States citizens rely on gender stereotypes when limited information is presented about a candidate. This work aligns with prior studies but is unique in its methodology. In this research, I conducted an experiment where I acted as a journalist and wrote two fictional news stories. The content of the story was exactly the same, except the first story featured a politician presented to research participants as male and the second featured a politician presented to research participants as female. After my participants read the article I asked them a series of questions about how the candidate “seemed.” Overall, these questions attempt to prime them for the most important question, which candidate would they vote for? I predict that the results will be that the politician presented as female will be more likely to be categorized with traditionally feminine stereotypes, for example as bossy or family-oriented. Whereas, I predict that the politician presented as male will be more likely to be categorized with traditionally masculine stereotypes, for example as assertive or aggressive. My hope is that this research can be used to begin to understand why there is a limited number of women in politics. Additionally, I hope this research can be used to the advantage of a much more diverse group of people attempting to run for public office; specifically, women, people of color, LGBTQA+ people and any other marginalized group who currently lacks influence in the political sphere.
SpaceX, a private company whose goals are to “revolutionize space technology, with the ultimate goal of enabling people to live on other planets”, is active on many different platforms of easily consumable social media. Given the risky and innovative nature of its mission, SpaceX must manage and inform the masses about its failures as well as its successes on these platforms. This study was conducted to determine the ways in which SpaceX informs the public about their successes and failures on social media, and investigate the ways those posts from the company help shape responses from the general public. Using content analysis methodology, I coded responses by members of the general public to tweets and pictures posted by the official accounts of SpaceX on Twitter and Instagram following a mission that is characterized as a “success” or a “failure”. There are five tweets for “successful” missions, five tweets for “failed” missions, five pictures for “successful” missions, and five pictures for “failed” missions coded, as well as a systematic sample of the comments that follow. Comments were coded on a scale of 1 to 5 for tone; 5 being the most positive comment and 1 being the most negative. I found that positive comments were more common than negative comments, even if the post was about or after a “failure”. In conclusion, those who follow SpaceX’s social media (specifically Twitter and Instagram) appear to be more likely to comment positively no matter if the post concerns a successful or failed mission, further demonstrating the support that the company has among those who follow them.
YouTube is a platform that allows for everyone with access to the internet and a camera to produce, upload, consume, and spread content to a potentially very large audience. Could involvement in this community, whether it be producing or consuming content, be associated with entrepreneurial tendencies? Could YouTube involvement be associated with the desire to have a career that is creative or fulfilling? This is significant as it has not yet been studied due to the recentness of the popularity of YouTubers. I will make use of a survey distributed online to college-age participants. The survey will use a variety of questions that will determine how involved with YouTube the participants are in terms of both producing and consuming content, whether they may exhibit entrepreneurial tendencies, and how fulfillment relates to their choices and desires for careers. From these questions we will see how strongly entrepreneurial tendencies are present in this sample of young participants who have grown up with YouTube. We will see how much content they watch and how closely they follow certain content producers. Finally, we will learn how a desire for fulfillment ties in with their views on careers. From these results I will determine if viewing of YouTube content creators makes emerging adults lean more towards entrepreneurship and a desire for more fulfilling work in their own career aspirations. This is clearly a vital aspect of the incoming workforce to examine from both a managerial aspect and a cultural aspect.
Internet is an essential tool in today’s corporate America. The purpose of this study is to evaluate the perceptions of employers and employees about the use of recreational Internet use in the workplace. This research will then be analyzed to test whether or not these perceptions diverge. In order to obtain this information I have distributed two surveys. One survey is specific to employers. They will be asked to identify their rank in the company, to comment on their office’s recreational Internet monitoring policy, and to predict how they believe their employees feel about the policies in place. The second survey is specific to employees. They will also be asked to identify their rank in the company, to comment on their office’s recreational Internet monitoring policy, and to evaluate how they themselves feel about employers using this policy to control their recreational Internet use. After distributing these surveys to fifty employers and one hundred employees through LinkedIn, I expect to find that in offices with strong recreational Internet use policies employers believe that employees are more comfortable with electronic monitoring than they actually are. A study such as this allows for companies to reevaluate their communication when implementing major policy changes such as those on recreational Internet use.
Gone are the days where job applicants would respond to “help wanted” ads in a printed newspaper. Instead, much job searching is now conducted through the Internet. As someone who wants to pursue a career in Human Resources, the intention of my thesis is to use my data to learn what platforms work best to recruit college students. Additionally, while there has been a fair amount of research done on how people look for jobs, there has been little research that focuses specifically on how the Internet plays a major role in job searches.

After reading other research on how people job search and how companies recruit applicants, I conducted a survey of college seniors about their job search processes. I asked about their use of the Internet and social media in job searching and their job search self-efficacy and looked for a connection between these variables. The results of my thesis will show how a student’s major, their job searching methods, and their job search self-efficacy correlate to how many jobs they have applied to, how many interviews they have gotten, and if they have accepted a job for after graduation. The results of my research will shed light on the ways that Internet has changed the job search process and will provide data on both the positive and negative consequences of those changes.
This study investigates the cause-effect relationship between media exposure and a negative effect on body image through the "thin ideal" on Facebook and Instagram on women aged 18-25 years. The study aims to determine if the exposure to these images causes body dissatisfaction and lower self-esteem. Further, the study explores the roles of the comments section on the images by comparing effects for those who see the social media images alone to those who see the images alongside the comments.

In this context, the "thin ideal" is defined as a concept of the ideally slim female body, slender, feminine physique with a small waist and little body fat.

This study was conducted by first exposing the two groups to images of women on social media, and later investigating the effect on body satisfaction and self-esteem through previous scales. Self-Esteem was measured as a favorable or unfavorable attitude toward the self through the Rosenberg Self-Esteem Scale (1965) and Body Dissatisfaction as a person’s negative thoughts about his or her own body through the Body Appreciation Scale (2006).

The sample was comprised of female college students aged 18-25 years from the University of Massachusetts, Amherst’s undergraduate population irrespective of race, religion and economic background.

The results of this research can promote healthy and realistic body type images of women on social media sites as well as encourage advert companies to stop photoshopping and editing images of women to create the unattainable “thin ideal”.
Thurston Radio is an audio podcast series, created in association with the Fitchburg Art Museum, with the intention of yielding an engaging library of artist interviews. Each episode showcases a contemporary artist taking part in a long-form discussion of creative endeavors, and philosophy. Through the study of sociolinguistic interaction using the method of conversational analysis, this project reveals insights into how extemporaneity works between the multiple interlocutors involved in a podcast conversation. What can be gained from the analysis of interactive extemporaneous speech. In pursuit of learning how conversations work within the podcast, a realization of what the functionality of this interaction is emerges. The idea is not to bypass a social boundary, instead it is to connect by meeting in the middle at honest dialogue. Furthermore, how does cooperation of a conversation work in real time, including its cues, interruptions, and anecdotal moments? The method of conversational analysis, by transcribing and coding moments of dialogue. Armed with only a laptop, audio interface, and a pair of microphones, a recording session with a single host is scheduled. Followed by post-production editing and a deep analysis, the audio is curated into a narrative that is as concise, and clear as possible for the listener. In conclusion, this project breaks through into the inner-workings of dialectal acumen, and its achievements in podcasting.
In the modern world we live in today, sports have become as much a part of our lives as religion or politics. Hordes of faithful fans all over the world watch with immeasurable passion as their favorite players or teams compete in various athletic competition, all for the viewing pleasure of the spectator. Obsessive sports fandom is often regarded as irrational to those who don't share the same fervor for the local team, but is rarely regarded as a problem or detriment to society. My research seeks to weigh the perceived benefits of spectator sports with the negative impacts that it has on fans and society as a whole, and determine whether fanaticism over professional sports is a problem. An article published in *The Sports Journal* in 2012 examined some of the effects that sports consumption had on individuals, and found that those who watched sports regularly led much unhealthier lifestyles than those who do not watch sports, and were more likely to experience cardiovascular complications such as heart attacks. Recent events in the NFL have given voice to representatives from a community protesting police brutality and racism in America, but that same leagues championship game resulted in rioting and destruction in Philadelphia. Understanding all of the different ways that professional sports and its fans impact our society, good and bad, help us determine whether this world wide phenomenon should be met with resistance or viewed with harmless indifference.
The issue that I am exploring through my research is how U.S. involvement in the Vietnam war impacted the American citizens’ view of their government. There was not an inch of America that was left unscathed by the war; rich, poor, black, white, male, or female - everyone knew someone who had been sent there, or someone who didn’t come back. With the release of the classified information contained in the Pentagon papers, the war in Vietnam became a pivotal starting point in the erosion of Americans’ blind faith in their governing system. Through my research, I will examine what role the Vietnam war played in stimulating political distrust in America during the 1960’s and 70’s. The war in Vietnam has been widely regarded by experts and American families alike as an unnecessary loss of resources, soldiers, and national dignity. Chronicled in the Encyclopedia of American Cultural and Intellectual History, at an anti-war protest, SDS (Students for a Democratic Society) leader Paul Potter spoke for the nation when he said, “the incredible war in Vietnam has provided the razor, the terrifying sharp cutting edge that has finally severed the last vestige of illusion that morality and democracy are the guiding principles of American foreign policy”. His quote reflects the profound loss that America suffered as a result of the war, and epitomizes the deteriorated trust that citizens had in their government.
In today’s society there is a severe pay gap between women and their male counterparts for the same job. Men are getting paid more than women, but how can this be fixed? Jo Cribb has a TEDx talk on how to “Close the Gender Pay Gap” in which she mentions that discrimination against women in the workplace is subtle, sometimes unknown to the perpetrator, but still harmful. Cribb also speaks on a time in which she asked for flexible work hours like the “law allows”, but she was denied. Woman being seen as worth .77 “less” (Women make $0.33 for every $1.00) than men is one of the main problems the general public of the U.S. faces. Many are waiting for “them” to fix it; them meaning government and big business. Some governments such as the Australian government have shined a light on the discrimination against women and Cribb says that “that gap is closing”. However, change is slow and not all governments have the structure and support to make the changes that places like Australia have been making. To create equal work environments in the United States where women are paid equally and treated fairly, the changes are on us. Not just conversation but action is needed by the people of the States if we are to work toward a future for humanity as a whole.
Instagramming Africa: Measuring Narcissistic Motivations for Participation in Volunteer Tourism

This research explores the phenomena of the White Savior Complex and Poverty Porn on social media as a motivating factor for the participation in volunteer tourism abroad. In this context, the White Savior Complex is defined as a prosperous tourist providing services to underprivileged communities for self-serving purposes. This complex is often considered a form of Neo-Colonialism. In this situation, Poverty Porn is defined as any variety of media used to exploit impoverished communities to incite sympathy or related response to the post, in the form of donations, increased participation, both, or in the case of this study, interaction on social media posts. This study was conducted in two parts, first measuring the implications, expectations, and motivations for volunteer tourism, and later investigating the potential narcissistic tendencies of the volunteer tourist paradigm. The researcher hypothesized a relationship between strategic self-presentation on social media profiles, in an effort to maintain a particular aesthetic and carefully calculated perception of themselves, with participation in volunteer tourism abroad. The method of this quantitative research was completed via an online survey, targeting college-aged adults but accepting responses from adults of all ages and from diverse backgrounds. The results of this research can be used to establish a baseline for appropriate reasoning to participate in volunteer tourism, an important step in ensuring host communities are only positively affected by their visitors. This research measured narcissistic motivations as incentives to travel abroad to work in underprivileged communities.
The perception that convolution is the mark of consummate academic prose is perpetuated by the many impenetrable articles that continue being penned, published, and emulated; the belief that unintelligible academic writing is impressive—not that it should be, necessarily, but that some substantial portion of academics find it so—has been codified in a long series of studies dating back to the ‘80s. As that body of research has been confined to confirming or denying a propensity in academia for being impressed by unreadable prose, the assumption that this propensity is exclusive to academics has remained unexamined. A survey of a sample of U.S. adults was conducted to determine if a preference for less readable texts is present in the public at large, and whether educational attainment is a strong predictor of that preference.
Climate change is the greatest threat facing our society today. However, corporations exert undue influence on both media and politics, effectively shaping the status quo around climate change narratives. Perhaps giving audiences the tools to think critically about messages, especially ones guided by powerful corporate interests, will change their attitudes about climate change. Therefore, this study will examine the media’s effects on individual feelings about climate change, particularly as this pertains to feelings of hopefulness and hopelessness about the future. Through application of framing theory, originally discussed by Goffman in 1974, it has been shown that exposing framing can reduce negative framing effects on climate change beliefs and climate-friendly actions. Many studies note the influence of identity and self-efficacy on the relationship between hope and climate beliefs; the present study wishes to uncover the effect that evoking feelings of self-efficacy has on individuals’ feelings of hope about a future with climate change. All participants were exposed to a message written with the underlying assumption that fossil fuels provide a benefit to society, and one group also read an explanation about framing in this context. All were then asked to provide information on their feelings about hope, self-efficacy, the future, and climate-friendly actions. The results of this study will provide context not only on how to inspire action in those more inclined to support climate-friendly actions, but will also provide strategies for addressing self-defense barriers in those less inclined to engage with climate change beliefs.
Investors who buy and sell securities in the United States have access to a vast amount of financial news. Financial news can be found in journals, magazines, newspapers, on TV networks, and through many other platforms. This study was conducted to investigate how the sentiment of a financial news article influences investor securities trading behavior. Prior research on financial media sentiment suggests that aggregate media sentiment around the world influences stock market values. To further investigate this claim, this study measured the influence of different sentiments (positive and negative) on the security trading behavior of investors. The magnitude of influence was found by presenting three groups of investors with three artificial financial news statements that varied in sentiment, then determining whether the willingness of investors to buy and sell a specific security varied by group. Group one received a news statement about a fictitious company with a neutral sentiment, group two with a positive sentiment, and group three with a negative sentiment. A survey administered to a national sample of adult investors following exposure to the financial news statements determined willingness to buy or sell the security. Understanding the impact of financial news sentiment on the behavior of investors helps us better understand the determinants of stock market values, and also expands research on the negativity effect (the tendency for bad news to have more sway than good news) to investors.
Being “lost” in college is natural for most, as young people are starting to look for a sense of community and belonging in adulthood. The do-it-yourself music scene in Massachusetts creates a home and sense of community for many, as well as a safe space for all to enjoy. Many members of the DIY music scene take pride and sanctuary in these safe spaces, which cater to their friends, acquaintances and strangers alike. The meaning behind the music and the intentions of the individuals who create it is often where these safe spaces begin to grow. I chose to delve deeper into these intentions by interviewing select band members that have contributed to the community through their production of meaningful music. I intend to bring awareness to these safe spaces and the subtle, yet powerful, musicians that stand behind them. While listening to music and watching a performance, there are coveted meanings behind the music and lyrics that are not always obvious to viewers. This project aims to dissect the motivation, meanings, and actual happenings behind creating and performing this music. Many people who take part in the DIY music scene identify with feeling “lost” and with nowhere to turn; these musicians have used their vulnerability to create a secure space through their music, for those who may not be able to do the same. Exploring and revealing the meanings behind the music and safe spaces will bring awareness to the power of local music and how it allows for growth and feelings of security that can last a lifetime.
Protest through Music

One of the most universal ways to communicate with others is the message music can send to us. This project will research different artists, what message they are trying to convey in select songs, and how they influenced different generations. Select song lyrics will be dissected in chunks and explained to in more detail. I will be looking into different genres of music from rock, to folk, to rap and even pop. From the Vietnam era, we will peruse the genres of rock and folk and some of the artists that came along with it such as Bob Dylan, CCR, & Joan Baez. I will then move on to talk about Civil Rights and police brutality through the uprising of rap and hip hop in the 90s & 2000s and look at works of people like 2Pac, Beyonce, & Kendrick Lamar. Lastly, I am going to be discussing how music has been uplifting women and people of the LGBTQ+ community in the 2010s by studying the works of artists such as Janelle Monae, Julien Baker, & Lady Gaga. I want to express a point that when an artist sings about something that effects a large amount of people, they can have a huge following. I believe that this project will make people think more about what the artist is actually singing about and how the music is connected, personally, to the listener and to society at large.
The Effectiveness of Advertising Appeals in Social-Marketing Campaigns: A Cross-Cultural Study between the US and Asian Countries

Social and environmental issues like recycling are rapidly becoming a global concern. As such, social marketing faces diverse challenges to address this, and possibly other similar, issues in an effective way that can reach a broad audience. Although recycling is a global need and desired behavior, marketers must consider their target audience and its particular characteristics to design a tailored campaign which will guarantee maximum impact and understanding of the message. This research study evaluates the effectiveness of advertising appeals in social marketing campaigns—specifically focused on recycling—regarding three cultural dimensions that are compared between the United States and Asian countries. Based on the Hofstede Cultural Model, these dimensions are: Collectivism, High power distance, and Long-term orientation. Both American and Asian students were randomly assigned to one of three groups that featured advertisements reflecting one of the cultural dimensions, followed by a series of questions that aimed to collect students’ attitudes toward the advertising, attitudes toward recycling behavior and intentions to recycle. The purpose of this research is to provide valuable insights regarding appropriate appeals in an intercultural setting for social marketing campaigns dealing with environmental issues. Moreover, this study is intended to be heuristic—leading to further questions that are meant to increase the existing knowledge on the subject of social marketing. Future research could evaluate other cultural dimensions from the Hofstede Model, or test the hypotheses using different theoretical frameworks.
Branding is the process of distinguishing a company from its competition, and personal branding is the process of distinguishing oneself from their peers or rivals. Over time, the “personal brand” has lost its personality, resorting to gimmicky choices like using square business cards because they are “cool,” rather than designing something truly authentic. Young professionals are faced with a lack of direction in how to brand themselves, coupled with a fear of venturing into the unknown creatively. The sum of these circumstances has brought about an age of frankly uninspired personal branding, an age in which these budding professionals choose their favorite color rather than researching color theory; where superficial choices rule without challenge. In my presentation I re-conceive the idea of personal branding, asking where the idea of aesthetic over substance fails us, and what we can do to create a more enriching and truthful self-brand. I examine Sir Ken Robinson’s and G. Richard Shell’s work, and build a new system following their lead by examining what is within before trying to design without. In my research I seek to teach others that to brand ourselves in a more natural, intrinsic way is more sustainable, and although some may fear the plunge, in the end they will learn how to portray themselves in a truer, and even easier fashion. Rather than falling into the habit of following “what works,” I want to help others succeed in finding their brand by following their roots.
Improving Dropout Rates in Cities with High Crime and Poverty

Research shows that dropping out of high school has measurable negative impacts on individuals. As such, the Massachusetts Department of Elementary and Secondary Education tracks the dropout rates of the various public school districts. This data includes a breakdown by grade level, race and gender. This disaggregation of data allows for comparison between school districts with similar demographic makeup. New Bedford, a city that was once known for its riches and success in the whaling industry, has a recent history of high dropout rates. In contrast, Springfield, a city with similar demographics as New Bedford, has a lower rate of students dropping out of high school. The research question for this project is: what factors explain the difference in dropout rates between the two cities? It is the student-researcher’s hypothesis that the two cities have employed different strategies to increase retention of its high school students.
Especially in the past 20 years, superhero comic books have taken strides to create LGBTQ+ representative characters. Looking at these characters in other mediums, like movies or television, you would often be hard-pressed to see them as anything other than heterosexual. Characters like Catwoman, who is bisexual but typically only portrayed as a romantic subplot for Batman in other media. The erasure of this specific part of characters’ identities in media outside of comic books is significant to those who look to these characters for representation. This presentation features a documentary focused on analyzing this erasure using expository interviews with professional writers, journalists in the industry, and new and old superhero fans. This will be juxtaposed with material from the original comics contrasted against the media counterpart to show where this erasure is and how it impacts the community. The lack of representation, or misrepresentation, of these characters’ sexualities in other media is due to a fear that a LGBTQ+ character will not perform as well as a more relatable heterosexual character, a source of frustration and disappointment for the community. Most casual superhero fans, like the average moviegoer, won’t even know some of their beloved characters are LGBTQ+. Superheroes are looked to as idols, icons, role models; the erasure of this specific part of the characters’ identities in other media sends a message to those who idolize them that this part of them is unwanted. Media that shows these characters should represent them accurately, as the inspirations they are.
Social media use has increased tremendously over the past couple of years. The emergence of social media sites, such as Facebook, Instagram, Snapchat, Twitter, Tumbler, and Pinterest, has become part of many individuals’ daily lives. Previous studies have looked at how specific sites, like Facebook, have contributed to the feelings of jealousy that individuals in romantic relationships may experience. The purpose of this study was to explore the effects of social media use on relationship satisfaction, trust, jealousy, and privacy, in romantic relationships. Participants ($N = 149$) completed an online survey that assessed the impact of social media use on a previous romantic relationship or current romantic relationship. Analyses revealed that individuals who do not trust their partner are less satisfied with their relationship, and thus are more likely to surveil them on social media (e.g., secretly check partner’s social media behavior). This study contributes to our understanding of the ways in which romantic relationships are significantly affected by social media use.
Surrealism is an art movement that taps into the subconscious mind and brings it forward. This style is widely known for displaying very dreamlike visuals and disturbing audiences. Due to it’s out of the box and uncomfortable imagery, surrealism has been featured numerous times throughout different horror movies such as The Cabinet of Dr. Caligari and more recently with Beyond the Black Rainbow. These films, among others, create visuals and utilize sound design in order to make the audience feel disturbed or uneasy. This style is very unorthodox to what horror movies usually are. It’s a different type of fear. This type of horror cares more about how uncomfortable it makes you feel rather than big scares. In order to better understand how surrealism works, I’ve examined paintings done by surreal artists such as Salvador Dali and Pablo Picasso. This art movement works in a very different way than say pointillism. It works primarily to shock its audience by using dreamlike imagery. Eraserhead is one of the most widely known examples of how surrealism works in horror. The film is recognized for its very disturbing and uncomfortable imagery, especially the deformed baby that appears in the films. The soundtrack is also known for how it was able to add dimensions to the surreal atmosphere of the film. This project highlights the various ways surrealism has played in the horror genre and what it does to the human mind.

Unlike art in a gallery setting, public art reaches broad audiences and has the potential to add artistic, societal, economic, and environmental value to the cities and neighborhood communities in which it is displayed. However, the recent influx of young “hipster” artists moving to lower-income New York City neighborhoods has put many public artworks using abstraction and symbolism in jeopardy. Because the artwork’s message is not explicitly stated, these young artists may not understand the significance of the public art to the community it represents. This results in a lack of resistance to gentrification in lower-income neighborhoods, especially when it comes to the demolition of public visual art. When public art is removed from a community space, the cultural capital that the art brings and the sense of community that the art evokes both suffer, resulting in the devaluation and depreciation of communities in neighborhood communities in the outskirts of New York City. This thesis uses Sharon Zukin’s, “The Culture of Cities”, as well as several cases of current and former public art spaces, to evaluate the cause and effect relationship of gentrification on the value and significance of public visual art in New York.
In this research I seek to assess the kinds of emotional appeals advertisers use in the twenty-first century. Advertisers have long used psychological and emotional appeals to sell their products, and I aim to identify how their appeals to adults compare to their appeals to children. I evaluate 20 ads and identify the emotions they seek to provoke in their audience. Video ads for a variety of products are found online from the time period 2000-2018: 10 ads aimed at children and 10 ads aimed at adults. I record basic data, including the product advertised, demographic/audience targeted, year, length of videos and where the ad originally appeared. I assess emotional appeals by (1) describing the language of each ad and (2) describing the imagery used in each ad, and (3) analyzing the interaction between language and imagery. On this basis, each ad is given at least one emotional label (for example, “happiness,” “sympathy,” “excitement”), and my rationale for choosing labels, based on analysis of text and imagery, is recorded. On this basis, comparisons will be made between the two types of ads – for example, an ad a children’s toy car and an ad for an adults car. Findings and conclusions will be presented in a poster, along with some commentary on what they say about contemporary commercial culture.
My research aims to discover how elderly people are depicted in television commercials. My hypothesis is that they are depicted as weak, clueless to new technology, and wanting to be young again. Each of these hypothesized representational patterns are understood as "negative" and "ageist." I will use Youtube to find at least 10 English-language television commercials in which elderly people play main roles. I will systematically analyze the commercials, keeping track of basic data (product advertised, number of characters in ad, presence of younger people, etc.). Additionally, I will conduct an in-depth qualitative analysis of each advertisement, identifying and describing details through which characters are represented in either "positive" (non-ageist) or "negative" (ageist) ways. I will attempt to rank the way elderly people are rated in each commercial in the sample on four difference scales of "ageism" – one scale for weakness/strength; one for technological proficiency; one for aspirations to be young; and one overall scale of "ageist representation." On the basis of this method I will determine whether or not my hypothesis is supported by my data. I will present my findings in a poster board presentation.
Since the introduction of social media into our society, both positive and negative aspects have developed. Overall, the way we interact with each other has drastically changed. As a society, we rely on social media for consuming news, discovering information, connecting with friends, finding companions, openly sharing whatever and whenever, debating politics, etc. On the other hand, social media now reserves a place in our world for new forms of bullying, stalking, and even terrorism. Through thorough research, these positive and negative aspects of our generation’s latest communication method will be uncovered.
Liberals faced challenges in the 1980s. Ronald Reagan defeated Democratic incumbent Jimmy Carter with a win in 43 states, a culmination of the conservative movement of preceding decades. After running on a platform of deregulation, as President Reagan united many pieces of conservatism, creating a robust political force from the right. Arising from his vision for economic policy, deregulation influenced his administration’s actions toward other areas of American culture as well. Republicans trusted the government about 60 percent, while only 28 percent of left-leaning Democrats trusted these institutions. Democrats on the left were dissatisfied with the conservative overhaul of the 1980s. Reagan’s policy goals increased partisan polarization. One area Reagan targeted for deregulation in his second term was the media, specifically public broadcasting. In 1987, Congress repealed the 38-year old Fairness Doctrine. Republican politicians, ideological groups, broadcasters, and networks advocated for its repeal. Historians argue that the doctrine served as the “centerpiece” of an ideological debate. Yet, while research has focused on how conservatives responded to the Fairness Doctrine and penetrated the media, few historians have examined how those on the left responded to repeal. Therefore, this thesis will examine the liberal reaction to the overturning of the FCC’s Fairness Doctrine in 1987 under the Reagan Administration, and explore the variety of arguments being made by ideological groups, politicians, and broadcasters as to why the doctrine is important and how it defends the sacred idea of public interest.
In October of 2016, Twitter announced the cancellation of Vine. As frequently as Social Medias are created, other social medias die. In this study, Social Media was examined to find the public's desired function of Social Media to determine why a platform might eventually shut down. Specifically, the study was created through the lens of the life cycle of Vine. Various news outlets along with statistics reporting sites, stock information, and testimony by companies themselves were used to find the flaws in Social Media which lead to their downfall and the potential future of Social Media. These sources coordinate major events in the lifespan of the platform with public reaction. A theory was found that Social Media failed when it diverged too far from its function which initially drew users and failed to "keep up" with similar applications. Vine ended after applications such as Instagram implemented similar functionality and it implemented longer-form video - the complete opposite function of the app. In conclusion, for future Social Media to succeed indefinitely past the hype surrounding its inception, the product must have a clear and concrete vision from which it must not waver too far, and it must be able to regularly update its interface. Thus, emerging media will be either specifically niche and stay as such, or function as a "Swiss army knife" from the get-go. Following these rules, we may be able to predict the failure of Social Media even such as Facebook.
Technological advancement in the field of digital photography is growing exponentially, and entry level digital cameras now provide many advantages over the equivalent film cameras, yet the market for analog film is booming. Although many would consider this phenomenon a result of nostalgia for past decades’ analog technologies, it is actually a new, millennial, crowd, who are responsible for the increase in sales. The analog resurgence is a result of distrust in new media because when the market for photography online is oversaturated with subliminal advertisements and a clutter of clichés, photographers need to find a new way to create an audience. It is no longer sufficient to share photographs on social media because they will be scrolled past and forgotten forever. The process of digital photography is less gratifying, less authentic, and less rewarding than the process of analog photography. My goal is to analyze the consequences of this phenomenon through the lens of the disposable camera. In addition to the inefficiencies demonstrated by typical analog photography, disposable cameras are also lacking features and settings that give you control over the resulting image. What might be punitive is that this scarcity of features is biggest benefit of disposable cameras. Not having to focus on the technical aspects of photography gives you more freedom to live in the moment, resulting in images flourishing in authenticity and ingenuity. The beauty of disposable camera images is in their imperfections, as they bring about a much more personal, storied, photograph.
A film is only as good as its script, and the script is only as good as its characters. Throughout the preproduction for my thesis short film, I have focused on the fundamental questions behind effective character development. While there is not one definitive answer to what makes a character effective, there are many right answers. The key to writing a character is to know what questions to ask. What purpose does the character serve? What is their dramatic need? How do you make the audience understand and relate to the character? These are just a few of the questions that lead storytellers towards a better understanding of the characters they create. My presentation will ask many of these questions, will provide brief case studies that demonstrate effective character development, and will address my own scriptwriting process and influences.
"The moment that changed my life..." is an interview style documentary focusing on exact moments that have changed or altered an individual's life. I am interviewing a few people with varying stories. Every single day each of us makes choices and/or has something happen to us that is completely out of our control. Typically, these things make little impact on the rest of our lives, it might be a bump in the road for the day but overall it doesn't affect our life plan. However, every now and then something happens that entirely changes our course. Whether it be the moment we decided we knew what we wanted to do with our lives and took action on it, or the moment we were diagnosed with a life altering illness, everything can change in an instant.

A cut version of this film will be viewed during my presentation. I am making this film to show how we all connect as humans. We pass people every single day, and make judgements on them based on the surface level of information that we know. The stories they don't tell us could severely change how we view them.
After the 11 September 2001 attack, the United States government has been blamed for intruding on people's privacy through surveillance and technological control which has affected its relationship with the people. From the click of a button, technology has made personal privacy an open book that can be read by anyone. This paper is based on George Orwell’s book *1984* which demonstrates and illustrates the effects of government surveillance, technology and totalitarianism. Peer reviewed scholarly articles and texts form the basis of an analysis of a variety of 21st - Century surveillance examples including the National Security Agency (NSA) and Google as main contributors to the eradication of personal privacy in the twenty-first century. In other cases, this paper considers monitoring and tracking devices installed in personal and business technological devices that have been used to monitor people and other nations during their daily activities and conversations without their approval sparking local and international protests. The Edward Snowden saga has contributed to changes in policies which have reduced the government's surveillance on its people. This paper attests that people are willing to surrender their personal information to the government and Google, but both entities must provide fair operating conditions.
Social media has been redefining the way we see ourselves and others. There is currently a theory that states social media has caused problems with personal image. This identity-knock is caused by several factors. The first part of the theory explores likes. Generally, social media will have some form of likes, whether you are on Twitter, Facebook, or Instagram. The problem that arises is that people will feel inadequate when they see others get more likes than them. This grasp at relevance is seen in young people especially. A Huffington Post article called “Social Media’s Impact on Self Esteem” goes into this issue deeper. In it, they interviewed a group of people aged between 28 and 73, and found these findings; 60% of people find social media has impacted their self-esteem, 50% found that social media had negative impacts on their relationships, and 80% reported being deceived by social media. This deception idea is one of the reasons for all the social problems it can carry. What will often happen is this; people post the good side of their lives, and paint a picture that isn’t quite accurate. The article touches down on this idea in the world of dating. People will try to seem “more socially engaged, have a better social capital, and more popular, all the while masking their true persona.” Social media is a great tool for meeting others and sharing your life, but with all great things, there is a downside.
Communication: The Topographical Use of the Human Face

When we communicate we use both verbal and nonverbal communication. Recent research has shown that only 25 percent is verbal and 75 percent is nonverbal. We are taught the 25 percent from infancy. We first learn words then graduate to sentences and rules of grammar. However, we are never officially taught the 75 percent. In fact we hardly even think about it at all, it’s second nature to us. But what if there are rules that we automatically follow? Through the close study of actors and actresses and the use of freeze frame, this paper will reveal the basic grammar of nonverbal communication. With these tools, the features of expression will be clearly shown and organized into the structures we recognize as emotion. Often times miscommunication of these emotions can occur, this study will assist our understanding of those situations. With this detailed breakdown reading and expressing emotions will be as simple as reading a paragraph.
Beyond Constraints: Getting Out of My Own Way

In the world of design, there are principles set in place to guide the designer and help them make decisions. However, oftentimes we abide strictly by these rules and let them stifle our creativity. In this project, my goal was to take the learned conventions of graphic design and push past them, going beyond my own constraints. This process is important because it has allowed me to become more conscious of my limits, so that I can continually improve my creative practice.

In order to do this, I researched artists and designers throughout history, such as Michelangelo, Van Gogh, Futurism, and Dadaism, in order to see what they had done to push the conventions of their time. For instance, although Van Gogh’s work was unappreciated during his lifetime, his heavy application of paint, coupled with a vibrant color palette, have served as a source of inspiration for many artists even today. Additionally, I discovered that these artists who sought after innovation were remembered for years to come, as they had created works that were truly unique.

Parallel to this research, I took inventory of my own work and investigated through simple exercises how I too could advance my work into new directions beyond my own creative inhibitions. Through inspiration from these pioneers in art history, and learning to trust myself, I discovered that I could work beyond my own constraints; leading to a state of continual growth and development throughout my career.
COMMUNITY/PUBLIC SERVICE

231 Hadley Room  8:30-9:15  Panel 1
Rebecca Haley Goodman
Richard Daniel Cavaliere
Ellen Correa (Faculty Sponsor)
Department of Civic Engagement & Service-Learning, UMass Amherst
Crayons for Social Justice: A Project to Understand and Help Address Resource Inequality in Public K-6

Having access to writing and art supplies in Elementary School is often taken for granted. But the reality is, not all public school students have access to these important learning tools. For example, Morgan Elementary School in Holyoke, Massachusetts cannot afford to equip most of their classes with these supplies, while the classrooms at Crocker Farm Elementary School in Amherst, Massachusetts are well supplied. This project is a collaboration between two Boltwood Project service-learning student leaders, one serving at Morgan Elementary School and the other at Crocker Farm. Ronny Hernandez, Manager of Enrichment and Extended Learning at Holyoke Public Schools, says: “Research shows affluent schools have more enrichment opportunities totaling at about 6,000 more hours.” He further explains that one cannot have opportunities, like poetry club, if the students do not have pencils and notebooks. This project aims to understand the system that creates inequality and access to materials for students in neighboring communities, and to create a sustainable supplies bank for the students at Morgan Elementary School. Our presentation will report on the process we employed and our challenges and successes.
This service-learning project is undertaken by five Boltwood Project student leaders. The Boltwood Project is a UMass Amherst student-run service-learning organization that engages people with disabilities in recreational activities. Through the friendships we have developed with our program participants and our classroom learning we have realized that there is a lack of sex education to provide adults with intellectual disabilities the tools to have safe and rewarding intimate relationships. This lack of education puts people with intellectual disabilities at greater risk for harm, abuse, misunderstanding, and unsafe practices. This project engages scholarly research and best practices to create a curriculum for health and sex education that has the potential to be used in specialized programs for adults with intellectual disabilities. Some of the topics covered include education about the male/female anatomy, consent, safe sex practices, and appropriate means for finding a romantic partner. The project seeks to make this initiative sustainable and impactful by coordinating closely with local service providers. In this presentation we report on our process and outcomes, focusing on the successes and challenges of expanding sex education for adults with disabilities in the greater Amherst area.
The Food Recovery Network is a registered student organization that takes leftover food from the dining commons and delivers it to local organizations. Our motto is "Fighting Waste, Feeding People" because food should not be going to waste if there are people right next door who can use it. The UMass Food Recovery Network has been recovering food from Worcester Dining Commons and delivering to Craig's Doors, the emergency shelter right near the UMass Visitors Center, since 2013. We now recover food five nights a week. In 2018, we began recovering food from Earthfoods, the student-run vegetarian cafe, to bring to Craig's Doors. We have also started picking up food from Berkshire Dining Commons. On Sundays, we bring the food to the Quality Inn in Northampton, which has been hosting people who are here on a FEMA voucher because they were displaced by the hurricane in Puerto Rico. On Tuesdays and Thursdays, we bring the food from Berkshire Dining Commons to Not Bread Alone, a community meal downtown in the First Congregational Church. The UMass Food Recovery Network is a student-run project that collaborates with UMass Dining, our community partners, and various volunteers. We were able to expand to multiple other sites once recoveries from Worcester Dining Commons to be running smoothly, and decided to focus in on outreach and volunteer recruitment.
Circle K International at Westfield State University will feature a presentation that will inform the audience on what Circle K is, and how it relates to the university and community. The information provided is important for students who are interested in joining the Circle K International club at Westfield State University, and for those who are interested in the concept of this group, which is SERVICE. This presentation allows the students to peek into the lives of an everyday club member who participates in the various activities and events that are held. For students who do not have a Circle K club at their college, they are presented with the ideas and fundamentals of what the club is involved in and how it affects not only the school, but as well as the community - and as important, how to organize and start a Circle K club at their school.

Note: The Circle K International at Westfield State University poster will contain information regarding:

• Who are we?
• Service at Westfield Circle K
• Leadership at Westfield Circle K
• Service for our neighbors
• Fellowship at Westfield Circle K
• Service Beyond our Backyard
• 2017-2018 E-Board Members
Circle K International will feature a presentation that will inform the audience on what Circle K International is, and how Circle K provides cultural, educational and holiday events/activities while working closely with various schools, business owners and Kiwanis groups in their community. The information that is provided is important for students and others who are interested in joining the Kiwanis Family, whose main goal is service. Circle K International works closely with each region to help provide services to people within a community. Each club E-board is made up of seven positions in which members work together to plan events for club members to participate in. For viewers who do not know about the Kiwanis Family, they are presented with ideas and fundamentals of what the club is involved in and how it affects the community. The Kiwanis family has six different levels; Kiwanis, Aktion Club, Circle K, Key Club, Key Leaders, and K-Builders. Kiwanis International was originally founded in 1915 by a group of business men in Detroit, Michigan. In the 1960s it became a worldwide club that today connects almost 80 different nations and geographic locations together through service.

Note: The Circle K International poster will contain information regarding:

- The K-Family
- Kiwanis and CKI
- What is Circle K?
- The 7 Positions of the E-Board
- Recent District Projects and Preferred Charities
- New England District, District Board, and International Board
Improving the Usability of the Worcester State University Learning Garden

This research project will provide the Urban Studies department and the Worcester State University community about realistic and usable adaptations that can be implemented in the Worcester State University Learning Garden. The report will include a comprehensive set of recommendations, including an immediate plan, future plan, and blueprint to transform the learning garden into a place that is accessible and usable for all people. We will apply our knowledge of the current garden layout along with our Occupational Therapy educational background to ensure that individuals with any motor, cognitive, or sensory deficits are capable of utilizing the garden for various educational and recreational purposes.
It’s estimated that there are 65.3 million people in the world who are forced to flee their homes due to persecution or violence around the world (Falk, 2016). In response to this, Worcester, Massachusetts has become a major city offering asylum. From the 2007 to 2012 time period, Worcester welcomed 26% of all the refugees entering the state of Massachusetts (Fabos, Pilgrim, Said-Ali, Krahe, and Ostiller, 2014). In order to assist this group, junior occupational studies students, along with the help of occupational therapy graduate students, developed an integrative community outreach program that consisted of multicultural exchange, engagement in social relationships, and group activities specific to refugee women in the Worcester area. These women faced several challenges in obtaining basic needs such as housing, employment, and childcare, and their daily lives consisted of little to no social participation due to cultural and language barriers. Through this program, the women developed a sense of belonging as well as a source of social and emotional support. This project helped the students to gain perspective of their own lives and the resources that are available to them. Refugees are in need of more social support to become culturally engaged in the community and to learn how to participate in meaningful and purposeful occupations within Central Massachusetts. This research allowed us to discover that a college campus can be an important resource for this population.
COMPUTER ENGINEERING

238 Concourse  8:30-9:15  Board 51
Anthony Chan
Lixin Gao (Faculty Sponsor)
Department of Electrical and Computer Engineering, UMass Amherst
Behavioral Analysis of IoT Devices: How IoT Reacts to Network and User Interaction

While the growing volume of Internet of Thing (IoT) devices connected to the Internet provide novel autonomy and convenience for users online, they pose a threat to Internet security as a whole. IoT devices contain exploits which have been used in attacks towards companies and servers, and until security is further developed, these devices will continue to be susceptible to hacks that will disrupt the Internet and its users. However, by understanding and profiling typical IoT device behavior, future research on abnormal behavior can be developed which will help in alerting of malicious behavior on a network, in an effort to quickly and efficiently detect attacks. The research here is aimed at developing behavior profiles on IoT devices available in the Market. First, a secured and controlled network hosting multiple IoT devices (Amazon Echo Dot, Ezviz Mini O Smart Camera, Mini Smart Socket) was designed to record data transmitted between devices and the Internet. Second, scripts were developed which produced metrics that include results of IP/DNS destinations, data rates, and data flows for each device under normal and abnormal test cases. Tests and interactions with the devices range from normal use cases to malicious attacks aimed toward the devices. Finally, the results of each kind of device were compared. Based on the data gathered and analyzed, we profile each device. This will aid in identification of mechanisms each device has for interacting with other devices on the Internet, thus enabling for a more secure Internet of Things.
Americans spend, on average, 87% of their time indoors, and HVAC systems are utilized to provide these indoor spaces with a reasonable level of comfort. However, HVAC systems are also responsible for 43% of residential energy consumption in the U.S. Therefore, a clear challenge lies in how we can improve their energy efficiency while maintaining or improving comfort. Although there is only a relatively limited amount of external temperature sensors in buildings, nowadays most people have smartphones that contain internal battery temperature sensors that can be used to gather temperature data. However, heat generated by other hardware components of smartphones, such as the CPU, affect the battery temperature measurements, rendering it difficult to gauge the ambient temperature based solely on battery temperature sensor readings. This research project develops predictive models that reduce the effect of this external heat, and isolate and predict ambient temperature as accurately as possible. Two smartphones, a Nokia 6 and a BLU R1 HD, were utilized to collect battery temperature and other sensor readings under varying ambient temperatures and stress conditions. A preliminary, regression-based model has been developed using this data to predict the ambient temperature through the Nokia 6 with errors of up to approximately 7°F compared to the actual ambient temperature. This model will continue to be improved, and a model for the BLU R1 HD will be developed. Models such as these, implemented in smartphones, could help building management better optimize HVAC systems and ensure comfort.
A Study of Dynamically Repositioning Drone Algorithms

When communications infrastructure (e.g. cell phone towers) are destroyed after a widespread disaster, a network of drones in the sky are a solution for providing communications connectivity to both victims and disaster relief workers in a time of great need. The purpose of this project is to test and evaluate different algorithms for controlling a drone network. Most of the algorithms require a powerful computer and require that the drones do not move when communicating; however this project will test algorithms designed to run on moving drones. Of these, none have formally tested on a physical network of drones. This project will test each algorithm's ability to meet important requirements in the disaster relief application, including reconfiguration time and positioning. The project will test the algorithms in three stages: MATLAB, DroneKit-SITL, and on a physical network. The MATLAB testing will focus on high level simulation of the algorithms and fully understanding the algorithm. DroneKit-SITL is a drone simulation software that allows the user to code similarly to coding an actual drone. It will be used for testing the speed and overall feasibility of the algorithms. Critical to this type of research endeavor is validating performance in the field, as numerous real-world constraints and conditions are difficult to reliably simulate; hence, the last (and most critical) tests will be the physical network tests will determine whether algorithms meet system requirements on an actual drone network.
The modern abundance of data creates a need for rapid analysis requiring minimal human supervision. Tools that can accurately identify patterns in data are therefore of significant value. The intent of this project is to write a program, using Python, which takes a two dimensional collection of data in which there is an unknown relationship between the two values. The program will plot the data and create a best fit model that accurately fits the collection; Thus identifying the underlying relationship, should one exist. Although many models already exist, they can be prone to overfitting their data, creating a complicated function when a simpler explanation is available. (A polynomial of a large degree may connect more points, for example, but is not always the best fit to show a true relationship.) This project will attempt to apply the simplest function available to accurately represent the trend between the relations in data. With outlier detection and removal, the program should be robust to "noise" and better able to identify simpler underlying functions. To do this, the program checks the relationship of any one point to its nearest sibling, removing anything too far removed. Using known patterns, this program will then compare several functions and attempt to declare whether or not the collection of data fits any one function family, and if so, which. The presentation will demonstrate the program, discuss the creation of the project, and display the inner workings of the code.
Internet of Things (IOT) is in the spotlight because its applications positively impact everyday quality of life. This study aims to develop a cost-effective solution to real time video streaming by using a low-cost ARM (Advanced RISC Machines)-based computer, i.e. Raspberry Pi. We developed a simple streaming server written in Java that runs efficiently on the Raspberry Pi, and showed that the Raspberry Pi can support streaming to multiple devices at once. We also developed a light-weight android application that the server can stream to. The client and server communicate via JSON (JavaScript Object Notation). We divided high quality video into image files with the jpg format, into packets and then transmitted them to multiple hand-held devices simultaneously without any interruption or interference. We tested this system with ten different Android smart phones, and found that the developed system can stably support real-time video play without interrupt for each Android smart phone. We conclude that our system anchored in a low-cost ARM-based computer can retain quality of service (QOS) regarding video streaming to multiple hand-held devices.
Next year, the world’s first Operating System (OS) UNIX will celebrate its 50th birthday. This relic of the past is objectively the most important creation that has ever influenced the field of Computer Science. However, mysteries of this artifact were only discovered in 1995. Two engineers, Paul Vixie and Keith Bostic dug deep enough to find several DEC tapes “under the floor of the computer room [at Bell Labs]” which held several early binary files for UNIX. Shortly after, with the help of several people, these two engineers were able to reverse engineer the binary tapes they found, and put up a repository for this ancient system on GitHub. There it has stayed, waiting for someone to use like it was meant to be used, on a DEC PDP 11/20, the computer UNIX v1 was initially written for. This is what this research project has been focused on. Currently the PDP 11/20 can send and receive data via a homemade serial emulator we have written in Java, and the PDP 11/20 has been loaded with a binary file for the BASIC programming language. Once the entry point for BASIC can be determined, we will start to write code to emulate paper tape readers to assist in loading UNIX v1 into the PDP 11/20’s memory. In the end we hope to have a fully functional system running the world’s first Operating System.
Current existing data driven frameworks and libraries do not have a standard interface for building data visualizations, leading to differing protocols when creating the same visualizations across different platforms. Our research is focused on exploring visualization theory and implementing small system prototypes that would support the conversion to or linking with visualizations from different commercial and open source data driven frameworks or libraries. This can greatly enhance the visualization creation experience for software engineers and influence the standardized development of future data driven libraries and frameworks on a global scale. We use Natural Language Processing (NLP) with semantic and ontological techniques to define a standard interface that communicates to different frameworks and libraries. We generate a visualization knowledge base (VKB) common to a large collection of framework and libraries of interest. This VKB supports our development of the standard interface to capitalize on. The development of VKB involves exploring theory on ‘semantic similarity’ and ‘software structure’ in order to gather this knowledge from different documentation and tutorials of these frameworks and libraries on the web. This is a complex problem as formats and syntax are dramatically different. The system’s evaluation will center around determining the completeness, advantages and limitations of the visualization conversion process involving different origin and target frameworks and libraries. An immediate example of our system’s broader application is in automatically identifying code evolution as versions change and determining minimal version compatibility between frameworks and libraries.
In a world of constant technological progress there is always a new threat looking to steal user data. CUP (Cyber-Security Undergraduate Project) will help to protect and monitor key files on Linux operating systems, one of the most commonly used server operating systems, against cyber-attacks at the file system level. The program will be used to prevent hackers from gaining access and modifying key files, selected by the user, that are often left vulnerable and exposed due to a lack of monitoring. When specific files are accessed an alert will be sent to designated contacts notifying them that a protected file has been accessed or modified and will “freeze” the file to protect it until further notice by altering the user permissions of that file. The contacts can then choose from three different options. The contacted person can confirm that the file was opened on purpose and it will unlock the file, they can hold the “freeze” on the file until further notice, or they can shut down the server/computer so that way the file can no longer be accessed by anyone until the server is turned back on. This program can prevent stored personal information from being stolen, files and directories from being wiped, high traffic servers from being brought down by code manipulating attacks, and malware from being installed. CUP will protect your valuable information and your future even when you’re not looking.
If a person were to be presented with two images, one a high quality photograph of a scene, and the other a grainy or maybe blurred low quality copy of the original, would be able to determine the two photographs are from the same scenery. A computer however, cannot easily arbitrate such a decision. Like all other digital media, digitally stored images are at the basic level composed of binary bits. If a computer takes two images that are identical to the human eye, but is off by just one bit, it would register as a different image altogether. There are many use cases of comparing digital. One of the most popular is Google’s own image search feature. The purpose of this research is to explore different techniques and their combinations for digital image comparison. Each technique has its own set of pros and cons. The use of the algorithms differ depending on the goal. I've used Linux as the operating system due to the availability of open source software for image processing and computer vision. I also used Python as the main programming language for its agility in rapid prototyping. OpenCV was the main image processing library used for handling and processing images. There are a number of image databases for use online found in ImageScience.org. By combining personal pictures and ones downloaded from these databases, I’ve created a 1000+ sample set to test out the various algorithms and techniques including using filter histograms, spatial filters, structural similarity index (SSIN), peak signal to noise ratio (PSNR), feature extraction using scale invariant feature transform (SIFT) and others. As expected, the more complex techniques were generally more accurate but at the tradeoff of performance and complexity.
Spud, a software as a service tool, does just that. By using crowdsourcing, growers collaborate through our forums, database of plant types, and viewing the growth data of other users. Data input by users is plotted into intuitive graphs to track growth and bring understanding to how healthy a plant is. Spud also makes use of the data sent by a user’s sensors. Alerts may be set up then sent to the user’s phone and email if any sensors read an abnormal level. Spud makes it easy to know exactly what the plant needs. Users can track their plant from seed to perish.

Plant types, managed by the community, set the parameters for what a healthy plant is. Models are then created for what their plant needs in order to grow faster or bear more fruit. Users can track the process plant by plant, or large groups of plants.

The goal of the project is to have a prototype that implements the features listed above in the form of a web application. In the future a desktop and mobile phone application will be created for users to have access on the go and on their computer.
The Exchange Visitor Visa (J-1), is a non-immigrant visa issued by the U.S. Department of State that provides numerous opportunities for international candidates looking to travel and gain experience in the United States. For this program to be a success, four groups of people need to interact: students, sponsors, employers and facilitators. In the past, the processes by which international students apply for the J1-Summer work and Travel visa program had been all done by paper, telephone and/or text messages. This old way of running the system was labor intensive and time consuming. In this project work, we designed and developed a multi-user, database-driven, interactive dynamic Web application that replaced the paper-based system. Used by students, sponsors, employers and facilitators, this application provides a full spectrum of functionality. It functions as a central hub that connects students with all the resources they need and provides services such as application management, summer job placement and sponsor selection. Various dynamic web application development techniques were used throughout the development of the application. Security was implemented with high priority.
iManage is an IOS application that will help “Chez Rachid” store to replace its current paper-based inventory management system with a computer-based system. It will improve the accuracy of orders and help the company to figure out exactly how much inventory it needs to have on-hand. The improved inventory management system can have real-time and monetary benefits.
Internet of Things: The Perceived Risks and Benefits

The Internet-of-Things (IoT) has dominated the technology industry in recent years with its idea of machine-to-machine learning that allows data to be collected on various fields throughout the physical world. The potential applications for this kind of information is boundless, with the ability to both interpret and advance upon the efficiency of highly important techniques and data analyses that impact various business industries and people’s everyday lives. There are significant risks, however, involved with this mass collection of information. The risks are abundant for both the businesses that have to collect, store and use this data in order to improve their products or services to the people who are generating this highly personal information that exposes their own personality to a relatively unknown entity. There is a perceived balance in society that has been trying to balance this exposure in order to achieve high convenience for IoT device users while, simultaneously, maintaining data security for the privacy of people and for the business users of that information (Weinberg, Milne, Andonova, & Hajjat, 2015). This research will identify which expert-posed perceived risks there are in the IoT field for businesses and individuals presently and in the future, with a more focused approach on identifying the relationship of privacy and convenience. In addition, the research will also include quantitative data analysis by using a survey sample in order to gauge people’s own idea of this struggle in the IoT field.
251 Auditorium  11:45-12:30  Board 41
Jack Normand Kenney
Edward A. Rietman (Faculty Sponsor)
Department of Computer Science, UMass Amherst
Adaptive Machine Learning: An Example in Jazz Ensemble Improvisation Using Quasi-periodic Oscillators

The purpose of this project is to test the learned synthesis, memory, and adaptable capacity of a quasi-periodic oscillator implemented as a neural network in a small-world architecture. We will do so by testing first the ability of the system to accurately synthesize sine waves, given expected frequency and duration. Then we will observe the memory capacity of the architecture by testing how accurately it can recall one or more musical pieces, given the first measure as input. Finally we will move beyond a static architecture to demonstrate the efficacy of an adaptive network to improvise in a jazz ensemble. The adaptivity will be implemented and tested using a variety of hypotheses, including adding and removing nodes, swapping weights within cycles, and pairing networks up in a reinforcement learning inspired structure. Once the software is complete, we will move to testing these concepts on real adaptive hardware using a novel neuromorphic chip designed by the BINDS Laboratory.
My focus is on the gender ratio of the different types of majors. The four majors that I will be focusing on is Computer Science, Construction majors, Mathematics majors, and Nursing majors. In Computer Science the gender gap is favored by the male side by 85%. This shows that more men end up enrolling in computer science than females. However, in Nursing, the gender gap is favored by females by 88%. While doing future research, men just typically choose majors that are more towards construction or mathematics that tend to lead to higher pay. The data that I have gotten is strictly taken from U.S. colleges from the East and West coast. The average pay for the majors that men usually take are $61,700. Some outlying factors could be if a family member owns the business that you want to get into and so on. Let’s look at the pay gap when we uncontrol outlying factors. For example, there could be factors that could affect it slightly. Like experience in the work, and time within the job. When we control for these factors and look at the pays once again, we see that women earn just as much as men by 98%. This piece from the economists at the New York Federal Reserve says that their key finding is that men tend to care more about money and income potential when choosing a major, while women place a higher importance on non-pecuniary aspects.
Designing a campus robot that can interact with prospective students is the goal of this project.

The robot, programmed to produce and deliver information about the Quinsigamond Community College computer science transfer program, will also be able to direct students and visitors to various departments on the main campus. In total, it will serve dual functions: it will be a complete and updated information bank featuring the College’s Computer Science Transfer program. It will be capable of offering thorough course description details such as course title, course number, class credits; information regarding the required courses and any prerequisites. It will also house information on how many semesters or years it takes to complete this transfer program, when classes are offered.

The secondary feature will be its ability to describe various units within campus buildings and may specify parking lots, bus stations, and other campus navigation necessities. “QiChat” is the primary API needed to program the robot to guide the students with sequences of information. The secondary tool set is derived from a web application. It becomes operational by taking the input from the text box, then the robot will vocalize the script that was written in the first part of the project. JavaScript will enable this feature rather than “QiChat.” Working together, these two programs will help create Quinsigamond Community College robotic assistance. As a storehouse of College information, the robot will also be a timesaver in terms of human labor, freeing up personnel to attend to other tasks.
Imagine a world where crops are grown without the expensive, laborious care and manpower that limits food production around the world. The goal of this project is to improve the productivity of a greenhouse through the implementation of custom and experimental automation technology. A piece of experimental technology that will be tested is an invention that functions exclusively on solar energy. This mechanism extracts carbon dioxide from the atmosphere and pumps the gas into the greenhouse to aid plant growth and reduce carbon dioxide in the atmosphere. The fundamental automation of caretaking tasks will be accomplished in three phases. The first phase will be the installation of microcontrollers at key locations throughout the greenhouse. The microcontrollers, designated as nodes, will have novel programs managed via Bluetooth by a single-board computer. This computer will act as the brain of the system and will be officially denominated as “Mothership.” Phase two of this project will be to install an abundance of sensors to collect data for the prioritization of the automation processes. Mothership will use innovative techniques to gather data for further analyses and to be displayed on a public website. Finally, phase three will be to automate key processes in order to optimize the production and productivity of the greenhouse. This optimization will include the installation of mechanical apparatuses to automate systems of heating, lighting, and watering. Ultimately, this project will serve to foster interdisciplinary research on the college campus and paint a picture of a brighter future for the world.
Robotics is becoming a booming industry throughout the world. It keeps growing and integrating new technologies as time goes on. One integrated technology that is becoming more and more prevalent is visual detection, which is used to recognize objects and perform a specific task based on what is detected. Currently visual detection technology on the NAO robot is still in a primitive state, meaning only basic colors can be recognized and simple tasks can be performed.

The NAO robot is a good tool because it has that basic capability to visually detect color as well as perform simple tasks based on what it detected. The robot will be programmed to respond to two specific signs, one green and the other red. When the green sign is held in front of it and recognized, the robot will begin a continuous walking cycle. When the red sign is recognized by the robot it will come to a complete stop. It will be able to switch between the two states freely, as it recognizes one of the two designated signs.

This project will be very expandable for future projects. The robot could be eventually programmed to detect more complex items and perform more complicated tasks, using the previous stated program as a base. It should be very accessible to build upon in the future.
Laws based on cyber crimes are a new trend in government. What should be regulated online? Should people be held responsible for what they do or post? Can your first amendment rights be taken away online? How are you affected by laws today? These are questions that are brought up and debated when discussing cyber laws and policies. Starting with a historical view, we look back at why these policies needed to be put into place and how it plays a part in society. We also look at the history of hacking and how it plays a part in today. As we take a step towards the future, we consider new laws that could be put in place and the freedoms everyone should have.

We live in the age where these laws and policies are being defined. In 2017 alone we dealt with two major political problems, Net Neutrality and the Russian Hacking Scandal, that were in the spotlight and will shape the landscape of politics that surround issues on the internet. There are already laws in place that protect people rights on the internet, such as your credit card information, but there are only a certain few. Moving forward, we will use current issues that we face today to create possible laws for moving forward to the future. Within the next few years, cyber laws and policies will become a larger issue. Being prepared and on this issue will be important when attempting to tackle laws surrounding the internet.
Expanding A*

Path repair is a problem in many domains, from dynamic obstacle avoidance to multi-agent collision avoidance. We present a novel algorithm for general anytime replanning which uses properties of A* search trees in order to manipulate start and goal positions of the search while preserving the existing search tree and maintaining optimality of the found path. Expanding A* is provided an initial optimal but colliding path, and operates by repeatedly growing a replan window centered around the collision of the given path, where the initial window is large enough to capture all of the path segments that are involved in this collision. It iteratively replans an optimal path inside a given window window, and then transforms the given window’s search tree to allow it to be used in the next, larger window, thereby performing less work to generate an optimal collision-free plan within the next window than naively planning from scratch. Initial empirical results show Expanding A* requires fewer state expansions and far fewer collision checks than naively rerunning A* in each successive window, while still returning optimal paths within the window.
Creating a Cross-Modal Active Learning System

Increasingly, machine learning is being used to solve problems from spam detection to autonomous driving. One of the most popular techniques is supervised learning. Data, such as text, are labeled by a human, for example as “spam” or “not-spam”, and, after sufficient data are labeled, the machine learns from this labeled data with the goal of being able to predict labels for future data. A downside to supervised learning is that obtaining labels is expensive. Active learning is a framework in which the machine learns in a supervised fashion, but is allowed to ask a human during learning to label unlabeled data instances of interest. Active learning is of interest due to its potential to train models of higher quality with less data.

This project develops a cross-modal active learning system for video and sensor data. The machine learns from labeled sensor data and can request that a human label other parts of the data by displaying the corresponding video, allowing for iterative improvement when retrained on the enlarged labeled dataset. Creating this system involved implementing active learning techniques, verifying them by reproducing published results, and designing a user interface. To evaluate the system, a dataset was collected of sensor and video data. Experimentation showed the system to be effective, and the models trained reinforced the theory of active learning being useful. The system is of particular interest in areas such as human activity recognition, and may be used in the future to train machines in this domain.
Predicting Palliative Treatments for Hospice Care Patients

My project involves working with a hospice care in Italy to prepare data on their patients in a manner that can be used to predict the type of palliative treatments to give each of their patients. Their goal is to improve the quality of life for their patients, and being able to predict this will help them significantly to do so. More specifically, my work consists of exploring and analyzing the multiple datasets provided about the patients and determining what features to create a neural network on to do the prediction. A large part of my work is also preparing the dataset to be in a form that I can feed into my neural network.
The Effects of Navigation on User Engagement

With SPIRE being one of the primary technologies used at Umass campus it is essential to understand its core features. With the new release of the responsive web version, IT hopes to bridge the gap and put SPIRE’s use into a more mainstream modern direction.

My study looks into the engagement that users have with this newly released version and what factors are affecting its use. The study utilizes surveys and One on One user experience tests to gain insight of how many students are using this new product and how we can improve it moving forward. The first survey is used to test general student body willingness to share ideas while the second focuses exclusively on navigation. The usability studies consist of timed exercises to determine how different placement and wording can affect a users cognitive map and learnability.

The current findings show that the change in navigation is a major concern of users. Currently, around 85% of the 155 surveyed feel that the mobile application is difficult to use. The surveys so far have also expressed that they feel that they are unable to find core features that are offered on the desktop version. This is an extremely interesting finding since both interfaces actually offer the same navigation to both. From the usability studies, we have found that the cognitive map of users is also affecting their willingness and ability to learn the new interface.
It is known that effective recovery plan can improve the life quality of stroke survivors, who suffers from a long-term serious disability, such as upper limb hemiparesis, caused by the stroke. For that efficient recovery plan, we need a systemic and empirical way to measure the motor performance of the patients. The objective of this study is to develop an accurate, non-intrusive wearable device that monitors the motor performance of multiple fingers in stroke patients. This device will utilize Radio-Frequency Identification (RFID) technology. Each subject will equip plastic fingernails embedded with passive RFID tags and a smartwatch-like RFID reader on their wrist. In real-time basis, the device will collect RF phase and its signal strength (RSSI) from each tag and convert them into 3D coordinates of each finger. Using the generated 3D coordinates data, we will measure the motor performance of the human subjects.
This study is about binge drinking among high school students and how it affects their academic performance. Researchers conducted a secondary analysis of data collected through the Monitoring the Future study. The theoretical framework for the current study is self-control theory, which would argue that there is a lack of self-control among high school students due to the fragile and potentially limited self-confidence of high school students. Self-confidence is hypothesized to have effects on participation in binge drinking and on academic performance (measured by grades earned) and academic behavior (measured by attendance). In addition to self-confidence, demographic characteristics of respondents (including age, sex, religiosity, family structure and work) are expected to affect both binge drinking and academic performance. It is anticipated that binge drinking will ultimately be the greatest predictive factor in academic performance. Findings from this study can help identify specific variables that will influence binge drinking and academic performance as well as factors that affect binge drinking directly.
Solitary confinement has been a controversial practice in the criminal justice system since its inception in the early-19th century. The origins of American solitary confinement lie in Philadelphia’s Eastern State Penitentiary, opened in 1829, where inmates were kept isolated and silent for 24 hours a day. Today, the U.S. Department of Justice defines solitary confinement as housing an inmate in a locked cell, fully separated from the general population, and unable to leave the cell for 22 or more hours of the day. It is estimated that 80,000 to 100,000 inmates nationwide are in solitary on any given day. This project primarily relies on interpretive legal analysis, meaning that I will choose significant cases related to solitary confinement from the past two centuries and analyze the Supreme Court’s legal logic in each case. This requires attention to what precedent the justices cite, how they frame the legal issue, and how they logically justify their constitutional avoidance of solitary confinement. The logic the Court uses may illuminate the motivations and concerns of the justices on this issue. I will also consider the social context of these cases—legal scholars note that the social institutions surrounding the Supreme Court have unique effects on the justices’ decisions. Additionally, I will review social science literature—primarily from psychology—to gather empirical evidence demonstrating how solitary confinement can be mentally detrimental, and then, ultimately, assert that the Supreme Court should rule long-term use of it unconstitutional.
Abortion, one of the most controversial topics faced by America and the U.S. Supreme Court. In regards to legal implications, abortion law is a multifaceted concern that pulls at the fabric of the legal system. To address this topic in a professional and unbiased manner a very specific question was asked that focused on two of the most striking Supreme Court rulings. How have the decisions in Roe v. Wade (410 U.S. 113, 1973) and Planned Parenthood of Southeastern Pennsylvania v. Casey (505 U.S. 833, 1992) impacted the rights of individuals involved in the abortion debate? In this research the topic of Abortion Law will be discussed as it applies to the rights of the mother, the father, the state, and the fetus. To further open a channel for discussion this research has related the rights granted within the first, fifth, ninth, and tenth amendments to the U.S. Constitution to each of the four selected populations. As readers and/or listeners of this research everyone shares some interest in the topic of Abortion Law. The goal and purpose of this research is to provide a clear understanding of these decisions to help scholars, and the layperson alike, to form an unbiased and educated opinion on one of America’s most controversial topics.
Toxic Masculinity and School Shootings

School shootings exist as dynamic events that occur within western society, and are phenomena yet to be stopped in the United States. Many pieces of the full explanation have been uncovered and discussed. The research conducted here aims to point out a new and emerging piece of the causal factors in school shootings: toxic masculinity. The term is first defined with relevance to criminal justice, a social science, and then defined by the concepts of how it is socialized within persons. The research focuses on three shootings in particular, the Columbine massacre, the Westside Middle School shooting, and the Isla Vista shooting. Using the backgrounds and experiences of the five young men who perpetrated these incidents, it is possible to deduce that toxic masculinity and negative socialization played a role in leading them to commit these acts. This research created a template for finding toxic masculinity in previous actions and behavior of school shooters, which can be applied to other incidents of similar caliber. The research concludes by suggesting a number of solutions, some of which include intervention of parental figures in the lives of their children, and integration of mental health awareness within schools.
Juveniles serving life sentences are particularly challenging because they often lack the physical and mental coping mechanisms that adult prisoners use to maintain their mental health and self-respect. There are approximately 2,500 offenders serving sentences of life without the possibility of parole, for crimes committed as juveniles (Nellis, 2012). At the time of sentencing, most juveniles sentenced to life do not truly understand that they will be spending the rest of their lives in prison. The Supreme Court addressed juveniles’ immaturity in Roper v. Simmons (2005), while banning the death penalty for juvenile offenders. Research shows that the brain is not even fully developed until 25 or so. It is often argued that juvenile offenders do not have the capability to fully understand their actions and the consequences that come along with them.

Recently, the Supreme Court ruled that a life sentence without parole is unconstitutional in Montgomery v. Louisiana (2016). Even with this court ruling, there are thirty states allowing this sentence for juvenile offenders. It is believed that juvenile lifers would have different experiences in prison from adults’ offenders. This study will examine how life sentences affect juveniles’ development in prison, as well as discuss why this is a harsh penalty for them. Further, this study will also investigate unique experiences of juvenile lifers, in order to make suggestions of possible reforms for the future.
Private Prisons

The proliferation of private prisons in the United States has become a major concern to corrections. Private prisons are a profitable institution where they earn money for holding inmates within their system. Due to the fact that private prisons are profiting through the incarceration of offenders, there have been concerns about conditions of private prisons, including institutional security, safety for both inmates and staff, violence, health services, and prison management. According to Review of the Federal Bureau of Prison Monitoring of Contract Prisons (U. S. Department of Justice, 2015), private prisons have experienced more safety and security incidents than BOP institutions. Institutional misconducts in private prison can be one of the major issues that threaten inmates’ and correctional officers’ safety. The Corrections system should carry out the mission to protect society by confining offenders in correctional facilities that are safe, humane and secure while offering rehabilitation opportunities for offenders. Thus, private prisons should be managed in order to carry out this mission under the close supervision of government agencies. However, private prisons have faced many challenges. This study intends to find the differences, both positive and negative, between Private Prisons and State Prisons. Through research, the study will analyze State/Federal and Private Prisons’ confinement conditions and review the institutional misconduct data in private prisons in comparison to State/ Federal Prions. The purpose of this study is to uncover the major problems that Private Prisons create in managing an offender population. By identifying crucial issues of private prisons, this study will be able to make suggestions to address the major concerns of private prisons.
Solitary confinement is a form of punishment used against inmates who violate prison rules and regulations. According to Bureau of Justice Statistics, approximately 20% of prison inmates have been held in administrative segregation or solitary confinement every year (BJS, 2015). Corrections systems have increasingly relied on solitary confinement, in which inmates are restricted to their cells twenty-four hours every day with extreme isolation, as a prison management tool. Studies demonstrate that solitary confinement negatively affects inmates' general well-being. In the report of Walpole Prison, a large number of detainees in isolation indicated reliable examples of psychopathological syndromes, including massive free-floating anxiety, hyper-response to external stimuli, perceptual distortions, and hallucinations. Furthermore, after being held in solitary confinement, inmates have experienced difficulty with concentration and memory. Also, detainees who are in isolation show higher rates of self-hurt contrasted with prisoners in general population. Physical effects of solitary confinement include sudden violent outbursts and an expanded danger of self-damage or harm to others (AJPH, 2014). Prisoners are regularly placed in isolation as a result of unruly conduct as punishment. With the understanding of the widespread use of solitary confinement in state prisons as a disciplinary measure, this study intends to examine the effectiveness of using this practice of discipline. This study will also answer the question whether or not solitary confinement can be justified even with negative effects on inmates, and discuss the issues pertaining to the Eighth Amendment.
Drugs in Prison

According to the New York Times, there are about 1,000 drug confiscations each year in prisons in California. 47% of federal prisoners were serving sentences for drug-related offenses in 2016 (BJS, 2018), and having drugs in prison will not help inmates cope with addiction. A prison is supposed to be a secure place where illegal substances are not allowable. However, it is recognized that drug use in prison has been epidemic and become one of the major concerns in corrections. Drugs in prison not only cause serious behavioral problems with inmates but also hamper correctional officers performance in managing security and safety in prison, let alone helping inmates' rehabilitation. The purpose of this research is to examine why drug use is such a critical problem in prison, and how drugs are so easily accessible to inmates in prisons. Further, this study will also discuss how drugs affect inmates' misconducts in prison. According to the evaluation study about prison drug programs funded by the National Institute on Drugs Abuse, the recidivism rates of prisoners who had participated in a drug treatment program while in prison, was lower than that of prisoners who did not participate in it, during the first six month follow-up period from their release. Thus, this study will briefly discuss how drug treatment programs implemented in prison affect drug use in prison.
Sex offenders have always been at the forefront of debate for policy-makers and criminologists due to the nature of their crimes and the concerns about their recidivism. This unique category of offenders is most publicly shunned and made public through the use of sex offender registries. An individual can easily search registered sex offenders’ information nationwide by using the Dru Sjodin National Sex Offender Public Website (NSOPW) run by the U. S. Department of Justice. The public at large is more concerned with offenders in this category due to their higher rates of recidivism. The debate mostly revolves around whether or not there is any effective treatment available to be able to reintegrate sex offenders back into society and reduce their rates of recidivism. Thus, understanding the effectiveness of sex offender treatment programs and their recidivism will be the important task to manage such offender groups in prison as well as in the community. So, this study intends to examine sex offender treatment programs implemented in prison by reviewing established studies, in order to discuss the effectiveness of programs and how they help to reduce rates of recidivism among them. Also, the studies about sex offenders’ recidivism will be thoroughly reviewed to explain inconsistent arguments about it. By identifying effective programs for sex offenders, this study will be able to suggest feasible rehabilitative approaches for sex offenders.
Plastic bottles, aluminum cans and cardboard are all examples of materials that can be recycled to reduce the environmental impact of their production and use. On college campuses, young adults use an abundance of these materials and make recycling decisions. Although the University of Massachusetts – Amherst ranks near the top nationally in recycling, the recycling rate is only 58%, meaning there is certainly still plenty of room for improvement. However, the most effective and efficient way of boosting the recycling rate remains unclear. College campuses are particularly of interest because the habits formed here may have a lifelong impact. This research is primarily focused on determining which factors are critical in a student's decision to recycle and what is the most effective way of influencing this decision. A survey was distributed to students on the UMass campus in an attempt to measure these factors and gauge the opinions of students. The results have wide implications, not only for college administrators looking to increase the recycling rate on campus, but also for policymakers that may believe the tools of the past, such as monetary bottle deposits, are outdated and ineffective.
American urban areas often face issues with high crime and poor air quality. This study will explore the ability of green space to reduce crime and asthma rates, using county-level data from the state of New Jersey. Utilizing land use data from the New Jersey Department of Environmental Protection, crime data from the New Jersey State Police, and asthma data from the New Jersey State Health Assessment Data, regression analysis will be performed to determine the impact of green space on asthma rates and different types of crime. The regression will control for income, population density, unemployment rate, and educational attainment. The results of the regressions will show the significance and impact of green space for varying types of crime and asthma rates. Additionally, the results will examine the differing impact of green space on crime and health by urbanity and wealth. These results can be applied to a cost benefit analysis for municipalities and states considering increasing green space in their areas or debating different means of decreasing crime or asthma rates. Furthermore, the results can allow for optimal allocation of green space to maximize the benefits to crime and asthma reductions, i.e. placing green space in wealthier or poorer areas, or more or less urban areas.
Across the United States, five towns and cities run independently on 100% renewable energy, and approximately fifty others have followed by pledging to achieve this goal in the near future. Within Massachusetts, seven towns have committed to 100% renewable energy by 2030 or 2050. The transformation to renewable energy sources is becoming increasingly more accessible and inexpensive, with tremendously less environmental impacts than alternative sources. This study uses cost-benefit analysis to examine the feasibility of a town or city’s commitment to 100% renewable energy. This study focuses on the city of Cambridge, Massachusetts that has committed to 100% renewable energy by 2030.

The cost-benefit analysis examines a plan for the city of Cambridge to accomplish 100% renewable energy through a combination of on-site solar installations and off-site wind or solar projects. The costs of the plan will incorporate the costs of hiring contractors, building the renewable energy structures, and administrative costs. These costs are compared to the benefits of more stable energy prices in the long-term, carbon emissions avoided, improved air and water quality, and the recognition of the city of Cambridge as a local clean energy leader. The results of this cost-benefit analysis will give insight into the effectiveness of Cambridge’s plan, as well as the feasibility for other similar cities to achieve this goal.
Is Risk Perception to Blame for the Movement Away from Nuclear Energy?

The opposition to the expansion of nuclear energy has caused this energy source to fall out of favor when considering ways to combat climate change. With its high safety record, low emission rates, and the potential to generate the needed energy supply, this contradiction has prompted the question of why this opposition exists. A potential explanation lies in the risk preferences of individuals and their interpretation of the risk posed by nuclear energy. To examine the connection between opinions about nuclear energy and risk preferences, a survey of college students was conducted. The survey asked students to express their opinions of nuclear energy. In addition, various questions based on the DOSPERT Scale were asked to measure students' risk preferences. Survey results were then analyzed for connections between the risk preference of an individual and their opinion of nuclear energy. Finally, they were compared with scientific facts about nuclear energy to determine if opinions are different. The results of the survey were then used to analyze possible actions that could be taken to change opinions about nuclear energy, and what that would mean for energy policies.
This study looks at modeling how hydropower facilities manipulate water flows in relation to energy prices, with a focus on hydroelectric plants in New England. Flow data is measured in cubic feet per second from two sites: Vernon Dam in Vermont and Northfield Mountain Pumped Storage Project in Massachusetts. The price data is taken from two separate pricing markets, day-ahead and real-time. Day-ahead prices are forecasted prices given to energy production facilities 24 hours in advance, while real-time prices are updated to the minute to reflect real-time demand. The model in this paper not only addresses the effect of energy prices on water flows but also seasonal and cyclical patterns within the data. In addition to seasonality and cyclicity, another special case of flow occurs at Northfield Mountain. Being a pumped storage hydropower facility, Northfield can record negative flows, indicating water being pumped back into the reservoir in preparation for generation. The model shows some correlation between price and flows at both a natural dam in Vernon and a pumped storage dam in Northfield. These results exhibit a relationship between the energy market and the rivers used by hydropower facilities and can be the first step in determining the environmental and economic effect of hydroelectricity in New England.
Denmark and the United States both have capitalist market economies which feature high levels of pre-tax income inequality. In order to combat this inequality, the United States has employed a system of means tested welfare provision. In recent years, however, these policies have proven largely incapable of effectively addressing the issue of inequality. The Danish government has assumed a much more central role in providing for its citizens, developing a comprehensive system of universal social programs to ensure economic security for all Danes. These programs have also enabled Denmark to pursue active labor market policies with the goal of protecting the unemployed from financial insecurity and retraining them to reenter the workforce. In recent years, this Danish system has been put forward as the utopia for other countries to follow. It is important, however, to understand which aspects of the Danish system have allowed it to succeed and whether this type of system can be applied to other countries. Many scholars have questioned the sustainability of this system and whether it can truly be applied to countries such as the United States, that have vastly different population demographics and political ideologies. The goal of this analysis is to examine the ties between the Danish welfare state and its pursuit of labor market policy and assess the sustainability of this system and its applicability to the United States.
Universal Basic Income as a Possible Solution

With the replacement of jobs for humans with automation and the increasing income gap, people have been looking at the Universal Basic Income (UBI) as a possible solution for these issues. Although these problems may not affect some of us now, they will in the future. Universal Basic Income refers to the policy in which people, no matter their income or status of employment, would get a sum of money sufficient enough to satisfy their living needs. The concept of a UBI was formed more than a millennium ago, but only recently have people, companies, and countries started to take action to discover more information about the system through experiments. This paper will examine some of the concluded and continuing pilot programs to compare the pros and cons of the Universal Basic Income and determine if it is an answer to some of the economic problems our society is facing. So far, there have been more benefits than drawbacks from investigations and surveys of the finished experiments from the United States, Canada, and India. This is also the case for the pilot programs that are currently being studied by corporations, such as Y Combinator and Give Directly, as well as in countries, such as Finland. With the information from case studies, Universal Basic Income appears to be a possible solution for the economic issues even though there are some potential consequences that need to be heeded.
Effective Altruism: Where We Should Donate Our Money

Over the past couple decades, a movement called “effective altruism” has emerged in the world of philanthropy. Effective altruists pose a major question to philanthropists all over the world: where should we donate our money in order to save and improve the most lives? The purpose of this thesis is to compare two specific types of charities. These types of charities are exemplified by two particular foundations. The first foundation is the Against Malaria Foundation, a foundation that immediately and effectively helps save Africans who face the risks of malaria. The other foundation is the Future of Life Institute, a relatively speculative foundation that could potentially help save humanity in the case of existential risks. While the money raised by the Against Malaria Foundation is used immediately to help treat victims of malaria, the Future of Life Institute uses the money they raise mainly for research. Using scholarly literature written by highly esteemed philosophers and economists this thesis attempts to answer which of these two foundations uses donations more effectively. In order to answer this question, both foundations are analyzed. Several criteria are utilized to grade the impact that these foundations can have. I explore arguments in favor of charities that have immediate benefits and arguments for charities that are more speculative but have the potential for very large benefits. The goal of this thesis is for people to have a better understanding of where their money can be donated in order to maximize their potential impact on others. The effective altruism movement will continue to captivate philanthropists for years to come.
This paper examines the effect of marginal tax rates on economic activity. An income tax rate change has two primary effects on economic activity: tax evasion and labor supply. The scope of this study is to examine these relationships down to their logical extreme at the implementation of a flat tax. The research method focuses on comparing tax evasion and labor supply rates before and after tax changes. Finally, using these findings, I will assess the potential impact of the Tax Cuts and Jobs Act on economic activity in the United States.
A growing population impacts governmental policy, the global economy, and the environment; a myriad of issues arise that inevitably will affect the public sector and private sector. Population growth debate and future impact of population on real and financial economic growth rates, intertwined into a larger network represented by the global economy, are projected to have deep and reverberating consequences for Earth. By using scholarly literature, the central theme of this research is to discuss the relationship between economies and their occupants’ consumption. My research asks whether and how population growth, over time, affects the economic growth and performance of a country and its currency as a vehicle of value thereby, influencing the valuation of life. According to “Demographics and markets: The effects of Aging,” demographic factors contribute to a 1.25 percentage point decline in the real gross domestic product growth and natural rate of real interest since 1980. This slump implies that demographics rather than fiscal policy, technology and other changes in productivity are responsible for literally all contraction in economic growth over the last 35 years. A Federal Reserve research paper suggested that low yields may be unavoidable, and the current economic policy debate may be misguided. Economies exist for humans intricately involved with man-made societal existences. The quality and valuation of human life, resources being finite, eventually must be re-envisioned for the sake of survival.
Over the last forty years, Sudan has suffered from recurring famines that have devastated the lives and livelihoods of thousands of farmers. Though food supplies remain relatively constant, the region suffers from a lack of purchasing power engendered by failures of rural credit policy. Through a thorough review of scholarly articles on Sudan and comparable nations this paper seeks to discover how a policy intervention in the rural credit market could ameliorate the effects of famine during a period of drought. The literature shows that there are clear connections between some credit channels’ inefficiencies and farmer insolvency during drought. My investigation argues that the two channels of credit with the greatest inefficacy are the informal "Shail" system, and the formal banking system. Under the former system, lenders have market power, and use it to offer loans at predatory interest rates, while the latter system is incapable of effectively extending its loan services to rural areas. Based on a Senegalese design, my solution is to propose a hybrid of the two, using Shail merchants' local access and symmetric information as well as the banks' oversight and fixed interest rates, my policy will use incentives to repurpose these Shail merchants as financial intermediaries for banks so that wide reaching loans may be fairly offered. With this policy, there will be fewer insolvencies in the rural farming sector, thus strengthening famine resistance in times of agricultural hardship.
Valuing foreign life has been, and continues to be, a fraught and underdeveloped field of study in American economic and political analysis. Moreover, as global environmental issues become more pressing, it is clear that there exists a lack of debate on how the United States incorporates the valuation of foreign life into environmental regulations. This paper will analyze the moral implications of valuing foreign lives through the lens of philosophical theories of global justice, and apply this analysis to our current regulatory practices of cost-benefit analyses and value of statistical life (VSL) estimates for environmental regulations. Drawing upon philosophical theories from philosophers such as John Rawls, as well as economic literature regarding cost-benefit analyses and environmental regulation, this study will ultimately make a recommendation as to how we should include foreign life into our cost-benefit arithmetic. Considering these philosophical theories it is necessary to conclude that access to a clean and healthy environment should be considered a basic human right, and therefore government regulations should consider the impact of American environmental regulation on foreign life in some manner. This necessitates the analysis of how foreign lives, or foreign mortality risk, is affected by proposed American environmental regulation through VSL estimates or otherwise. As the United States is a major economic and political world power, as well as a top global polluter, it is necessary that the American government leads the way in respecting and accounting for the right to a clean environment for all.
Investing in Sustainable Development: A Cost-Benefit Analysis

Developed countries have historically contributed the most to global warming. However, in recent years their total emissions have stabilized while emissions from developing countries have been steadily growing and are expected to grow even further with projected economic growth. Our study analyzes the performance of sustainable development projects in developing countries, focusing on how effectively the Greenhouse Gas (GHG) emissions are either eliminated or mitigated as a result. For this research, we examine sustainable development projects from the United Nations Framework Convention on Climate Change (UNFCCC) project database, and integrated this data with spatial information about project localities. These projects are part of the clean development mechanisms (CDMs) framework, which awards tradable GHG emission credits to developed countries that invest in climate mitigation projects in developing nations. Our analysis allowed us to evaluate which types of projects are most effective at mitigating GHG emissions, which are most cost-efficient, and how local characteristics (i.e. climate, geography, infrastructure, and population densities) may affect these outcomes. We explored how efficiently these projects create sustainable energy sources. More specifically, we examined how effectively projects contribute to climate change mitigation, while they simultaneously promote growth through the development of new sustainable energy infrastructure. This study will provide useful policy recommendations on sustainable development project design. In particular, we will identify the most successful design strategies in relation to specific constraints including capital investment size, maintenance cost, project duration, and location characteristics. By identifying the most successful designs we expect to highlight best practices for future climate change mitigation projects in developing nations.
A Renewable Energy Credit (REC) is produced when one megawatt hour (MWh) of renewable energy is generated and transferred to the electric grid. RECs are traded separately from the energy produced and are used to prove compliance with renewable energy mandates. This study will focus on Solar Renewable Energy Credit (SREC) markets by comparing two well established SREC markets in Massachusetts and New Jersey. SREC market prices have been volatile which has the potential to impact investment in solar energy. This study attempts to quantify common externalities that lead to the volatility of the SREC market.
Why do most people often leave the grocery store with more items than they were initially intending to buy? Evidence suggests that the placement of various items in a store can influence consumers’ purchasing patterns. Using data from the European Food Information Council (EUFIC) this study demonstrates that your local grocery store can inadvertently help you pick and choose what foods to purchase. Surveying previous literature, these past studies prove that the organization of grocery store chains directly influence consumer choice. This study examines variables including location of the store, sizes of the stores, department and display layouts and food placement that individuals are exposed to, to examine how consumers’ implicitly alter the basket of goods ultimately purchased. Not only does the store layout affect the purchases consumers make, but it is shown it can impact what he/she considers well-being and their daily food choice.
Previous research finds that, in a laboratory setting, willingness to pay elicited in auctions consistently and predictably diminishes after a negative information treatment. However, there's reason to believe that preferences elicited in experiments are correlated with participant characteristics imported into the laboratory setting. The purpose of this research was to empirically test for correlation between proclivity towards following social norms and a decrease in bids associated with a negative information treatment. It was hypothesized that participants with a greater degree of sensitivity to social norms will exhibit larger bid decreases as a result of the negative information treatment than those less sensitive to norming. A series of experiments exposed participants to a negative information treatment about animal welfare standards in the dairy industry to influence consumer preferences for ice cream. Participants began by completing a survey about perceptions of dairy industry practices, then engaged in a rule-following activity, and submitted bids in two sequences, consisting of five-rounds each, of second-price auctions. Analyzing the data with linear regression software, there was a decrease in WTP. Using the results from the survey, the statistical significance of the different groups of dependent variables were investigated. Dependent variables include demographics, animal welfare preferences, dairy consumption habits and dairy industry standards. This supports the objective hypothesis that higher sensitivity to social norms is associated with greater bid decreases as a result of a negative information treatment.
Analysis of the Price Elasticity and Market Structure of Toothpaste

This study is designed to examine the price elasticity of toothpaste and its connection to the revenues generated by manufacturers as they change its market price. Published data on toothpaste sales, average prices and revenues provide evidence that the price elasticity of demand for toothpaste is less than 1, indicating that it is a necessity to consumers with few, if any, substitutes. As a price inelastic product, firms experience higher revenues when they raise the price on toothpaste. The consumer’s lack of sensitivity to price change in toothpaste thus works in favor of its manufacturers who earn larger revenues from occasional price hikes on their product.
This thesis examines the relationship between changes in hospital ownership and hospital performance. As the United States enjoys a mixed public-private healthcare system with over a thousand private hospitals, some healthcare firms see an economic advantage in acquiring hospitals and expanding their revenue and profits. As with any other industry, healthcare experiences market consolidation activity, and this market activity has an effect on consumers. In the context of healthcare, consumers' financial costs incurred are not the only worry of market consolidation, but also the quality of care they are provided. Though there have been studies that have examined the relationship between hospital mergers and acquisitions and resulting patient outcomes, the results vary widely, and there is no popular consensus on the relationship between ownership changes and health-based patient outcomes (there is substantial literature on changes in ownership as it relates to the financial costs accrued by patients).

This research aims to further establish the relationship between hospital consolidation and hospital performance, using patient outcome metrics based on health as a proxy for hospital performance, and also examining consolidation's effect on patient satisfaction.

I use a means comparison and multiple linear regression as a method of analyzing the relationship between these factors, and include controls for income and environmental health risks (county-level risk factors for smoking, obesity, poor physical health, premature death, etc.) to mitigate the causal effects of various external influences on the patient outcome metrics.
This thesis explores the topic of digital identity (DI). DI is an online identity associated with a person or organization based on their browsing history. As more and more consumers around the world are gaining access to the internet, digital channels have steadily grown in importance. An analysis of DI is, therefore, essential in order to protect consumers. Without such protection, consumers will face a loss in privacy and potentially devastating financial losses through identity theft. This thesis also explores the impact of DI on two industries, finance and social media, and examines the failures of past DI systems. Research has shown that although the current DI system is vulnerable to hacking, strides are being made towards building a more secure system. Companies are beginning to acknowledge that since they hold consumers’ DIs, they are responsible for its protection; otherwise, they may lose consumer support. Accordingly, several companies are using cutting-edge technology, such as differential privacy, to help safeguard the personal information of consumers. Countries have a different take on DI and many are in the process of establishing new regulations. While the United States is using DI to protect the identity of consumers, interestingly, China is using DI to control their citizens from denouncing the government. Despite the differing motives, both countries are still striving towards the same goal of a successful DI system. China is also creating a virtual identification system which could be adopted by others as well.
Hydraulic fracturing has allowed America to become more energy independent than ever before. The technological breakthroughs of horizontal drilling has led to the development of depositories that were once thought to be inaccessible. By injecting millions of gallons of water, sand, and chemical additives under extreme pressure, the shale cracks and allows the resource to flow back to the surface. However, up to thirty percent of the water necessary for extraction returns to the surface as a waste product. If handled incorrectly or well integrity fails, the wastewater can seep into groundwater sources. Past research has suggested that this can impact human health, as many of the chemicals are known to have carcinogenic effects, and also lead to environmental degradation.

To prevent this indirect cost of production, companies must choose how to handle the large quantities of contaminated water. There are different treatment options available, but the most common techniques involve Class II well-injection and treatment for reuse, both on-site or at a wastewater facility. Using a comparative cost-benefit analysis, accounting for non-market costs, this project proposes a course of action regarding the most efficient treatment option. Through the collection of transportation costs, price per barrel, and other operating costs found in scholarly articles and public records, the analysis can determine the net present value for each option. Multiple evaluation rubrics are used to take into account different target objectives, such as minimizing costs, valuing a human life, and conserving the environment.
Saving for retirement is one of the most important financial actions an individual can take. Facing a high government deficit, the depletion of Social Security funds, and a decreased prevalence of pension plans, the millennial generation must depend “exclusively on personal savings and 401ks” (Ghilarducci 2015). Behavioral economics, the integration between economics and psychology, has contested the view that individuals make rational calculating decisions. Influenced by many behavioral factors, people make decisions that defy standard economic theory and go against optimizing outcomes. For example, many people exhibit status quo bias, sticking with the default option provided despite its lacking qualities (Madrian and Shea 2001; Choi et al. 2004). Through economic and behavioral economic analysis, I argue that the current structure of automatic enrollment 401(k) plans does not address the growing concern amongst millennials of having insufficient retirement funds. (EBRI 2017; Wells Fargo). The returns on investment are extremely low (+$8,956) and the total account balance is inadequate ($124,291). I argue that retirement choice architecture must include both participation and contribution focused mechanisms going forward. Therefore, I propose a government mandated automatic enrollment plan with a six percent default rate in a large cap stock fund with automatic escalation features. Under my proposed change, a millennial will retire with $1,415,226, quadruple the total 401(k) balance at age 70 under the current plan. Overall, this proposal seeks to identify and address the important characteristics of retirement savings frameworks.
The United States’ incarceration system is famously costly to operate. It is therefore imperative to regularly re-evaluate the prison system and reform it accordingly. One essential function of prisons is to rehabilitate offenders so that they may return to society as productive, contributing members. This paper examines different prison and post-prison education programs and attempts to glean what makes an education program an effective rehabilitation tool. This paper synthesizes the findings of multiple prison education studies and evaluates what common program elements account for successful education programs. Where program studies often examine recidivism rates and post-prison employment status as metrics for success, these studies often neglect prisoner experience. To supplement this absence of information, this paper provides qualitative data from former prisoners through a survey that inquires about their notion of their education program and what value they garnered from their experience. With this added lens, the paper finds that effective programs are characterized as ones that build on the self-efficacy of prisoners, make prisoners feel more optimistic about re-entering the workforce, that supply prisoners with marketable skills that can be put to use in their communities, and that give structure to their lives. These findings better inform education program decision making and emphasize the value in considering the experience of prisoners when evaluating the success of a program.
The Great Recession of the 21st century rocked the American economy from its stable foundation and left consumer confidence plummeting. While the recession was unanticipated, the aftershock effect it had on consumer confidence was expected, as uncertainty left consumers feeling pessimistic about the economy. Similarly, when an external force outside of the economy occurs, such as a natural disaster or act of terrorism, their effects are unanticipated due to the sudden nature of them and negatively impacts consumers' confidence, also without warning. These occurrences are known as negative exogenous shocks and have a draining effect on economic conditions based on the same principle of uncertainty. Negative exogenous shocks are expected to have an indirect relationship with consumer confidence, such that when a shock occurs, consumer confidence will lower and when no shock occurs, confidence will remain fixed on economic conditions. This presentation sheds light on the diminishing effects of exogenous shocks on consumer confidence after the Great Recession and is comprised of two time periods in the 21st century: before and after the recession. This thesis argues that the time period after the recession shows no difference in consumer confidence, whether or not a shock occurs.
This research paper uses an ordinary least squares model estimation to attempt to find a statistical relationship between U.S stock market returns and a number of assumed independent financial variables including: real disposable income per capita, population growth per capita, last year S&P 500 prices, dividend yield, P/E ratio, capacity utilization, commodity prices, VIX/VXO index, and external GDP. In order to try to find any statistically significant relationships I review past research papers on similar topics and build my model based on previous research and try to add value by introducing slightly different econometric methodology. In picking my variables I use economic theory to back up my reasons for picking the variables I did. For example, last year S&P prices should lead to higher current year prices because investors and business owners should be confident in the state of the markets, thus investing more. This paper, will also analyze different results during different business cycle stages in the U.S economy, such as pre-2008 recession and post-2008 recession to see if results differ given different economic stages.
Gender and identity are intimately connected, however, one is given to you, and one you choose for yourself. Over the last decade, our country has come a long way in accepting members of the LGBTQ community. But why is it a community? People of the lesbian, gay, bisexual, transsexual, and queer community are still perceived as different through the eyes of many, because in years past, being something other than straight was not considered the norm. Although it is now becoming more common for people to "come out," there are still people who abide by "tradition" and frown upon the idea of a young man or woman who seeks something that is, perhaps, different. Fortunately, a huge historical movement broke out on June 26, 2015: gay marriage became legal in all states. Although many people were in disbelief that day, gay marriage should've been legal all along. Today, some claim racism is over because it's less common for whites to look down on African Americans, but what is it called when straight men/women look down on people for showing who they truly are? Homophobia. Homophobia still exists today because some feel as though they're above others. They are somehow privileged enough to judge people for loving someone of the same gender or wanting something different with their bodies. Now, some members of this community, are afraid to be who they truly are because they want to fit in, self-conscious of feeling they may not belong.
A bachelor’s degree is necessary in the 21st century to secure reliable and quality employment. The accompanying stress of higher education and pressure to earn a degree often triggers mental health complications, primarily depression. Colleges across America face an increasing rate of student depression. With rising levels of depressed students, colleges are unable to provide adequate services to properly and fully address the issue. Unfortunately, this inability to treat the depression epidemic results in lower academic efficacy because depression hinders a student’s classroom performance. My research explores the effect depression has on the academic performance of students in a post-secondary educational setting. In a 2012 National Alliance on Mental Illness (NAMI) report on mental health in college, a survey respondent explains how depressive episodes prevented the student from attending classes, and as a result the student had to withdraw from the college. The report presents statistical findings that of all the respondents who dropped out of college, sixty-four percent of these students withdrew due to mental health related issues. NAMI’s report, based on respondent feedback, urges colleges to provide more campus-based services to accommodate the growing need. Since depression is intimately tied into the academic progress, and therefore determines the likelihood of graduation, it is vital to not only understand the extent of effects from depression, but also to formulate a comprehensive response to the issue of rising depression.
The purpose of the research project is to identify the needs of international/immigrant students at Bristol Community College (BCC) and to make recommendations for improvements in support for students’ academic, financial, social, and family needs. The motivation for this project came from the negative media attention given in the past year to immigrants. One way that we can combat this issue is to provide immigrant students with a good education, and to make them aware of the services that BCC offers. In addition, the project will educate American students about cultural relativism. The intent of the project is to use the findings to hold an event on campus that best fits the needs of students. In addition, a goal is to utilize campus media to reach as many students as possible. The proposed research methods include surveys and video interviews conducted with international and immigrant students. In addition, proposed research includes analysis of documents showing the outcomes for international/immigrant students who were successful in their community college academic careers. The project is pending approval, so at this time, there are no conclusions available and the significance cannot be determined.
Dual-Language Programs: The Most Beneficial Way to Teach ELL Students

This paper explores the benefits of teaching ELL (English Language Learners) students through Dual Language Programs. Dual Language is the instruction of course material in both the student’s native tongue, and the language he or she is trying to learn. There is evidence that ELL students lack confidence in their learning. Because of their linguistic reality they are often perceived as different from other learners, thus leading to disappointing academic results. Examples of these results are: low achievement on test scores, increased dropout rates, low graduation rates, and inadequate reading and writing proficiency. This paper focuses on research that has proven that Dual Language Programs will boost test scores, reduce the dropout rate, raise the graduation percentage and enhance proficiency in reading and writing. The general argument is that long-term goals of developing the education of ELL students in the United States will improve with the implementation of Dual Language Programs. This paper exhibits how ELL students are marginalized and thus failed by the US education system. In other words, they are not given the opportunity to learn like their English-speaking classmates. The situation is such, that it could be said that these students are not prepared to succeed academically; and thus lack the opportunities to move forward beyond school. Dual language programs would allow ELL students to grow in many ways not solely academically, but will be given the opportunity to shine and use their linguistic reality as a resource instead of a language barrier.
Despite nearly 10,000 miles of ocean that separates them, Puerto Rico and the Philippines are united by a history that manifests itself in neither Spanish nor Tagalog, but English. In 1898, the Treaty of Paris declared the end of the Spanish-American War, signaling the fall of the Spanish Empire and the rise of the United States as a global power (Doyle 144). This treaty not only established peace by ending the war, but also yielded Spain’s former colonies, Puerto Rico and the Philippines, to the United States (Doyle 144). Although Puerto Rico became a Commonwealth in 1952, and the Philippines gained independence in 1946, both territories continue to feel the effects of colonialism, more specifically through language (Caronan 338).

After the end of the Spanish-American War, the US implemented an education system in Puerto Rico and the Philippines that strived to Americanize the masses of both colonies through English language education (Barreto 90-91). By establishing this system, the US not only was able to extend its universal values of equality, peace, and democracy to territories that they considered to desperately need them, but also promulgated the superiority of English language and Anglo-American culture within them as well (Barreto 91). Even if the US forced its first colonies to learn English and revere American culture, ultimately Puerto Rico and the Philippines would rebel against their oppressor. Just as creole and pidgin languages formed between enslaved peoples so that they could communicate in secret, I argue that Spanglish and Taglish are similar forms of rebellion that slowly dismantle imperial authority in a manner that can be neither perceived nor understood by the oppressor. Therefore, I hold that the formation of Spanglish in Puerto Rico and Taglish in the Philippines symbolizes a linguistic rebellion in both territories; or further, an effort to fight against the imperial power of the US with the objective to maintain identity, culture, and the language that binds a people together.

In this present study, I search to compare and analyze education policy, imposed by the Americans after the Spanish-American War, that both de-humanized the people of Puerto Rico and the Philippines and submitted them to confront the violence of suppressing their own cultures and languages. In the process, the Puerto Ricans and the Filipinos appropriated the language of the colonizer, English, and converted it into their own cultural element as a means to liberate themselves from their mental chains and re-humanize themselves. By studying the politics that Puerto Rico and the Philippines bore, and analyzing their rebellious responses through education reform and
linguistic fusiones, this present study will offer an understanding to how periphery nations are able to dismantle the element that binds a nation’s core values together at a seam: language.

Bibliography


Mental health is heavily stigmatized in society, making it difficult for individuals to openly discuss their struggles and receive the help they require. The negative impact of mental health stigma is especially present on college campuses. YouTube’s rise as one of the most influential and widespread social media platforms offers a platform for increasing awareness of and discussions about college mental health topics. Although much research has been conducted pertaining to the use of videos in education, little research has been done to understand how YouTubers are able to captivate such large audiences. Even less research has been done on how to utilize these platforms to purposefully engage audiences in specific discussions. For this study, I examined YouTube videos, blogs, and research literature to identify common elements that shape the success of YouTube videos. I developed a video rubric based on my findings, which will be used to guide the design of YouTube videos focused on mental health for college students. Through a combination of understanding where the stigma surrounding mental health originates as well as key attributes of successful and engaging educational YouTube videos, I will be able to develop a YouTube channel focused on increasing discussion and reducing the stigma surrounding mental health on college campuses.
When conducting my research I hope to find out how successful life skills classes are in teaching students with Down syndrome how to live independently in the future. The Center for Disability Services released an article with tips on how to best teach students with Down syndrome. They wrote how important it is to have high expectations, and base your lessons on each student's individual needs. They also wrote how students work best when they can perform and be hands on and interactive in their learning which is essentially what life skills classes are all about. (Down Syndrome Aim High Resource Center) With my further research I hope to find how successful these classes really are. I will be interviewing life skills teachers and students, and also group home residents, volunteers, and employees to find whether life skills classes are or are not successful in teaching people to live independently. If I find through my research that life skills classes are not successful in teaching students to live independently I will offer plans and strategies to adapt life skills classes so they are successful in teaching students to live independently.
The Gap in Learning between Children and Teachers

Adults administer standardized testing to children in elementary schools to gather information on how well a student can read, write and solve math problems. Students who attend elementary school do not always agree with their teachers about what is important to learn. This project will focus on representing that gap using two-dimensional art.

The school building is made up of gray, semi-abstract cardboard built structures, backed by a particle board frame. A closer look through the windows of the buildings will reveal classroom requirements and Massachusetts teaching framework objectives such as the fourth-grade math standard that states students will draw and identify lines and angles, and classify shapes by properties of their lines and angles. In the foreground, the ideas of the elementary school aged children will be depicted by using the primary colors red, yellow and blue in the combination of paint, marker and collage materials from books and internet sources.
For millions of high school students across the country, mental health struggles can be a serious obstacle to success. In colleges, counseling centers help students who struggle with mental health issues. In high schools, however, counselors are not equipped or trained to help students who struggle with depression or anxiety, and in lower income schools these problems are more apparent and almost rarely dealt with. Teenagers are filled with emotions that can impact their daily lives. Even if students aren’t suicidal or depressed, it can still be nice to have someone to talk to each day. Providing high school students with counseling with qualified professionals is a necessity that every high school should have. By researching effective mental health programs at high schools around the country (and the world), this project explores the social and academic benefits of hiring qualified counselors to work in high schools in Massachusetts. I am looking for a more permanent solution to reduce the amount of teen suicide, bullying, and mental health related cases in these schools.
The article titled “Race & Ethnicity” on criticalmediaproject.org focuses on how and why the media portrays certain individuals in specific ways, including why people of color are often cast in certain roles such as the maid, the gangster, the “model minority,” and the terrorist, while most of the main characters in movies and television shows are white. The media is one of the most influential ways of how people receive information and how they portray certain products, other sources of media, and especially other individuals. Media creates meaning about race and ethnicity, and plays an important role in shaping the way we understand race and ethnicity as part of our own identity, our history, and our everyday lives. In the United States, whites have historically been associated with superiority and privilege while people of color have historically been associated with inferiority and labeled as the "Other" in society. The negative effects that arise from this ideology is that people tend to use race and ethnicity as descriptors, which automatically place people in groups which, overtime, have developed into having certain traits and attributes. With these groups forming, dominant groups rose to power and created influence over others by occupying and controlling languages, cultures, and rituals of the U.S. This caused racism to exist on not only the interpersonal level, but the institutional level as well, which means it is prominent in institutions including the government, law enforcement, education, religion, as well as media industries.
This project will examine racial protests within sports and the outside world. Race is important because of the different events that are happening in the media that have to do with taking a stand and the different protests that are going on nationwide. Some examples of these that have to do with taking a stand against racism and police brutality is when Colin Kaepernick, an NFL player who kneeled in 2016 when the national anthem was playing because he believed there were racial injustices occurring against black americans. Some other examples of sports stars taking a stand against racial injustices would be when Miami Heat players wore hoodies in response to the death of Trayvon Martin in 2012. Some other examples of responses to racial injustices within professional sports would be when the Black Lives Matter movement was happening and NBA players would wear t-shirts with the word I Can’t Breathe in response to the death of Eric Garner. The WNBA team the Minnesota Lynx showed support of the Black Lives Matter movement and wore t-shirts with the slogan “Change starts with us. Justice and accountability” after Philando Castile was killed by police in Minnesota. All of these movements and support throughout the sports industry shows us how much certain citizens in the United States care about police shootings and other violent crimes that happen in urban black neighborhoods. People are showing support of the Black Lives Matter movement by protesting after cops shoot innocent black children.
My research focuses on the debate over which theory of universal creation should be taught in schools: evolution or intelligent design. The ongoing discussion about teaching theories of creation has timelessly challenged educators, curriculum writers, and the government. Through anecdotal discussion in the context of court cases I attempt to dilute the reasons for conflict and propose why both evolution and intelligent design should be incorporated into the curriculum, though each theory may be taught in different settings; evolution is likely to be taught in a biology classroom, whereas intelligent design has a more appropriate place in a theology or philosophy class. The purpose of this research is to demonstrate the alignment between my educational philosophy and the teaching of both theories. I would encourage school districts to allow for the instruction of both theories. The goal of an educational system should be to prepare students to acquire independent thinking skills rather than indoctrinate them with a particular view, and I believe that teaching both evolution and intelligent design, even if they are taught in different settings, would aid in developing such skills.
In current day, education is a big factor in someone’s life. It is what initially helps someone become successful in life. In order to succeed and prosper in education we need to make it the best it can be. Like everything else in life the education system still has space for a lot of improvements. One of these issues is diversity. Diversity is known to be a major issue on different college campuses around the country. This lack of diversity can not only affect the students but also affect professors.

In order to construct this research project we as minority students on a predominantly white institution are going to expand our understanding of the situation. We are going to interview professors of different ethnic backgrounds and different jobs levels to express their feelings towards diversity on campus. We are also going to give out an anonymous survey to the students on the campus and give them a chance to also express themselves. Along with our personal experiment we are going to read more about others research. This is not only going to help is understand the situation but also help us come up with a solution or the proper steps to improve diversity on this campus.

At the end of the research it is hoped that we can help have a better diversity rate on our own university and university’s around globe. This is research project can also wake this education department up and get them to start making some changes.
“Engineering School” was created with the goal of introducing students from kindergarten through fourth-grade to STEM concepts, vocabulary, and ways of thinking in an informal setting outside of the classroom. Math anxiety and the dislike of STEM subjects are widespread across the country in people of all ages and especially in girls. Engineering School provides resources and support that engage children in exploring STEM subjects unrestrictedly, giving them the opportunity to use their curiosity, creativity, and instincts to guide their interactions with STEM topics through building and folding activities. Engineering School, a weekly workshop setting in an after-school program at Wildwood Elementary School in Amherst, MA, has engaged boys and girls 5-years to 10-years old in hands-on engineering projects. Learning is happening at the highest cognitive levels: students evaluating designs, students creating their own designs, and students teaching other students. By allowing weekly activities to be directed by students’ interests and curiosity, Engineering School creates an environment in which youngsters feel comfortable exploring new ideas, utilizing their creativity and taking risks. These behaviors are fundamental to success in all STEM endeavors which require creative and innovative thinking and the constant asking of questions. Through their active participation in Engineering School, students are gaining confidence in themselves developing the skills of successful engineers.
The purpose of this study is to understand how to best serve ethnic minority low socioeconomic status youth through mentorship programs. This research focuses on understanding if the literature’s description of the average mentor (White, middle class, medium-high SES) is more effective than mentorship done by a more relatable figure who has experienced similar life challenges as the average ethnic minority urban based youth. This research is significant because the literature fails to examine these individuals as a viable mentorship option. The opportunity for a mutually beneficial program that fosters mentor and mentee growth is also discussed. Collected data will be mostly qualitative and obtained through interviews and surveys. Interpretation of data will be used to understand how to best connect with and help youth in similar urban communities. Though the results have yet to be fully interpreted, they are pointing towards reason to value the importance of relatability in a mentor-mentee relationship. This finding would be novel, as most research accepts the aforementioned typical mentor to be most acceptable, while these findings would suggest otherwise. The results of this research are important because understanding needed characteristics in a mentor are vital if mentorship programs are to be successful. Additionally, this research is examining programs that are mutually beneficial towards developing local men into mentors as it is with the youth themselves being mentored. This is significant because this research would aid in development of programs that serve two marginalized populations.
Synergy between Pumped-Hydro Energy Storage and Wind Energy in the New England Electricity System

Pumped Hydro Energy Storage (PHES) is a well-established energy generation technology with over 20 GW of installed generation capacity currently in the US. The main benefit of PHES is the additional flexibility and reliability it offers the grid. Grid variability caused by high levels of renewable generation sources can be mitigated through the integration of PHES. When operated alongside wind farms, a PHES plant can exploit the rejected or excess wind energy which is stored as potential energy in the form of water pumped to an elevated reservoir. This paper explores the relationship between high levels onshore and offshore wind penetration with PHES. A computational model simulates the operation of a PHES facility in the electricity system. The results obtained indicate that introducing PHES into an electricity grid with high penetration of wind energy can result in increased capacity factors of wind generation technologies. With PHES, offshore wind in New England increases its capacity factor from 7% to 12%.
A four-year-old community-dwelling child has a severe neuromuscular disease called Nemaline Myopathy. The condition weakens all of one’s muscles and complications include difficulties with moving and speaking. The child is learning to read and write, so predictive text devices are not yet available to them and communication is accomplished through images and symbols. The child is being taught to use a Prentke Romich Company (PRC) speech-generating communication device, which uses a computer tablet to form expressions by selecting symbols that have meanings. The primary objective of this project is to create a new access interface for the child to use to interact with the PRC communication device. The child can currently manipulate the PRC device through either a switch or an eye gaze access interface. However, the interfaces have shortcomings that include being bulky and cumbersome to use outside of the home and have lengthy delay times resulting in slow communication. Considering the child’s needs and physical abilities, a new communication interface is developed using a gyroscopic mouse that can be manipulated by the child’s hand or head, as these are two places where the child has sufficient motor skills to manipulate an object. This interface uses an inertial sensor to send acceleration and angular velocity data to the PRC device. This data is interpreted to make appropriate mouse movements on the screen via a Universal Windows Project installed on the device. The device housings will be constructed using 3D printing to secure the inertial sensor to the child’s hand or head during use.
An Investigation into Capitalism and Unfree Labor in the Twenty-First Century

From the nineteenth century transatlantic slave trade to the contemporary era of mass incarceration, capitalism’s entanglement with unfree labor has been the subject of scholarly research from Karl Marx’s *Capital, Vol 1.* (1867) to Eric Williams’ *Capitalism and Slavery* (1944) to Dennis Childs’ *Slaves of the State* (2015). However, with more people enslaved today than all of the people violently seized from Africa during the transatlantic slave trade (Bales, 2012, p. 9) and capitalism persisting as the predominant worldwide economic system, a critical analysis of the structural relationship between capitalism and unfree labor remains all too pertinent in the twenty-first century, especially if we as a society truly wish to abolish all modes of unfree labor.

Hence, the purpose of this investigation into capitalism and unfree labor in the twenty-first century is to examine prevalent forms of unfree labor which exist in the present day capitalist mode of production, namely unfree prison labor, unfree migrant labor, and unfree international labor. The conclusion to this research suggests that the production and exploitation of unfree laborers is the result of a structural tendency inextricable to the framework of capitalism itself. With a “werewolf hunger for surplus labour [and maximizing surplus-value]” (Marx, 1867, p. 291), capital in the twenty-first century continues to commandeer a panoply of state institutions and functions responsible for incarceration, immigration, and international trade in order to “force the cost of labour back towards [...] zero” (Marx, 1867, p. 657).
Loneliness has been a heavily combated emotion, one that ties everyone together in a universal empathetic grasp. This piece of fiction was written to confront those feelings, as well as reach out some hope that there are others experiencing the same thing. Nowadays, it is all too easy to feel isolated, so this story helps to bridge the ever growing gap between people. “Do You Taste Like I Do?” is based on personal experience. The main character fights with her own sense of self-worth and absence from the people around her, and in the process, meets a girl that seems so insurmountably different from her, yet they share the common thread of loneliness. Instead of closing herself off, the main character opens herself to this new girl, both of them sharing optimism when finding each other; another person who understands just how she feels. The story reaches one of the most simple instincts a person has - to find someone to connect and share with. It is able to instill a sense of bittersweet solace within its readers. It moves an audience to reach out and make a new friend. When living in a world so closed off and secretive, a story such as this is vital to keeping morale high and inspiring to do the unimaginable; to divulge in another person and give up a piece of themselves to dispel the loneliness.
Kanye West would be the first person to tell you that Kanye West is not ordinary. He is an artist, a producer, a visionary. He is crude, egotistical, impulsive. My undergraduate thesis, from which the proposed paper is taken, examines how West’s music reveals that his albums are created for much more than entertainment. What sets Kanye West apart from many of the rappers of his time is his reluctance to commodify his art and his vision for profit. The proposed paper will examine how, in his first several albums, Kanye uses his platform to expose the trap of several prevailing ideologies through music. Soyica Diggs Colbert comments on his debut album as a rapper, “The College Dropout,” noting that it “decries alienated labor and incorporates bitter irony with notions of transcendence” (54). In the proposed paper I shall examine how Kanye mixes in his experience as a middle-class African-American to criticize the meritocracy in America, demonstrating that its real purpose is to create social hierarchies and further segregate people. Specifically, and because of how predominant racial commentary is in his music, I will focus primarily on the complicated race relations in the U.S. and how they contribute to what I call his “conceptual martyrdom.” His lyrics suggest fame, fortune, and success are empty dreams because they foster a false sense of security and happiness. Further than that, Kanye accuses black people specifically of being most oblivious to the emptiness in these dreams. For example, in the song, “All Falls Down” off “The College Dropout,” he raps “Things we buy to cover up what’s inside// Cause they made him hate ourselves and love they wealth” (West). My proposed paper will argue that this reward system breeds a ferocious consumer culture that equates material possession with success. As Chris Richardson has asserted, “West recognizes that a university degree is necessary for attaining status and the hope of a well-paying career but is also a way for the dominant culture to judge others and legitimate social hierarchies and segregation” (102). By questioning what is otherwise widely and passively accepted by most, Kanye’s likeability suffers. Ultimately, the proposed paper argues that Kanye’s character suffers an unfair metaphorical death because his vision promotes radical thinking about the current state of American culture. The media mistakes his confidence for arrogance, and remembers his passion as mania. This paper is intended to recover his character as a radical social critic instead of a methodless madman, revealing how his work provides insight and inspiration to those willing to listen.
The purpose of this research is to examine a new phenomena in American warfare. In 1994 the United States military officially lifted the ban on female soldiers serving in combat rolls. This means for the last several decades American women are fighting alongside of men. In war, historically constant racially sexualized violence against women has been used to punctuate the defeat and destruction of an ethnic group. American military women are now thrust into participating in a warrior culture they were previously partially separated from. For the first time in American history women are exposed to or participate in torture; are they victims or perpetrators of abuse? This complexity of violence raises cases of Post-Traumatic Stress Disorder (PTSD), and other medical and societal implications. Also, violence against women, physically and sexually, has increased in the number of reports in the last two decades among military personal. The complex nature of the subject involving gender, the military, and aggression, lends itself to an interdisciplinary research approach.
Early twentieth century philosopher, Frederich Nietzsche argued that because language is only metaphorical and cannot provide knowledge of things in themselves beyond phenomenological experiences, it (language) is inadequate to proclaim anything true about ontology, experience or meaning. Our very vocabulary alienates us from being, leaving us fragmented and split. However, the ability to express these ideas, requires the use of language. Author Nicholas Carr argues that technologies in written language,—specifically the phonetic alphabet and the Gutenberg press— brought about an expanding vocabulary that brought words and ideas into being that had previously not existed. Through which, people’s experience of reality was heightened, made more complex and nuanced. Stated more explicitly, Carr writes: “As language expanded, consciousness deepened.” The mode of language, especially the written word, give tools with which to understand our experiences in relation to a world whose fundamental reality is contingent. Far from alienating us from our internal and external worlds, language gives shape and form to our experience. Words may only be metaphors of phenomena, but they are metaphors that have meaning and being in things beyond themselves. However, we live in an age where language has been leached of sense and definition. Words that used to burn with meaning have been replaced with pith, platitude and hackneyed cliche that sit in the mouth like tepid water or emerge stillborn.
When I first began crafting my Honors Project, a feature-length screenplay in the neo-noir genre, I sought to answer one question: How do you create an engaging script that is as compelling as it is emotionally authentic to its themes? Screenwriters and producers are often so heavily focused on the entertainment value of their projects that a serious subject, such as PTSD, can often feel overly romanticized, or in some cases, trivialized. I wanted to discover the origin of this phenomenon, and in the process challenge the status quo by creating an emotionally rich narrative that is respectful and realistic of its harrowing subject matter.

I would like to present an ePosterboard on the process of creating this screenplay. My project, titled Paper Faces, presents the story of an ordinary person suffering from extraordinary trauma, who is slowly losing touch with reality. In preparation, I have conducted research into addiction, child loss, the psychology of memories, and the diverse forms PTSD can take. A common misconception in film and literature is that PTSD is the same for everyone. I have studied the effects of trauma, spoken with people living with PTSD, and read case studies published by the American Psychological Association and Fire Fighter Nation – an online community for first responders to discuss their struggles and triggers. This research, when combined with my studies of genre, scriptwriting techniques and non-linear storytelling, has guided my work in creating an original script, and avoiding Hollywood clichés that can cloud stories of real human experience.
As long as people have been speaking, they have been telling myths. Our fascination with myth has never been limited to stories themselves. Rather, across cultures, languages, and time, people have been writing and analyzing myth through the practice of mythography: they retell, repackage, and repurpose these stories, and seek mythology’s origins, rationale, and connections within and outside itself, its divergences and changes over time, and its relevance to the mythographer’s own society. Since mythographic texts are often more accessible than texts in the original ancient languages, many authors use mythographies as their primary source for Classical myth. However, these mythographies come with their own biases and interpretations that make them worthy of their own scholarship. As such, my study aims to investigate eighteenth-century English mythographies as texts and as objects. Informed by perspectives on mythography theory, book history, contemporary scholarly debates, and relevant historical information, this study closely reads primarily Samuel's Boyse's *The New Pantheon: or fabulous history of the heathen gods, goddesses, heroes &c.* (1753), with consideration given to Thomas Blackwell’s *Letters Concerning Mythology* (1748) and an English translation of Abbé Antoine Banier’s *The Mythology and Fables of the Ancients Explain’d from History* (1739). By analyzing how these books speak about myth, establish “modern” texts, and use images that reflect eighteenth-century taste and style, this study finds that mythographers not only interpreted myth, but rewrote it to create a textual and physical object in their own literary tradition. With this understanding, eighteenth-century mythographers complicate the binary of the scholarly debate in this period that pitted the relative merits of the “moderns” against the “ancients.” For us, this study offers a critical perspective for understanding the various ways we continue to remake Classical myth and for what purposes.
In my honors thesis, I focused on how elements of Victorian literature are satirized in contemporary texts for children and young adults and why this satirization is significant. During the Victorian period, most children’s books were created to educate children. While some Victorian books taught children basic reading and writing skills through the use of alphabets, others emphasized the importance of behaving properly and following the codes of conduct generated by Victorian society. The child character who followed the rules and behaved in an appropriate manner was the one who experienced a “happy ending” in the text. In my thesis, I analyzed texts by Victorian authors such as Charles Kingsley, George MacDonald, Louisa May Alcott, and Lewis Carroll. In regards to contemporary literature for children and young adults, I closely examined texts by authors such as Edward Gorey, Lemony Snicket, and Roald Dahl. In these texts, the authors satirize elements of Victorian literature through their unique writing styles, their use of morbid subject matter, their somewhat unsettling illustrations, and even through their alteration of the textual medium itself. Ultimately, I addressed the following questions with my thesis project: How are these contemporary authors satirizing Victorian elements in their works? How is this satirization significant and does it affect how the text is interpreted? Despite the satire within their texts, are the contemporary authors still attempting to teach in some form?
The works of Jeanette Winterson are often viewed through the lens of queer theory and gender studies. While these approaches are certainly important, they do not focus on Winterson’s specific storytelling techniques which are often overlooked in the critical conversation surrounding her novels. Consequently, I ask, what kind of stories does Winterson tell, how does she tell those stories, and why is the way she tells those stories so influential? *Oranges are Not the Only Fruit, Written on the Body,* and *Weight* are three works that span Jeanette Winterson’s career, but tackle the same topic: the ability of stories to tell and evade the truth, re-tell and re-create the past, and to specify and universalize human experience. It is evident that Winterson’s methods—the use of fairytales, biblical texts, and mythology—all have the power to serve as truth-telling texts despite their surface differences, and it is the elements of intertextuality, inter-discourse, and autobiography that allow these truths to reveal themselves. Thus, these three novels show how different forms of storytelling can influence our understanding of fact, fiction, and truth, and it is clear that these terms must be defined by the context in which they are in. This attention to detail and dedication to expose the truth through storytelling fortifies Winterson’s own statement: “if truth is that which lasts, then art has proved truer than any other human endeavor.”
While modernist poet Marianne Moore is most known for her animal metaphors or use of quotations, she should also be considered as a contributor to the democratic project. It is evident in her poems, "In Distrust of Merits," "Spencer's Island," and "Sojourn in the Whale" that Moore advocates for the free state. Above everything, Moore wanted to fight for equality. This fight was not without its detractors. Critics strongly debated if Moore's political poetry was rooted in feminine emotion or honest, researched intention. In order to focus more on the poem's context, Moore highly edited her poems. She shows that any medium can represent an individuals' political views. There is a sense that politics must be stoic, but there is nothing more emotionally driven than the political taste.
There is a critical importance for a body of creative work around many types of physical and mental displacement during an “age of displacement,” which is particularly apparent in the growing divide between people of different backgrounds in the current volatile American atmosphere. The perspective of the outsider, especially members of communities marginalized due to race, gender, class, religion, immigration status, or a number of other factors both major and minor, has been long undermined, devalued, or ignored altogether in popular media, and this limits representation and empathy. This causes a sense of displacement and further isolation from a society that, without exposure to the complexity of these perspectives, denies them just thought and compassion. Texts focusing on outsiders such as *Invisible Man* by Ralph Ellison, “Ozymandias” by Percy Bysshe Shelley, “Fun Home” by Alison Bechdel, and *Oedipus Rex* by Sophocles, all of which include elements that emphasize and celebrate the individual, isolated spirit as a multilayered entity, inspired my usage of creative writing as a force for empathy. Particular themes of this collection include physical displacements in female coming-of-age and immigration, as well as the mental displacements of unsettling environments and experiences. This collection of creative writing aims to capture the implications of displacement and is an innovative solution to this issue of invisibility. More importantly, depictions in creative writing of both minor and extreme experiences of isolation and duality is fundamental if diverse perspectives are to be more accessible.
After living in Taiwan for the first nine years of my life, I moved to America with my family. I struggled with learning the language, adapting to the culture, and fitting in. Now that I have assimilated, I can see that some English speakers just didn’t understand how difficult life was for immigrants. My thesis, “No English,” is a series of creative non-fiction essays, attempting to help people understand what it’s like to be someone who struggles to learn a new culture. By recording my transition from being illiterate in English to an English major, I demonstrate the hurdles that immigrants must overcome as they adapt to the American way of living. Our schools and culture can impede an immigrant’s development. The adjusting can be made easier and faster when immigrants receive the proper help and support. For this presentation, I will give readings from my manuscript about the struggles I went through and suggest the best way to help immigrants, especially those who cannot speak English.
African Americans have suffered much abuse in the United States due to a lack of law and order, white supremacy, and the pursuit of gain on both a personal and national level. This infamous paradigm of violence against African Americans has been evident throughout the history of the United States and continues today. The perpetuation of this issue is why today there exists groups like Black Lives Matter and Antifa, as well as the increasingly counter-aggressive and counter-violent tendencies of these groups.
This paper will discuss how the rise of anti-Muslim sentiment within the United States is linked to a psychological term known as Scapegoat theory, where the United States blames an entire group of people for their own failures therefor allows Americans to discriminate, create nativist policies and be racist against Muslims. Since 9/11, the United States has passed anti-Muslim sentiment like the Patriot Act and most recently Executive Order 13769 or commonly known as the Travel Ban. These laws are inherently violent as these nativist laws, in order to protect Americans from terrorist, allow the United States to ban Muslim immigrants from entering the country, detain any immigrant who is under suspicion of being a terrorist, allow police to search homes or business without consent etc. Scapegoat theory tells us that these aggressive violent laws are created to relieve frustration and preserve a good image of oneself during times of economic downturn, like the recession created from the Housing Bubble of 08 and during times of conflict, like the war in Afghanistan.

Using history and fiction will I prove that the United States since the beginning has always been violent to immigrants and why nativism is still being bread through American politics. Scapegoat theory will help recognize the patterns and events that explain how discrimination is permitted through the use of the law in the United States.
Bluffing only works for so long. America has secured its position as a global police force, and major world power thanks in part to the fact that it was the first country to develop and deploy nuclear weapons. Since then this technology has been used as leverage to get other countries to comply with American will. However, this threat only works if you are actually willing to follow through. It is only a matter of time before America's bluff will be called and nuclear arms are again deployed.
The purpose of this study was to describe the ways in which film and merchandise reviews for Disney princess films such as *Pocahontas*, *The Princess and the Frog*, *Brave*, and *Moana*, depict Disney’s attempts at becoming progressive in their representations of female role models for young children. The study was conducted in response to the ongoing discussion surrounding the Disney films and their inability to represent realistic and attainable role models for viewers. The basic design of the study was conducted through coding and discourse analysis. The study focused on how stereotypically racial and gendered rhetoric is used to describe the princesses, as well as the reliance on a male figure and various sexual innuendos. Despite some progress, there are a few issues that remain with how Disney princesses are portrayed. Both film and merchandise reviews continue to use coded rhetoric, which creates unrealistic expectations for young children as well as inadequate role models.
Community is an important aspect that helps define us as individuals. Defining a person's community - and the effects of living in that community - gives us insights into that person's characteristics. My project is a short story collection that seeks to examine the community of the main character and its impact on his life. Pulling from events that happened in my own life (either to me or in my hometown), this collection details the life of the protagonist Adam, his descent into bitterness and depression, and his self-reflection. Adam is based primarily on myself, and characters he interacts with or describes are based on people that grew up around me. Drawing from these real-life influences, I created a community that is a reflection (and sometimes, a parody) of my own, as well as put to words my own struggles with depression and social alienation. The end project describes a man who is introduced in the story as misanthropic and depressed, then discovers more about himself through retelling the stories that make up the collection, ultimately resolving inner conflicts that have been brewing for decades. The perspective evolves throughout the collection, as Adam breaks down the persona he has molded for himself and realizes the damages his previous personality has caused. This change is the core of the project, and shows not only Adam's character arc, but a changing perspective on his community.
"Sangre" is the Spanish word for "blood". This chapbook is an intimate exploration of the transition from adolescence to womanhood. Through self-observation, aspiring poet Hadiya touches upon topics surrounding depression, anxiety, feelings of love and loss, and several other "growing pains". With the use of prose and poetry, she manipulates difficult life experiences in a way that opens up discussions about self love, acceptance, and maturation. On one hand, this collection of poetry talks about the beauty of change and evolution of the self. On the other hand, she opens conversations about mental illness and the effects of society on mental health in young adults. She faces depression head on in her writing and is not afraid of showing her own vulnerability. In this raw, heartfelt collection of poetry, Hadiya talks about her own struggles with self-acceptance in society as well as her battle with depression in the hopes that her readers also find solace in self-expression. Each poem tells a different tail of trial and tribulation. The overall purpose of these works is to spark comfortable conversation among adolescents who struggle with themes discussed in this book. This chapbook is meant to make the hardships in life less scary by presenting them in way that the audience can relate to. Hadiya places a spotlight on the all-to-familiar feelings of insecurity and self-doubt.
This project will focus on three primary literary works by Margaret Atwood that depict flaws in women’s societies. I will argue that Atwood writes female protagonists into oppressive worlds to show how women’s rebellious tendencies allow for them to experience personal growth within their societies. In the novels *Surfacing, The Handmaid’s Tale,* and *Alias Grace,* the three protagonists are all influenced by expectations from men, from other women, and from society that dictate how they are supposed to live and act. The protagonists respond negatively to these constraints, forcing the nature of oppression to become a set of rules against which the protagonists are attempting to rebel. Atwood depicts these oppressive societies by creating flawed female characters who are outspoken and non-conformist. At some point in each female’s journey, she reaches a breaking point that sets her apart from her society – whether it be through escaping the natural world and reaching a level of insanity, acting out in a feminine and sexual way, or being framed and punished for a murderous crime. Through Atwood’s creation of these insurgent women who evoke their personal power through their actions, she is showing how rebellious and outspoken women can cause some degree of change within their societies.
Gertrude Stein's novella, "Melanctha," has a narrative structure that functions as a time experiment. She juxtaposes stasis with instances of rapid movement and repetition to create a work of art in her writing. One purpose of this project is to identify and evaluate the purpose and effects of intentional repetition in Gertrude Stein’s “Melanctha,” using the novella as the primary source, along with some of her explanatory speeches, namely “Composition as Explanation.” Another purpose of this project is to attribute the elliptical time aspect to the insistence seen in Stein’s repetition, as her repetition allows for her to control the passage of time in the narrative. One of the most puzzling things Stein does in this novella is write in a tense known as the “continuous present,” which also sets the narrative in an elliptical motion, counterintuitive to the more linear narrative with which readers are usually more comfortably familiar. Stein has defined “continuous present” as “beginning and beginning again” in her speech “Composition as Explanation.” This project will set out to identify parts of “Melanctha” where her writing in this tense is particularly influential, and relate those to relevant instances of repetition which contribute heavily to the elliptical feeling of the narrative. Stein’s cycle of “beginning and beginning again,” however, can be seen as almost stagnant, and this project will shed light on the way Stein propels the narrative forward while also seeming to force it to stall in some ways, especially in instances of intense repetition. Examples of this become especially clear in the negative, frustrating interactions between Melanctha and Jeff Campbell, with extremely pervasive repetition of more definitive words such as “truly” or “certainly,” placed in slightly varied contexts. This might give the reader a feeling that the words are supposed take on a slightly different meaning in each instance of varied context. Not only does this repetition affect semantic understanding, but it also adds a frustrating amount of lag to the narrative of “Melanctha.”
Whether or not you have social media, or whether or not you are a teenager, it is clear that the increasing popularity of Facebook, Instagram, and Twitter has impacted teenagers’ identities. This idea is based in the truth that before social media rose in popularity, most of the influences on a teenager’s identity were positive ones. Social media however, is very often a negative influence. In a study run in 2011 by psychologytoday.com, researchers found that most of the influences on a teenager’s identity before social media helped them develop a strong identity that gave them confidence in who they were. Some examples of these influences are parents, peers, local communities, schooling, and extracurricular activities. In the past, these influences have all been a part of shaping a teen’s identity. Some may have been positive and some may have been negative, but the beneficial influences almost always outweigh the negative ones. As of late, however, social media has taken the place of almost all of these influences. This is bad for two main reasons. First, no one influence should bear the total weight of creating a teenager’s identity. Second, it isn’t beneficial for a teenager’s identity to be born from how they are perceived online by peers or other people who they may follow. Now a teen’s identity may solely be shaped by social media, and in many cases this is toxic. In conclusion, social media has negative effects overall on a teen’s self esteem and sense of identity.
Many people assume that patriarchy only affects women. This is not true, as cisgender, heterosexual men are also required to conform to certain gender norms. When people think of a man, they picture someone who is stoic, tough, and brawny. If a man does something that defies these expectations, such as cry, he is seen as weak. When men cry, they are told to “man up”. This kind of attitude forces men to hide their feelings, instead of letting them out in a healthy way. Men are not only expected to behave in certain ways, but they are also expected to have certain interests. If a guy likes more feminine music, such as Beyonce, he is seen as “gay” and effeminate. While there is nothing wrong with being gay and liking these things, this stereotype hurts men because it does not allow them to be themselves.

Like other forms of discrimination, such as misogyny, standards regarding masculinity are so ingrained in our culture, that we start to believe them, and it can influence what opportunities men and women have. For example, many people think of a mechanic as a man, and a nurse as a woman. I know that this is not true, because there are both male and female mechanics and nurses where I live. In order to achieve true gender equality, feminists need to not only look at the ways that women are hurt by gender roles, but how men are as well.
Impact of Beauty Standards on Young Women

Why is it common for people to look in the mirror and dislike their appearance? Humans are not born inherently dissatisfied with themselves or others. This is a behavior that is learned through the process of socialization, which enforces what is deemed acceptable and unacceptable in terms of one's physical appearance. Contemporary American society’s beauty standards have the most impact on young women who experience many negative impacts as a result of not being able to meet the social ideals of being thin, having an hourglass-figure and having clear skin. These negative impacts include development of eating disorders, low self-esteem and depression and anxiety. In a recent study from Stanford University, it was determined young women who turn to dieting in an effort to control their bodies were at risk for developing disordered eating behaviors such as bingeing and purging (“Why Young Women Are Prey to Eating Disorders” Stephanie Gilbert 1996). Being incapable of meeting society’s beauty standards leads many young women to also develop low self-esteem. Low self-esteem causes these young women to feel like they are not acceptable enough to engage in activities they enjoy, which leads to feelings of anxiety and depression. To conclude, all Americans should work to not impose such strict beauty standards in order to prevent the development of eating disorders, low self-esteem and depression and anxiety in young women.
The Power of Illustrations in Children's Literature looks to breathe life into the illustrations present throughout children's books. While it cannot be argued that the purpose of illustrations in literature is to enhance the written word this essay looks to put the phrase "a picture is worth a thousand words" into practice; how do these illustrations tell their own story and what impact does that have on their audience? The project examines the history of illustrations in children's literature and their impact as well as showcases original illustrated work. As the illustrations take over the research text, using a creative and hands-on method, the project literally shows how much the illustrations themselves have to say and how much power they truly have.
Technology is a tool, yet there is a huge disconnect between the online reality and the physical reality. While online, you may see people the way they want you to see them; while in person, you may see the fuller picture of an individual. That technology enables us to create and shield our true selves can be frustrating and powerful in its own right. Although technology seems an effortless and effective communication tool independent of location, Chimamanda Ngozi Adichie's novel, *Americanah*, presents a complicated vision of technology - it gives characters the power to create identities in space they've been denied in the physical world. At the same time, the use of technology deepens the rift between characters whose relationships are already strained by physical distance. Throughout the novel, Adichie presents an imperfect model of a relationship strung together through the virtual space, which demonstrates how technology is a poor supplement for emotional glue; specifically, Adichie illustrates this through Ifemelu and Obinze's various trials regarding self and romantic love across physical and emotional distance.

For support, I will address the characters use of communicative technologies to contact friends and relatives from whom they are geographically separated, and the impact technology has on their relationship. Furthermore, I'll discuss how new communication technologies, such as email, social media, technical devices and applications are utilized within *Americanah* and how they are an increasingly integral part of globalized African realities and consequently, find their way into literary representations of those realities.
In this project, I explore two of W.B. Yeats's public responses to several Nationalist events that occurred in Dublin in the early twentieth century prior to Irish independence. I discuss his written reaction to Hugh Lane’s Art Gallery and the Dublin Lockout, as well as his response to the Easter Rising. The poems which were published as his public reaction are “September 1913” and “Easter 1916,” and I analyze them in the historical and political context of the events to which they respond. I examine the theme of nationalism within these works and explore how the support which Yeats displays for the nationalist movement shifts between the two poems.

I argue that the nation as a whole felt the need to express conflicting opinions about the issues of nationalism and identity during a time of widespread tension, and that Yeats's work is an attempt toward that expression. My main goal for this project is to explore the role of the poet in society during a time of conflict. I chose to focus on the aspect of nationalism in Yeats’s public persona because I believe that at this point in Ireland’s history, nationalism was a widely debated characteristic of identity. I argue that his response to the Easter Rising is more ambiguous than his response to the Hugh Lane Gallery and Dublin Lockout, and that this shift is an expression of internal conflict about the contentious Irish Nationalist movement in general. I seek to understand the effect of Yeats’s public responses to nationalist events.
Presentation Details

338    Room 917    10:45-11:30    Panel 2
Alisa Ferguson
Len von Morze (Faculty Sponsor)
Department of English, UMass Boston
"Speak Again" Revision, Reciprocity, and Social Relations in *King Lear*

In *The One King Lear*, Brian Vickers argues the 1608 Quarto of *Lear* is not a first draft of the later version released in the First Folio of 1623; but a butchered duplicate of the "true" edition that was reduced by the novice printer Nicholas Okes. Vickers argues, "The revisionists claim that the passages missing in the Quarto but found in the Folio were subsequently added by Shakespeare. I argue that they were, in fact, omitted by the printer, Nicholas Okes, because he had underestimated the amount of paper that he would need," (*Preface*, x-xi). I agree with the revisionist theory that Shakespeare himself instituted the changes but that theory does not go far enough in the quest for answers behind the purpose of revision that I will expound upon; such as investigating the aspects of cultural anthropology that are prevalent. I explore the concepts of reciprocity, and gift giving (both are forms of exchange that build social connections, relationships and trust) and their influence on characters in *King Lear*. Looking at the two versions of *Lear* to explain that while Shakespeare made crucial edits, (removals and additions of entire passages, word changes and reassigning lines to different characters), between the two versions; the consistent parts offer much to be studied from an anthropological point of view. I explore what Shakespeare left behind that alludes to known and valued theories on social relations through a comparison with Marcel Mauss’s *The Gift*, surrounding relationships and forms of exchange.
Since the publication of James Joyce’s highly experimental novel *Ulysses*, many authors have adapted aspects of Joyce’s virtuosic technique and encyclopedic style; in this thesis I argue that David Foster Wallace’s novel *Infinite Jest* is both directly influenced by *Ulysses* and indirectly indebted to Joyce via the mid-twentieth century novelists who incorporated aspects of Joyce’s style in their texts: Pynchon, Nabokov, and Delillo, to name a few. Joyce’s innovations that appear in Wallace’s work—“stream of consciousness,” parodic discourses, intertextual writing, and what some scholars call “encyclopedic form”—were, of course, adapted to some degree from his predecessors; however, in Joyce’s lifetime and in the decades after, these techniques became the Joycean trademark. Most importantly, these technical devices are not used as mere displays of talent, but rather shape both novels’ political themes of imperialism, ethnic discrimination, and the role of a citizen. Studying these novels in tandem links to scholarly threads about the significance of “encyclopedic narratives” for a nation’s culture; artists such as Goethe, Dante, Melville, and Joyce have produced long, “encyclopedic” works which aim to represent every form and discourse of their countrymen—I suggest that with *Infinite Jest*, Wallace attempts the same feat for a rapidly changing America at the turn of the millennium.
Brick Lane, a neighborhood in the East End of London, is famous for its curry houses, historic old Spitalfields market, boutiques, and liveliness. The neighborhood has a long and rich history of serving as an in-between space and refuge for migrants such as the Flemish, French Huguenots, and East European Jews for over four hundred years. More recently, it has come to be labeled “Little Bangladesh” or “Banglatown” due to the noticeable presence of a Bangladeshi diasporic community there. It is against this backdrop that contemporary British Bangladeshi Muslim writer Monica Ali sets her 2003 novel, *Brick Lane*. Ali’s novel follows the life of Nazneen, who settles in Brick Lane after an arranged marriage to a man, Chanu Ahmed, 20 years her senior. *Brick Lane* has garnered a large and impressive body of scholarship on topics ranging from Hijab sweatshops as gendered spaces to the novel’s fraught erasure of Brick Lane’s race riots. None of this scholarship, however, examines exclusively the place and role of the scenes involving *jinn* (supernatural creatures) in the novel. Using research on *jinn*, postcolonial and diasporic theory, I highlight the moments of *jinn* possession and performance of possession as an extended metaphor for British Asian women’s experiences in diasporic space. I contend that transformative female agency erupts in these moments through mimicry, as the burden of home is destabilized and a new space for agentic British Asian women is imagined.
This thesis traces the evolution of dystopian literature from its origin in Thomas More’s *Utopia* and More’s influences in George Orwell’s *1984* and Ray Bradbury’s *Fahrenheit 451* to its contemporary shift in Lois Lowry’s *The Giver* and M.T. Anderson’s *Feed*. These novels convey the central purpose of dystopian literature: to change the present by warning people about a disturbing, yet conceivable, version of the future. *1984* and *Fahrenheit 451* both bestow the responsibility to communicate this message on adults who consciously rebel against the governments and systems they have known and accepted for decades. Forty years later, *The Giver* and *Feed* rewrite the narrative from the perspective of young adults. External circumstances force the adolescent protagonists, Jonas and Titus, into roles and situations that expose the injustices of which they are not aware due to their innocence and inexperience. Initially, the two characters only wish to survive the conditions under which they are placed and do not intend to resist the governments and systems adults have taught them to trust. They nevertheless prove to be more effective agents of change than the adults in their societies. In this way, dystopian literature has transformed into a source of power for adolescents. By incorporating these young-adult texts into their curriculums, English teachers can prompt their students to think about how they can impact the future and, as a result, make the world a better place.
Americanah, a best-selling, award winning novel by Chimamanda Ngozi Adichie is rapidly approaching canonical status as it gains popularity both inside and out of the academic setting. Published in 2013, this postcolonial migrant diasporic novel follows protagonist Ifemelu over more than a decade as she moves from Nigeria, to the U.S., and back to Nigeria. This novel brings issues of race, class, and identity to the forefront of an engaging story, navigated by Ifemelu through her sagacious blog posts. In my paper, I will engage with, and extend, existing scholarship on the novel to focus on how both Ifemelu and her cousin Dike (raised in the U.S.), enter a space in which they must question everything they know about their identity and how it is shaped. I argue that in this text, with a weighted focus on Dike, Adichie is advocating for writing not only as a way to challenge oppressive social structures and attitudes, but also as a method of self-discovery in a world where who we are is so often defined by others.
My short story, “Abuse”, is a stand-alone piece that I wrote for a creative writing class. It calls to mind, through fictional circumstances, the horrors and difficulties that women have to deal with when married to an abusive spouse. It is not based off any experience of mine, rather it is a personification of society’s capacity to make the right decision in a tense or difficult situation. This piece also brings to mind the imperfections of society, through the protagonist and the antagonist. The goal of this short story is to shed more light on topics that need more attention.
In her novels *The Waves* and *To The Lighthouse*, Virginia Woolf weaves autobiography, memory, and identity together through metaphor and emotive prose. Using motifs of nature, most notably the ocean, Woolf engages deeply with identity through her use of autobiography to fuel character relationships. Her personal narrative and collected familial memory intertwines with the characters' narratives in both novels. Using evidence from autobiographical essays compiled in *Moments of Being*, the research in this paper examines how the motifs Woolf employ translates her experiences into the experiences of her characters spanning time. The most formative moments of Woolf's childhood were the summers spent on the coast at her family's home in St. Ives. *To The Lighthouse* focuses heavily on the dynamic of the Ramsay family while they are staying at their summer home on the coast. The characters are perpetually observing the ocean, seeing their emotions and relationships reflected in it. *The Waves* builds characters in the context of the ocean. The sun rising and setting over the ocean parallels the characters' lives and growth. Their identity also reflected in the vast ocean. Just as Woolf feels St. Ives is the base upon which all else in her life stands upon, the ocean is the base upon which *The Waves* and *To The Lighthouse* are built.
Climate change is an issue that greatly impacts the world we live in today and is beginning to influence the way we approach agriculture and food production. Because of this, carbon farming is gaining a lot of attention, however, what is the efficacy of carbon farming and global efforts? This is currently the unknown that we intend to investigate. Carbon farming is a form of agriculture that addresses climate change and has the potential to change the atmosphere that surrounds global warming. Carbon farming involves methods such as cover cropping, crop rotation, composting, and conservation tillage to sequester carbon from the atmosphere in the soil. We intend to investigate the effectiveness of carbon farming in different climates.

We will use the world hardiness zones to identify the normal climate conditions in different regions and identify the plants that thrive in those zones. With that information we can extrapolate which of those plants are best at sequestering carbon and rank the regions by their potential to sequester carbon. From that point, we will analyze the implications for incentivized global efforts to sequester carbon, halt climate change, and create more arable land. Theoretically, our efforts will result in a breakdown of the feasibility of carbon farming in all climate types based on the factors discussed above.
Bees (Hymenoptera: Apoidea) provide pollination services critical to the stability and productivity of natural and agricultural ecosystems. Therefore, given emerging observations of bee population and species decline, it is necessary to monitor the health of these communities through long-term surveys. Here, we compiled data from studies conducted in 1990-1991 and 2007-2008 measuring the diversity and abundance of bees pollinating cranberry (*Vaccinium macrocarpon* Ait.) in Southeastern Massachusetts. In 2016 and 2017, we repeated the procedure of the previous studies by surveying bee communities at 11 cranberry bogs from mid-June to mid-July. Each bog was visited three times during cranberry bloom, where one person collected bees with an aerial net and small containers for 15 minutes and recorded bee visitation during six 5-minute quadrat observations. Collected bees were identified to species and used to determine the Shannon entropy, a diversity index, for each of the three study periods. Our findings reveal a significant decline over the 27-year survey period in the diversity of bumble bees (*Bombus* spp.), which are predominant and effective pollinators of cranberry. There was no significant change in the diversity of other native bee species, and the sample location did not affect diversity. The results of this study confirm a decline in richness and evenness of bee species in this cranberry-growing region, indicating a community less resilient and more vulnerable to change.
Greenfield Community College is fortunate to have a campus that includes approximately 40 acres of forest and several known wetlands. In Fall 2017, spotted salamanders were documented in the campus forest despite the lack of any known appropriate breeding habitat for this vernal pool obligate species. USGS topographic maps and Mass.gov GIS mapping illustrate existing wetlands and emerging wetlands on campus, with only one currently registered and protected. Our goal is to thoroughly survey the campus property for vernal pools and wetlands this spring and to document the presence of amphibian species breeding in these habitats on our campus. Through the process of identifying, surveying and seeking certification for additional vernal pools and wetlands, we explore the lessons of ecology and raise awareness through implementing conservation and education. Because these habitats are critical to a wide variety of biologically specialized aquatic and semi aquatic plant and animal species, it is essential that their presence and the needs of their inhabitants be taken into consideration as campus management decisions are made. This research could inform future projects conducted on campus including construction, landscaping and forest management plans. It will also allow us to document what possible threats are present on site such as invasive species, run off, high human foot traffic or contaminates and allow us to explore what measures we can take to lessen or manage the effects of human activities on our campus.
The necessary expansion of agriculture presents a dilemma in providing food and livelihoods for a growing population, while also being environmentally sustainable and maintaining function and services provided by natural ecosystems. Agroforestry offers a favorable alternative to intensive agriculture or monocropping, as it incorporates a diversity of species and forest elements, thereby retaining some ecosystem services of a natural forest while still serving as a productive farm. Coffee is a shade-grown crop that is often grown in agroforestry systems. The objective of this study was to determine how tree species diversity and composition affect aboveground carbon sequestration on six coffee farms in the Rio Grande Watershed, Costa Rica. Data was collected twice over the course of eight years on six farms: once in 2008-9, and once in 2016-17. At each farm, trees were identified and information on heights and diameters of trees and coffee plants was collected to assess aboveground carbon levels. Carbon sequestration was found to increase with diversity of plots. Mixed plots that were dominated by *Cedrela odorata* proved to be better at sequestering carbon than plots that primarily contained *Erythrina* spp. These results, along with research of current policies, provide possible implications for agricultural management and climate change mitigation. Incorporation of biodiverse systems containing mixtures of trees that are good at carbon sequestration can bring about more resilient and sustainable agricultural systems that simultaneously serve as a climate change mitigation strategy.
As climate change leads to more extreme weather, including heat waves, it will be important to understand how variable microclimates may help buffer these variations in temperature. The purpose of this study was to explore the range of ambient, water, and soil profile temperatures. It was expected that the temperatures of air would vary more than that of water or soil. Every week between 19 September 2017 and 15 November 2017, temperatures were collected from the same location within a 10m x 10m plot in the forest behind Greenfield Community College (GCC). Water temperature was collected from a stream within the plot. Soil temperatures were taken every 10 cm from the surface to 50 cm deep using ibutton dataloggers, and average daily ambient temperature was reported by the GCC weather station. The daily ambient temperatures ranged approximately 26°C, while the temperature of water ranged approximately 10°C. I predict ambient temperatures will also exceed those experienced within the soil profile and that the variation in soil temperatures will decrease with depth. We hope these data will continue to be collected each fall in order to compare on a more long term basis. These data will help us to understand temperature microclimates within GCC’s forest and how organisms may respond, either by seeking refugia in more stable temperature microclimates or by having to sustain despite extreme temperature variations in their habitat.
Dams fragment river systems, alter discharges, store sediment, and affect stream water quality. Dam removal has the potential to remedy adverse impacts of dams on native fishes; however, the timing and spatial extent of responses to dam removal are not fully studied. Over the past 20 years, dam removal has become a leading tool of riverine restoration in Massachusetts, resulting in 60 removals since 2000. The purpose of this study is to explore the upstream and downstream effects of dam removal on fish assemblages. We used the Massachusetts Division of Fisheries and Wildlife’s database to compile fish data from surveys completed at sites upstream and downstream, before and after, 12 dam removals. In these 12 sites, we compared the presence and abundance of stream fishes before and after dam removal. We expect that fish composition will be more similar between upstream and downstream fish populations after removal compared to before removal. Where temperatures decrease from warmwater to cool or coldwater downstream of former dam sites, we expect that coldwater fish abundances will increase following removal. Our results may be used to inform managers about the potential responses of riverine fish species to dam removal.
Freshwater mussels are critical components to aquatic ecosystem functioning, water quality, and food web dynamics, serving as sustenance for various animals and providing substrate for benthic invertebrates and algae. However, many populations of freshwater mussels have been declining due partly to habitat loss from urbanization and damming. Research suggests that annual lake winter drawdowns—a common practice for controlling invasive vegetation, among other purposes—may affect mussel densities because the rapid dewatering exposes mussels, resulting in mass mortalities. We aimed to quantify effects of drawdowns on mussel densities, and, consequently, water quality. Within 6 drawdown and 3 non-drawdown lakes, mussels were sampled through visual snorkel surveys along 20-m transects and excavation surveys within quadrats at 0.5-m and 1.0-m depths (whereby the 0.5-m was exposed during drawdowns) at 3 locations in late summer/early fall prior to drawdown. Post drawdown surveys were conducted at 11 drawdown lakes to monitor mortality. Preliminary results revealed higher densities of common mussel species, *Pyganodon cataracta* and *Elliptio complanata*, in non-drawdown lakes compared to drawdown lakes within transects that are exposed during drawdown. These data will be used to calculate loss in filtration from mussels and assess the impacts of drawdown-associated mussel declines on lake water quality.
Winter water-level drawdowns are conducted in many New England lakes with the goal of killing nuisance aquatic vegetation, among other purposes. If winter drawdowns reduce vegetation, there may be negative consequences for littoral (shoreline) species, as the complex structure of vegetated lake habitat functions as a resource base for many species of fish. We asked whether winter drawdowns alter growth rates of three native fish species that use both littoral and pelagic (deeper water) zones of water bodies. Our pelagic species were the largemouth bass and yellow perch while our littoral species were the pumpkinseed and young-of-year (YOY) largemouth bass. Using boat electrofishing and a beach seine, we sampled fishes in 12 lakes with a range of annual drawdown magnitude and 2 non-drawdown controls. A subset of individuals were measured and aged using sagittal otoliths. Annuli widths were used to back-calculate growth for each year; wider widths correspond to faster yearly growth rates. Growth rates were then compared to a range of annual drawdown metrics (e.g. drawdown magnitude, percent of shoreline exposed). We expect that pumpkinseed and YOY largemouth bass growth will be negatively affected related to increased drawdown magnitude and percent shoreline exposed, as these fish feed on littoral macroinvertebrates that are likely to be impacted by drawdowns. Growth of older bass and yellow perch may be less impacted by drawdowns since feeding habits are more diversified among habitats and trophic levels. Our results may be used to inform management strategies that reduce impact to native fish species.
While it may sound at first stereotypical, culturally Brazilians grow up with laughter at home as a natural substance in a Brazilian household. Not that unhappiness does not exist, but there is a saying in Brazil; vou rir para não chorar: I'll laugh so I won’t cry. My research analyzes the construction of home and identity of immigrants from Brazil, focusing on how Brazilians in America raise their children in the United States according to Brazilian custom. While in other cultures, kids have birthday parties mid mornings or in the afternoons, a regular Brazilian birthday celebration begins around eight at night, even if it is a first birthday. Especially when the task of immigration is already so difficult, not only for the parents but also for the children, everyday practices in the home represent not only values but survival strategies. Most people would attest that when immigrant parents are insistent on raising their children in their native culture, those children might suffer from the crisis of identity conflict: their family back home will make fun of Americanized ways, and their friends in the United States will notice their Brazilianism. However, the reality is the opposite, the little brazucas will be able to not only pass their families’ culture to their own children one day, but their will have a very different perspective from their fellow American friends. And this diversity of perspectives and values contributes to how Brazilians implement their own culture in archiving their American dream.
Carribean coral reefs have declined by 80% over the last five decades. Development of coral reef ecotourism may promote sustainable economies that can motivate efforts towards reef recovery. However, there is a general consensus that snorkeling based tourism can damage coral reefs. The amount of damage caused by recreational snorkelers remains unclear. Therefore, we carried out observations at reef locations throughout the Bocas Del Toro Archipelago to establish the baseline level of coral damage, as well as quantifying snorkeling behavior that damages reefs. We compared damage between protected areas (Isla Bastimentos National Marine Park) to unprotected areas to assess if reef protection and snorkeling behavior improves within the reserve. Snorkelers exhibited, on average, 2.02 damaging behaviors per individual. Behaviors included standing, sitting, or kneeling on the reef (34%) and the next most frequent behavior was Fin/Foot Touch (29%). Only 34% of snorkelers never exhibited damaging behavior. There was no significant difference for coral damage nor snorkel behavior within or outside the MPA boundaries. Our results suggest that snorkeling damage may contribute to the loss of coral cover and that future management efforts and tourism techniques may consider intervention and education to mitigate this damage.
Every day, over 500 million straws are thrown away in the United States alone. Since plastic does not completely decompose, every straw thrown away is still in a landfill- or worse, in oceans or in an animal’s digestive system. Westfield State University is no exception.

This research project will examine the use of disposable plastic straws on campus—more specifically, in the Ely Cafe, the Bistro, and Dunkin’ Donuts—and compare usage in these three facilities to two on-campus facilities that no longer use disposable plastic straws. The project will also analyze the environmental and economic impacts on continued use of disposable plastic straws. In addition, this project will also look into ways that Westfield State University is making sustainable options more accessible to their students, faculty, and staff, and how much support there is on campus for sustainable options.

Methods used in this research project will include surveying students, faculty, and staff about disposable plastic straw usage, as well as if dining facilities on campus are using or intend to use biodegradable or reusable straws in the future. Calculations for the mass of straws thrown away by the campus community as well as the cost for the university to continue using single-use plastic straws will also be included.
With water supply contamination cases seemingly on the rise throughout much of the world, the purpose of this research is to study the social implications, health, and economic impacts on those communities and individuals affected. To do so, various case studies and scholarly articles on the subject were analyzed. Looking at the data, it is evident that poor, minority, and other powerless segments of the population are disproportionately affected socially, health wise, and economically by contaminated water. Since the majority of these individuals live either at or below the poverty line, they are unable to afford more long term, permanent solutions such as filtration systems and have thus turned to a temporary solution: bottled water. This however, presents many challenges as water bottles not only contribute to the degradation of the environment through pollution, but also inadvertently perpetuates the cycle of contamination. To further complicate the issue, utilizing bottled water is not sustainable financially for most. As a result, they are eventually forced to drink contaminated water. In drinking the contaminated water, a host of short term, long term, and permanent health complications and economic losses ultimately occur for those individuals unable to afford alternatives. Through this research, it is abundantly clear that contaminated water goes beyond the environmental aspect to encompass a social justice issue as well.
Hydroelectric dams are an important part of the electricity system in New England. While these power plants provide zero-emission energy, the location along the Connecticut River has an impact on migratory fish populations, such as American Shad. This research focuses on determining the effect of hydroelectric dams on fish populations and migration patterns, and modeling this impact as a mathematical program. The mathematical program will provide stakeholders with a way of incorporating ecological impact of hydroelectric dams into their planning process.
Variation in the Distributions of Two Sympatric Species of Mouse Lemurs across a Habitat Gradient in Northwestern Madagascar

The sympatry between Microcebus murinus and M. ravelobensis, two species of mouse lemurs native to northwestern Madagascar, has been intensively studied. However, most research on these species has been restricted to dry deciduous forests, with few studies addressing the ecology of these species in other habitat types such as mangrove forests. We conducted a study to assess how lemurs living in mangrove forests may differ ecologically from conspecifics living in nearby dry forests. We utilized capture-mark-recapture techniques along transects spanning different habitat types and analyzed our data using ArcGIS and a generalized linear model in R. We found that the species occurrence significantly correlated with distance from the Mariarano River and elevation. M. murinus was found in higher proportions closer to the river and at lower elevation, while M. ravelobensis was found in higher proportions farther from the river and at higher elevations. Our findings suggest possible differences in species distribution due to different ecological strategies and represent some of the first data on lemur biology in mangrove forests. Understanding how lemurs utilize habitat types in different ways can help inform conservation decisions for these threatened primates and the wider ecosystem.
This study focuses on the allometry of open-grown amenity trees. Amenity trees provide a variety of benefits such as soil retention, attenuation of temperature, pollution, and noise, and aesthetic improvement. Allometry is the study of size-correlated variability in organic structure and process. In other words, allometry studies the growth of one part in relation to the whole, or one part in relation to another part.

The study's objective was to examine allometry within individuals of Tilia cordata Mill. Two 10-year-old Tilia individuals were sampled between June and December 2017. Among the characteristics measured were stem diameter, wood and leaf mass, position in space, and stem length. The models created predicted allometrics such as average branch mass vs. average branch diameter, average leaf count vs. average branch diameter, and between specific gravity and proportion of branch length, and this list is not exhaustive. The findings are applicable to arborists who have to know about the allometric characteristics and patterns of the trees they work on. These predict how a tree will grow, and how it will react to being subject to management practices like pruning, bracing, and cabling. Knowing better how a tree will react to these practices will help guide arborists to make the most well-informed decision about how to manage their amenity trees.
Now is the time when colleges need to set an example for sustainable living and help instill environmental conservation values in their students. A Living Machine (LM) is a natural wastewater treatment system that mimics the processes occurring in wetlands in order to clean sewage for reuse. Building a LM would advance Holyoke Community College (HCC) in the global quest for sustainability. As a vanguard in sustainable studies, HCC has the opportunity to reduce campus water and energy usage while engaging and educating students and community members about the natural world.

The current system for cleaning water is inefficient and uses harmful chemicals in the process. A LM uses solar power as its main form of energy and emits no odor during the process. A LM on the HCC campus would set a sustainable example for other communities and could help prevent combined sewer overflows into the Connecticut River.

If HCC were to construct a LM, it would cost around $500,000 and would be perfectly suited to the needs of the campus. At HCC, the LM would be designed to treat about 4,000 gallons of water per day (the water from two buildings) and would require 600 square feet of space. HCC is and should continue to be one of the forward thinking leaders in sustainability. This project would help set a precedent for institutions of higher learning that they have a responsibility to educate students about sustainability and environmental protection.
361   Concourse   10:45-11:30   Board 95
Paige Geraldine Pressey
Timothy Parshall (Faculty Sponsor)
Department of Environmental Science, Westfield State University
The Effects of Leafcutter Ants on Reforestation

It is important to understand the effects of leafcutter ants on tropical reforestation, because a single colony of ants can defoliate an entire tree in a matter of days. As a result, leafcutter ants might hinder the entire reforestation process. Through an independent research project in Costa Rica, I compared the damage of leafcutter ants on trees in a newly reforested site with the damage in an adjacent forest that was mature. After finding four ant colonies, I measured the percent of leaf damage on nearby trees from 0 (no damage) to 10 (100% damage). I also recorded leaf damage in four different directions from the center of each colony. Two of the colonies were in the reforested area and the two other colonies were in a mature forest. This was done in order to observe the differences in leaf damage between the two different areas. I found that trees closer to the colony in the younger forest had more leaf damage, while trees farther from the colonies in the older forest had greater leaf damage. One possible explanation for this pattern may be related to the fact that younger forests have less leaf coverage. Since ants are sensitive to drier, sunnier conditions, ants from colonies in younger forests may not be able to travel as far to get the leaves for their fungus.
Dam removal has become an increasingly popular strategy to address aging infrastructure and restore ecosystems. Ecosystem benefits include increased habitat connectivity, restored ecological processes (e.g. nutrient dynamics) and improved water quality. Most research studies focus on changes in physical and biological conditions before and after dam removal, and little is known about the impacts on water quality. As a result, water quality goals for dam removal projects are often broad and uncertain. To address this knowledge gap, we investigated the short-term effects of four recent dam removals in Massachusetts on dissolved oxygen. Continuous dissolved oxygen concentrations were measured upstream, downstream, and within impoundments for three, one-week periods in summer months (July, August, September) before and after dam removal. Prior to removal, all four sites experienced decreased dissolved oxygen in impoundments relative to upstream conditions. Preliminary results show that after removal dissolved oxygen in former impoundments begin to improve. By analyzing how dissolved oxygen concentrations adjust following dam removal, we provide insight on how water quality is impacted by dam removal and the restoration of ecological processes.
Although bottlenose dolphins (*Tursiops truncatus*) are one of the best studied species of cetaceans, surprisingly little is known about their natural communication system. Bottlenose dolphins produce individually distinctive signature whistles that function in establishing contact and maintaining group cohesion; however, few studies have examined their use in groups of known composition. Similarly, how whistles other than signatures, known as non-signatures, are used is completely unknown. This lack of knowledge is largely due to difficulties in attributing whistles to individuals and in identifying group members. The resident population of bottlenose dolphins in Sarasota Bay, Florida provides a unique opportunity to examine whistle use by free-ranging dolphins; all animals are visually identifiable and have known signature whistles. Acoustic recordings collected during behavioral observations in 2001 of visually identified animals were analyzed to look for patterns of signature and non-signature usage with respect to the composition, size, and activity of the group. A total of 881 minutes of recordings of 11 dolphin groups were analyzed using the software Raven Pro, which enables visual categorization of whistle spectrograms. Preliminary results identified 1465 whistles that were classified into 24 distinct types. These whistles will be compared to known signature whistles of group members in order to determine how many are signatures vs. non-signatures. These results will then be correlated with data on group composition, size and activity. Overall, this analysis will provide insights into whistle use by free-ranging bottlenose dolphins.
Toothbrushes are a common household item, and best-selling brushes in the U.S. have comparable designs and materials. The main accessories of a toothbrush are the bristles and elastomer components, including cheek and tongue cleaners and polishing cups. A common characteristic of these materials is their ability to accumulate lipophilic chemicals. A chemical of interest, which is found as an ingredient in some toothpastes, is triclosan (TCS). TCS is a broad-spectrum antimicrobial agent with reported dental benefits; however, it has been banned in hand soaps and hospital cleaners within the past two years. Our studies on 22 best-selling manual toothbrushes show substantial accumulation of TCS into toothbrush head components. The elastomer components accumulated significantly more TCS than the bristles. Over one third of the adult size brushes had TCS uptakes between 21-37.5 mg, which is equivalent to 7-12.5 recommended doses of TCS. Comparable results were seen on children’s toothbrushes. Because of the material characteristics, TCS can also be uncontrollably released. To test the release, a TCS-loaded brush was used with TCS-free toothpastes. During this switch, a gradual release of TCS was seen. A rapid release was seen when exposing the brush to peroxide-containing, commonly marketed as “whitening” toothpastes, and toothpastes containing baking soda or more surfactants. Accumulation and release were not exclusive to TCS as it was seen on several other ingredients in toothpastes. Based on our observations, it is recommended that when consumers switch their toothpastes, they could also discard their toothbrushes.
River herring – alewives and blue back herring – are anadromous fish native to New England that rely on major river systems for annual upstream migration and subsequent spawning in lake habitat. Human alterations to the landscape, primarily damming river systems, threaten river herring survival and affect the timing of life history events. This study investigates the changes in the phenology of anadromous river herring in relation to climate change and damming impacts between the late 1800’s and contemporary times. The study analyzes differences in the timing of upstream migration on Cape Cod, Massachusetts between 1865 to 1871 and 2012 to 2017.

Upstream migration to spawning grounds in Waquoit Bay on Cape Cod occurs at least 2 weeks earlier than migration during historic times. Dams, particularly hydropower operations, tend to alter the natural flow regime of freshwater systems. Understanding river herring migration timing could lead to optimizing flows for transit through fish facilities with implications beyond the case study area. For example, the Connecticut River has several dams on the main stem that can impede access to suitable spawning habitat. Fish passage facilities are often closed or impassible due to high or low flows, with significant impacts on migratory species like river herring. Flow management may be necessary to allow for fish passage at the correct times, which currently does not factor into flow decision-making by hydropower operators.
Efforts to reduce the production of greenhouse gas emissions through the burning of fossil fuels for energy production has pressed policymakers and the scientific community to explore the possibility of increased reliance on hydropower as a source of renewable energy. Hydropower energy generation certainly has the benefit of reducing emissions, but dams also create an impermeable physical barrier, change natural flow regimes and temperature profiles, reduce available spawning habitat (particularly for anadromous fish species), and increase habitat fragmentation. The impacts of dams in this regard have been studied at great length, but often procuring relevant information to conduct meaningful research requires the consultation of various regulatory agencies and NGOs. As we strive to rely on renewables to provide a larger proportion of our generation mix, it is imperative to facilitate access to these resources in order to succinctly answer questions regarding the impacts of hydropower, and dams generally, on the fitness of fish communities within economically and ecologically vital watersheds.

A visual product has been created through the use of ESRI ArcGIS, MassGIS resources such as dam locations, surrounding land use, and extensive data management efforts undertaken by the Massachusetts Division of Fisheries and Wildlife dating back to 1952 to expedite future research addressing pressing questions about dams, hydropower, and their impacts on aquatic organisms. This work will also serve to synthesize the known impacts of dams on fish community distribution, with an emphasis on the Connecticut River watershed within Massachusetts, which already has several operational hydropower installations.
To create more sustainable and cost-effective energy production, national and local institutions urge consolidated ownership, competitive markets, and low-carbon solutions. Large-scale hydropower, popular for lower-carbon electricity generation, supplies relatively cheap baseload electricity demand. At the same time, these dams negatively impact surrounding environments, via river flow volatility and concomitant impacts on riparian and aquatic ecosystems. For over 170 years, the Holyoke Dam has been the site of hydropower developments. Holyoke Dam changed from privately to municipally owned in 2001 and achieved LIHI certification for their sustainable development initiatives in 2012. We use an analytical comparative-historical approach to examine river management policy and practice: (1) under private ownership but pre-competitive markets (pre-1996); (2) after competitive markets and Holyoke Gas and Electric (HG&E) municipalization but pre-Low Impact Hydropower Institute (LIHI) certification (2001-2011); and (3) after LIHI certification (still with municipal ownership and competitive markets; 2012-present).

Using interviews, field site visits, municipal and private licensing submissions, and historical and environmental documents, we examine Holyoke Dam policy and practice on the Connecticut River. We test a hypothesis that municipalization and LIHI certification have prioritized fish passage and habitat goals, greening Holyoke Dam’s electricity generation. However, with competitive markets driving production, there are conflicts of interest between economy and ecology. We seek to demonstrate whether municipal ownership, competitive markets, and LIHI certification could be a model for other large-scale hydropower in attending to the needs of fish and wildlife while staying competitive for ratepayers.
The construction of large dams along rivers has disturbed the flow of sediments downstream, impacting wetland ecosystems and causing deltas to decline. As people depend on sand and salt to remove ice from roads in the winter, a consequence can be higher salinity in rivers. This can affect aquatic organisms as well as animals and humans that depend on the water for hydration. High salinity levels in water have the potential to be unsafe for people on low sodium diets to drink. Our objective is to evaluate the effects of applying salt to roads near the Hoosic River. We anticipate documenting spikes in salinity following spring wet weather events. Another component is to measure suspended sediment levels in the river to assess if dams upstream, affect sediment transport downstream. Suspended sediment monitoring began during the fall of 2017; the continuation of suspended sediment monitoring will provide measurements in the presence of high flows from snow melting. Measurements of salinity will be taken with YSI 566 probes. Suspended sediments will be determined by collecting water samples in dry and wet conditions. After collection water will be filtered out of samples, then dried in an oven at ~105°C for forty-eight hours. This study will help gauge if ice removal practices on roads in North Adams and towns upstream impact microorganisms and wildlife that depend on the Hoosic River. Additionally assessments can be made if dams upstream are significantly impacting sediment transports.
In the midst of global climate change and mass extinction, understanding population dynamics of sensitive species is essential. Reptiles with temperature-dependent sex determination are particularly threatened by changes in climate. Oak Mountain State Park in Shelby County, Alabama provides freshwater turtle populations representative of the southeastern United States, although very little is known about current populations. Throughout June and July 2017, a biodiversity survey was conducted of turtles in Double Oak Lake. Turtles were captured and assessed using morphometry and mark-recapture techniques to determine species abundance, sex ratios, and age structure. Fifty-five individuals were collected from 4 different species. Sex ratios observed across these species slightly favored females. Data loggers were buried in nesting beaches around Double Oak Lake for several weeks to determine whether current incubation temperatures are favorable for the health of future generations. Nesting temperatures suggest clutches in their thermosensitive period during this study will produce predominantly male hatchlings. This research will serve as a point of reference for future studies to evaluate change in turtle populations at Oak Mountain State Park over time. Understanding the effect of temperature on populations with temperature-dependent sex determination is a critical component in developing conservation strategies for these sensitive species.
This study investigates atmospheric carbon dioxide sequestration by the terrestrial biosphere at Harvard Forest in Petersham, MA. The purpose behind this research was to evaluate how carbon sequestration varies with respect to tree species and forest age as a function of time. The two study sites surveyed consisted of the following: a red pine plantation established in 1925 and a former conifer plantation harvested in 1990 and now undergoing natural regeneration. The study began in 2008, with individual trees tagged, species recorded, and growth monitored each year. Diameter at breast height (DBH) data were collected for more than 800 trees with DBH > 5 cm, and the study areas were also surveyed for tree mortality and recruitment (trees recently grown into the >5 cm DBH size class). Field measurements were entered into a series of Excel datasheets containing data since 2008. The statistical analysis program R will be used to convert DBH data into biomass carbon using species-specific allometric equations. It is speculated that certain species of trees will likely store carbon at different rates than others. By determining the patterns of sequestration by species and stand age, it may be possible to form strategies to maximize forest carbon sequestration in New England.
Blueback Herring (Alosa aestivalis) is an anadromous fish that has experienced extreme declines in abundance in the Connecticut River beginning in the mid 1990’s. The Atlantic States Marine Fisheries Commission coastwide stock assessment in 2017 determined this species severely depleted. Beginning in 2013, a large-scale US Fish and Wildlife Service (USFWS) data monitoring project was started in the Connecticut River to address data deficiencies for the species. This project will use fish sampled by the USFWS from 2013-2017 to look at Blueback Herring age and growth determined using otoliths. Back calculations of size-at-age will be conducted using measurements of annual growth increments for male and female blueback herring collected from five sites throughout the Connecticut River. Otolith measurements will be used to create a von Bertalanffy growth function for the population. This work will be help inform more complex fisheries models that assist state and federal agencies in the management of blueback herring in the Connecticut River. This data could also be used to explore possible factors that influence of at-sea growth of blueback herring.
The paper examines the effect of product concentration on economic vulnerability at the economic level, during industry-wide or global shocks. The study measures concentration for a panel of countries, at the product or industry level, and compares product concentrated to diversified economies to assess effects of concentration on vulnerability. Afterwards, I focus on the effects of degrees of concentration on vulnerability of the economy, based on product-specific and global shocks, and how it is related to recession and recovery paths.
One of the contributing factors to the 2008 U.S. financial crisis was the growth of shadow banking, which includes non-bank financial intermediaries that are not regulated as strictly as traditional commercial banks. In the years leading up to the 2008 crisis, shadow banks spread credit risk by trading subprime mortgage-backed securities and collateralized debt obligations. This paper examines the effectiveness of post-crisis regulations, such as the Dodd-Frank Wall Street Reform and Consumer Protection Act, in limiting the risk-taking behaviors of shadow banks. I focus on how legislation has affected hedge funds, mutual funds, and government-sponsored enterprises, such as Fannie Mae and Freddie Mac. While the primary focus is on the U.S. financial system, this study also examines the evolution of shadow banking in Europe and Asia, in order to assess risks posed by foreign shadow banks in the global financial system.
How the Business Process Management (BPM) and Workflow (WF) Approaches Can Improve the Reusing Rate and Quality of Big Data-Based Financial Calculations' Software and Increase Overall Return of Assets

The demands of growth and constantly changing requirements push financial applications to the level where maintaining stability and accountability requires changes that are expensive and often impossible. Critical aspects such as growing expenses to support operations for financial companies limit competition such that only big corporations with significant diversification, can afford short term losses. Additionally, quality degradation and failing stability of banking financial software, sometimes result in unacceptable and scary outcome. There are many approaches that try to deal with this problem, such as using decoupled enterprise architecture approach as Services Oriented Architecture (SOA). Even though these approaches serve the primary goal to improve stability while keeping predictable expenses, they do not solve a problem at the macro system level. One of the potential solution to the problem can be related to the Business Process Management (BPM) approach. BPM helps to improve business operations, using scientifically defined way to describe, analyze and improve operations that are part of any business. Beginning with the Scientific Management approach first applied by Frederick Taylor in 1890 putting some science behind attempts to improve the labor productivity, the process evolved and currently is at its third generation. Interest in BPM is increasing because BPM identifies and defines how to solve the same conflict as financial applications face. However, it remains to be seen whether this approach helps with the Big Data based applications.
Herding Behavior in Financial Markets

The role of groupthink in the stock market has been seen many times in recent years, ranging from the financial recession in 2008 to today’s volatility in stock prices. Investors make trade decisions not just based on their rationale and research, but also from the actions of fellow investors. Recent trends that have led to this problem include stock market volatility following the recession, economic growth of other financial currencies, and an increased workflow into the industry, giving it more attention in recent decades. Whatever reasons may be, it is aware in behavioral finance that groupthink can have detrimental impacts on returns, valuations of assets, and the overall performance of the stock market. Groupthink specifically impacts the financial industry as herding bias, the individual act of going against personal opinions and experience to follow the actions of other investors, assuming that a group decision is safer. To further understand the effects of groupthink, this paper will analyze public search trends from tech companies and compare that to stock returns. The idea is to use data from Google trends, which shows interest over time of a term’s search history. My data will focus under the finance category trends as a way of measuring public behavior.
This study discusses the new financial regulations in the post-financial crisis period, focusing on Commercial and Investment banks, their solvency, liquidity, and profitability. The total number of requirements increased, making it difficult to determine how and when our Banks will be affected and which of regulation will bind the Banks and which will actually help. For example, the recent Senate Banking Committee passage of the Dodd-Frank Act regulatory reform bill provides a range of changes to the 2010 law that include providing relief to small and mid-size banks, and the Basel III regulatory with Common Equity Tier 1 and HQLA which is believed to cause more restraints on large banks. In addition, this paper will speculate how new regulation that had been passed or expected to be passed in the near future might affect the banking industry.
The purpose of this paper is to find out whether or not the degree of multinationality of a multinational corporation (MNC) has a significant effect on its stock price crash risk. Academic literature has shown that MNCs have a higher stock price crash risk when compared to domestic firms/single-nation firms (SNCs). A known fact is that higher agency costs are associated with higher stock price crash risk. The literature generally finds that effective corporate governance mechanisms can help reduce the agency costs associated with opportunistic managerial behavior in MNCs and thus lower their stock price crash risk. However, the literature doesn’t address what type of effect a higher degree of multinationality has on MNCs. Data from the transnationality index, as calculated by the UNCTAD, will be used to run regressions in order to analyze the effects of multinationality on stock price crash risk. This study will examine how different degrees of international operations affect a firm’s stock price crash risk. By finding out how the degree of multinationality of a firm affects its stock price crash risk, we will be able to better understand how MNCs are valued.
The objective of this paper is to examine the impact of the United Kingdom’s exit from the European Union on cross-border mergers and acquisitions. The paper identifies when mergers and acquisitions are most likely to occur, the underlying firm motivations behind this investment activity, the level of premium paid for targets, and the determinants of post-merger success to apply them in the setting of interest. This paper tests whether the propensity of British-originated M&As in the European Union and the respective premiums are affected, as these companies attempt to retain access to the unified market.
In recent years, separatist movements have gained traction in Western Europe, whereas, in other areas of the world, countries are seeking closer integration, with the Eurasian Economic Union (EAEU) being the latest milestone. This paper examines the incentives and challenges behind the economic reintegration in the post-Soviet states are, and whether this initiative has been beneficial and effective. My analysis starts from a historical overview of the underlying relationships among the former Soviet states during the Soviet and post-Soviet periods, and extend to case studies between countries that joined the EU and states that chose different paths. Finally, I examine the prospect of the post-Soviet economic reintegration and the EAEU in the context of a competitive global environment.
The trade-off between risk and reward plays a key role in the investment decisions of market participants. By analyzing the strength of loan covenants and the level of risk-free interest rates, my research aims to show whether changes in risk-free yields are a determinant of the strength of loan covenants that creditors demand. To quantify these effects, loans that have received “Loan Covenant Quality” ratings are measured against both United States Treasury and LIBOR yields. Moody’s Investor Service’s “Loan Covenant Quality” rating framework provides a thorough measure of the strength of loan covenants and the level of protection they provide creditors. To facilitate this research, a dataset was constructed of 278 loans - from 2007 to 2017. The main finding, is there exists a weak to moderate correlation between loan covenant strength and the level of risk-free interest rates. This correlation can help explain how investor’s risk and reward preferences respond to changing interest rate environments.
A long withstanding argument for New Jersey residents has always been: Which region is better to live in? North or South Jersey? The two halves are different in multiple aspects, but the most prominent one is the fact that the north is rather urban, but the south is primarily rural. Because of this, each region has its own benefits and disadvantages. This study used Geographic Information Systems (GIS) to assess the spatial patterns within the twenty-one counties' using several forms of analysis. The purpose of this research project was to compare quality of life metrics from a geographic perspective for the state as a whole. By using several geospatial methods, such as hot spot analyses, point density measurements, and cost-distance functions, on data sets that I identified as "life essentials", I compared how each county is observed through different spatial lenses. From this study, viewers could learn about how the 'best' and 'worst' areas to live in New Jersey are most likely ranked by social surveys and studies, as well as the difficulties associated with this kind of analysis.
Since its colonization in the 16th century, the nation of Chile has had a history marked by human rights violations and environmental degradation (1). While great strides have been made in terms of improved social welfare and increased sustainability efforts, there are visible signs of the harm that continues to be suffered by the people and their land. One prominent challenge that threatens the survival of Chile’s population, ranging from inhabitants of rural, mountainous communities to individuals living in densely-populated urban areas, is the disappearance of the Andean glaciers. The Andes are home to approximately 95% of the world’s tropical glaciers, and by surface area, 80% of South America’s glacial mass is found in Chile (2). Since the Little Ice Age, these deposits of snow and ice have been decreasing in size, but the most notable shrinkage has been brought on by more recent climate change-related shifts in temperature and precipitation. As a major contributor to the global trade of agricultural exports, this has become not only a social and environmental issue for Chile, but an economic threat as well. The photographs prepared as part of this collection document the country’s present situation, highlighting the impacts that climate change is having on Chile’s cultural and geological landscape.


Field work was conducted in Harvard Forest, Petersham, MA in August 2017. The purpose of the study is to measure carbon fluxes in and out of two forest stands over a ~10-year period. This study also investigates the feasibility of using the ArcGIS Collector app to map remote field sites.

The field work investigated two study areas, first established in 2008: one red pine plantation established in 1925 and one former red pine plantation that was harvested in 1990 and is now a young re-growing forest. Each study area consists of six randomly located 10-m radius plots where trees with a diameter of ≥ 5 cm were previously tagged (more than 800 trees total). We gathered the GPS locations of the plots with the ArcGIS Collector app for iPhone. The DBH (diameter at breast height) of trees was recorded and plots were surveyed for tree mortality and recruitment. We manually walked the outline of the study area with ArcGIS Collector to create a polygon/shapefile of the study area.

Data from ArcGIS Collector will be used to create detailed maps of the study areas. The maps from this work and biomass carbon data from another student using DBH data will allow extrapolation of the data across larger scales. This will permit generation of regional-scale estimates of the role of these types of forests on the carbon cycle of Massachusetts. This work will help predict future carbon dynamics in Massachusetts forests as well as generate management strategies to maximize forest carbon sequestration.
Hydropeaking is the practice of rapidly changing the amount of water released from reservoir hydroelectric power stations in response to fluctuations in power demand. These rapid stage changes impact the physical habitat of reservoirs and rivers, changing the movement of water and sediment in the system. Due to increased concern about adverse impacts such as erosion, stakeholders have been demanding that more environmental studies be done during dam relicensing processes. Pumped storage dams, in which water is pumped uphill so that it may be released via hydropeaking when demand is high, as well as dams with large reservoirs, tend to have greater impact than run of the river dams. In this study, we compared environmental documents from the licensing processes of Fifteen Miles Falls dams, Holyoke Dam, and the Northfield Mountain Pumped Storage dam, for the purpose of understanding how hydropeaking affects physical habitat and what measures have been recommended to mitigate adverse effects.
Agriculture is synonymous with our civilization- it is one of the most fundamental ways society interacts with the environment. Soil, especially healthy soil, is essential to maintaining the ability to provide food for a growing global population as well as acting as an important sink in the global carbon cycle. This research explores how human interaction, primarily agricultural practices, and erosion are affecting soil organic carbon (SOC) in cultivated soybean-corn crop rotation fields compared to native prairies. Analysis shows that prairies have an average $^{13}$C value of -18.6‰, while the signature of cultivated fields is -22.7‰. In the fields, 35-54% of the SOC was input by domestic crops and the carbon concentration had decreased by an average of 40%. Carbon sources were determined via soil carbon concentration measurements and carbon isotope mixing models. The influence of hillslope curvature was also examined using modeling. Hillslope curvature values suggest that the field’s morphology may not have a large influence on $^{13}$C, but likely influences the decline of carbon concentration. By understanding the isotopic composition of SOC and the effect hillslope curvature has on it, we can move toward developing an effective tool to further the understanding of how soil organic carbon, a vital nutrient, cycles through agricultural landscapes.
Today, as climate begins to change increasing pressures are being put on our society to adapt or face the brink of collapse. This is not the first time there has been a connection between climate change and the collapse of complex societies. Specifically, the collapse of societies in northeast Africa and the Nile Valley during the Old Kingdom period. A period of global cooling which ensued over 200 years caused variations in flooding, leading to widespread famine. In addition, problems with succession also led to a decentralized government unequipped to handle the famine. Using both geologic data and eyewitness accounts this study seeks to analyze the evidence behind climate change during this period. As well as provide context into what exactly caused the collapse of Old Kingdom Egypt.
Agricultural land use can degrade soil and reduce the global pool of soil carbon. The loss of soil organic carbon (SOC) reduces soil fertility and may contribute to the rising atmospheric carbon dioxide levels, thus, negatively impacts humans. Restoring degraded soils can increase fertility and offset greenhouse gas emissions. We investigated SOC accumulation in restored prairies in the Midwestern United States to gain insight on the behavior of carbon accumulation in this region. SOC measurements in farmland, restored prairies, and native prairies in northeast Kansas were used to address SOC reduction due to farming, and SOC accumulation in decade to half century old restored prairies. Soil samples were collected in 0-20 cm and 20-40 cm depth increments, and inorganic carbon was removed by acid fumigation prior to SOC measurement using an elemental analyzer. The SOC in the agricultural field was 58% and 50% lower at 0-20 cm and 20-40 cm depths respectively relative to native prairie. The SOC reductions demonstrate agriculture’s negative impact on fertility. Results from restored prairies indicate the annual SOC accumulation rate was 0.0164% over a fifty year time period. Soil carbon content is positively correlated with time since restoration ($R^2=0.93$, after accounting for an outlier). Factors including land use management, vegetation, rill erosion, and topographic gradient and curvature would be worth researching in order to gain more insight on carbon accumulation rates in Midwest soil.
Although Poliomyelitis has existed for centuries, the silent killer once again emerged during the Summer of 1916. The deadly disease enforced a reign of terror over the United States, and nothing anyone did would safeguard them from its crippling effects. Unsure of how it spread, individuals relied on isolation as a preventative measure—one to which Polio had no response. Polio seemed to pursue innocent children, and its consequences could lead to paralysis, or even death. This "new" disease imposed the greatest insult to American power, both in its technological and medical fields—inflicting national power and affluence. A solution had to be found, and fast. This race quickly gained attention as the 1950’s began, where progress on the disease came faster. As research continued, the epidemic increased in strength. Countless children and adults who had active and healthy lifestyles were crippled by disease. As the baby boom occurred following World War II, polio epidemics were rising faster than the population. What could be done? What factors caused the sudden movement for eradication for the disease? This project will explore the full effect Polio had on the United States by considering the epidemiological, socioeconomic, and psychological factors involved in its widespread survival, as well as its eradication. Evidence supporting the numerous influences will be provided through academic articles, and personal memoirs that help to reflect the significance of the disease on those afflicted in the 1950's, following World War II.
The incidence of Bubonic Plague that ravaged Europe following its arrival in 1348 wrought many changes on the socio-economic landscape of the region. Using primary and scholarly sources this paper will demonstrate that the plague greatly affected the European labor market, peasants' perceptions of their place therein, and their ability to barter for wages, shifting where the power lay in the labor market. The nobility had no choice but to enact new, sometimes drastic sanctions and policies in reaction to the rapidly changing economy. These events generally improved the lives and standings of the lower classes, aided in the advent of the middle class, and further estranged the nobility from their subjects. Eventually, in the following decades these factors coalesced, serving to widen class divisions and nurture animosity towards the nobility and landed gentry and culminated in mass rebellions, such as the Peasants' Revolt in England and the Jacquerie in France.
The Bubonic Plague was one of the deadliest plagues in history during its three pandemics. The plague was first found in 541 C.E. in the Byzantine Empire and eventually affected Western Europe between the years 1340-1400. This paper focuses on the socioeconomic effect of the second pandemic of the Bubonic Plague particularly on the continents of Europe and Asia. It will include the plague’s effects on politics, territory, trade, and finance. The plague was also notoriously known as the Black Death, because it killed 30-60% of Europe’s population. It drastically affected trade, farming, communication, currency distribution, and violence. The Bubonic Plague defined the Late Middle Ages and shaped the history of not just Europe but the world.
This paper will focus on the evolution of the use of biological weapons. Preliminary research suggests that the real danger posed by biological weapons is not in large-scale nation-versus-nation warfare, but instead lies in the ability of nations or non-nations to use them as a means of terrorism. With the development of biological weapons becoming more transparent, it is now easier than ever to construct such devices and use them to push personal or political goals. The development of biological weapons has opened a Pandora’s box. Although still a threat in large-scale warfare, bioweapons have become far more likely to be used for terrorism. Internet sources supported by scholarly sources including different journals and historical documents will be used to analyze casualties and incidents in which these weapons endangered lives.
Disease, man’s most formidable foe besides mankind itself, is an expert killer. From smallpox, to the Black Death, to influenza, plague washes over civilizations and sometimes the whole world leaving devastation in its wake. No one is safe from pestilence, as it can strike anyone from any class resulting in death. But, there is a part of society that even now remains the most vulnerable, and the most vulnerable would be those of the lower classes. From living conditions to access to medical care the lower class is very susceptible to disease. Without the lower class in society, things fall apart, and this core workforce, this core of society is the most valuable and most vulnerable. Without people to work jobs like harvesting for instance there would be food shortage. The “lower” classes of people make up most of society so when they are all wiped out the economy or perhaps even an empire can come crashing down. In the succeeding pages, exploration of the impact of multiple diseases on the lower class population will be discussed. Instances ranging from the beginning of civilization to present day will be examined to reveal the devastation that contagious disease can inflict on the lower class.
In this research project, the artistic response to the HIV/AIDS epidemic that occurred in the United States in the 1980s will be explored. This project will include a researched account of the stigmatization of the LGBTQ community during the initial crisis, as well as make connections between this marginalized community, its stigmatization, and the outpouring of activist artwork. The project aims to answer the question of how a community ravaged by disease responds during crisis – it will show that the lack of an organized response from the government, stigma in the medical community, and even isolation from the rest of society created a vibrant activist-artist movement. The research will explore individual artists as well as art collectives that used creativity to counteract the psychological and sociocultural pain of the LGBTQ community during the AIDS crisis.
During the course of history people are forgotten and as historians pick up the pieces of a story decades or centuries later those people are never again remembered. People lost their identities and maybe even their humanity; this is an attempt to return the identities to the Jewish people of colonial era Newport, Rhode Island.

Today, the community is thriving but in the mid-seventeenth century this was not the case. The community was small and had very little presence in Newport, using the city as a layover to their next stop.

Although an attempt to return identities to these Jews living in Newport, this paper is only a beginning. It examines the lives of only two, prominent and influential men in the community; Moses Seixas and Aaron Lopez, as well as their families. They were both merchants with large families but came from very different backgrounds; one was born in the colonies while the other in Europe, one was more successful than the other. Both men, however, were hit equally hard by the onset of the American War for Independence while being staunch supporters of the colonists.
Between the end of World War II and the 1970s, the United States and the Soviet Union were locked in a competition for control of the next frontier: outer space. Sergei Korolev led the Soviet effort; he was a brilliant rocket engineer who had survived imprisonment in the Gulag. Korolev dedicated his life to this public contest with the United States. His opponent was Wernher von Braun; he had led the German rocket program under the Nazis and then became the head of the U.S. team after the war. However, these rocket programs and engineers did not operate in a vacuum. Within the context of the Cold War, the United States was incredibly open about the details of their space program; however, the Soviet Union closely guarded their scientists and methods. This paper examines the impact that the Soviet tradition of complete confidentiality had on their rocket program. It looks at the reasons and effects of concealment of important information, as well as the political context for this secrecy. Based on archival materials such as government and intelligence records, newspapers, interviews, and memoirs, in addition to secondary sources, this research suggests that the secrecy of the Soviet Union contributed to their early successes but ultimately limited their accomplishments in the rocket program and the space race as a whole.
Why the Presence of a Strong Polish National State in Post-WWI Europe Benefited the Leaders of the Weimar Republic

The period immediately following World War I was one of the most trying times the German people had ever experienced. Nevertheless, the attitudes and actions of the major players in European politics at this time portrayed the atmosphere in Germany in a significantly different light. The presence of a strong Polish state, while seemingly detrimental to Germany’s Central European dominance, actually helped the German leaders sustain Germany’s powerful position in Europe. Using a variety of secondary sources, accessed at the W.E.B DuBois Library at the University of Massachusetts Amherst, and primary sources, primarily microfilms from the American Commission to Negotiate Peace and memoirs from delegates active European delegates, this paper takes into account a multiplicity of experiences. By analysing relationships between the different European nations and leaders, this paper provides an accurate depiction of Europe’s post-WWI political environment. A desire to both keep Germany in check and provide a buffer state from the growing Bolshevik threat led Western European countries to provide significant support for the reestablishment of Poland. Unfortunately, in order for Poland to properly function, it had to annex certain territories which had majority German populations, thus violating Woodrow Wilson’s self-determination principle. Germany’s presence as a potential countermeasure against the Bolshevik threat gave them a validation that they were still a power in Central Europe. Meanwhile, Poland’s undermining of the self-determination principle represented the misconception of Western Europe’s moral superiority.
Mithras, also called Mitra or Mithra, is a god who had been worshiped for over 2,000 years by the time of the Roman Empire. To the Romans, this Indo-Iranian deity took on a new form as a god of the soldiers, as well as a god of personal salvation for his followers. Lacking a central text for Roman Mithraism, the manner in which he was worshiped is unclear from the surviving material and literary evidence. This project will investigate the origins of Mithras as well as how this deity came to be known in the Roman Empire. This project also discusses aspects of Mithras that are present in the art left behind in the Mithraea, underground temples used for religious ceremonies by the cult, as well as the imagery associated with Mithras in both Roman and non-Roman sources. The specific aspects involved include the sun, the harvest, the zodiac, and time. The final section will posit a possible theology surrounding the cult of Mithras since no satisfactory belief system has been identified.
The seventies in the United States was a time that many historians would argue consisted of multiple societal shifts and events that shaped the way modern Americans think and act. Students at the Salem State College campus, took to the school newspaper, The Log, to voice their opinions and concerns about this turbulent decade. Among the many movements of the seventies, the second wave feminist movement was on the rise. Salem State students were no exception and took to their student led newspaper to use their voices. I will investigate primary sources from The Log, such as images, photos, newsletters, and columns to explore rape and sexual assault that was taking place on Salem State’s campus. The Log, which was overflowing with student written sources, gives insight to the opinions, supportive or not, about how the student body was dealing with these issues. I will then use this evidence to answer larger questions about the significance of the culture surrounding rape and sexual assault on college campuses. These larger questions being: what were women on Salem State’s campus writing about in the paper? What policy change were they advocating for, and did they receive it? Was Salem State an isolated case, or was this rise in rape and sexual assault a national issue? All these questions tie into the importance of a larger question that concerns many of us today: how have these issues impacted or changed the way we see rape culture in our existing society?
Harriet B. Stowe's *Uncle Tom's Cabin* and a Woman's Influence on the Civil War

This electronic presentation will analyze *Uncle Tom's Cabin* as a literary text and a decisive piece of American history. Visuals, historical sources, text from the novel, and original analysis will be utilized. The research will appear as an imitation newspaper article/book review, as if it were published during the years surrounding the Civil War. The background of Harriet B. Stowe's prominent social position will be assessed in order to fully understand the context in which the fictional novel was written. The validity of her supposed run-in with Lincoln, and him calling her "the little woman who began this Great War," through the use of primary and secondary sources, will be questioned. However, the bulk of the presentation will surround Stowe's interaction with Black Americans, slavery, racism, the culture surrounding her, and how she decided to use her voice. As a white citizen, she had influence. As a woman, her writing was bound to be scoffed upon. This innate tension encompassed in her position in society and her own personal experiences birthed *Uncle Tom's Cabin* - the novel that was second in sales only to the Bible during the 19th century.
This project explores the reasoning on why Vietnam became Communist in the 1960-70’s. It will explore Vietnam’s culture and how it can relate to the Communist philosophy of Karl Marx. It will look more in depth of French colonialism in Vietnam along with American intervention and how the Vietnamese reacted to these types of policies. Rather than having said Vietnam fell under the wrath of Communism, it will explore why the communist ideal may have fit Vietnam’s ways of government and be the ideal system that represented the people at that time. This project will also focus on Vietnam’s willingness to become an independent country by fighting for their ideas and the unification of the North and South.
Charlie Turcotte of Pawtucket, RI entered the United States Navy in 1941 shortly after Pearl Harbor was attacked. While in the USN he sailed on the U.S.S. Farenholt as a first-class gunner's mate and experienced the sinking of the U.S.S Wasp and the Battle of Guadalcanal. He was also involved in the Battle of Okinawa while serving on the U.S.S. PGM-11 and was witness to the infamous kamikaze attacks. Throughout his time in the service, Turcotte's ships were subject to numerous hits, including from friendly fire during the Battle of Cape Esperance, which nearly sank his ship. During the Battle of Okinawa, his ship was grounded and barely got home safely. Like so many servicemen, Turcotte came home after the war and married the love of his life. Turcotte's experiences were similar to those of other sailors of the time and as such, the paper connects his experience to the wider war in the Pacific. By writing this paper, I was able to learn about the life of a sailor and understand the war in a more personal way. This paper has been dedicated to Charlie Turcotte and his wife, Virginia, both American patriots.
While teaching historical events through a singular presented narrative may be effective time-wise, it robs students of the opportunity to think critically about the past. In history, there is not one version of events; instead, there are multiple perspectives that, together, create a richer understanding of it. Teaching solely from a textbook gives students descriptions of events that can be grossly oversimplified. Presenting information through interdisciplinary activities, with multiple perspectives in mind is a more effective way to educate students and also strengthen their critical thinking skills. It is difficult for the United States to look back on its darker moments, and even more difficult to teach these events to students. Executive Order 9066 and the internment of Japanese Americans is one such moment in American history. The narrative of the internment process provided in most textbooks does not adequately present it as anything more than an influential domestic decision. However, by adopting lessons that utilize multi-perspectivity, and by focusing more on discussion and analysis of primary sources, teachers can encourage students to take an active part in their own learning while also analyzing the multilayered decision to imprison American citizens.
A New Sphere: Developing Matinees and Moral Dramas in Antebellum New York City

Nineteenth-century theaters and shows is a topic that receives little attention within historiography, and the discussion of matinees and women even less. Despite this, antebellum theaters were a rich and crucial part of entertainment for citizens, offering a variety of acts that could attract a variety of people, including women and families. Matinees, and the popular moral dramas that emerged from them, are a rich piece of nineteenth-century culture that developed out of changes not only in entertainment, but in the evolving environment around them. Developing gender roles, consumerism, and reform movements provided the foundation for the creation and popularization of matinees and moral dramas in the antebellum period by means of enabling women to be included in theater life. Many works discuss matinees when arguing a larger point about theaters, however, matinees are rarely placed at the center of their discussion. Moral dramas, while having works dedicated to their progressive ideas, are rarely contextualized into their role within theaters. Through a variety of sources from etiquette manuals and women’s writings, to moral drama scripts and broadsides, this poster both contextualizes matinees and moral dramas into the larger societal changes of the nineteenth century while also acknowledging the progressive importance of such topics. Such a discussion is essential to understanding both how broad societal changes affected the everyday lives of citizens within nineteenth-century cities, as well as how entertainment in turn affected society during this dynamic period.
Nurses in the Civil War, such as Clara Barton, are considered pioneers of modern medicine. Barton founded the American Red Cross and was instrumental in turning nursing into a profession for women after the war. Most nurses in the Civil War were highly dedicated to their patients and would often quarrel with surgeons over their proper care as they felt surgeons lacked the empathy and competence to treat the wounded. By looking at this conflict only as a power struggle for nurses to gain recognition or control within the hospital, it removes the human aspect of their care and the personal connections they had with their patients. Being responsible for their patients care and comfort on a daily basis allowed personal connections to develop. Personal connections along with flow of information from parents of the soldiers and other nurses encouraged nurses to fully dedicate themselves to the care and wellbeing of their patients and allowed them to challenge the decision and practices of the surgeons in regard to their patients.
Many times, rebellions and uprisings are inspired by certain music. In the German Democratic Republic (GRD), behind the Berlin Wall, a counter culture of Punk rockers was brewing, inspired by the forbidden western music of David Bowie. The existing culture was mobilized to revolt after the Concert for Berlin in 1987, when Bowie played at the Brandenburg Gate, and pointed his speakers East to give those in GDR a show. This led to one of the most brutal revolts in East German history, with scores of young East Germans being beaten and arrested by the police. After this, the punk movement continued to gain momentum, terrorizing the regime, and ultimately played a significant role in tearing down the wall and reunifying Germany in 1989. Research to support this thesis focuses on first hand accounts of those who attended and rallied, as well as those who organized uprisings, as well as interviews with David Bowie himself. There are also large numbers of state official documents recording the East German paranoia about the Punk culture, western rock music, and youth uprisings.
Puerto Rico is an island nation whose local bilingual population has become subservient to the U.S. Most Puerto Ricans descended from the Taino, who were once a prominent Native Americans who lived in the Caribbean islands and Puerto Rico for four hundred years until colonization and expansion led to the disappearance of a distinct people. Yet, the truth is that their cultural extinction was brought upon assimilation of a conquering group, the Spanish conquistadores. After Spanish rule Puerto Rico was ceded to the U.S. What happened then is a history of an oppressed group of people that until today not much has changed. Capitalist policies prey on the weak and the uneducated, conformity has led to a class consciousness that has made it “okay” to be oppressed, in other words, a silent oppression. The relationship between the U.S. and Puerto Rico is a controversial legacy, which directly affects Latin America. It remains to be said that the existing social problems are because of this dichotomy. By tracing ideological patterns and events we'll understand these questions from a modernist perspective: how has U.S. imperialism after the Treaty of Paris of 1898 impacted the current Puerto Rican debate over statehood? Should P.R. become a state of the U.S. or an independent nation, and what are the disadvantages and advantages? What is the relationship between Puerto Rico and the U.S.? 
The influences that led to the political rise and legacy of John F. Kennedy were present throughout his life. Born into an already wealthy and powerful family that allowed ample opportunities for success, the young and often frail John Kennedy experienced a whirlwind of influences that eventually led to his role as the 35th president of the United States, consequently becoming a political and cultural icon for decades to come. Presented in a timeline format, these influences include his privileged youth, education, the effect of World War II on him and his family, and finally his terms as congressman and senator. These experiences prepared him for the strenuous 1960 presidential election and shaped his leadership as president.
My research examines the participation by American women in the arts during the period of the Women’s Suffrage Movement, from the late 19th century through the passage of the Nineteenth Amendment in 1920. I argue that women were making significant contributions during this period, and that their activities functioned on multiple levels. More specifically, I profile the lives of three individuals, each serving as a case study to inform a distinct area of the arts sphere during this period. Blanche Ames (1878-1969), an artist-cartoonist from Massachusetts committed to the causes of suffrage and birth control, created visual arguments through her widely distributed work. Alice Morgan Wright (1881-1975), a sculptor and representative of the fine arts sphere, collaborated and with other suffragists, including the revered Emmeline Pankhurst of the Women’s Social and Political Union in London. Third, Louisine Havemeyer (1855-1929), a major American art collector, as she supported the work of fellow suffragist and artist Mary Cassatt played a critical role in facilitating art exhibitions for the cause. I show the necessity of fusing a political framework with our understanding of these female artists and their work, and conversely, art with how we understand the politics of this movement. Further attention and proper recognition, which are so often denied to women in the arts, is provided to these figures, bringing their personal histories and contributions into greater focus.
Growing up I was definitely charmed by the Disney Princess world; the beautiful dresses, their kindness to everything and everyone, and the captivating romances between an “ordinary” girl and a handsome prince. Warner Brothers came out with a film called Anastasia; a beautiful love story about an ordinary young woman who had no idea who her family was let alone her past. Anya stumbled upon two con-artists trying to win a large sum of money by trying to trick the grandmother of Anastasia, Dowager Marie, into letting her think they found her lost grand child after the Romanov assassination. This movie showed me that there was one young beautiful woman who was a long lost princess and got her happy ending, however, fast forward to high school and I learn the tragic truth about the bloody assassination of a family whom I thought was perfect. This led me to constantly think about this revolution; through historical context, the Russian Revolution was a horrible time filled with blood spilling left and right and the assassination of the royal family, the Romanovs. After the Revolution and assassination Europe is faced with a woman who is believed to be the youngest surviving Romanov daughter, Anastasia. Fast forward a little more and America is producing a Disney knock-off film, Anastasia. In this paper, I explore the transformation of a bloody revolution into a romanticized tale of lost and found identity.
Alaric marching his troops into Rome in 410 CE was the first time since 390 BC the city of Rome had been sacked. For three days Alaric and his barbarians took all that they could from the city of Rome and left. The city of Rome was sacked because the Romans refused to let go of their notions of the barbarians, believing in their superiority to the barbarians, and took advantage of the barbarians instead of giving up their shortsighted views and allying themselves with the barbarians. In my paper I examine Barbarian and Roman relations (mostly through Caesar's conquests), the relationship that Rome had with Alaric and his barbarians, and the events that led to Alaric sacking the city of Rome in 410 CE. Through my research I came to the conclusion that Alaric was the true victim and not the city of Rome when Alaric sacked it and that the sacking was Alaric's greatest failure in his life.
This paper analyzes the Greek government and the influences that propelled Greece to join World War One. Greece’s involvement in World War I came at a high cost. Greece suffered a division in leadership, a constitutional crisis, the creation of an oppositional government, and an Allied invasion. All of which eventually create an internal strain on the nation and served as the root cause of civil strife for the remainder of the century. This paper examines the relationship between the Entente and Greece, and argues that the Entente manipulated Greece to join the war; a task that would not have been possible without Entente aid and intervention. Greece in World War One is a topic that has received little to no attention by western historians and few if any texts acknowledge the events that unfolded in Greece during the war.
Remembering the Hidden History of Boston's Abolition Acre

Most visitors to Boston’s Beacon Hill and the area adjacent to City Hall Plaza are completely unaware of the rich history beneath their feet. These locales were once enlivened by some of the most contentious issues of former times: immigration, enslavement, taxes, women’s rights. This presentation, Remembering the Hidden History of Boston’s Abolition Acre, focuses on an area rich in abolitionist history from the period before the Civil War. Here are some of the lesser known personalities and events which have impacted the course of American history. Designed to entertain, enlighten and educate, my research brings to life the disturbing tale of Mark, Phillis and Phebe, the enslaved servants of merchant John Codman, the gentle poet Phillis Wheatley, the kidnapped Nahum Hazard, and Boston’s firebrand of human rights, David Walker.
Women’s Reception of Classics in the American Abolitionist Movement

The American republic was forged on a foundation of elite and privileged Classics-influenced philosophy and learning. Despite its high-flying rhetoric of equality, America, like its Greek and Roman models, was built on enslaved labor. This thesis researches how abolitionist women writers, especially women of color used Classics, foundational to the new country’s creation, in ways that challenged the normalcy of slaveholding in the period between the American Revolution and the Civil War.

These writers include Margaret Fuller, Phillis Wheatley, and Lydia Maria Child, as well as anonymous women writers. Their writing transcends genre, and includes editorials, plays, fiction, and non-fiction. Upon close reading of these texts, it becomes clear that these women, like many other Americans at the time, viewed Classics as a strong contributor to any argument. The accuracy of the historical facts they use is less important than how they engaged with this history. Their deployment of Classics often hinges around a moral invocation that was unusual among male writers. In this way, women brought their social role as ‘moral enforcers’ to the fore even as they wrote about Classical history in a very conventional way.

As a whole, Classical reception is well-studied, but not among women or Americans of color, or the American abolition. This topic fills an essential gap and helps the modern reader understand the continuing impact of the Classics on social justice movements that fall outside the typical narrative of Classical scholarship.
Not yet a city until 1848, Worcester, Massachusetts experienced a growth spurt, in population and industry. The industrial period of the mid-nineteenth century is where Worcester can be placed on the map of a growing and prosperous hub of exporting manufactured goods. This did not happen overnight, and it took many people to make this happen. This research focuses on two people who helped the growth of Worcester, which shaped Worcester to become a leader in the nation for exporting manufactured goods, Levi Lincoln, Jr. and Stephen Salisbury, II. Both involved in politics were wealthy and considered very influential in the community. They were involved with implementing the Blackstone Canal and Railroads for Worcester. The Blackstone Canal was a costly failure. However, growth in population increased during this time with an influx of Irish immigrants, which expanded during the construction of the railroads. Friendships formed between businessmen and workers, some that would play to the advantage of those looking to circumvent around local government. The primary sources researched for this history capstone paper were through the American Antiquarian Society, Worcester Historical Museum, Massachusetts Historical Society, the Library of Congress digital collection, and scholarly articles. The connections and influence these two men was quite evident through my research. I would like to extend this research, to bring forward a better understanding the depth their influence had not only over the industrialization of Worcester but, their own personal legacy and wealth too.
This paper will examine the long withstanding relationship the American military has with violence against civilians, from the Vietnam War (1955-1975) to the present. In war it is understood that there will be casualties. However, there is a line between what can be considered “collateral damage” and unnecessary civilian’s deaths. During the years of U.S. involvement in the Vietnam War between 1965 and 1973, civilians were bombed, gassed, sexually and physically assaulted, in manners so brutal, that much attention has been called over the years, to the inhumane practices committed by the American military.

Using the Vietnam War as the base of comparison, this paper will look at America’s continued violence against civilians as well as why the violence occurred, whether it be due to racial tension, poor political decisions, or the increasing use of more destructive weapons.

Additionally, though civilian deaths in the War in Afghanistan (2001-) and the Iraq War (2003-2011) are less than that of the Vietnam War, the numbers are still staggering. Where one could hope that brutality committed by the American military since the Vietnam War, would be something that is incessantly avoided, civilians living in war zones in the Middle East have been frequently killed by bombs, drone strikes, IED’s, bullets, etc. These casualties should not however, be seen as collateral damage in war, but rather civilian deaths that could have been avoided.
Outlaw motorcycle clubs have become romanticized within American culture despite countless examples of lurid violence. Americans have developed an affinity for these clubs due to the fact that they embody many of the characteristics that are revered by society as a whole. This would include the allure of living life on the fringes of society, a shared emphasis on the importance of brotherhood, as well as the willingness to violently protect our way of life.
American corporations regularly commit acts of environmental injustice, almost always inflicting the most damage to racial minorities belonging to a lower socioeconomic status. In a country heavily stratified by wealth and race this is inevitable. This project aims to explore environmental racism as a mechanic that makes the "American Dream" unattainable for many minority communities while materially, physically harming them.
American Racial Profiling and the Assumption of Black Criminality

The deep-seated prejudices and entitlement of the "first people" to establish an American space shaped the attitudes of future Americans. It is detrimental in how Americans look/deal with minorities.

Racialized slavery shored up white power with the help of strategic stereotypes (especially after we "won" emancipation). These stereotypes, deeply rooted in American history, are what caused the mass amount of gross insensitivity, racial profiling and white washing that comes with America.
The poster will focus on the themes of Jace Weaver’s *The Red Atlantic*, Andrew Lipman’s *The Saltwater Frontier*, Nancy Shoemaker’s *Native American Whalemens and the New World*, and David K. Richter’s, *Facing East from Indian Country*. Their themes focus on the role the Atlantic Ocean and Imperial Europe played in the discovery and colonization of the “New World”, as well as first contact with indigenous people and the interplay between native populations of New England. Extensive use of graphic images and bullet-point text will direct visitors through years 1620 to 1927, the year cross-Atlantic air travel began.
During my time spent in both HIST 0290 Islamic Civilization and HIST 0399 Studies of Islam, I have gained an understanding on the origins of the religion of Islam, the practice of Islam throughout history, and the impact that regional culture has on Islam throughout several different parts of the world. Not only are the cultures of these areas and nations different, but so too are their perspectives on Islamic Feminism, with Islamic Feminist movements growing in support and awareness in some countries, while others are suppressed by the state. I intend to compare Leila Ahmed, an Egyptian Islamic Historian, and her findings in Women and Gender in Islam as well as A Border Passage, to Fatima Mernissi, a Moroccan Islamic Sociologist, observing her works Beyond the Veil, Dreams of Trespass, and The Veil and the Male Elite, as well as evaluate on what they observed, and why they acquired different results.
Drugs use represents a ubiquitous and complex issue for policymakers in the United States. While the purpose of these substances can arguably range from medicinal to recreational, the necessity to legislate them has become increasingly salient. The opioid crisis has become a paramount issue—which is responsible for 63% of all drug overdose deaths—that lacks a proactive solution. Despite President Richard Nixon’s announcement of the "War on Drugs" nearly 50 years ago, and despite President Donald Trump declaration of the opioid crisis a "public health emergency" months ago, the federal government has failed at addressing this epidemic.

America must reevaluate its federal drug policy. Since the establishment of the Drug Enforcement Administration in 1973, incarceration rates in the U.S. have risen at unprecedented rates. The current approach to drug policy has failed to yield measurable results. Instead, current policy perpetuates systemic racism and targets the poor and vulnerable; it has contributed to the U.S. having the highest rate of incarceration in the world despite the continuous increase in prescription opioid and heroin-related deaths.

This paper will examine the social impact the War on Drugs has had by assessing a cornucopia of statistical evidence, and juxtaposing the analysis with federal drug policy.
This research describes and highlights the importance of transportation developments in Worcester, Massachusetts during the 19th century towards its growth from a stagnating rural township to a major industrial city. The research focuses on the history surrounding the Blackstone Canal, the major railroads that ran to and from Worcester, and the various firms and industries that developed around them. The sources drawn upon include the work of various historians, both contemporary and from the period researched, as well as primary sources such as company charters, stock reports, newspapers, photographs and lithographs. Through the use of these sources it is shown that by being quick to adopt the latest transportation technology and infrastructure, early 19th century rural Worcester set itself up to become an industrial boom town despite its limitations as an inland town that lacked access to navigable natural waterways. Starting with the construction of the Blackstone Canal in the 1820s and followed by the construction of railroads like the Boston & Worcester, and the Western during the 1830s and 40s, Worcester opened itself up to the raw materials, labor, capital, and markets required to build a vibrant and diverse industrial sector that would prosper well into the 20th century.
My honors thesis will highlight secret human experimentation performed by the United States government throughout the course of the twentieth century. I will specifically be focusing on the victims of these experiments, how they sought justice through the court system via compensation, how that compensation was received or not received, and how the families of these victims continue to fight for justice in the present. I will also be analyzing how the victims of each experiment were chosen (i.e. gender, race, socioeconomic status, etc.) and how their perception of government changed following their experience. The Tuskegee Syphilis Study, the Vanderbilt University Medical Center “Nutrition Study,” and the Massachusetts Walter E. Fernald State School “Science Club,” are some of the events I will be describing. I hope to paint an accurate portrait of the horrific scenarios victims were often placed in. It is in this way that I will demonstrate how their demand for fair compensation and national recognition is understandably justified. Lastly, by analyzing how the victim’s perception of government changed dramatically after their experience, I can draw relevant conclusions /seek to explain the attitudes of many United States citizens and how our perception of government slowly declined over the course of the twentieth century and catapulted us into a new age of political distrust.
Figure skating has come a long way from its early beginnings, to the point where triple and even quadruple rotation jumps are now commonplace at senior level international competitions. The first ever skating club, the Edinburgh Skating Club, was formed in 1742, which was the beginning of formalizing skating into more than just a mode of transportation, as it had been for millennia prior. Just a few decades later, in 1772, an instructional book was published, dividing skating into two main fields: speed skating and figure skating. At this point in history, skating was mostly restricted from female participation. It wasn’t until 1863 that American skater, Jackson Haines, began incorporating ballet and dance, rather than simply tracing figures on the ice. This innovative skater, in his efforts to intertwine different disciplines, sparked the evolution from stiff and rigid moves to the balance of art and athleticism. Throughout its complex history, skating also developed into one of the more political sports on the world stage. Figure skating became a way of sharing peace during the cold war Olympics, but also great animosity later on. Such animosity culminated in the 2002 Olympics when French judge, Marie-Reine Le Gougne, was allegedly pressured to place the Russian pairs skaters in first, in exchange for better marks for the French ice dancers later on. This, along with many other controversies, led to a complete upheaval of the judging system and the creation of a newer, less bias system.
In the spring of 2017, I was approached by a professor to join him in a writing project that will be published in 2019. The project is a volume called: *50 Events that Shaped African American History*. My contribution to this project is a chapter on the Harlem Renaissance. The Harlem Renaissance took place between 1920 and 1930. Once the decade passed, the Harlem Renaissance ended as quickly as it had begun. Using primary and secondary sources, I researched and learned about the various themes within the Harlem Renaissance. Such themes include: politics, literature, music, and black identity and culture. I had to write a chronology, a narrative, two biographies, and two sidebars. One biography is about Langston Hughes, and the other, James Weldon Johnson. The one side-bar comments on the concept of “The New Negro” and the other, comments on the Harlem Riot of 1935 and how that symbolized the end of the Harlem Renaissance. The goal of this project was to write an unbiased view of the Harlem Renaissance. I encountered the arguments, victories, and defeats of the Harlem Renaissance. Writing about the Harlem Renaissance also caused me to ask questions. One question was: “Was the Harlem Renaissance a success?” I intend to share what this writing experience has taught me and also hope to offer my own take on the questions offered above, and help to start an educated conversation of an influential moment in African American History.
Tattoos are not only fun and interesting to look at, but the meaning and reasoning behind each tattoo expresses an individual’s self and their identity. In the article “The Identity Crisis Under the Ink” by Chris Weller, he explains how individuals, more specifically millennials, believe that expressing themselves through art, is a more personal, symbolic, and cheaper way of expressing one’s identity. I say cheaper because Weller talks about how individuals will tend to express their identity to others by showcasing what they own, like clothes, cars, houses, and other material possessions. In the past few decades, tattoos have become more popular as we’ve seen society change to fit the current trends and popular media in general. People have the urge express themselves by doing something that is unique to them and only them. Yes, you can get the basic green Irish shamrock that you saw online, but that shamrock can mean completely different things to every person that gets it. We live in a society where if you tell someone what you’re getting a tattoo of, the very first thing that person is going to say is, “So what’s the meaning behind it?”. Every tattoo has some meaning behind it, whether it’s a heart that’s a symbol for your mom, or just because you think dragons are badass. Sociologists say people get these tattoos of people, stories, objects, places, etc., all to build a person’s identity, and to accept their “remembered past, perceived present, and anticipated future”.
Established in 1978, the Heritage State Parks program was a response to deteriorating economic and social conditions in post-industrial cities across the Commonwealth of Massachusetts. Part historical site, part urban renewal tool, the parks attempted to leverage local histories in order to drive private investment in urban centers. Relatively successful in meeting their programmatic and urban planning goals during their peak in the 1980s, the Heritage State Parks program was ultimately downsized, with many parks turned over to local control following the 1990-91 recession.

This work seeks to uncover the story of the Heritage State Parks program, tracing the system from its beginnings in Lowell in the mid 1970s, to its eventual downsizing in response to the fiscal crisis faced by the Commonwealth during the recession of the early 1990s. Supplementing this general survey are three case studies focusing on the Lowell, North Adams, and Holyoke parks. Chosen for their divergent histories, these case studies uncover each park’s development and operation, and analyze how effective the heritage parks were in revitalizing their host communities.

While ultimately unsuccessful in achieving their broader aims, the Heritage State Parks were unique in both scope and goal, and influenced similar programs in both New York and Pennsylvania. By revealing the Heritage State Parks program’s history and importance in the broader scope of urban renewal, we can better understand how to leverage local histories and public and private investment to revitalize our communities.
The Real American Drug Problem

Since their existence, humans have used psychoactive drugs. Since before and shortly after the 20th century, psychoactive drugs were have been widely available and used. It wasn’t until race and culture became connected with drug use that strict laws prohibiting their use, as well as stereotypes about who uses them, came about. These policies drastically changed how drugs and drug addicts have been treated; from the helpless to criminals claims David Courtright in Forces of Habit:Drugs and the Making of the Modern World. This presentation shows how over the past century, not much has changed with the drug-related policies that have caused massive disparities. As seen through primary sources from David Musto’s Drugs in America: A Documentary History, in the 18th century, doctors hailed the benefits of drugs and users were catered to. To the contrary, those who saw the dangers of drugs wrote about them and pushed for regulation. This fact seems to have faded from U.S. history and that has shown to be to it’s detriment. Worry about drugs and their dangers brought up questions of how to handle them. Many of the policies put in place caused more problems than they solved. The United States “tough on crime” mantra just isn’t working. Portugal decriminalized all drugs and offered support to addicts over twenty years ago and has successfully dropped drug abuse rates in that time. There are better ways of dealing with these dangers that have shown to work and the people of the U.S. deserve better.
429    Room 911    3:30-4:15    Panel 6
Jenna Marie Henderson
Laura Lovett (Faculty Sponsor)
Department of History, UMass Amherst
Using History to Make the Drag Community a More Inclusive Space for Both Queer
Women and Non-binary Individuals

The term “drag” describes dressing up as the opposite sex. Drag performance tends to
consist of drag queens and/or drag kings.

I have noticed that the drag community is primarily occupied by queer men, and I want
to examine this closer.

I am utilizing both primary and secondary historical sources to research ways to make
the drag community a more inclusive space for both queer women and non-binary
individuals.

I am currently working with three books, Roger Baker’s Drag: A History of Female
Impersonation in the Performing Arts, Laurence Senelick’s The Changing Room : Sex,
Drag and Theatre (Gender in Performance), and Esther Newton’s Mother Camp:
Female Impersonators in America.

I am still searching for resources that address women in drag – as both kings and
queens.

I intend on examining when drag queens first emerged and when drag kings first
emerged. I want to examine the historical context of these times and trying to identify
ways to make drag more inclusive for more people.

I am also working with Taylor Mac’s piece of theater, The Lily’s Revenge as an example
of a drag piece that is inclusive to all gender identities.
The Seven Years' War (1756 – 1763), a conflict commonly known from the North American perspective as the French and Indian War, engulfed four nations and reached across the continents of North America and Europe. It is among the most critical wars in history, as it established a new balance of power in Europe and abroad—a fact that would affect the fate of millions for years to come. Greater still were the War’s implications for the French people. This paper focuses on the assertion that the Seven Years’ War set the stage for the French Revolution, that this War essentially weakened the already cracked ice on which the French monarchy continued to rule. It is important to clarify that this paper does not seek to prove that there is a direct causal link between the Seven Years’ War and the French Revolution, but rather that the great conflict caused much of the financial, political, social unrest which would later cause the fires of Revolution to be spread in 1789. This historical interpretation is explored through the extensive use of primary and secondary resources put into context with the contending or supporting perceptions of the historical community.
The trial and execution of Charles I were unprecedented events in English history. English kings had been killed in battle or assassinated, but had never been put on trial and then executed. The most preposterous part of the charge against Charles I was the charge of high treason. The statutes, cases, and treatises on the law of treason prove this charge to be without merit. The regicides attempted to remove the sacred aspects from Charles I and the monarchy but failed. Charles I became a martyr. The failure of the Cromwellian experiment in creating a new sovereignty not based on the monarchy and sacredness, but instead on the law, vindicated the civil lawyers, a group of lawyers who practiced in the prerogative courts of the King. Never again, would a king of England be put on trial and executed.
This presentation will compare the historical significance of King’s Chapel in Boston during the American Revolution and the Panthéon in Paris during the French Revolution. Both of these buildings symbolize old societal ideas as the rest of the city was enveloped in revolution. King’s Chapel was the first Anglican church established in Boston. The chapel was a place of worship for loyalists, and as the American Revolution developed, it quickly became a symbol of the oppression of England to the revolutionaries. The Panthéon in Paris was constructed to be a Catholic church, but was converted to a mausoleum for great Frenchmen. King’s Chapel still stands today as a church, but the Panthéon is no longer a symbol of religion in France. The reaction of the revolutionaries to the buildings that represented the old regime act as a case study of the nature of these two revolutions. I will demonstrate how the older ideas that were considered "anti-revolutionary", embodied by these buildings, had to do with the religion of the society before the revolution. Through my comparison, I hope to illuminate the nature of resistance to revolution, in the form of older concepts of societal expectations, and how revolutionary ideas and actions eventually pervade.
Travelers searching for lodging traditionally seek out hotels, but hotels are expensive and do not often offer an authentic impression of the community they are located in. AirBnb offers a solution to this dilemma. This relatively new company has been able to maintain an excellent reputation as affordable and locally flavored lodging. Unfortunately with the creation of AirBnb some ethical problems have come to light. My research explores the sociological and economic issues that arise in the new tourism industry of AirBnB. Various travelers have given a big thumbs up to their experiences with this service, but many do not see the behind the scenes issues with the business. For example, disabled travelers are facing discrimination and exclusion from a great number of properties offered on the site. The article “Disabled Travelers Are More Likely to Be Rejected by AirBnb Hosts, a Study Finds” (Chokshil, Niraj and Benner, Katie) explains how unregulated the requirements of these rentals are in comparison to more conventional methods. Sadly, it leaves disabled people unable to stay at many of the sites locations giving them a much smaller pool of availability than the average traveler. AirBnb would need to gain more requirements in order to be accessible to all. They have already make steps toward this with the creation of there anti discrimination policy. AirBnb’s mission is to find the right space for any and everyone to stay.
Using "Kiosks" to Expand Global Business in the Hospitality Industry: Uniguest Case

Not everyone can use their laptops to conduct business in their hotel rooms. The objective of this study is to develop a business plan that would help a business called “Uniguest” expand their kiosk business internationally. Uniguest kiosks are computer systems used in hotels for their guests to use. These kiosks wipe out all the accumulated history and data from the internet after a guest logs off. This benefits the hotel guest due to the fact that the next guest in line for the computer won’t be able to view sites/ information that the previous guest had searched. Uniguest currently operates all over the world. By using the data Uniguest already has, the study will conduct research on different countries hotels within the data and outside of the data. Using Tableau and various other research tools, the study will generate new information that will lead to Uniguest’s international growth outside of the U.S and Canada. Some of the questions that need to be answered are:

- Can you help quantify the number of international hotels?
- Can you help quantify the addressable market vs. the total available market based on criteria Uniguest would provide
- What types of similar services or offerings are being used internationally?
- Are there critical service elements needed for hoteliers outside of the US?
- Are there any new technology trends internationally that we should be aware of?
- Can you map out areas where Uniguest does /does not have business in currently?
Previous studies reveal that there is a strong interaction between push and pull factors of motivation. Push factors represent social physiological reason for travel whereas pull factors represent destination attributes in general. To effectively market a destination, it is necessary to understand both push and pull factors and the relationship between them. Knowledge about the interaction of these two dimensions of visitor motivation can help marketers and developers of destination areas determine the most successful coupling of push and pull factors as tourism product bundles. This interaction based on tourism motivations may then provide a basis for segmenting those travelling for pleasure.

The study has two main objectives. The first is to delineate and understand existing product bundles as a function of both push motivation factors and pull destination attributes utilizing canonical correlation analysis. Canonical analysis is a technique for finding the correlations between one set of variables (multiple dependent variables) and a second set of variables (multiple independent variables). Second, the study explores and illustrates the usefulness of the relationship between push and pull factors based on the delineated variates of these items by assigning respondents to identified product bundles to form market segments with overlaps and provide marketing implications. The sample of this study consists of those individuals who visited a state park at least one time in the past 12 months in the southeast part of the USA. A total of 3,050 usable surveys will be analyzed to address the study objectives. The study will end with appropriate marketing and management implications.
According to “The Big Idea: How to Solve the Cost Crisis in Health Care” in the Harvard Business Review, the United States has the same increasing trend in healthcare costs as other countries, however, it is the only nation that spends 17% of its GDP on it. The current form of reimbursement for healthcare professionals is based on procedures performed instead of outcomes achieved. This research discusses how healthcare costs can be reduced with a mutually positive effect on the quality of care and the profitability of the important players in the healthcare industry. It will introduce the role relative technology, informative insurance health plans, and deductible investment portfolios will play in facilitating the proposed system discussed in this paper. According to “How the U.S. Can Reduce Waste in Health Care Spending by $1 Trillion”, focusing on the quality of care may significantly reduce healthcare costs by decreasing the amount of visits a patient makes and prohibiting the use of unnecessary tests to increase profitability. Instead of revenue made from the tests given, revenue will come from the various stages of care a patient undergoes. The concept is to create teams of various disciplines in the health industry working together to improve the quality of life of each patient. Due to the multiple players in the healthcare industry, the quality of care must be attained by its guarantee on partial or complete patient satisfaction to boost sales of services and products.
This paper examines the impact of globalization on social movements. The advancement of information technology and social media has allowed different kinds of social movements to move to a global scale. Using resource mobilization theory, this paper will explore how various aspects of the internet, such as the multitude social media platforms, provides activists additional political space to effectively organize events and disseminate information. With new technological developments, movements can expand their agendas beyond national borders and become global. To demonstrate the utility of the resource mobilization theory, this paper will discuss how several global events such as, the election of Donald Trump, the Brexit vote, and the electoral victories of far right parties in parts of Europe have benefited enormously by such technology. In many ways, these groups or movements are propelled by populism and hyper-nationalism, and share a common agenda: resistance towards globalization, especially in terms of free trade, immigration, and cultural exchanges. Although social platforms such as Twitter, Tumblr, and Facebook have provided new spaces and opportunities to gain more followers and influence on politics, the implications of such technology on the state of democracy and the broader liberal world order are manifold.
Discourses on identity are often preoccupied with the impacts of identity-categories based on race/ethnicity, social class, religion, and gender. Language, by contrast, is often overlooked. And yet, language is central to the shaping of collective and individual identities, particularly in contexts of migration. My interdisciplinary paper focuses on ELL students (English Language Learners), and aims at opening up critical perspectives on current educational approaches in public schools that are intended to support ELL learners.

My paper will be using interdisciplinary frameworks that draw on insights from sociology, immigration studies, and education. The paper discusses current pedagogical and curricular models, analyzes the teacher-student-centeredness of given models, and critically considers methods and approaches to ELL students in the classroom (such as the creation of learner groups, the use of pre-teaching material and visuals). A central issue that distinguishes different approaches is whether ELL students are taken out of the classroom for separate instruction or remain within the classroom while attempts are being made to integrate English language teaching and learning. It is found that academic achievement is negatively affected when students are taken out of the classroom for ELL instruction, while missing central parts of the general curriculum. The discussion is framed by insights on academic success of ELL students and their socio-cultural development and well-being within the public school environment.

The presentation will conclude with reflections on how alternative pedagogical models, a well-designed curriculum, improved collaboration between schools and parents, as well as investment in teacher education can provide an environment that better meets the needs of ELL students.
Fulton County, Georgia is home to one of the worst, if not the worst, jails in the country. Constant overcrowding, understaffing, and poor conditions caused the jail to be under federal oversight from 2004 to 2015. However, even now, over two years later, there are still major problems in the facility. Using local news sources and docket reports from multiple lawsuits, this paper highlights the injustices faced by Fulton County inmates both before and after federal jurisdiction took effect. Inmates are regularly forced to sleep on the floor and in closets, guards are often not present when needed, and many people have died due to the lack of health care. Improper record keeping has allowed for inmates to be lost in the system, kept in jail longer than their original sentence, and in some cases even death. Overcrowding creates dangerous conditions, with constant threats of violence and disease amongst those being housed in the jail. Exposing these injustices is the first step in making more improvements and not allowing this case and all the people it affects to be forgotten about.
This is a Commonwealth Honors Interdisciplinary Project which integrates knowledge from Computer Science and Art. The goals of the game are to create great user experience and convey social messages about labor and thinking. In particular, we do this through the implementation of a game that has the user take the role of a delivery entrepreneur to survive in a highly competitive world. Only through thinking and hardwork can the user proceed in the game. This is a Virtual Reality game running on a mobile device and Google Cardboard. The game is developed using Unity and C# as the programming tools and Maya as the Art creation tool. Rounds of playtests are conducted to get feedback on how well these goals are achieved. During the development process, the thoughts and efforts in achieving these goals and the differences between developing mobile games versus desktop applications are noted for analysis and future references.
This research paper seeks to answer the following question: what is the role of Turkey in United States foreign policy in the Middle East, and to what extent does Turkey undermine American efforts in the region? This project will analyze the American-Turkish relationship in the context of changing political circumstances within the Turkish government, mutual and opposing interests relevant to national security in the region, and the effects of recent Turkish actions on American strategy in the region. This subject is of particular interest to me because of the frequency at which Turkish and American actions seem to conflict with each other’s interests, despite the long history of cooperation between the two nations. Turkey’s recent actions against American partners within Syrian Kurdistan, as well as a government in Ankara that appears to grow more authoritarian as time passes seem to be red flags in what has otherwise been a fruitful alliance, and this paper aims to examine the strength of this alliance as it stands today.
“Climate Change is no longer some far-off problem; it is happening here, it is happening now.” --- Barack Obama on Climate Change, President of the United States of America.

Climate Change is indeed an urgent threat to our planet and humanity. The effort to stop carbon emissions requires a collective endeavor and collective accountability. This study will conduct an assessment of the impact of the Paris Agreement in China and the United States. The research will analyze attitude and motivation behind cutting carbon emissions; report commitment under the Paris Agreement for China and the United States; and examine the costs and benefits of actions undertaken to meet commitments in the past year. Finally, this paper will also draw a parallel comparison of the two countries’ attitude, motivation, commitment, actions and leadership role in global climate action. Using the cost and benefit analysis (CBA) method, this research will examine the effectiveness of one specific national policy for each country under their submitted nationally determined contributions (NDCs). The results of this analysis will raise awareness on the issue of global climate change, and improve understanding of the importance of the Paris Agreement, which is a legally-binding framework in the 21st century for an internationally coordinated effort to tackle climate change.
Criminals have made use of contemporary technology in sex trafficking efforts, making it more widespread and profitable than ever before. The rise of trafficking online has also lead to increased collaboration between law enforcement and NGOs, provoking questions about the distinct interests of each of these stakeholders, how they intersect, and the potential impacts of their differing definitions of the problem. We have begun examining the techniques for detection and enforcement, as well as the various problem definitions that hold currency in the anti-trafficking community through interviews with stakeholders. Additionally, we are examining how these definitions and perspectives of the problem compare with the experiences of trafficking victims and other sex workers through interviews with social workers and other professionals who work with them in highly impacted communities within the U.S. From this study, we hope to learn how different stakeholders in the anti-trafficking community view the problem and examine whether there’s a disconnect between their perspectives and the on-the-ground experience of victims and consensual sex workers, as well as the social workers and other professionals who interface with them. This may ultimately speak to the effectiveness of anti-trafficking techniques in preventing human trafficking, convicting traffickers, and providing aid for victims, as well as allow us to consider the extent to which these same efforts contribute to modes of panoptic control directed at marginalized communities and further the monetary and political interests of non-governmental actors—what Musto and Boyd(2014) refer to as "neoliberal governmentalities."
This research project aims to address racially diverse media reporting in news publications in the 21st century. Legacy newspapers like The New York Times, Washington Post and The Wall Street Journal have not included sufficient racially diverse content on their print and digital news platforms. In the past, conversations about newsroom diversity have focused on the number of journalists of color in newsrooms, and rightly so. However, these conversations have failed to address the lack of diverse race reporting, especially in legacy newspapers. This research project proposes that legacy newspapers allow their reporters of color more journalistic freedom in reporting on underrepresented communities as a way to diversify race reporting. The primary basis of research includes setting five key parameters to define legacy newspapers: 1) multi-award winning, 2) having a circulation of at least 500,000, 3) having a strong reputation in the history of American journalism, 4) being over a century old, and 5) maintaining national coverage. Additionally, research includes analyzing several articles on race from digital media sites including BuzzFeed, Huffington Post and Vox and comparing them to race coverage in legacy newspapers. The goal is to discover not only how they differ but also what legacy newspapers can learn from digital news outlets in terms of diversifying race coverage. With an emphasis on The New York Times due to weaknesses outlined in its 2020 report, this research seeks to offer solutions to how legacy newspapers can create greater diversity in race reporting while maintaining their respective identities.
Physical activity (PA) is any body movement produced by skeletal muscle that results in energy expenditure (EE). Measuring PA accurately during various activities is important for many researchers to better understand the dose-response relationship between PA and health. Purpose: The purpose of this study was to use video-based direct observation (DO) to characterize the PA level and tempo of University Ultimate Frisbee (UF) players during game play using research grade accelerometers as the comparison measure. Methods: Study participants were males aged 18-21 on the University of Massachusetts UF team. The participants wore two ActiGraph accelerometers: one on the hip (AG-H) and one on the non-dominant wrist (AG-W). The session was video recorded with a GoPro camera. Data Processing and Analyses: Each video will be observed in the Noldus Observer XT software and coded for whole body movement, activity type and estimated Metabolic Equivalent values (1 MET=resting metabolic rate). AG-H and AG-W data will be processed and analyzed in the ActiLife software. Cutpoints will be applied to calculate the amount of time spent in light, moderate, and vigorous PA. Descriptive statistics of time spent in PA levels and estimated EE will be calculated and compared between DO and both AG locations. Movement accumulation will be characterized by identifying work-to-rest ratios. The results of this study will more accurately inform the Compendium of Physical Activity for the MET intensity value associated with Ultimate Frisbee.
A Study of Kinematic Factors of Tibial Stress Fractures with an Emphasis on Stride Length

Introduction: Tibial stress fractures (TSFs) are injuries frequently incurred by female athletes and military recruits. Injured recruits and athletes are unable to train for an extended period of time which hinders their careers and, in the case of the recruits, also costs the army capable personnel. Researching kinematic factors which are associated with TSFs may provide insight into interventions that reduce the risk of incurring a TSF. The purpose of this study was to ascertain if kinematic variables like rearfoot eversion and, in particular, stride length are significantly larger in females that have previously experienced a TSF. Methods: Ten participants (five with a history of TSF and five without) will be recorded with 3D motion cameras while running. Ground reaction forces will be collected via force platform. The 3D kinematic data will be processed with Visual3D. The variables to be observed are stride length, free moment, rearfoot eversion, vertical loading rates, and tibial acceleration. Results: It is expected that values in these variables will be significantly larger in those with a prior TSF injury than in those without a prior TSF injury. Conclusions: A final conclusion will be formed after data has been collected and analyzed from the subjects.
Introduction: Anterior cruciate ligament (ACL) tears are a prevalent knee injury in sports. Studies have shown that female athletes are 2-9 times more likely to injure their ACLs than male athletes. Most ACL injuries occur in non-contact situations due to forces generated by a sharp deceleration as in a single-leg landing. Previous analyses suggest that non-contact ACL ruptures occur when knee is close to full extension and in a valgus position. The purpose of this study was to compare knee extension angles and knee valgus angles in healthy male and female populations during a single leg landing. Methods: Data were collected from 6 male and 6 female participants aged 19-22 using 3D motion cameras and force platforms. Participants performed 10 simple hops onto their preferred leg off a 41cm box, followed by 10 dynamic hops where the participant immediately rebounded after landing. Data from the first 100ms after initial contact were processed and analyzed using visual 3D and a custom computer program. The primary variables for this study were peak knee extension angle (PEA), peak knee valgus angle (PVA), and peak knee valgus moment (PVM). Results: It is expected that females will have greater PEA, PVA, and PVM values than males, and that dynamic hops will result in greater PEA, PVA, and PVM values than simple hops.
Effect of Shock-Absorbing Insoles on Ground Reaction Forces of Over-Pronating Runners

Introduction: The number of runners has increased in the past decades due to its health benefits and low cost. During the process of running, one’s foot contacts the ground and then rolls inward in a process to reduce ground reaction forces (GRF); this motion is referred to as pronation. However, some runners over-pronate when they run meaning too much inward rolling occurs. Since the foot motions are unable to absorb these forces, over time the bones and muscles over the lower leg will accrue micro injuries which could potentially lead to medial tibial stress syndrome and other overuse injuries. Insoles have been designed to reduce these forces which in turn prevents injuries. The purpose of this study was to test the effectiveness of shock absorbing insoles in runners who overpronate. We hypothesized that the impact peak of the vertical GRF and the ankle eversion angle will decrease. Methods: Data were collected from participants, ages 18 to 22, using a 3D motion capture system and a force platform. The primary outcome variables for this study were: ankle eversion, ankle abduction, ankle dorsiflexion angles as well as ground reaction forces. Results: We expect to observe a significant decrease in ground reaction forces when a shock absorbing insole is used as opposed a control insole. We also predict that the ankle eversion angle will decrease as well. Conclusion: Final conclusions will be made following in-depth analysis from all subjects.
Introduction: Fatigue may alter muscle activation in jumping and landing maneuvers which could be a potential mechanism of anterior cruciate ligament injury. The effect of lower extremity fatigue on ground reaction forces and muscle activation during the landing phase of a single leg jump was investigated. The purpose of this study was to analyze how fatigue affects muscle activation during a single leg landing exercise. We hypothesized that peak muscle activation times of the thigh and shank muscles will change after a fatiguing protocol. Methods: Participants were 5 female ultimate Frisbee players (ages 18-22 years). Dominant leg ground reaction forces and muscle activation data were sampled at 2000 Hz before and after completing a fatiguing protocol. Results: We expect the results to show earlier muscle activation times after the participants have completed the fatigue protocol. Run and land vertical jump progressions depend on spring-like properties of a relatively stiff muscle, but fatigue has been shown to result in an earlier onset of muscle activation of the lower extremity muscles during this kind of maneuver. Conclusion: We expect that fatigued athletes will demonstrate changes in muscle activation times which could suggest alterations in lower limb neuromuscular factors. Fatigued athletes may have an increased risk of noncontact anterior cruciate ligament injury.

Caroline Pellegrini, Gillian Weir, Joseph Hamill, Biomechanics Laboratory, Department of Kinesiology
Over the years, running has become one of the most popular exercises around the world for women and men alike. Despite the plethora of benefits, running comes with a high incidence of injury. Patellofemoral Pain Syndrome (PFPS) is the leading cause of injury amongst runners; 25-40% of all running injuries correlate with Patellofemoral Pain Syndrome. Knee bracing is a popular treatment option runners use to combat PFPS. While in theory, knee bracing offers a logical solution to eliminate patellar maltracking and delayed onset of vastus medialis activity, two of the primary mechanisms behind the development of PFPS, most research have been unable to provide conclusive evidence that it is effective. The purpose of this study is to assess the impact bracing has on both the onset of vastus medialis and vastus lateralis quadriceps muscle activation patterns as well as knee kinematics and kinetics in patients with PFPS. **Methods:** Data were collected from female participants with and without anterior knee pain, ages 18-30, using 3D motion cameras, force platforms, and electromyography. The primary outcome variables of this study were knee joint kinematics, kinetics, and quadriceps muscle activation patterns. **Results:** We expect to observe a statistically significant difference in knee kinematics and kinetics and quadriceps muscle activation patterns while wearing a knee brace compared to without wearing one. **Conclusions:** Final conclusions will be made following an in-depth analysis of data from all subjects.
Purpose: Anterior Cruciate Ligament (ACL) injuries are traumatic, debilitating knee injuries that can remove an athlete from competition upwards of 12 months. The majority of these injuries typically occur during non-contact side-cutting and single-leg landing tasks. Females have been reported to be 3-8 times more likely to sustain ACL injury in sport than their male counterparts. The primary objective of this study was to investigate the discrepancy in injury rates between male and female team sport athletes by measuring muscle activation strategies during an unanticipated side-cutting maneuver. We hypothesized that female athletes will exhibit lower total muscle activation and undesirable directed co-contraction ratios when compared with males. Methods: 10 female and 10 male athletes completed a random series of anticipated and unanticipated sporting tasks. Surface electromyography of eight lower limb muscles (gluteus maximus, gluteus medius, biceps femoris, semitendinosus, rectus femoris, vastus medialis, medial gastrocnemius, lateral gastrocnemius) was recorded with a Delsys Trigno wireless electromyography system and ground reaction forces were measured from a 1.2x0.7m AMTL force platform, both sampling at 2000Hz. Results: As per our hypotheses, we expect to observe less total muscle activation for each muscle group in the lower limb, greater quadriceps dominant muscle activation strategies and directed co-contraction ratios associated with injury risk in females compared with males. Conclusions: Final conclusions will be drawn following the analysis of the complete collected data.

Mirra Stillman, Gillian Weir, Joseph Hamill, Richard van Emmerik
Introduction: Running has gained increasing popularity as a method to gain fitness and improve health. However, many runners will experience injury. Patellofemoral Pain Syndrome (PFPS) accounts for 25-40% of running-related injuries and is difficult to treat. Most patients deal with symptoms for 4-18 years after onset. The etiology of PFPS is unclear, thus rehabilitation is not effective. Deficits in proprioception may cause PFPS. A balance-training protocol that improves proprioception could be a more effective rehabilitation strategy for PFPS. Purpose: The purpose of this study was to gain an understanding of the role of balance training on knee proprioception. We hypothesized that proprioception will improve after the training protocol. This study will allow researchers to develop further research on potential treatments of PFPS. Methods: Data will be collected from participants ages 18-25 using a Cybex 11 isokinetic dynamometer. Participants will conduct trials attempting to replicate a target angle. Data will be collected pre- and post- four-week balance training protocol. The primary outcome variables for the study will be the absolute angle, the absolute difference between the target angle and the perceived angle. Results: We expect to observe changes in absolute angle after training. We suggest that the absolute angle will be reduced after participating in the training protocol. Conclusion: Final conclusions will be made following data analysis of all participants.
Ankle injuries are highly prevalent among athletes, accounting for about 35% of lower body injuries. Most injury prescriptions include wearing braces to stabilize the ankle during recovery, reducing its range of motion. To compensate for this limited motion, the motion of other joints must change. These kinematic changes result in different joint loading patterns which can increase deterioration of joint structures. The magnitude of these changes is potentially more significant during dynamic movements like jumping or running. The purpose of this study was to determine how the ankle bracing effects the joint kinematics and ground reaction forces during a dynamic movement. Twelve subjects performed six drop-jumps, consisting of dropping off a 41-centimeter box, landing on individual force platforms, and immediately accelerating into a maximum vertical jump. Subjects completed three trials for each of two conditions: a non-brace condition and while wearing an Ankle Stabilizing Orthosis brace on their dominant foot. Hip, knee, and ankle joint angles, peak vertical ground reaction forces, and center of mass motion were measured and compared between braced and non-braced conditions. Data collection and analysis is ongoing and will be used to determine the effects of ankle bracing on lower extremity impact forces and kinematics. These results can be used to determine whether prolonged wearing of ankle braces presents a risk for other lower extremity injuries and could be used to develop more effective rehabilitative practices for ankle injuries.
Resistance training (RT) is recommended by major health and sports organizations to maintain good health. In addition to aerobic exercise, the Physical Activity Guidelines for Americans recommends individuals engage in RT two days per week. RT is difficult to measure due to its variety of movements and positions with frequent rest periods. It is important to have accurate measurement of RT in order to better understand its health implications. Accelerometers are often used as an objective measure of body movement to estimate physical activity, however a single accelerometer is limited by device placement and may miss crucial body movements during RT. The purpose of this study is to characterize accelerometer patterns during a RT session to create a new system to identify specific RT exercises from accelerometer data. Five college-aged individuals were equipped with ActiGraph GT3X accelerometers on the non-dominant wrist and right hip and were filmed during a RT exercise session. The recorded videos were coded with two direct observation systems: one that groups all RT exercises together (traditional), and another that allows for specific RT exercises and rest periods to be identified (new). The results will demonstrate a greater number of events reported in the new DO system, compared with the traditional system. Data from wrist and hip worn accelerometers will provide a preliminary description of unique movement patterns for specific RT exercises. These descriptive parameters will be used in future research that uses specific machine learning techniques to further improve measures of RT bouts.
Multiple Sclerosis (MS) is a demyelinating disease of the central nervous system that can result in impaired cutaneous sensation. This impairment is more prevalent in the lower body and can affect one extremity more than the other, although the extent of such a bilateral asymmetry and whether this varies among MS sub-types is not known. Plantar cutaneous sensation and its asymmetry were determined in 31 volunteers with non-progressive MS (NP; 52.6±9.8 years, 90.2% female, 96.8% ambulatory), 31 with progressive MS (P; 59.2±8.8 years, 67.7% female, 74.2% ambulatory) and 29 controls (CON; 55.5±12.2 years, 75.9% female, 100% ambulatory). A biothesiometer was used to measure vibration perception threshold (VPT) at 3 locations on the plantar surface of both feet (big toe, 5th metatarsal, and heel) and an asymmetry ratio was calculated as:

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\frac{|\text{Right} - \text{Left}|}{\text{Right} + \text{Left}} \times 100
\]

for each location. Two-way ANOVAs (group, location) and post-hoc pairwise comparisons were applied. A significant non-zero value for mean asymmetry was evident for all groups at all locations (p<0.0001); there was no asymmetry interaction between groups and locations (p=0.62). Asymmetry did not differ between groups (p≥0.16) or between locations (p≥0.20). These results suggest that although VPT asymmetry is present, the asymmetry ratio did not differ between controls and MS sub-type. Future investigation is needed to determine if applying a different measure of sensory function to the asymmetry ratio calculation is more sensitive to distinguish MS sub-type.

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Sleep and physical activity are important for well-being. The study is designed to determine if there is a relationship between number of steps per day and night sleep duration in full-time college students who are 19-24 years of age. This is important information as members of this population frequently walk around the campus and also have a high risk of sleep deprivation. Six college students were recruited: 3 men and 3 women who were free of any injury or illness that impaired their ability to walk or sleep. A telephone screening was completed prior to the study. Participants’ anthropometric data were recorded using standardized procedures in the Physical Activity and Health Laboratory. The participants were provided with a Garmin Vivofit 3 for step tracking and sleep duration recording. They also received a log to manually record of the time they fell asleep and woke up each day. Excluding the date when the devices were provided, the participant wore the device for four consecutive days (Thursday, Friday, Saturday, and Sunday) and returned the devices on Monday along with their self-monitored data. A positive/ negative/absent relationship between the number of steps per day and sleep duration was evaluated. Differences in these behaviors between days will also be described. Lessons learned from the research process will be shared.
In most research studying dance physical activity (PA), results typically showed that dance produced below average levels of moderate-to-vigorous physical activity (MVPA). However, existing literature evaluating dance PA using accelometry relies on narrow demographics in their participant populations, typically comprising only female dancers who are either children or adolescents. This study seeks to evaluate dance PA using mobile health devices, but will focus on college-aged students (18 – 23 years old). A total of 6 students, 2 men and 4 women, enrolled in a beginner-level modern-dance class at the University of Massachusetts Amherst, were recruited to participate in the study. Data collection took place over the course of two days. Participants wore Actigraph GT9X accelerometers on their right hip during their 50 minute dance class period. The class periods were observed by a researcher to record what proportion of class time was spent sedentary, warming-up, and performing choreography. Data from the Actigraph GT9X accelerometers were exported to the ActiLife software for statistical analysis. The data gathered from the accelerometers will be analyzed alongside the different segments of class activity to evaluate if the accelerometer data corresponds with respective activity intensity. Participants are hypothesized to be more active during the choreography portion of class rather than during the warming-up portion of class. The results of this study will help to determine the reliability of using mobile health devices to detect motion during dance.
Can Wearable Devices That Count Steps Be Used to Monitor Horse Riders’ Activity during Rising Trot?

This study was conducted to take the first step in testing the effectiveness of wearable accelerometer-based devices uses during a non-ambulatory activity, horse riding. The study recruited six professional horse riders from a local riding stable. All were between 18-30 years of age and supplied their own horses. Riders' height, seated height, and weight were measured using standardized protocols. Riders were monitored using Actigraph and Activpal accelerometer-based devices. Individual rider’s observed movements were limited to sit-stand transitions during a standard rising trot and this was video recorded along and counted using a hand tally device. Data were collected from both accelerometers in steps using a manufacturers’ software and were compared with the actual rider’s count of sit-stand transitions. A correlation between both sit-stand transitions and steps data was reported, indicating a positive correlation. The formula used to calculate the sit-stand transition taken was (number of steps - 42) for Activpal and (number of steps) for Actigraph. These results indicate that accuracy can be affected by the rider’s or the horse’s performance. The study was limited to rising trot and does not test other horse speed phases. In conclusion, wearable accelerometer-based devices that count steps can be used to monitor horse riders’ sit-stand movements. Hopefully, this study will open the door for future studies, leading to the creation of a wearable device that monitors horse rider’s movement at all horses’ speeds.
The Association between Objectively Measured Physical Activity and Daily Mood

Previous research has indicated that higher levels of physical activity (PA) are associated with a plethora of benefits, one of which is lowered risk for anxiety/depression and improved mental health. However, much of the past research has focused on overall mental health in the long-term, and has tended to ignore healthy populations especially on a short-term basis. Therefore, the purpose of this study was to investigate the association between PA levels and mood on a day-to-day basis. Six mentally and physically healthy university students were recruited to participate for three consecutive days. PA was measured objectively via ActivPAL to gather measurements for steps/day, moderate-vigorous physical activity (MVPA), and sedentary time. This was done alongside measurements of daily mood, gathered via a daily online survey using the Positive and Negative Affect Scale Shortform (PANAS-S). This generates a score for both positive and negative affect, which will then be compared to the three measurements of PA using correlational statistics. It is expected that as steps/day and MVPA levels increase, positive affect will increase and negative affect will decrease. It is also hypothesized that as sedentary time increases, mood scores will be negatively affected. Although healthy university students may not be suffering from a clinically diagnosed mental disorder, increasing PA has the potential to be an effective coping mechanism in times of stress. These findings could promote and solidify PA as a therapeutie method for improving mental health and mood states.
Wearable devices are a recently popular trend in the fitness industry, yet focus primarily on tracking aerobic physical activities. It is unclear if static activities, like strength training, are being tracked. Therefore, the purpose of this study was to identify the outputs, specifically step count and calorie expenditure, that these devices provide in relation to increasing work intensity in weight, in addition to locating their optimal placement during certain exercises. Six college-aged students (3 men, 3 women) will be recruited based on self-reported moderate strength training experience. The wearable devices used will be the Apple Watch (placed on the left wrist), the Fitbit Blaze (placed on the right wrist), and the Samsung Gear Fit2 Pro (one placed on the left wrist and one placed on the left hip). The procedure consists of 3 sets of 10 reps for a total of 6 exercises. Sets will increase from self-selected light to moderate to vigorous weight. Exercises will include barbell squats, dumbbell lunges, and machine leg presses, barbell bench presses, dumbbell bicep curls, and dumbbell bent over rows. Steps and energy expenditure values will be recorded immediately before and after each set. Work in strength training relates to intensity. Work is a product of set x reps x weight. Reps and sets are held constant, so work is proportionally related to weight. Steps and energy expenditure values will be statistically compared against work to determine a relationship. Additionally, wrist and hip placement will be compared for optimal positioning during these type of activities.
The habits that a student forms while at university have an impact, both positively and negatively, on the rest of their life. This study is focused on the role the students' place of habitation, whether it is on-campus or off-campus, has on their walking behavior. The distance between the participants' location of habitation and two areas of interest (the student union and a self-identified hub of classes) will be determined. Participants' daily walking behavior will be tracked for two consecutive weekdays using a FitBit Zip. Preferred mode of transportation, be it either by motor vehicle or ambulatory in nature, used in commuting to classes will also be recorded. It is expected that students who live on-campus, while having a shorter commute than those who live off-campus, will more freely move around campus resulting in a higher step count. Students who live off-campus will most likely more often make use of motorized transportation, but once on campus may move around more as they lack the base of operations that living on campus provides. This study aims to increase the knowledge of the different factors, specifically the location of habitation of the student, that contribute to a student’s level of physical activity. This information is needed to support those interested in increasing overall student health and in promoting healthy activities throughout adulthood.
Heart rate is an indicator of aerobic physical activity that can be both easily tracked and comprehended, and over the past decade consumer grade heart rate monitors have gone from relatively unrecognized to commonplace. Photoplethysmography (PPG) has emerged as the preferred technology for these devices due to both comfort and convenience. This method utilizes light, which is reflected by body tissue, to determine the heart rate of the individual. This works as most tissue stays in place, whereas the local volume of blood changes based on if the heart is in systole or diastole. However, despite acceptance from consumers, the technology lacks validation under many relevant conditions. One of these conditions is in cold ambient temperatures, where vasoconstriction reduces the blood flow to the extremities where these devices are placed. This study aims to begin to address this possible issue. Six participants were asked to perform activities of varying intensity levels, from a seated rest to a fast-paced stair stepping, in both room temperature conditions (~70°F) and cold conditions (20°F - 40°F). During these activities the participants wore four wristwatch heart rate monitors. Three of these were PPG based, and one displayed readings from a chest strap monitor, which have been shown to be accurate enough to be used as a standard. Both absolute difference and percent difference were used to compare the PPG devices to the standard, which also elucidated the relevant biases of the PPG devices.
Much research has analyzed the physical activity (PA) behaviors of university students on college campuses, however, there is still a knowledge gap in regards to the extent that environmental factors impact the PA of university students. The rationale for this research was to explore this gap by examining how scheduling of academic/social/extracurricular activities by University of Massachusetts Amherst students impacts their PA variables during two consecutive and differently formatted school schedule days. Six participants (three men, three women) were recruited. All were full time students unlimited in their ability to walk. Each participant provided informed consent. Anthropometric data were collected using standardized protocols. Each learned how to wear the ActiGraph GT9X and was asked to wear the device either from Tuesday (when they woke up) to 12:00 a.m. on Thursday or Wednesday (when they woke up) to 12:00 a.m. on Friday. A post-data collection questionnaire was given to each participant to assess attendance at various activities. With the data collected so far, the participants ages are 20.3yrs. ± .6 yrs. Anticipated results are hypothesized to show that the greater the number of scheduled activities, the greater the various indicators of PA (i.e. total step count/day, average steps per both days, etc.) will be. Overall, the results of the study should help fill the gap of how external factors, such as time budgeting for college students, affects if and when PA is being performed during school/work days.
Current research concerning pedometer versus accelerometer validity is expansive, however gaps in knowledge surrounding the effects of high exercise intensity and variable ground surface conditions on the efficacy of physical activity trackers remain. The limitations these factors may place on activity trackers are especially important to competitive runners who rely on such devices for training purposes. In the present study, step counts and distance measurements tracked by the Garmin Forerunner 230 and New Lifestyle NL-1000 pedometer are compared to manual measurements when worn by collegiate runners over three ground surface types: flat pavement, flat grass, and hilly terrain. During the data collection period, the Garmin Forerunner 230 was worn on the non-dominant wrist and the NL-1000 pedometer was worn over the right hip. The six participants then completed three quarter-mile running trials over the aforementioned ground surface conditions. At the end of each trial, distance and step count readings of each device were recorded and compared to manual measurements. In both step count and distance, the NL-1000 pedometer displayed the largest inaccuracies across all three surface types, and consistently over-estimated measurements of distance. Additionally, the validity of both devices decreased as the running surface became less flat, as indicated by an increasing absolute percent error between manual and device measurements. These results provide evidence that uneven ground conditions negatively affect the ability of physical activity trackers to accurately measure step count and distance.
The Apple iPhone has been validated as a physical activity monitor in a laboratory controlled environment. However, more research needs to be done on varying device placement in order to portray real world carrying conditions in a free-living environment. This research gap needs to be filled because it is important for iPhone users who use the Health app as an activity tracker. The purpose of this study is to examine the accuracy of the Apple iPhone in recording step count at varying device placements in a free-living environment. The study will consist of nine 3-minute trials in which each participant will be instructed to walk outside at a self-paced moderate speed. The device will be placed in one of three different body borne locations for each trial. Placements include: 1) inside the side pocket of a backpack, 2) held in a dominant hand, and 3) inside the rear pant pocket. Steps will be directly observed and recorded using a hand tally counter. Step count data will also be recorded from the Health app on the iPhone. Data collection for this study will take place from February to March. Data analysis and interpretation will be completed in March and April, and the finalized project will be ready to present by late April. These results will help to fill the research gap of whether device placement affects the accuracy of the Apple iPhone as a step counter in free-living.
Purpose: This research is to determine if resistance training in conjunction with mindfulness training is more effective in mitigating the symptoms of Generalized Anxiety Disorder than mindfulness training alone. The proposed method of research is using a 6-week resistance training protocol in conjunction with mindfulness training versus a 6-week mindfulness training protocol alone. The hypothesis is that resistance training in conjunction with mindfulness training will reduce the symptoms of Generalized Anxiety Disorder to a greater extent than mindfulness training alone.

Participants: Subject recruitment from Salem State University, Salem MA and the surrounding area via in person interviews and via flyers, will be healthy males and females, aged 18-60. Inclusion will be based on the CAMS-R results. Exclusion criteria include participants currently taking prescribed medication to deal with anxiety, hypertension, or any health issue that would contraindicate exercising at a vigorous intensity.

Methods: Participants will undergo a familiarization day including a PAR-Q, Health History Questionnaire, and Informed Consent. Subjects will be asked to complete the Cognitive and Affective Mindfulness Scale- Revised (CAMS-R) in order to assess baseline anxiety levels. Participants will be familiarized with the exercises in the protocol and baseline strength assessments will be conducted. Next the participants will be randomized into the mindfulness training protocol with or with resistance training. Upon completing 6-weeks of training subjects will spend a washout week performing no mindfulness or resistance training. Then subjects will cross over to the training group they were not initially assigned to.
Introduction: The purpose of this study is to assess whether foam rolling will have an effect on the recovery of muscle soreness and performance of the nervous system following exercise induced muscle damage.

Methods: Participants, both male and female, will go through a testing battery that will consist of having their Pulse Wave Velocity (PWV), Heart Rate Variability (HRV), perception and scale of muscle soreness in the hamstring, quadricep, and calf, range of motion, and agility measured. We will conduct baseline testing for 3 days for familiarization, Wednesday to Friday, and then the following week 5 days of testing will be conducted Monday-Friday, with muscle damage induced on Monday. The participants will complete 40, fifteen-meter sprints with a five-meter deceleration zone to create the muscle damage needed. The participants will get a 30-second break between sprints. The measurements being collected during the five days will be compared to the baseline testing to show the effects of foam rolling on exercise induced muscle damage.

Results/Discussion: Data collection is currently underway, and will be available April 27th
Exercise induced muscle damage and/or delayed onset muscle soreness has been shown to cause decreases in sports performance. Low-level laser therapy (LLLT) may positively influence muscle fatigue and performance recovery (Machado et al., 2017). Forty male and/or female participants will be divided into two groups: an LLLT (n=20) and a control group (CON n=20). Each participant will complete a 10 day testing battery. During day one through three, Wednesday to Friday, participants will undergo a familiarization phase of the testing battery. Measurements will include vertical jump, flexibility, the agility T-Test, and perceptions of muscle soreness. The following Monday, day four, muscle damage will be induced through the sprinting protocol, followed by LLLT treatment (LR n=20) or a sham placebo treatment (CON n=20) on different sites of each leg including the rectus femoris, bicep femoris, vastus lateralis, vastus medialis, and gastrocnemius. Day five through ten, Tuesday-Friday will include the laser therapy and placebo sham therapy prior to the testing battery. Data collection is ongoing, and results will be available by April 27th, 2018.
The Effect of Moderate and Light Intensity Physical Activity on Sleep Quality and Psychosocial Outcomes

**Purpose:** Research suggests that moderate intensity physical activity (MPA) may be used as a method for improving both mental and physical health. The purpose of this research is to investigate the relationship between physical activity, psychosocial outcomes, and sleep quality in sedentary but otherwise healthy adults. Although most research focuses on moderate physical activity, we will also examine the role of light intensity physical activity (LPA). **Methods:** This was done by analyzing data from a randomized control trial called the SPOT study, a stealth intervention that examined the influence of dog obedience training on dog-owner physical activity levels. LPA and MPA were objectively measured via Actigraph accelerometers, and mental health outcomes were assessed via questionnaires focused on sleep, stress, depressive symptoms, and health related quality of life (HRQOL). The questionnaires used in SPOT include the Perceived Stress Scale, Center for Epidemiologic Studies Depression Scale, Pittsburgh Sleep Quality Index, and questions from the Center for Disease Control health related quality of life questionnaire. **Results:** Data analysis is underway. It is hypothesized that there will be a reduction of stress and depressive symptoms and increased HRQOL in individuals who have increased their LPA levels. Individuals with higher levels of MVPA are expected to report improved sleep quality. **Conclusion:** If the hypotheses are supported, future research with larger sample sizes should be conducted to further understand the effects of physical activity on psychosocial outcomes and sleep quality.
To date, the research assessing menthol's influence on short term anaerobic performance and measures of muscular strength and power remains equivocal, and so this experiment will test the null hypothesis that acute application of menthol will influence neither anaerobic exercise performance, nor agility, nor measures of muscle strength and power compared to a placebo gel and a dry control condition. **METHOD**: This within-participant repeated-measures study will take place in the Human Performance Laboratory in the Department of Sport and Movement Science at Salem State University. Fifteen participants will be recruited and complete three familiarization sessions consisting of a battery of tests including: a squat jump, counter-movement jump, the agility test, a one-repetition maximum leg press test (1RM test), and the 30 s Wingate test on a cycle ergometer. Following this, they will complete the testing battery (minus the 1 RM test, and now including 10 leg press repetitions at 35 % of the 1RM) under three separate conditions in a balanced order; once with a menthol gel applied to their lower body, again with a placebo gel application, and on another occasion without any such application. **DATA ANALYSIS**: Magnitude based inference will be employed to classify small, moderate and large effects between conditions.
In the United States, one in three adults and one in six children is obese. Although obesity and its related diseases are a major cause of morbidity and mortality, and represent a large economic burden, positive progress can be made. Recent research supports the hypothesis that skin surface applications of menthol, a cold receptor TRPM8 agonist, may influence non-shivering thermogenesis (NST) and energy balance in humans through the activation of brown adipose tissue; however, the precise dose that optimizes the response is not known. To test this hypothesis, twelve participants will be recruited and complete four conditions in a balanced order; placebo Control (CON), high dose menthol (MH), medium dose menthol (MM), and low dose menthol (ML). During each exposure participants will rest supine in an environmentally controlled tent (30°C, 50% rh) for 30-minutes before their intervention is applied, and 60-minutes thereafter. Perceptual measures include thermal sensation, thermal comfort, perceived exertion, and irritation. Thermoregulatory measures include skin blood flow (laser Doppler flowmetry at index finger), rectal temperature, skin temperature (chest, forearm, thigh, calf), and electromyographic muscle activation of the trapezius, sternocleidomastoid, and pectoralis major as a surrogate of shivering. Brown adipose tissue activation will be measured indirectly using supraclavicular skin temperature, oxygen consumption and carbon dioxide production. A one-way ANOVA (alpha=0.05) will compare dependent variables between the four conditions to identify the influence of menthol dose on thermoregulation and energy expenditure in humans.
The sliding filament theory of muscle contraction is difficult for students to grasp. Traditionally it is taught using assigned readings and two-dimensional textbook schematics; however, there are drawbacks to these approaches. The purpose of this study is to test whether participant learning of the theory is enhanced with a physical model building activity. It is hypothesized that constructing a physical model will improve learning compared to a control condition. Thirty-two participants will receive a standardized lecture and reading. Each participant in the model building condition (n=16, MB) will be instructed to build a physical model with provided materials. Participants in the control condition (n=16, CON) will draw a schematic of the concepts. Multiple choice questions will assess learning before and after the activity, and a learning retention test will be given one week thereafter. The percentage change in correct answers from pre/post assessments, and between pre/retention assessments. Data will be compared between CON and MB using an independent t-test, whilst the Chi square test will assess the frequency of correct answers. The alpha level will be 0.05. The outcome of this project will help educators in the allied health sciences choose the optimal pedagogical strategy to aid learning of this complex concept.
Adipose or fat tissue deposition in muscle is known to cause adverse health outcomes, which may include loss of muscle function. To determine whether greater levels of intramuscular fat disrupts force production in the quadriceps muscles of otherwise healthy adults, magnetic resonance images (3 tesla Skyra, Siemens Medical Systems, Germany) were obtained of the thigh in 5 normal body mass (NBM; BMI 18.5-24.9) and 3 high body mass (HBM; BMI >30.0) adults aged 24-45 years. Fat and muscle tissue in the middle 10 slices of the quadriceps were determined using a 6-point Dixon method and analyzed in MATLAB (Mathworks, Natick, MA). Maximal voluntary isometric and isokinetic torque were determined via isokinetic dynamometer (Biodex 4, Biodex Systems, Shirley, NY), and used to determine specific torque (torque produced per unit muscle mass). Specific isometric torque was not different between groups (2.54±0.03 Nm/cm², 2.40±0.20 Nm/cm², respectively; p=0.17), nor was specific power during dynamic contractions at any velocity tested (90, 180, 240 and 360 deg·s⁻¹; p≤0.44). Specific power at 180 deg·s⁻¹ was not associated with %fat in the muscle by linear regression (r=0.17, p=0.68). Though intramuscular fat deposition may negatively affect torque production of the quadriceps muscles in healthy young adults, our sample may not be large enough to observe a statistically significant difference. Impairments in muscle function may have further deleterious effects on mobility and thus contribute to inactivity-related disease over the lifespan.
It is generally accepted that humans adapt locomotor patterns that optimize metabolic cost. However, it is unclear whether the locomotion patterns of people with lower limb amputations are optimized for reducing metabolic cost. Research has found that people with lower limb amputations generally have greater metabolic cost compared with people without amputation. The purpose of the study is to understand the effect of inter-limb asymmetry on metabolic cost and lower extremity joint kinematics. I hypothesized that each person with a trans-tibial amputation will have a gait pattern that is most optimal for them. Five people with a unilateral transtibial amputation and five people without amputation walked on a treadmill while receiving real time visual feedback about stance time asymmetry. Subjects walked on a treadmill with preferred, symmetrical and varying levels of asymmetrical characteristics. Joint kinematics were determined from motion capture data, and energy expenditure was determined via pulmonary gas exchange. Energy expenditure and joint kinematics were compared between groups for each condition using multiple T-test. Data collection and analysis are still ongoing and will provide important new information on how walking pattern, metabolic cost, and asymmetry interact in able bodied people and people with limb loss. This new information will inform enhanced rehabilitation techniques and improve prosthetic design to optimize mobility and independence in people with trans-tibial amputation.
Potential Bioenergetic Mechanism of Age-Related Differences in Muscle Fatigue

Muscle fatigue, defined as the contraction-induced decline in maximal force- or power-producing capacity of muscle, is similar between young and older adults in response to moderate-velocity contractions. In response to high-velocity contractions, muscle fatigue is greater in older compared with young muscle. Currently, the mechanisms for this greater muscle fatigue in older adults are not known. Twenty young (25-40yrs; n=10 men) and twenty older (65-80yrs; n=10 men) healthy, sedentary adults will be recruited. Participants will be positioned supine in a 3-Tesla magnetic resonance scanner with a dual-tuned 31-phosphorus coil positioned over the vastus lateralis muscle of their thigh, which will be strapped to an isokinetic dynamometer at the knee and ankle using inelastic straps. Participants will then complete 1 maximal voluntary dynamic contraction every 2s for 4min at either a moderate (120°s⁻¹) or high velocity (240°s⁻¹) while 31-phosphorus spectra are acquired every 2s. Our hypothesis is that the older muscles will have a lower oxidative capacity that in turn causes greater reliance on non-oxidative ATP production compared with young muscle during high-velocity, but not moderate-velocity contractions. We further hypothesize that this scenario will result in greater intracellular accumulation of metabolites known to cause fatigue (i.e., [H⁺], [Pi] and [H₂PO₄⁻]) following the high-velocity, but not moderate-velocity, contraction protocol. If our hypotheses are true, this study will provide the first experimental data in support of a bioenergetic mechanism for the age-related differences in muscle fatigue during high-velocity contractions.
Birds undergo numerous changes in response to migration, which include catabolization of a significant amount of skeletal muscle mass. This reduction in tissue mass is used for energy, but this loss may cause reductions in important contractile proteins. Measuring tissue loss during normal bird migration is challenging, therefore, we expose white-throated sparrows (*Zonatrichia albicollis*) to 48 hours of starvation, a procedure used to mimic 8 hours of migration, and compared this experimental cohort to control birds that were fed and housed normally. Changes in pectoralis myofibrillar protein composition for each group were assessed using SDS-PAGE. Each 4-20% acrylamide gel contained 9 bird samples (5 starvation and 4 control) and each sample was examined at low (10 µg) and high (20 µg) protein loads. Changing the load provided the opportunity to study both high and low abundance proteins. Despite trying to load the same total protein in each well, there were differences in intensity between lanes, which required the development and implementation of a new gel analysis technique. Overall, our results demonstrated no difference in myofibrillar protein composition between control birds and those undergoing 48 hour starvation. Now that there are established techniques, the myofibrillar protein composition of birds flown for 8 hours in a wind tunnel will be examined in the coming months to determine if similar results are obtained.

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Dog Ownership in Relation to Physical Activity and Health

Walking is a simple and effective form of physical activity (PA) and should be accessible for everyone. For dog owners, walking is even more important as it is necessary for the well-being of the dog. Dog owners who regularly walk their dog typically meet the recommended PA guidelines, which can improve their health and psychological well-being. Currently, there is limited research that has used activity monitors on both dogs and owners to objectively measure dog walking behavior. The purpose of this study is to measure the PA of both dogs and their owners, examine the effects of PA on psychosocial outcomes of the owners, and identify the environmental and dog-specific facilitators and barriers to PA. Data will be obtained from the Pets and Lifestyle Study (PALS), which will examine self-reported and device-measured PA levels among US dog owners (as compared to non-dog owners). PALS is a two-part study; the first part will collect survey data on pet owner’s lifestyle, PA levels, socioeconomic status, sleep, etc. The second part of PALS will use activity monitors on both the dog (Fitbark) and their owner (ActiGraph GTX3) to collect the PA levels of the owner and the dog. Our study will contribute to our current understanding of dog ownership in relation to PA and health.
Multiple Sclerosis (MS) is a progressive neurological disease resulting from inflammation of the central nervous system. Due to increasing neuronal damage, balance issues are common in MS and may lead to a high risk of falling. Tai Chi has been shown to improve balance in people with MS but it is not clear what aspects of Tai Chi, actual balance training and meditation, contribute to improvements in balance control. The goal of this study was to determine if there are improvements in static balance measures after an 8-week Tai Chi or Mindfulness Meditation intervention, and whether benefits will persist through an 8-week wash out period. The balance conditions tested include quiet upright standing with feet apart, narrow standing with feet together, and maximal forward and backwards leans. Balance was assessed using inertial sensors (APDM, Opal System) at baseline, after the intervention, and 8 weeks after the intervention ceased. The key dependent variable was postural sway derived from the 95% ellipse area of trunk movement. The Tai Chi group (n=3) showed an average decrease in postural sway of 25.57% during narrow standing, 26.60% during backwards reach, and 38.42% during forwards reach after the intervention. The Mindfulness Meditation group had an average decrease in postural sway of 52.73% during narrow standing, 17.83% during backwards reach, 47.56% during forwards reach and 45.31% during quiet standing after the intervention. No balance benefits persisted during the washout period for the tai chi group, however they did for the meditation group. These results suggest that both Tai Chi and Mindfulness Meditation may improve balance in people with MS, with the Mindfulness Meditation group possibly leading to longer term effects.
Measuring Differences in Physical Activity and Physical Function following an Intra-articular Knee-Joint Injection in Obese and Non-obese Patients

Purpose: To quantify the change in physical activity amount and intensity following an intra-articular knee joint injection for individuals with knee Osteoarthritis (OA). In addition, the research will quantify the differences in physical activity change between obese and non-obese subgroups. Knee injections have proven to be an effective treatment method for improving pain and functioning. However, prior research on knee injections has not focused on objectively measured physical activity rather relying solely on self-report. Self-reported physical activity reports may not have the sensitivity to detect important changes.

Methods: 20 participants will be recruited including 10 obese subjects (BMI>30 kg). Participants will be provided with an Actigraph 3GTX device one week prior to the injection to record baseline data and then continue for two weeks following the procedure, while also filling out daily physical activity logs to assess self-reported data. Data analysis will look at steps per day as the primary outcomes which will then be compared pre-post injection within a participant and then between two subgroups.

Results and Discussion: The first subject to complete the study is a 69 year old (BMI=31.88 kg). The Actigraph recorded an average of 5552.143 steps/day prior to injection and an average of 5758.786 steps/day following the two weeks post injection supporting our hypothesis. An increase in physical activity in both obese and non-obese would support the efficacy of the knee injection to improve quality of life in knee OA patients and suggest knee injection may support behavioral change intervention for weight-loss.
Impact of Physical Therapy on an Athlete's Decision to Return to Sport

Injury is a reality that many athletes face when performing sport. Throughout time an athlete can cause significant damage to their body. Injuries can range from torn tendons to spinal cord injuries. Some injuries simply require rest while other injuries require surgery. In either case, the application of physical therapy is often prescribed to assist an athlete to return to sport, and in most cases return stronger than before. Once an athlete receives physical therapy and is cleared to return to sport many choose not to return. This research seeks to identify if physical therapy has an impact on the decision of an athlete returning to sport. The research study will use a qualitative questionnaire seeking the sampled athlete’s opinions on their attitude toward their sport and their ability to go back to play at the beginning, middle, and after the athlete is released from physical therapy. This research is relevant for those in the physical therapy field to understand how the process of physical therapy may impact an athlete’s decision to return to sport. Physical therapy aims to help an injured athlete get back to play, but understanding how the process of physical therapy may influence an injured athlete’s decision is important for physical therapists to know so they can provide the best care for patients. This research aims to find how psychological and physical aspects of therapy contribute to an athletes decision to return to sport.
BACKGROUND: Cardiovascular disease (CVD) risk increases during the menopausal transition, but aerobic fitness reduces CVD risk. Endothelial inflammation is an initial step in the development of CVD. Vascular cell adhesion molecule-1 (VCAM-1) is an inflammatory signaling molecule expressed on endothelial cells following vascular insult. It is unclear whether VCAM-1 increases with advancing menopausal stage and whether high levels of fitness or an acute bout of exercise influence VCAM-1 in women. PURPOSE: To determine whether there are differences in circulating VCAM-1 in women at different menopausal stages, with high and low levels of aerobic fitness, prior to and following an acute bout of exercise. METHODS: Venous blood was collected from high-fit (47.1±1.36ml/kg/min VO$_{2\text{max}}$) and low-fit (29.1±1.02ml/kg/min VO$_{2\text{peak}}$) peri-menopausal (n=24, 47.8±2yr) and post-menopausal (n=26, 59±2yr) women before and after a 30-minute bout of treadmill exercise (heart rate corresponding to 60-64% of VO$_{2\text{peak}}$). High fit pre-menopausal women served as a reference group (n=11, 44.5±2yr). A human VCAM-1 immunoassay will be completed to quantify VCAM-1 levels between women of different menopausal stages and fitness levels before and after the exercise period. Data will be analyzed using two-way repeated measures ANOVAs (menopausal status x fitness x exercise) and post-hoc testing. RESULTS/CONCLUSION: It is expected that VCAM-1 levels will be higher with later menopausal stages and lower fitness. Women of higher fitness, irrespective of menopausal status, are expected to have lower VCAM-1 from acute exercise.
The Influence of Exercise on Arterial Stiffness in Pre-menopausal Women

Arterial stiffness is a measure of cardiovascular health and a strong predictor of future cardiovascular events. Augmentation index (Alx) using pulse wave analysis and carotid-to-femoral pulse wave velocity (PWV) are two measures of central arterial stiffness. Some of the cardiovascular benefits of exercise training may be due to the accumulated effects of acute bouts of exercise. In men, PWV decreases after a single bout of exercise. However, to date, it is unknown if the same effect occurs in women. **PURPOSE**: To assess the effect of acute exercise on arterial stiffness in fit premenopausal women. **METHODS**: Participants are healthy women ages 18-40 with high aerobic fitness (≥ 80th percentile of age predicted VO_{2\text{max}}). Alx and PWV are measured at rest before, and 30 minutes after an acute bout of treadmill exercise. These measurements are taken on days 2 through 5 of the participant’s menstrual cycle in order to control for the effects of hormonal fluctuations. Both Alx and PWV will be analyzed using paired t-tests. **RESULTS**: We expect that Alx and PWV will be lower after exercise compared with before exercise. **CONCLUSION**: If our results match our hypotheses, then our data will be in line with results that have been previously collected in men. These results could suggest that for women the benefits of exercise on cardiovascular health may be related to the reduced arterial stiffness that accompanies an acute bout of exercise.

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PURPOSE: To date, the research assessing menthol’s influence on flexibility remains equivocal, and so the purpose of this experiment is to test the influence of a menthol gel (M) on active range of motion (AROM) assessed at the ankle joint as it moves through dorsiflexion, compared to a Placebo gel condition (P). It is hypothesized that M will not influence joint ROM compared to P (null hypothesis). METHOD: This within-participant repeated-measures study will take place in the Human Performance Laboratory in the Department of Sport and Movement Science at Salem State University. Fifteen female and male participants will be recruited and will first complete two familiarization sessions including a warm-up followed by an assessment of ankle dorsiflexion ROM, and measurement of neuromuscular activity using the Hoffmann Reflex (H-reflex). Participants will next complete the previously mentioned tests under two separate conditions in a balanced order; once with a menthol gel applied to their right gastro-soleus complex, and once with a Placebo gel application. During each testing day participants will first undergo gel application, warm-up, then complete a pre-testing, undergo a 6 x 60 s static stretching intervention through dorsiflexion, and finally, complete a post-testing battery. ANALYSIS: A paired t-test will assess significant differences between conditions with an alpha level of 0.05 and magnitude-based inference will be employed to classify small, moderate and large effects between conditions.
Physical activity (PA) impacts many facets of preadolescent health, yet only 42% of 6-11-year olds meet PA guidelines, with African-American girls less active than Caucasians. Low PA has been linked to poor self-esteem in this age group, which has been associated with negative mental and physical health outcomes that extend into adulthood. This study aimed to determine the effects of a culturally-tailored afterschool dance program on the self-esteem of preadolescent African-American girls. Participants included 67 girls (age=8.2±1.3 years) from the Springfield area. The 12-week dance program was offered 3 days per week for 60 minutes. The intervention group (INT) participated in dance class while those in the control health education group (CON) received homework help. Self-esteem was measured using the Rosenberg Self-Esteem Scale (RSES), and change scores were calculated by subtracting participants’ baseline scores from their post scores. A two-sample t-test was used to determinedifferences between self-esteem change scores for INT and CON. Average change scores for the RSES for INT and CON were 1.43 and -0.83, respectively. Although the trend was in the anticipated direction, as self-esteem increased for INT, the difference between the groups was not significant (t=-0.93, p=0.36). High rates of attrition occurred due to the burden of transportation to the intervention site. Extending the length of the intervention and follow-up period, or providing transportation could lead to a more accurate evaluation of the relationship between an afterschool PA intervention and self-esteem.
Preadolescents, especially African-American girls, are at risk for childhood depression, which can have negative effects on a child’s health and can continue into adulthood. Research suggests that physical activity (PA) might be a viable option for alleviating childhood depressive symptoms; however, preadolescent African-American girls are also at risk for low PA. The purpose of this study was to examine the effect of a culturally-tailored PA program on depressive symptoms in preadolescent African-American girls. Participants (n=33, age=8.28±1.28 years) were recruited from Springfield, MA. Throughout the 12-week program, the intervention (INT) group participated in a dance program for 60 minutes, three days per week, while the control (CON) group received homework tutoring. Depressive symptoms were assessed pre- and post-intervention using the Children’s Depression Inventory (CDI). Change scores for baseline and post-intervention CDI scores were calculated for the INT and CON groups. A two-sample t-test assessed change in depressive symptoms in the INT group compared to the CON group.

There was no statistically significant difference in change scores between the INT and CON groups (t=-0.53, p=0.60). Both groups experienced a slight increase in depressive symptoms that was not statistically or clinically significant. This increase could be attributed to the ceiling effect, since baseline CDI scores were healthy. Additionally, high attrition rates due to transportation difficulty limited the study. Future studies could overcome barriers to participation by utilizing mobile delivery, or by combining a PA intervention with mental health education.
BACKGROUND: Physical activity (PA) in children is important for healthy growth and development. The purpose of this study was to determine how three psychosocial factors (PA self-efficacy, social support, and enjoyment) mediated the results of a 12-week school-based strength and movement intervention. METHODS: This pilot cluster-randomized control study took place in seven 3rd and 4th grade classrooms at a local elementary school. At the end of the intervention, two gender-separate focus groups were conducted (n=8 males, n=8 females) to understand the effect of the intervention on these psychosocial factors. Focus group participants were randomly selected and from intervention classrooms (2 male and 2 female per classroom). The discussions were audio recorded and transcribed. Surveys were also administered over the course of the study at baseline, 6 weeks, and 12 weeks. RESULTS: Changes in survey response scores for both the boys and girls over the course of the study will be evaluated. The small group discussions were transcribed and will be analyzed using NVivo version 11 to look for trends in the responses related to the psychosocial variables. The results of this qualitative analysis of the focus groups will illustrate whether these psychosocial factors changed over time, and how the students express these changes in their own words. The implications of this study can be used to demonstrate the success of the intervention in increasing self-efficacy, social support, and enjoyment of PA, which is related to an increase in the participation of PA and change in behaviors.
Characterizing Movement during Sporting Activities in Middle-School Children

The primary purpose of this study is to use direct observation (DO) to characterize children’s movement during sporting activities by examining the time spent in different physical activity (PA) types and intensity categories (sedentary, light, moderate, vigorous). As part of a larger study, children (n=10) were recruited to participate in a sporting activity of their choosing for about one hour. Children were filmed throughout the session (GoPro digital camera) and wore one ActiGraph GT3X+BT accelerometer (AG) on their right hip and one on their non-dominant wrist. The AG data was processed using previously developed cutpoints to categorize the data into intensity categories. Each second of the sporting activity videos was coded (Noldus Observer XT) for whole body movements (e.g. sitting, walking, running) and intensity. Intensity category was assigned through DO by using multiples of the resting metabolic rate (METS, 1 MET = resting) found in the Youth Compendium of Physical Activities (Butte et al., 2018). The MET values were then categorized using standard cutoffs for sedentary (1.0-1.4 METs), light (1.5-2.9 METs), moderate (3.0-5.9 METs) and vigorous intensity (6.0 METs). We hypothesize that the majority of time will be spent in moderate intensity, with less time spent in sedentary, light and vigorous intensity over the duration of a sporting activity. However, we also hypothesize that the pattern of accumulation of time spent in vigorous PA will resemble that of high intensity interval training, an effective training modality for improving fitness and health.
Consolidation, the process of maintaining and strengthening memories, has been associated with motor skill learning. In particular, a motor skill can be strengthened over multiple bouts of practice through re-consolidation. A recent study showed that a previously consolidated motor skill could be modified and enhanced through exposure to increased sensorimotor variability during re-consolidation. We tested whether changing the task variability — by adding visual or proprioceptive jitter — could strengthen the retention of a newly learned locomotor skill. Individuals were presented visual targets to instruct changes in step length from one trial to the next during treadmill walking. Subjects receive a point each time they hit the target accurately. Study design consisted of three testing sessions (acquisition, re-consolidation, retention) and three groups (visual variability, proprioceptive variability, control). During Session 1, participants acquired a new step length sequence by practicing the pattern over 10 blocks of 100 trials. During Session 2 (6-hr later), they retrieved the previously learned step length sequence over 1 block of 100 trials, and then they were exposed to either 1) visual variability condition, 2) proprioceptive variable condition, or 3) no variability while practicing the same sequence over 10 more blocks of 100 trials. Participants were randomly assigned to the three groups. During Session 3 (24-hours later), all participants were re-tested on the original sequence to measure retention. Retention was measured by success rate of hitting targets in each block. We predict that both variable groups will have a better retention, as compared to the control group, resulting in a higher score during the final session.
Reward and punishment have been demonstrated to enhance procedural (motor) learning. However, previous studies with reward and punishment feedback focuses on upper extremity motor learning, and so it is unclear how this effect operates in different motor contexts, such as locomotion. Here we will examine the effects of reward and punishment on the acquisition and consolidation of learning a locomotor sequence task. We hypothesize that reward and punishment feedback will enhance consolidation of the task. 24 healthy adults (age 16-30) will be randomly sorted into three groups: a control group, reward group, and punishment group. Each group will undergo a training session in which they will learn a step length sequence during treadmill walking. During training, the reward group will gain a point for each successful hit, the punishment group will lose a point for each unsuccessful hit, and the control group will not receive points feedback. Six hours after the first session, each subject will be tested again without feedback. The effect of reward and punishment on the acquisition and consolidation phase will be evaluated by analyzing the success rate of hitting the targets. We predict that those in the reward group will show a greater improvement in offline learning (i.e. consolidation) than the control and punishment groups. Results will indicate that the effects of reward and punishment on learning identified in previous research is common across diverse motor skills beyond those investigated previously. This could suggest further research on how motivation can be implemented in therapy for those impaired by motor dysfunction.
While pediatric obesity and diabetes rates have recently stagnated, their prevalence among African American girls continues to rise. Physical activity (PA) participation is one available strategy to lower these rates. However, African American girls engage in less PA compared to Caucasians. Low PA is associated with elevated fasting insulin levels, which indicates insulin resistance and diabetes development. The purpose of this study was to analyze the effect of a culturally-tailored dance intervention on insulin levels in preadolescent African American girls. Participants (n=10, age=8.2±1.3 years) were randomized to the intervention (INT, n=6): a 60-minute dance program 3 times per week for 12-weeks, or control (CON, n=4): concurrent homework tutoring and weekly health education newsletters. Blood samples, drawn by a trained phlebotomist, underwent Homeostatic Model Assessment (HOMA-IR) from which a change score was calculated between pre- and post-assessment. A two-tailed t-test measured change score differences between INT and CON. The change score for INT was -12.4±14.1 mIU/L compared to 2.6±13.5 mIU/L in CON. There was no significant difference between INT and CON scores (t=1.68, p=0.13). The non-significant decrease in insulin levels among INT participants fell below the 15 mIU/L insulin resistance cutoff that indicates diabetes development, which is promising. However, the small sample limits the conclusions. Improving blood draw incentives may increase participation in future studies. Further research with a larger sample is needed to determine if culturally-based dance interventions can reduce insulin resistance and diabetes risk.
INTRODUCTION: The purpose of the research was to determine how the stance of a barbell deadlift affects NCAA Division III football players' power output during their 3 weeks of preseason training. The 2 different deadlift stances are a wider stance or sumo, and a narrower stance which is known as conventional.

METHODS: The study consisted of two testing sessions, no shorter than 48 hours apart to ensure proper recovery of the participant. The two sessions took place on the same time of day. One testing session determined the power output of the sumo style deadlift stance. The second testing session determined the power output of the conventional style deadlift stance. Both sessions included a short demonstration on how the deadlift is performed prior to testing. During testing, the athletes were asked to perform 3 sets of 3 repetitions with 70% of their 1RM max deadlift (taken from prior football testing). The data was collected on the GymAware unit, which calculates power based on a load and how fast it moves. All testing and training sessions were supervised for safe technique by a Certified Strength and Conditioning coach.

RESULTS: *Still in progress*

CONCLUSION: *Still in progress*
INTRODUCTION: The purpose of this study was to determine whether a periodized resistance training program would have an effect on the Beck Depression Inventory and/or Beck Anxiety Inventory scores in females.

METHODS: Eight subjects participated in a six-week periodized resistance training program. During the initial visit, subjects completed a Beck Depression Inventory (BDI) and a Beck Anxiety Inventory (BAI) to determine baseline values. The subjects completed a 3-5 repetition maximum (3-5 RM) for the sumo deadlift (SDL), bench press (BS), barbell back squat (BBS), and standing shoulder press (SSP). This data was used to estimate the 1 repetition max, which in turn was used to develop the periodization program. Following baseline testing, subjects participated in two full-body workouts per week for six weeks. The subjects were retested after they completed the six week program, performing 3-5 RM for the SDL, BP, BBS, and SSP. The subjects were asked to once again complete the BDI and BAI. A repeated measures 2 x 2 Analysis of Variance (ANOVA) was used to determine the effect of each resistance training activity had on the outcome measures.

RESULTS: There was a significant (P ≤ .05) decrease in BDI scores after the six-weeks of resistance training. There was no statistical significant difference in the BAI scores (P = .106). There was no correlation between any individual exercise and the outcome scores.

CONCLUSION: The results of the current study indicate that a periodized resistance training program is effective at reducing self-reported measures of depression.
Using a political ecology approach, this study explores the role of greening in post-industrial cities, the relationship between stewardship and tree survival, and the effect of polycentric governance networks upon these types of initiatives. Our study is built upon qualitative analysis of five in-depth interviews of key stakeholders involved in implementing a tree planting program in Holyoke, MA, ten interviews of businesses, community organizations, and residents who received trees through the program, and 20 informal surveys of local residents. We look at what motivates stewardship and how people conceptualize environmental responsibility. Additionally, we pair this qualitative data with a systematic inventory of some 800 trees planted since 2014, to explore the relationship between stewards’ motivations, capacities, and experiences with the program; and how this informs tree survivorship and health. In particular, this study examines the relationship between state and local actors, as well as formal and informal stewardship. This is especially timely in light of significant interest in greening post-industrial cities, where legacies of disinvestment now require new thinking about governance, economic development, and spatial design.
Countless controversies have arisen as a result of affirmative action policies in past years. Some people argue that policies have caused so-called reverse discrimination in the process of college admissions. My research asks whether the implementation of race-based Affirmative Action policies in higher education institutions effectively guarantees the Equal Protection of the Law to all applicants. African American author and professor Shelby Steele sustains that Affirmative Action leads to self-doubt among blacks because of the “blind” preferential treatment that is used. Steele asserts that this self-doubt develops from the lack of a merit-based system. Within a merit-based system, equal comparisons can be made between students to see exactly where they stand. Without it, minorities may feel and be looked upon as inferior due to the question of whether or not they could have made it on their own. In 1978, the Supreme Court upheld a controversial ruling in the famous Bakke case. Bakke, a white male, was denied admission at University of California’s medical school at Davis, but less qualified minority applicants were admitted. The United States Supreme Court upheld the state’s supreme court ruling that Bakke’s rights guaranteed by the 14th Amendment had been violated. However, the Court also ruled that it was constitutional for schools to use race as a “plus” factor in admissions. Affirmative action policies seek to increase diversity, fostering innovation and competitiveness necessary for the well being of society.
The White Border Wall

In this honors thesis, I am analyzing the racialized history and impact of U.S. immigration law on social conflict. I will argue that immigration law has maintained a pattern of racialized prioritization which, despite various changes over time, has maintained distinctions based on whiteness that limit access to entry and societal benefits. Such a separation from social benefits leads to unequal treatment of migrant populations as outgroups. This thesis explores how the master narrative of immigration law and policy in the United States has consistently relied on in-group and out-group distinctions to determine who becomes racially categorized as an outsider. In particular, I am interrogating how 1) the legal history of US immigration perpetuates a hegemonic narrative that supports racial privilege; 2) outgroup perspectives can identify the ways in which one version of social and legal reality perpetuates a superiority over another in the form of exclusion; and 3) how definitions of whiteness central to immigration law and policy feed social conflict. The thesis will first illustrate a perpetuation of a dominant narrative of whiteness and racial disenfranchisement through immigration law and policy, and then examine a correlation between such efforts and conflict within a subset of the public discourse.
Formal institutions of international law are relatively new. For most of history, these structures have existed temporarily and through the use of charters. Courts and tribunals have been the settings of international law. But, they are not all using the same legal principles and definitions. This paper seeks to examine and analyze why a specific legal concept has changed over time. Using textual analysis, I will be looking at why ‘crimes against humanity’ has changed over time in international and domestic law. The concept of ‘crimes against humanity’ exists in a unique space operating between a norm and a law. It has only existed as a concept for a little over a century. Using this specific example, I hope to observe why international legal principles change over time and what influences their changes. After completing a textual analysis of courts’ usage of this crime, I argue that the definition of crimes against humanity changes mostly due to the fact that it is being used in different courts and situations. This is due to the fact that international law did not have a permanent court institution until the early 21st century. This shows that law is fluid and constantly evolving, especially in international law. But, this law has not remained constant because it is a facet of international law. This research shows that international law is still young and has not established law in the way that traditional domestic courts have.
Almost one-quarter of Americans have some form of a criminal record. In making hiring decisions, employers show aversion to hiring former offenders in the interest of risk mitigation and prevention of workplace violence. The Ban the Box movement, adopted by state and local governments, attempts to increase job opportunities for former offenders upon release from incarceration. The policy prohibits employers from asking about previous criminal offenses, or using “the box” representing a conviction on a job application. This thesis examines whether Ban the Box (BTB) ensures fairness in the labor market. While this policy provides protections to all individuals with a criminal record, it does not take into account the correlation between race and criminal convictions due to the overrepresentation of minorities in the criminal justice system. I first explore philosophical literature of fairness and discrimination in hiring practices. I then assess the empirical research related to Ban the Box, and fairness in hiring outcomes based on both race and criminality. Finally, I synthesize the philosophical criteria of fairness with current hiring outcomes with BTB. The discussed empirical research finds, in the attempt to reduce discrimination against former offenders, BTB may lead to statistical discrimination against racial minorities in hiring decisions. In other words, blindness to an applicant’s criminal history may encourage hiring decisions based on assumptions of criminality. This finding suggests that anti-discrimination law, in limiting bias based on criminal record, can strengthen stereotypical prejudices against young minority males.
The internationally recognized definition of a stateless person is “a person who is not considered as a national by any State under the operation of its law.” According to the UNHCR, there are over 10 million people worldwide who would fall under this definition. This paper is aimed at understanding the causes of statelessness by examining what compels states to have restrictive laws granting citizenship. Individuals often become stateless when they are born in countries that do not grant birthright citizenship. This paper will use the Dominican Republic and Germany as examples of states that have made dramatic changes to their principles of nationality conferral. In 2010, the Dominican government removed birthright citizenship from its constitution and retroactively revoked citizenship from a large segment of its population. In 1999, the German government established limited birthright citizenship for the children of immigrants for the first time in its history. Restrictive immigration policy often comes from political climates of xenophobia and nationalism, despite social justice implications and potential economic benefits from more inclusive policy. This paper will examine and analyze the intrinsic and external economic and political factors that led to these changes to determine the effects that supranational legal frameworks, changes in the labor market, and political bargaining have on statelessness. It will also examine different theoretical perspectives of *jus sanguinis* and *jus soli* citizenship. In conclusion, it will suggest how understanding these factors can help to ameliorate the problem of statelessness.
Linguists and immigration lawyers are valuable assets throughout today’s complex immigration reform. Throughout this paper, I define and explain internationalization in large corporations: a spontaneous development of strong social influence and integrity that ensures the understanding of people. Empathetic communication is the first step in understanding a world full of immigrants, specifically those coming to the U.S. in search of employment opportunities. Therefore, in order to work with these immigrants, qualified immigration lawyers must start the process with an understanding of a client's personal information, socioeconomic status, and future career goals. According to Amazon, the process of written translation with confidential information must be seen as the growth of a tree, where the roots represent an individual's integrity from the very beginning of the process and the results lay the groundwork for future reform.
Language is a tool that allows individuals to communicate with others at any given time. Translation and interpreting serve as a bridge to continue facilitating this communication between two people who do not understand the same language. Every language has special nuances that make it unique—certain grammatical points that highlight different functions. Thus, being a translator serves the community in many ways.

When working with the law, every nuance of the language is crucial to the attorneys, who are fighting for their client’s rights and civil liberties. Each piece of evidence that is translated is critical to the trials, as life sentences are no light punishments. Every word of every sentence is impactful and can be challenged in the court room like a witness. However, there is ambiguity amongst different legal terminology that can further complicate this process. This presentation will focus on the various techniques used to translate the law, including the different terminology used in this environment. Having a clear understanding of the words used is imperative for the translator, in order for them to understand the meaning behind the law.
The purpose of the thesis is two-fold:

1. To investigate the precise nature of stereotypical gender inferences using a computational model.

2. To assess the viability of the ‘themselves’ as the reflexive form of the singular ‘they’.

Research across methodologies has shown that stereotypically gendered antecedents (e.g. nurse) that are definitionally neutral are not treated as such online. That is, people generally have a harder time reading masculine pronouns following a noun like nurse than they do with feminine pronouns. Alternatively, research has shown that the singular they pronoun is harder to process following stereotypically gendered nouns than gender known nouns. This counterintuitive finding motivated this study, particularly the not well understood interaction between gender stereotypical and gender-known nouns and the singular they. To probe this interaction, I am currently running a 2x3 eye-tracking study using items in (1) and (2) that contrast stereotypical with known gender antecedents followed by syntactically bound reflexive pronouns.

1. The soldier camouflaged [himself/herself/themselves] carefully to hide from the enemy during battle.

2. The boy hid [himself/herself/themselves] stealthily while playing hide and seek.

I am testing the hypothesis that stereotypical gender is probabilistic. That is, certain stereotypical nouns are more likely to be of a certain gender and this, in turn, impacts the processing of gendered and gender neutral reflexives. To test the hypothesis, I have formulated a computational model that accounts for these probabilities and produces a metric (“surprisal”) that quantitatively predicts reading difficulty at the pronoun.
"I am King of the Romans, and above grammar!" retorted Sigismund of Luxembourg to a particularly contumacious monk in 1414 after the latter dared correct the king over a minor gendering mistake in his Latin. Since time immemorial, politics has played an influential hand in the way that we speak. One of the foremost manners by which this occurs is linguistic prescriptivism, where one type of speaking is deemed more correct and its use emphasized. This can take many different forms, including word choice, grammar, and a process called "linguistic purism," which seeks to root out certain words that have accrued lower prestige. In *Linguistic Purism in Germanic Languages*, authors Langer and Davies suggest that prescriptivism is strongly linked to a variety of political concepts, perhaps most notably class, for standardization of a language often takes its cues from "those forms which are used by the ‘best’ group of speakers, i.e. the educated and upper class." In my research, I explore the politics of linguistic prescriptivism and purism, and how they affect both the speakers and the more general state of the language. Given that the way a person speaks is one of the first things we perceive about a person, it is only inevitable that it will be politicized in some way. Uncovering the effects this politicization of language has on people can provide deep insight into larger social and political structures.
In this study, we focus on second language prosodic acquisition, in this case, the ability of American English speakers learning Spanish to acquire the speech melody of their second language, a characteristically tricky aspect of second language learning. Specifically, we aim to discover: (1) if advanced learners studying in Oviedo, Spain sound more native to native Spanish speakers than intermediate learners studying in the US, and (2) how that nativeness rating relates to the learner's mastery of Spanish prosody. Preliminary results indicate that both learner groups are understood to about the same degree by Spaniards. Based on the hypothesis that advanced speakers will be more native-sounding to natives, we constructed an online survey in which native, advanced, and intermediate level speakers listened to question-answer pairs whose speech melody matched or mis-matched in the type of stress (normal declarative -- Maria took a drink-- or corrective emphasis -- No, Maria took a drink) employed by the speaker. As such, a match could be a declarative-declarative, and a mis-match a contrastive-declarative pair. Using participant responses (native or non-native), the true acceptability of the pair (match or mis-match), and the language level of the audio's speaker, we categorized the success of that listener's prosodic assimilation. Our work is one of the first in the field to employ American English speakers learning a second language, and highlights the crucial relationship between prosody and learner-native intelligibility.
While living in Andalusia, Spain, it became clear that the culture of the area was unique from the rest of the country. The strong Islamic history that coexisted with Christianity in Andalusia still leaves an impact on its present. My study centers on the ways in which this history has influenced the region’s specific linguistic nature as well as its ceramic art. In this study I will propose a correlation between the Moors’ Arabic linguistics (or "phonetics") and art, and how this correlation has affected the Andalusian culture today.
Somebody's Fool: Accommodating Perspective Shifts

Epithets, like "that jerk", express the attitude of a judge toward their referent. This judge is typically the speaker of the utterance. However, shifted interpretations with a non-speaker judge have been observed in certain contexts, including inside and outside of embedding under speech and thought. I present interpretation experiments demonstrating that the presence of speech and mental predicates in a preceding sentence increases availability of non-embedded shifted readings. The evidence further indicates that mental predicates most strongly promote shifts, contradicting the speech-centered predictions of accounts which rely on context-shifting operators in the grammar. Instead, I consider a new pragmatic explanation where many factors in a discourse, including but not limited to speech and mental predicates, can systematically promote shifted interpretations. In addition, I suggest a close relationship between these interpretations and cognitive representations within language-independent Theory of Mind systems in the brain. In sum, the results dispel possible grammar-internal explanations for shifted interpretations of epithets, and suggest that these readings are instead the result of general pragmatic decoding, influenced by a vested human interest in others' mental states.
Afro-European relations have never been as strong as they are nowadays, and because of this, ex-colonized people in various parts of the Caribbean, have been and are still being indoctrinated by the ideals instilled in them by the colonizers during the colonial era. These ideals, which can be seen through these nations’ religions, politics, culture, and with which they have become accustomed, now form part of their own ideology of the world. As a black immigrant from Haiti where French is mostly regarded as being the main official language, even though Haitian Créole is my mother tongue, I take an interest in inquiring about the history of this process of cultural exchange. Advocates and writers such as Aimé Césaire, Édouard Glissant and Frantz Fanon have shown that to speak a language is to assume a world, a culture. More precisely, the black man who can speak the French language becomes whiter, because of the colonial heritage of that language.

This thesis focuses on how language-use connects with political questions surrounding skin color and ideas of identity and belonging that are prevalent in Haiti and the Caribbean as a whole; particularly ways in which attitudes and mentalities may be influenced by linguistic and cultural hierarchies developed under the hegemony of European domination. It also seeks to interrogate the connection between language and social attitudes to homosexuality in an effort toward understanding the socio-cultural determinants of anti-queer resentment in the Caribbean.
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*Biutiful: El Reflejo de una Familia Marginal*

Esta presentación explora el tema de la familia dentro de la película *Biutiful* (México, Alejandro González Iñárritu, 2010). Este trabajo está centrado en las enfermedades que padecen los personajes principales, Uxbal y Marambra, quienes sufren de cáncer y bipolaridad respectivamente. Esta investigación nos sirve de fuente para establecer como el cáncer de próstata del padre, lo lleva a cometer actos de corrupción en contra de inmigrantes africanos y la bipolaridad de la madre, la sumerge en un camino de auto destrucción. De esta forma se puede demostrar que estas dolencias afectan el funcionamiento de esta familia marginal.

This presentation explores the topic of the family within the film *Biutiful* (Mexico, Alejandro González Iñárritu, 2010). This work is focused on the diseases that the main characters go through, Uxbal and Marambra, who respectively suffer from cancer and bipolarity. This research serves as a source to establish how the prostate cancer of the father, leads him to commit acts of corruption against African immigrants, and the mother’s bipolarity places her in a road of self-destruction. This way, it can be established that these ailments affect the function of this marginal family.

Note: This presentation will be in Spanish.
Black Waters of Doubt adapts an almost forgotten historical episode in the life of Theodore Roosevelt into a graphic novel format as a vehicle for the development of the artist’s visual and literary shorthand, while providing a harrowing glimpse at heroism in a time gone by.

The graphic novel was developed from the tale of Roosevelt’s trip down the then unexplored River of Doubt, located in Brazil, in the year 1914. Inspired by a segment of the Ken Burns documentary “The Roosevelts”, Black Water is designed to be an informative, and entertaining, read for all ages. A variety of sources were consulted in the crafting of this narrative, including President Theodore Roosevelt’s own account of the journey, Through the Brazilian Wilderness, Ornithologist George K. Cherries diaries, Candice Millard’s book The River of Doubt, along with countless photos from the expedition. The adaptation was an intense learning process that included weaving together the various sources, condensing time to improve pacing—emphasizing and enhancing moments of great drama and tension—along with combining minor participants into concise characters thereby avoiding long sections of exposition. By presenting a visual depiction of the events, along with a commentary not available in the primary sources, Black Waters of Doubt brings a new dimension to President Roosevelt’s undertaking. The use of the sequential art format to tell this story gives even the most casual reader an “easy in” to history, and the opportunity of enjoying a rollicking good adventure tale.
American culture has produced legislation which not only permits, but encourages violence against sex workers. Criminalization of prostitution has created a marginalized population who must constantly fear for their safety. The legislation operates to criminalize and disenfranchise the identities of those living in poverty, and other minorities. Particularly American is the way legislation is enforced unevenly, another fine example of American institutional racism and sexism. Clients, pimps, and other Americans engage in violence against "sex workers" as an identity which extends to violence and trauma against individuals.
This braided essay has three strands, each revolves around the relationship between parents and their sons in different scenarios. One of the braids, focuses on my own high school graduation, a situation that exposed how my father mistreated an important occasion in my life. The other braid addresses the fear I felt taking care of my mother after she went through a serious surgery. These two threads focused thematically on masculinity and the shifting of roles in a young man's life. The third braid is a script from the television show *The Fresh Prince of Bel-Air*. The scene in particular is when Will’s father walks out of his life for good, after being absent for fourteen years. Even though the show relies on comedic effect, this moment of raw emotion echoes the themes of the other threads: absent fathers and the pressure placed on a young man as he grows into an adult.
My research explores various portrayals of gender and race in both high and low art forms in the United States’ present-day society. For years, African American women have typically been portrayed in some forms of “low art,” as well as more canonical texts as individuals who are less in worth and importance when compared to the Western-Caucasian man. Such portrayals include the story of the African American woman, Sara Baartman, and the horrifying experience that she endured as her body was objectified and displayed for exhibition in England and France. I am exploring the negative portrayals of African Americans, specifically women in pop culture as I analyze excerpts from Claudia Rankine’s *Citizen*, songs by the rapper Eminem, as well as an article by Denise Herd in the academic journal, *Sexuality and Culture*, to illustrate how the recurring objectification of women, and the discriminatory portrayal of African Americans as violent, and seemingly less than human can ultimately shape, and impact the beliefs and actions of American youth. By highlighting the impact of negative portrayals on youth, I aim to demonstrate how one’s mindset towards African American women can hopefully be altered upon viewing the degrading representations of those individuals, as well as showcase the necessity in limiting youth to the exposure to such forms of art.
During the 17th century, Spanish Golden Age Theater or comedia nueva marks the history of the baroque and its components. With its pessimistic themes, sense of hopelessness and chaos, it opens the door to innovative minds such as Tirso de Molina’s, in order to bring the spectators a variety of plays based on the deception and misguidance of other characters. In the plays El burlador de Sevilla y convidado de piedra and Don Gil de las Calzas Verdes, Tirso presents to the audience two main characters whom through the means of lies and deceit, intend to get what they want. The difference between these two personas is that one is a man (Don Juan) and the other a woman (Doña Juana). Based on this key element, in this talk, I will examine how their frauds are different in nature and have possible divergent outcomes. Don Juan lies to please his carnal desires without fear of his actions while Doña Juana lies in a very calculated way to protect her honor, making it clear that a woman’s deception is more thoughtful and mischievous than a man’s.
As technology has become increasingly more ingrained in people’s lives, cybersecurity through means such as encryption and antivirus software have become commonplace. Despite the movement towards secure technology, cybersecurity incident rates have continued to rise, revealing an unaddressed factor: the users. The users are believed to be cybersecurity’s weak link due to poor security behaviors. Building off previous research, we will conduct a survey that will use the Security Behavior Intention Scale (SeBIS), a standardized measure of cybersecurity behavior intention, which addresses four common security factors: updating, device securement, proactive awareness, and password generation. The survey will also contain a risk-taking propensity scale and collect demographic data, allowing us to compare how these two factors influence SeBIS results through regression analysis. We will then address how our results compare to previous research to help determine the validity of existing beliefs on which factors influence security behavior. By contributing to this body of knowledge, we will help to improve the effectiveness of cybersecurity behavior management.
The Veterans Health Administration (VHA) is the largest integrated healthcare system in the nation, serving over 9 million veterans annually, with a total eligible population of 23 million veterans. The VHA is also “the [nation’s] largest provider of graduate medical education and a major contributor to medical and scientific research” (VHA, 2017). Due to chronic scandal, mismanagement, and misappropriation of funds, many question the ability of the Department of Veterans Affairs to provide the timely and quality care promised to our nation’s veterans. This research will explore the relationships between administrative culture and procedures as they relate to the implementation of policy within the Veterans Health Administration. There is also a question of a culture clash between veteran culture (searching for alternatives to pharmaceuticals) and administrative culture (financial responsibility) leading to a disparity in access to complementary and alternative healthcare and a trend of overprescribing pharmaceuticals. There is a large body of research available on each of these topics, but none that explores how they combine to affect the desirable outcome of quality care for all veterans. We will explore these questions with a mix of interviews and qualitative surveys of various stakeholders.
Recent college graduates are faced with extraordinary competition as they enter the workforce. An individual will devote abundant time and money into career coaches, interview preparation, and tips to make sure he or she secures that job. Personality plays a huge role in where one fits in to an organization and how much growth one will see. My research identifies whether or not there is a relationship between career advancement and personality type. I review qualitative data to examine if there is a correlation between introverted/extroverted personality type and career advancement through a survey sampling. The survey will measure individual’s self-perception of their personality, and their perceived career success/advancement. My results will determine whether extroversion or introversion is more likely to advance an individual’s career and professional success.
Illegal immigration has never been as profound and polarizing of a topic throughout the history of the United States of America as it currently is. Being one of the larger platforms in which our current President ran on, the topic has proven to be rooted in biases and very divisive among the two main political parties. The buzz created through the media’s stories on the topic has stimulated the minds of many throughout the country; however, it can be difficult to divulge the truth from opinions. The divergence of the U.S. from Globalization and NAFTA has created strong divisive opinions about immigration as a byproduct. This research will focus solely on the facts through the scope of a globalization model in order to address illegal immigration. Being a multidimensional and multidisciplinary model, the framework of the globalization model will create a structured lens that consists of both inner and outer domains to perform its analysis. The inner domains consists of economic, political, social, business and physical factors, while the outer domains consists of factors concerning neighboring country dynamics, trade blocs and global institutions. After thoroughly researching theses domains and unearthing the historical data related to these factors, this paper will present the impact illegal immigrants from Mexico and its satellite nations contribute to the U.S. economy and other domains. In addition, the effects the U.S.’s shift towards divergence may cause to the upcoming elections in Mexico.
Globalization has become a popular word which seems to represent a common strategic goal for many companies, but it is difficult to measure, assess, and accurately understand its implications and requirements. Many analytic attempts that discuss globalization are heavily biased towards the researcher's discipline, specialty, or interests. The flaws of a narrow focus in globalization analysis will be diminished by employing a system approach with a globalization model that is multidisciplinary and multidimensional. This research will use a globalization model to examine the Mercosur regional economic integration bloc that was established between Argentina, Brazil, Paraguay and Uruguay in 1991. Employing the model will allow for a thorough analysis as it provides a framework with inner domains (relating to internal economic, political, social, business and physical factors) and outer domains (relating to factors concerning neighboring country dynamics, trade blocs and global institutions). The study will investigate the benefits and impacts produced by the agreement for each country individually and as a collective unit while also examining shortcomings and future potential that has yet to be realized. This paper will look at changing trends of the different domains, assess further integration, immigration reform and the potential of the new level of integration to strengthen the position of the bloc. A comparison with another level of economic integration will be discussed as a form of comparison.
One of the overarching goals for competitive companies looking to expand their business centers is to understand the concept of globalization, but it is a difficult topic to measure due to the abundance of different areas and metrics that are encompassed, as well as the fact that there are many different perceived methods of defining and assessing it conceptually. Attempting a thorough and systematic analysis of globalization is convoluted due to research and analysis that is not broad or encompassing enough or is more suited to the researcher's own agenda or academic background. The shortcomings of a narrow focus in globalization analysis will be diminished by employing a system approach with a globalization model that is multidisciplinary and multidimensional. This research will employ a globalization model to examine the Pacific Alliance regional economic integration bloc that was established between Mexico, Colombia, Chile and Peru in 2011. The model will be used to focus its analysis on both inner domains (relating to internal economic, political, social, business and physical factors) and outer domains (relating to factors concerning neighboring country dynamics, trade blocs and global institutions). The study will take a historical look at the benefits and impacts produced by the agreement for each country as well as at the areas where it has fallen short or has future potential. This paper will look at changing trends of the different domains, assess further integration, immigration reform and the potential of the new level of integration to strengthen the position of the bloc. A comparison with another level of economic integration will be discussed as a form of comparison.
The purpose of this study is to first research and analyze the growth of electronic commerce (e-commerce) in the United States and China, then apply the insights to Morocco. This thesis will focus on the evolution of mobile commerce (m-commerce) which implies conducting business transactions online through wireless handheld devices such as cellular phones and tablets. Through a review of literature, our first goal is to determine the main factors that contribute to advancements in e-commerce and especially mobile commerce in each of these two countries. The next part is to apply insights gleaned to Morocco, a Northern African country that has yet to develop its Information Technology (IT) infrastructures and fully embrace electronic commerce. The aim of this thesis is to establish those success factors for mobile commerce in Morocco.
The complexity of ethics is shown through the many theories created by well-known scholars like Aristotle and Kant. While these theories are still taught today, ethics as a discipline has expanded to include more than just these philosophies. The discipline of ethics now includes a managerial concern for ethical decision making. However, there is a stigma within the business realm when it comes to balancing ethics and profits. There is a conflict between choosing a business strategy that promotes shareholder wealth maximization at the cost of acting ethically or sacrificing shareholder wealth to address ethical and social issues. The purpose of this study is to research the relevant legal authority that has been interpreted to create this stigma. This includes a primary review of legal cases, but also touches upon federal and state statutes, law reviews, and journals for supporting research. By applying and interpreting relevant legal theories, this paper discredits the sacrificing of corporate ethical values, while drawing attention to remedies which can mitigate the risk of acting unethically. Corporations have not struggled to act ethically due to legal restrictions. Instead, there has been a trend in unethical behavior which has had far-reaching consequences. Alignment between profit and ethical goals not only has a positive impact on the individual corporation, but also creates value for society at large.
Employing Fido: The Effect Dogs Have in Today’s Businesses

While an owner’s dog holds a special place in the heart, his or her dog has an impact beyond companionship. Dogs are a significant force in the owner’s bank statements, making them incredibly valuable not only to their owners, but to marketers and businesses as well. My research asks how have changed attitudes about dogs and dog-ownership impacted business in the last 15 years. While some view dogs strictly as a form of protection, they do not see the economic impact dogs have on society. Their interactions with their dogs are nothing special and they focus on giving them their meals on a schedule. Just by buying and giving dogs their food, first-year owners are spending over a thousand dollars, this may even be more if the dog is considered large. This is giving dog food companies like Mars Petcare Inc. over $17 billion a year. Furthermore, designer clothing lines such as Ralph Lauren have expanded their lines to include products for dogs. Dogs are able to make their own income as well. One in three commercials uses a dog to help promote their business helping businesses to emotionally connect with the consumer, and allowing the business to sell more products. While the protection skills that ordinary and service dogs are able to provide for families is important, it is just as important to evaluate how the perception owners have about dogs today is affecting the bottom line for businesses.
The use and prescription of off-label drugs is a legal practice and is a major contributor to the rise of pharmaceuticals in the United States. Although it is common for physicians to prescribe drugs for uses other than those that are FDA-approved, the promotion of such uses by pharmaceutical companies themselves is illegal and can result in major consequences for the companies involved, such as lawsuits. The purpose of this research is to explore the relationship between FDA guidelines and off-label advertising techniques to determine what, if any, changes need to be made to the guidelines. Another determination will also be made based on guideline change recommendations to see if doctors themselves should be held responsible for prescribing certain drugs off-label. It is hypothesized that although the FDA already has strict guidelines and laws regarding the promotion of off-label drug use, further measures must be taken to ensure that pharmaceutical companies do not publicly advertise their products to treat conditions they are not approved for and to ensure that the decision on whether or not to use a drug off-label remains in the unbiased discretion of the healthcare provider. This research employs a case-study method focusing on two specific incidents to research the ethical implications of off-label marketing: Allergan and Astra-Zeneca, both of which have faced lawsuits for off-label marketing of their pharmaceuticals Botox and Seroquel, respectively.
The purpose of my research is to test if Celebrity Endorsements have a direct correlation to increasing sales. For this research, I am concentrating on Puma which is an athletic clothing company based out of Germany. Celebrity Endorsement is when companies hire celebrities or public figures to promote their product from any given platform. Understanding the upcoming generation of media consumers is crucial for companies to stay relevant in the market. With social media and celebrity promotion on the rise, companies must find influencers that target their intended audience. My main focus will be researching from years 2014-2016. Since Puma has multiple influencers, I have decided to concentrate on the following three celebrities: R&B singer Abel Makkonen Tesfaye (known as The Weekend), Kylie Jenner, and Pop singer & CEO of FENTY Beauty Rihanna. Each of these celebrities have done a few different releases, so to keep track of these product launches I will have a timeline. In this timeline, there are announcements made by Puma about their partnerships, product releases, and notable social media posts made by the influencer. Then I will compare the timeline with sales data I have gathered from Interim and Annual Reports from Puma's website. My research will conclude the effectiveness of Celebrity Endorsements within Puma Company.
Multi-ethnic markets in the United States present advertisers with the strategic challenge of reaching diverse audiences. Often times, advertisers will approach this challenge through representing their target demographic in ads in hopes that they will identify more strongly with the source and perceive them as more similar (Whittler, 1989). Recent research in the United Kingdom by Lloyds Banking Group finds that consumers feel “more favorable towards a brand that reflects diversity in advertisements” and even “expect advertisers to represent diverse aspects of society” (Rogers, 2016). However, many brands fall short of featuring minorities in ads with consistency and accuracy.

This research aims to more definitively find advertising inclusion preferences by evaluating attitudes and purchase intentions for ethnic minorities when comparing ads which represent a participant’s own ethnicity, other ethnicity, or multiple ethnicities. These results contribute conceptually to the diversity in advertising literature as well as the motivation literature by demonstrating a link between consumer perceptions of advertising motivation and overall attitude towards the advertisement.

Works Cited

Rogers, C. (2016). Just 19% of people in ads are from minority groups, new research finds. Marketing Week.

The century-old movement of scouting has been making some newsworthy changes this past decade. These changes cause many Americans to be apprehensive to support the program because of their misunderstanding of the changes. The debate revolves around whether scouting is too progressive, not progressive enough, or some muddle of confused ideals and headlines. Recently, scouting has permitted gay leaders and scouts to join, created a co-ed programs such as the Venture Scouts, and permitted females to join troops as scouts and leaders. These events have influenced some Americans’ bias against the program causing them to not consider the overwhelmingly positive benefits scouts get from participating – regardless of how progressive the specific troop may be. Through interviews with members of the Western Massachusetts Council, with local troop leaders, with scouts of all ranks, parents of scouts, and drawing from personal experiences as an Eagle Scout, as well as recent news articles and the established history of scouting, we find scouting is a program made to benefit our youth and teach them how to participate in our rapidly changing society. Scouting should be supported by our families, by our communities, and by our nation because of its commitment to youth development and to the guidance it provides for scouts to grow into ethical and moral citizens.
Professional cuddling is an emerging business that has attracted media attention from major news sources. However there is little research on professional cuddling or its industry. A twenty-seven question survey designed to research potential stigmas, market, and opinions was distributed through social media and email. Based on preliminary results there is a market and interest for professional cuddling. Both the opinions and stigmas regarding professional cuddling are mixed. Through the presentation of the study and subsequent business plan, the business world will gain the knowledge of this burgeoning field and its feasibility. The world of business will also potentially gain a new company and new jobs.
Employment opportunities in STEM are predicted to continue to grow at a higher rate than non-STEM jobs in the next decade (USDC, 2017). To be able to take advantage of the economic needs and participate in a society that increasingly depends on mathematics and technology, students need a good background in advanced mathematics and science (Hill, Corbett, St. Rose, & Women, 2010). Unfortunately, our educational system fails many students when it comes to their mathematics preparation, where US students are drastically outperformed by students in other countries (National Science Board [NSB], 2016).

The hypothesis of this study, is that, as espoused by the Common Core standards, and by the National Council of Teachers in Mathematics (NCTM), using varied pedagogies are essential to learning complex mathematical concepts (NCTM, 2000). Using more tactile, real-life examples caters to students who learn outside of computation.

In this project, I define “high-quality” lessons as lessons that are of high mathematical content via diverse approaches, such as graphs, tables, equations, contextual problems, that focus on students’ problem solving, rather than the teacher reciting information. The research proposes to examine how the enactment of “high-quality” mathematics lessons impact students’ interest, motivation, engagement, and comprehension of Calculus at a local university. The study will review the existing literature around the connection between student achievement in mathematics and pedagogy, then use classroom observations, surveys, and focus groups, to collect data to support the studies’ hypothesis.
Extensively used by search engines, navigation systems, and social networks, graph traversal algorithms are highly important in modern computer science. Frequently, actual problems involve search over immense graphs, which makes them difficult to research or solve without mathematical tools. One famous example of such a problem is the Rubik’s Cube puzzle, the states graph of which contains over 4 quintillion (10^{18}) nodes. Because of its size, its diameter was discovered only in 2010 by computer scientists Thomas Rokicki and Herbert Kociemba. Their algorithms relied on group representation of the cube’s graph, multiple sequence databases, and invariants. Inspired by their mathematical solution, we used similar strategies to solve the Eight-Puzzle game, which is another well-known combinatorial puzzle but with only about 180,000 reachable positions. The fundamental idea behind our solver is the algebraic representation of the puzzle’s states graph. In fact, its nodes can be viewed as elements of a permutation group on 9 objects. This model allowed us to use subgroups as reasonable intermediate steps in our search algorithm, which had significantly minimized the computational burden of the search. Based on thorough tests results, we concluded that our solver provides valid solutions to any instance of the puzzle within 50 to 200 milliseconds. Our solutions are suboptimal and rarely exceed 120% of the Eight-Puzzle’s graph diameter. We also attempted to improve this performance by using the A* searching algorithm based on several heuristic functions.
The Effects of the Weather on Cities That Use Renewable Energy

As the technology advance, scientists are developing many different ways to produce renewable energy using the weather as its primary source. The production of traditional energy brings adverse effects on the people’s health and the environment. Some cities are implementing renewable energy that will reduce the cost of energy production and help the city to move to a clean energy source. This new invention will force cities to change the way they produce and spend energy. Austin in Texas and Cheyenne in Wyoming are two cities with significant reserves of fossil energy. It is expected that these two cities will not change to renewable energy. However, the reality shows otherwise, and Austin is already intending to use the weather to produce energy moving away from the oil energy. Whereas in Cheyenne, the city intends to keep using fossil energy. Using scholarly literature, statistical analysis, and external sources, I will demonstrate how the weather condition in Austin and Cheyenne plays a role in the way each city produces its energy.
Personality and Weather

Seeing how different types of weather has changed me into a different person was a shock. From a happy, active kid, I have become a guy who is more introverted and somehow grumpier. By analyzing the average daily temperatures of Honolulu (a place that has basically the same weather as where I grew up) and Boston (where I currently live), we can see how the weather may make a difference in people’s personality.
Weather and Soccer

Soccer is a popular sport that many enjoy. Some of the greatest soccer games have occurred in adverse weather. While the vast majority of games are not played in such extremes, it is still common for the weather to have an effect on players and the outcome of the game. In this study, we investigate teams based on climate: FL and NC. When assessing possible weather factors such as temperature that can affect the outcome of the game, we use statistical tools to analyze the effects of temperature on the outcomes of soccer games.
While the effects of climate change have become more apparent in the form of extreme weather, its economic effects are more encompassing than one would initially think. American fishermen contribute more than one billion to the economy annually, but temperature changes have had a significant impact on fishing towns. The loss of a cornerstone to a local economy can be devastating and have overwhelming social effects. By analyzing the data of changing temperatures in fishing months in fishing towns, we investigate the socio-economic effects changing temperatures can have on a city.
Effects of Weather Conditions on Car Accidents

Weather-related crashes play a major role in fatal car accidents each year, especially during the winter. In this study, we identify the specific conditions of the weather between Boston and New York in which the most accidents occur. Using scholarly literature and statistical analysis, we will investigate the impact that the weather has in both cities. While one might not be able to limit driving in winter, one can still follow the statistics recommendations.
Homelessness and Weather

As our society developed, more problems arise with it. Homelessness is one of them. While there are various factors that led to homelessness, many people say that it is due to the dramatically changing of the weather. In this research, we are going to look at two different cities with different weather patterns. By using statistical analysis, we can determine if the weather patterns are associated with homelessness.
How Weather May Affect Emotions

Many of us have moods that are changeable like the tides, for many of us, those moods are dictated by many things including the weather. We know what happens to our brain on drugs, but what happens to our brain on sunlight? And how about rain? While a lack of sunlight can cause seasonal affective disorder, the temperature may also affect mood, perhaps as a result of energy usage. Even though raining cannot directly affect our hormones or energy, it can affect our lifestyles in ways that are not conducive to a good mood.
Small Business and Flu Season

The employees of small businesses are usually meeting many different people, sharing small spaces, and working long hours so they tend to face more health problems than other kinds of job. The weather affects the flu season because it affects the rate that microorganism grows. For the past 20 years, this disease has been changing a lot, so the amount of people with flu is increasing in the recent flu season. That influences small businesses dramatically. In this research, we analyze the past 20 years' average daily temperature of two cities to see how we can use weather patterns to develop strategies for improving the health of small businesses employees.
Symplectic manifolds in dimension four have what is called a Lefschetz pencil. These are maps from a Symplectic manifold to the sphere satisfying several properties. What is notable about these Lefschetz pencils is that they can be modified to be a Lefschetz fibration. This has finitely many critical points where the map is not smooth, by examining the map around these critical points we get a sequence of Dehn twists which are elements of the mapping class group of the generic fiber of the Lefschetz fibration. Composing this sequence of Dehn twists will give the identity element in the mapping class group, this is what we call a positive factorization. It turns out there is a one to one correspondence between Lefschetz fibrations and positive factorizations up to some equivalence.

This correspondence allows us to translate questions about Symplectic 4-manifolds into the language of mapping class groups of surfaces. By finding factorizations of the identity, we can find constructions of interesting Symplectic 4-manifolds. In particular, I am particularly interested in constructing examples of exotic 4-manifolds. These are spaces that are homeomorphic, but not diffeomorphic to standard smooth 4-manifolds. My work concerns examples of genus two Lefschetz fibrations which have few critical points, these are the simplest class of Lefschetz fibrations we do not have good understanding of so hopefully by studying these Lefschetz fibrations will lead to insight into Symplectic 4-manifolds.
Exploring the Use of Predictive Analytics in Banking and Finance Decision Making

Predictive analytics is a branch of advanced analytics that is composed of various statistical techniques where each contributes in making predictions about future scenarios and outcomes. Some of these techniques include machine learning, data mining, predictive modeling, logistic regression, etc., and the patterns found within the results can be used to identify risks and opportunity. This project is focused on the banking and finance area, and the purpose is to create a list of targeted customers that are more likely to sign up for a credit card by using predictive analytics. I simulate my own data through R, and investigate the relationship between the binary response, the customers that should or should not be issued a credit card, and the predictor variables, the characteristics of customers. In the simulation studies, logistic regression models and a tree diagram are generated for targeting this specific group of customers using statistical software such as R, SAS, and BigML. The analysis of real-life data from a Portuguese banking institution is also presented.
In United States 5 percent of the population is responsible for nearly half of the health care expenditures while half of the population spends little or nothing on health care (Conwell LJ, Cohen JW, 2002). The purpose of this research is to quantify sequence and timing of events as well as specialty, diagnosis and medication complexity for patients with multiple 3 or more inpatient hospitalizations. We analyze the healthcare encounters data that include inpatient, outpatient, emergency room, medication events of individuals who have three or more than three inpatient events in 2011 (n=118) from a national longitudinal dataset called the Medical Expenditure Panel Survey. Each encounter that corresponds to one or more diagnoses and doctors’ specialties for individuals in the weighted survey provides information about the medical help a patient gets after each inpatient event. Our research provides descriptive quantification of time-based patterns between inpatient events; time from each inpatient event to the next office based doctor visit or outpatient doctor visit; common diagnosis and common diagnosis pairs; specialties of office based doctor visits after each inpatient event; degree of fragmentation across different doctors’ specialties of each doctor visit; and medication complexity.
Gödel’s Undecidability Theorem

Mathematics is the methodology of representing a perception of reality based on predefined terms which are, in turn, used to define further conditions. Postulates or axioms are used in multitudes of interdependent conjunctions to formulate mathematical systems. A fundamental theorem used in further theorems of geometry, specifically Euclidian geometry, is the Parallel Postulate which was considered irrefutable until an attempt to disprove the contradiction led to the development of Non-Euclidian geometry with valid geometries that contradict the once exclusively undeniable Parallel Postulate. The phenomenon of disassociating consistent mathematical systems from fundamental undefined and defined terms, axioms, and theorems is the foundation of Gödel’s Undecidability Theorem. This project is directed towards understanding and showing how Gödel challenges the idea that all mathematical conjectures can, with enough calculation and analysis, eventually be proven or disproven. This theorem states that “any mathematical system containing all the theorems of arithmetic is an incomplete system”. In other words, the system can never be proven true or false.

The purpose of this project is two-fold. First, the project will seek to understand Gödel’s Undecidability Theorem. Second, the project will explore the implications of undecidability to the fields of mathematics and computer science.
The ability to accurately model and forecast the spread of an infectious disease is a critical piece of the effective control and treatment of the disease. One such disease of interest is dengue fever, which infects approximately 400 million individuals worldwide annually. Without treatment, a severe form of dengue fever, dengue hemorrhagic fever (DHF), can lead to complications, including rapid loss of platelet count, internal hemorrhaging, and death, especially in children, the elderly, and immunocompromised patients. Dengue fever is endemic to many countries with tropical climates, including Thailand. Geographically, Thailand is split into provinces which are further split into districts. Five provinces have been identified by public health officials to be of particular importance for controlling dengue fever. The Thai Ministry of Public Health has provided us with data which includes the number of cases of DHF reported between 2006 and 2013, both at the province and district level. Utilizing this data, we constructed probabilistic models to forecast the incidence of dengue fever using Prophet, a model for time-series forecasting developed at Facebook. We compared the forecasts produced by these models to a simple reference model. This work shows that the Prophet model can be used to make reasonably accurate forecasts for the incidence of dengue fever, but it lacks some features and flexibility which would increase its utility for epidemiological modelling.
While renewables like solar and wind are environmentally friendly, they complicate operation of the power grid due to their intermittency. Hydropower plays a large role in providing flexibility and balance to the grid during these volatile times, making it a topic of great interest. This goal of this research is to understand the relationship between both onshore and offshore wind generation and hydropower operation in order to consider the impact of future changes to the energy system in New England. Changes in hydroelectric power plant operation are evaluated using an energy model based on historical hourly demand values and atmospheric data, where scenarios of varying generation capacity of each technology are defined as the model inputs. We investigate the impacts of increasing wind production in New England. Preliminary results suggest that increasing the installed capacity of wind leads to more energy generated by hydro, with offshore wind having a greater influence than onshore. The technologies that hydropower appears to replace are then investigated in these cases.
Precious Plastic is an innovation created by Dave Hakkens that offers a series of devices that recycles plastic on-site into raw material that can be used to create different types of useful products. Shredder, Extrusion, Injection, and Compression Machines can be built using open source blueprints from Precious Plastic. These machines are designed to be module-based which can adapt to any work environment. Due to Precious Plastic being open-source, anyone can build an inclusive design that can work within any type of financial budget, including extremely limited ones.

The safety of the equipment used is very important. You need to ensure that any equipment built passes safety inspections as students would be creating new products from the recycled plastic with the machines. The equipment can be built from scrap parts. If you already have equipment on your campus that can be used in Precious Plastic, there is no need to build the same machine. Combining Precious Plastic with your campus’s recycling program will enhance the capabilities of what products you can produce on-site.

You can engage multiple departments to expand on related strategic initiatives your college is working on. Keeping these initiatives in mind can help your own college’s Precious Plastic program succeed. Creating products with plastic without transporting recycled material takes recycling on your campus to the next level of sustainability as you reuse the plastic onsite and produce revenue-generating products at the same time.
The research project addresses the need for affordable, energy efficient housing without sacrificing comfort of daily living. Automated control of temperature and illumination through the use of innovative energy harvesting and architectural design approaches are investigated. A prototype model is used to quantify the energy needed to maintain “comfortable temperature”, where feedback control of temperature is incorporated, through the use of microcontrollers. The logic and set parameters of the microcontroller are varied so as to measure the quantitative impact of selecting temperature and feedback control parameters on energy requirements.
Passively-Controlled Airborne Wind Energy Systems

Airborne Wind Energy Systems (AWESs) consist of airborne airfoils that can reach altitudes over one kilometer at a fraction of the cost and using less material than conventional wind turbines. Previous development in AWESs have employed the use of computers, artificial intelligence, airborne actuators, and other monitoring equipment to be used in megawatt-scale farms. This paper discusses the feasibility of developing passively-controlled AWESs for small-scale distributed generation scenarios. A MATLAB model was developed to study the properties of a Gomberg Pilot 50 ram-air kite. The model will be used to aid in the development of a cyclic two-phase power generation process, exploiting changes in aerodynamic forces and the tensions of attached tethers to generate energy.
Magnetic Particle Imaging (MPI) is a new medical imaging modality based on the non-linear response of Super-Paramagnetic Iron Oxide Nanoparticles (SPIONs) to oscillating external magnetic fields. Unlike magnetic resonance imaging (MRI) that images the magnetic response from body tissue water, MPI images an introduced or “tracer” magnetic material; the SPIONs are injected into the body intravenously. Because the magnetism of the iron particle is $\sim10^7$ fold larger than the nuclear magnetism of water, MPI has a very high sensitivity to the tracer. Although MPI technology was introduced in 2005 and has been applied to rodent imaging, it has not yet been implemented at human scale. Unlike MRI, where the magnet is large but stationary, the MPI magnets rapidly rotate around the body similar to computed tomography (CT) scanners but with considerably more weight, creating mechanical difficulties and patient safety concerns. Our work evaluates a prototype MPI design consisting of two iron-cored electromagnets, constrained within a cylindrical aluminum and stainless-steel frame that rotates around the subjects head at 30 RPM on a series of rollers underneath the frame. I designed an assembly capable of rotating the $\sim2000$kg gantry at 30 RPM without any significant eccentricities. It is designed from non-magnetic material and to withstand the magnets' repulsion and weight, and to isolate the moving parts from the patient. Preliminary construction is currently underway, and success will allow for a system capable of imaging brain activation with substantially higher sensitivity than current MRI units.
Cold Spray is a metal deposition process in which high pressure gas is used to deposit a metal powder on a substrate. In this process, high pressure gas expands isentropically through a converging-diverging nozzle, and accelerates a metal powder to supersonic velocities. These high speed particles will bond to a surface upon impact, if the impact velocity reaches a certain critical velocity. This process differs from other thermal spray processes because it is performed at relatively lower temperatures, and uses the kinetic energy of the particles to facilitate bonding rather than their thermal energy. Cold spray can produce coatings with very low porosity and tensile properties that can match the properties of the bulk material. One major challenge with cold spray is nozzle clogging. Nozzle clogging occurs when particles bond to the inner surface of the nozzle, altering the local cross sectional area, and cause a drop in the flowrate through the nozzle, which results in a lower quality deposit. In particular, experiments performed at the United Technologies Research Center (UTRC) showed that some cold spray nozzles clog after about 15 minutes in operation. A computational fluid dynamics (CFD) model of the cold spray nozzle is developed to study the flow of metal particles in the cold spray process. CFD simulations suggest that pressure fluctuations in the particle feed system cause the particles to disperse in the nozzle, and ultimately lead to some particles colliding (and bonding) with the nozzle wall. Redesign of the nozzle is considered in order to mitigate the effects of particle-wall collisions as well as clogging in the cold spray process.
Wind energy is a renewable energy source that has been growing rapidly over the past two decades, thanks to technological advances and supportive policies. Nevertheless, there are still opportunities for improvements in wind energy technology to reduce costs and increase efficiency. Specifically, when wind turbines are grouped together into wind farms, the overall efficiency decreases due to wake losses. A variety of approaches have been taken to reduce wake effects including optimization of the layout before installation and control of the turbines in a farm when they are operating. An alternative approach is to consider static aerodynamic structures that are installed near the wind turbine rotor and deflect the wakes. These wing structures will increase the efficiency by redirecting free-stream airflow to the downstream turbine, so there is less energy lost due to wake loss. The upstream turbine is modeled using an actuator disc, which is an open disc that replicates the wake loss of an actual turbine of equal size. The wing structures will be attached to the actuator disc, and the different wing structure patterns can be changed easily. The experimental data is collected using hot-wire anemometers, pitot tubes, and power output from the functional, downstream model wind turbine. The final step of this project will be a feasibility assessment, meaning the practicality of these wings being implemented on a real wind turbine farm will be assessed, including the material used, attachment process, and maintenance required.
Recent estimates suggest that over 600,000 bats are struck by wind turbines every year in the US. Existing deterrence methods, ultrasonic emitters, are limited by their placement on the turbine nacelle and are not powerful enough to affect the full swept area of the turbine blades. Thus, the objective of this project is to design an air-driven ultrasound emitter to be placed directly on the turbine blades. By harnessing the flow-induced oscillations of a polyethylene film in flow, an ultrasonic response in the 20-75 kHz hearing range of bats can be produced. The influence of film tension and width under transient flow velocities is studied, to create an acoustic signal closer to what field studies indicate as an effective deterrent: frequency band jumps and pulse modulation, at a sound power level appropriate for full-scale wind turbine implementation.
Robotic lower limb prostheses are creating a new way to restore locomotion for individuals. Before they can be tested with a person, they need to be tested under same control scheme and test parameters for further analysis. A prostheses test device is designed and built to test prostheses which produces motion and ground reaction force in human stance gait phase. The test station is designed to accommodate prostheses with different shank lengths and thickness. The test station is about 1.5 m in width, 1.3 m in length and 1.2 m in height and is designed to fit on top of a standard walking treadmill. T-slotted aluminum bar is the major component for the frame for ease of fabrication. The treadmill produces the horizontal movement of gait motion. A barbell bar and weight system is controlled by a linear actuator and pulley system to produce vertical movement of gait motion. The test station can simulate a body weight range from 60 kg to 85 kg which is within the range of an average person. The test station provides more precise test results and systematic testing of control parameters for robotic prostheses prostheses.
The temperature of water can alter fabric properties in different ways based on its fiber content and how it was produced. Some garments have specific washing and drying instructions to reduce shrinkage, minimize pilling, or maintain luster and color. **Objectives:** To investigate how multiple permanent dyes stain cotton fabric in different temperatures of water from (1) boiling-100 degrees Celsius, (2) warm, (3) room temperature-20 degrees Celsius, (4) cold, and (5) freezing-0 degrees Celsius. **Method:** A thorough literature review will be conducted to understand the chemical process and different methods of producing dyed cotton fabric and a quantitative method (e.g., conducting an experiment and recording the results) to test how dyed cotton fabric reacts to different water temperatures. **Expected Findings:** The hotter the water, the faster the molecules of dye will move throughout the fabric, and the more dye will be able to transfer into the material. The cooler the water, the less consistent the coloring will be, likely causing a faded color. **Conclusions and Implications:** This study will determine the impact of different water temperatures on dyed cotton fabric, as well as which dye will stain the fabric more efficiently. Both manufacturers and consumers will benefit from these findings by being able to better understand how resilient different dyeing methods on cotton are when exposed to water in various environments.
BACKGROUND: In the textile and apparel industry, color fastness is a term that is used in dyeing textiles that characterizes it color resistance to fading or running. There are many stimulants (e.g., detergent, chlorine water, sea water, perspiration) that can affect the color fastness of a textile, including saliva. OBJECTIVES: (1) Determining how long it takes (hours) for saliva to change the color of a fabric. (2) Identifying the color difference for both light and dark colored fabric before and after the textile has been stimulated with saliva. METHOD: The color fastness to saliva test (DIN V 53160-1) will be used to identify color changes and how long it takes for the colored textiles to change color. EXPECTED FINDINGS: The fastness of the colored textile will change after 72 hours of coming in constant contact with saliva. CONCLUSIONS AND IMPLICATIONS: This study will determine the amount of time it takes for saliva to change the fastness of colored textiles. Also, this study will help the industry to find better fabric dyeing solutions that will not change color over time. Finally, this study will help designers and retailers choose saliva friendly fabrics for children’s wear.
BACKGROUND: Cotton is the main staple fiber in the fashion industry that paves the basis for the use of other natural and synthetic fibers. Because cotton is one of the most popular fibers for clothing production, its ability to resist wear and tear and staining is crucial to its success. OBJECTIVES: (1) Identify which detergent reacts best with staining on cotton. (2) Analyze the formula of each detergent and predict why that formula reacts best with stain removal. (3) Which type of soil gets removed more easily after laundering. METHOD: The colorfastness of laundering (AATCC Test Method 61) and soil release test (AATCC Test Method 130) will be employed in this study. White, light color and dark color cotton fabric will be washed using at least three different detergents. EXPECTED FINDINGS: The detergent whose formula has the least amount of water will be the least successful with stain removal. CONCLUSIONS AND IMPLICATIONS: This study will determine the effectiveness that each particular laundry detergent brand has on cotton fabric so that consumers can make an informed decision on which brand is best for stain removal. Also, by reviewing the results, each detergent brand can make modifications or adjustments to improve their results compared to other brands. Finally, this study will help businesses that use detergents in their everyday work such as dry cleaners and secondhand clothing stores to find the detergent that meets their needs.
BACKGROUND: Dying garments, such as tie-dying or adding dye for an ombre effect, is very popular today. This trend can be seen in stores as well as worn by celebrities. To avoid high costs of buying these garments in stores, many have taken to dying their own garments at home, using dyes that can be bought at local crafts, convenience or even grocery stores. These dyes may seem harmless, but could potentially weaken the strength of the garment. OBJECTIVES: (1) Identifying the most commonly used dyes for garments found in stores, (2) Developing a model to assess the reaction between the dye and the fabrics, (3) Identifying three different fabrics and their reaction to the dye. METHOD: A mixed method of research is employed in this study: observation (e.g., store visits to find commonly used dyes and secondary data source) and implementing strength test among fabrics after being dyed for a certain period of time. EXPECTED FINDINGS: Some fabrics will react poorly compared to others. Manipulating time for each fabrics exposure in the dye will worsen the outcome. CONCLUSIONS AND IMPLICATIONS: This study will determine the outcome of which fabric withstands a better reaction to dye and how long it was exposed to the dye. The model for the experiment could show little to no impact on fabrics. Finally, this study will help consumers to better understand which dyes, fabrics and what time exposure to dye will benefit them when dying their own garments.
BACKGROUND: Within numerous categories of fibers, fire resistant fibers hold a small percentage. Most fibers are flammable due to its organic reaction against heat or flame. The fashion industry does not promote the element of fire resistant as an essential part of the production of garments. When thinking of fire resistant fibers, the thought of fire fighter suits and police officer uniform comes to mind as those are two fields that require this element in their garment to perform their job duties. There is a need to study flame retardant textile apparel/ State official uniforms and manage a way to incorporate this need into daily usage. OBJECTIVES: (1) Determine all known fire resistant fibers (2) Select temperatures to test the resistance of each fiber while timing these events (3) Collect results from the fiber with most resistance in the longest amount of time recorded. METHODS: A qualitative method (content analysis) will be used for objectives one and two and a flammability test (ASTM D 1230) will be conducted to determine which fiber is most resistant to heat/flame. EXPECTED FINDINGS: This study should result in some fibers resisting from burning at a quicker time than others. Other expectations are for some fibers to burn completely into ashes and some fibers will change its natural form but will maintain structure/body. CONCLUSIONS AND IMPLICATIONS: This study will bring awareness to the demand for more flame retardant apparel and the textile industry.
BACKGROUND: Wine has been known to ruin clothes and couches, but that doesn’t stop people from drinking it. Since wine is never going out of style, researching what fabric is best for you to wear while drinking a delicious red wine is best. **OBJECTIVES:** (1) Identifying which fabric wine stains more than another, (2) Identifying what fabric has the least and the most absorbency of red wine. **METHOD:** The fabric soil release test (AATCC Test Method 130) will be applied to conduct this study. **EXPECTED OUTCOME:** The wool swatch will have the least amount of absorbency and stain after washing while the cotton swatch will hold on to the wine the most from the AATCC stain release replicas. **CONCLUSIONS AND IMPLICATIONS:** This experiment will allow us to obtain information on what type of fabric and what fibers will be the most and the least absorbent with wine stains. This experiment will help both consumers and manufacturers to determine how wine stain differs from other stains and how to remove the wine stain from the fabric.
Gut Bacteria and Obesity: Manipulating Gut Bacteria in the Microbiome Has a Significant Influence on Body Weight Fluctuation

Obesity is a common problem in developed countries, but the United States has one of the highest percentages of obese population worldwide. According to the Center for Disease Control and Prevention, almost 40% of American adults and 20% of adolescents are obese. Obesity causes numerous health issues such as diabetes, coronary heart disease, high blood pressure and stroke that all contribute to its mortality. The causes of obesity are well known: an unhealthy diet, a sedentary lifestyle and genetic predisposition. Recent animal and human studies revealed, however, another potential cause of obesity and this cause is hidden in our gut. It seems that the microbiome imbalance causes the rapid growth of the bacteria which is famous for harvesting more energy from the diet. My research asks whether manipulating gut bacteria in the microbiome has a significant influence on body weight fluctuation. The connection between the human microbiome and weight gain gives a new view of the existing problem of obesity as a disease and may also be the key of determining whether you are able to lose or gain weight. Balancing the gut microbiome through diet and probiotics may impact the obesity epidemic.
UV radiation causes DNA lesions that can result in daughter-strand gaps or double-strand breaks. Typically, excision pathways resolve these lesions; however, if a replication fork encounters an interruption before repaired, the fork collapses. In *Escherichia coli*, RecA plays a central role in DNA repair through recombination. RecA polymerizes onto ssDNA, forming a nucleoprotein filament that catalyzes strand exchange. This filament can also induce the SOS response by stimulating LexA autocleavage. Several recA mutants have previously been identified that induce SOS in the absence of external DNA damage. Among these mutations, RecA730(E38K) has been shown to have an increased binding affinity for ssDNA-SSB compared to RecA+, leading to the proposition that RecA730 binds to the lagging strand of the replication fork. We provide *in vivo* evidence for this model with ultraviolet time-lapse microscopy using recA-gfp. Since replication fork collapse is resolved through a RecA-dependent mechanism, RecA’s localization to the replication fork after UV is vital. We showed that while cells with recA+-gfp formed a significant number of structures after UV, recA730-gfp cells did not. We hypothesize that this is because RecA730 does not need to relocalize, as it is already bound to the replication fork prior to UV. Factors affecting RecA’s localization to the fork were examined in the context of dinI and uvrD mutants as well as in relation to SOS with lexA mutants and recA4142(F217Y). Our results support the model that RecA730 binds to the lagging strand of the replication fork and propose additional stabilizing and destabilizing influences.
DIET or direct interspecies electron transfer is the syntrophic process in which a bacteria transfer electrons to a neighboring cell resulting in electrons from the first cell functioning as electron donors for the the second cell. Geobacter sulfurreducens and Methanosarcina acetivorans have been found to be efficient at accepting electrons from other microorganisms. My objective is to see if Syntrophus aciditrophicus can also participate in DIET while growing in coculture with G. sulfurreducens or M. acidivorans. S. aciditrophicus will be inoculated with a variety of substrates that can possibly be used as an electron donor such as benzoate, butyrate, heptanoate and hexanoate. The electron donors for G. sulfurreducens and M. acidivorans will be omitted as the S. aciditrophicus cells are functioning as electron donor. In order for G. sulfurreducens to grow electrons must be transferred from syntrophus to G. sulfurreducens via DIET. To measure the effectiveness of this coculture the concentration of the substrates added as well as succinate produced from fumarate, G. sulfurreducens’s waste product, will be measured. The same experiment will be used to test if S. aciditrophicus can conduct DIET with methanosarcina. In this version of the experiment methane, M. acidivorans’s primary product, will be measured, as well as the substrates. In order to measure specific concentrations gas chromatography (GC) as well as high performance liquid chromatography (HPLC) will be used. We predict that syntrophus will be able to grow syntropically with G. sulfurreducens in culture showing that it can conduct DIET. The more effective microbes are at DIET the more of a chance there is to help in the research areas of bioremediation, nanowires, and microbial fuel cells.
Trypanosoma brucei is a single celled, eukaryotic organism that causes Trypanosomiasis, a vector borne disease in humans and other vertebrates, throughout sub-Saharan Africa. Current drug treatments for Trypanosomiasis are inadequate, with varying toxicity, and no vaccines are available. However, there is hope for new more selective treatments with minimal side effects because of the unorthodox biology of T. brucei. One property that is absent from all other eukaryotic lineages is T. brucei's mitochondrial kinetoplast DNA (kDNA) that is composed of thousands of circular DNA molecules catenated together to form a network and is required for parasite survival. The topological complexity of replicating catenated kDNA dictates some unusual features including a release and reattachment minicircle replication mechanism that separates replication events spatially and temporally. Additionally, this complexity is reflected in multiple replication factors including DNA polymerases, helicases, ligases, and topoisomerases most of which appear to have nonredundant functions. Interestingly these proteins have spatiotemporal localizations with respect to the kDNA that are cell cycle dependent. However, which proteins directly interact for minicircle and maxicircle replication is unknown. Using a yeast two-hybrid system will determine whether direct interactions are occurring between specific kDNA replication proteins in T. brucei. The groups of kDNA proteins (minicircle replication, maxicircle replication, okazaki fragment processing) analyzed through the yeast two-hybrid system are hypothesized to interact because of similar protein function and localization. Patterns of direct interactions will paint a clearer picture of the mechanisms occurring within kDNA replication and will aid in the search for new anti-trypanosomatid treatments.
Despite advancements and new technologies in identifying novel microbial organisms, the composition of environmental microbiomes is still largely a mystery. We are utilizing a new approach, Cell Sorted Environmental Genomics, to provide a more meaningful representation of the microbial structure of environmental ecosystems.

Through a process of cell extraction from soil samples and flow cytometry for the binning of groups of microbes, our lab has improved on a method of directly sequencing genetic information from environmental microbial populations. This method permits a better understanding of microbial diversity through identification of novel organisms. An unexpected consequence of this sequencing technique has been the visualization of life that has been poorly represented in prior environmental genome sequencing, namely endosymbionts.

These endosymbionts include giant viruses never found before in the soil. These poorly understood viruses are intriguing because they possess genomes larger than those of many bacteria, which contain genes coding for translational machinery and other genes usually associated with cellular metabolism. Likewise, nearly 100 genomes of the obligate intracellular bacteria and human pathogens of the phylum Chlamydiae have been identified abundantly through this technique. Presence of these groups is a testament to the potential this method has towards revealing the microbial world, and the significance Cell Sorted Environmental Genomics will have in the future of bacterial genome sequencing.
Contrary to popular opinion, the significant problem currently facing honeybees is not colony collapse disorder but rather the parasitic mite, Varroa destructor. This mite is found in almost every beehive and not only survives by extracting the blood from honeybees, but also transmits viruses causing bee diseases. The comprehensive goal of this project is to develop a bionanoparticle that can effectively control Varroa mites. This particle will be capable of delivering bioactive molecules, such as RNAi, that can be engineered to kill mites as they feed on bees. One specific research project will be to construct a packaging system capable of delivering the anti-Varroa active biomolecules. This system will consist of the BQCV capsid protein expressed by a recombinant baculovirus in insect cells. Ultimately, this bionanoparticle will replicate in bees, and then be ingested by the mites where the anti-Varroa biomolecules will kill the parasite. The outcome of this approach represents a sustainable method for controlling the infestation of Varro mite.
Mycobacterium tuberculosis produces a cell envelope that is unique among bacteria and critical for its pathogenesis. Phosphatidylinositol (PI)-anchored glycolipids, such as PI mannosides (PIMs), lipomannan, and lipoarabinomannan, are essential, conserved among mycobacteria, and integral parts of the cell envelope. However, their physiological roles are not fully understood. Previously, we identified PimE, a mannosyltransferase that transfers the fifth mannose in hexamannosyl PIM biosynthesis, in the non-pathogenic model organism Mycobacterium smegmatis. The \( \Delta pimE \) gene deletion mutant \( (\Delta pimE) \) forms a small colony on Middlebrook 7H10 agar, and this morphological defect was due to the increased permeability of \( \Delta pimE \) to copper present in the Middlebrook 7H10 agar. Indeed, removal of copper from the medium restores normal colony formation of \( \Delta pimE \) on the solid agar surface. However, copper removal from the medium does not restore the formation of a liquid-surface biofilm, known as a pellicle. Here, we found that the \( \Delta pimE \) mutant requires additional nutritional components to form a robust pellicle. Because \( \Delta pimE \) could form a normal pellicle on M63 broth, we initially examined the effects of each component present in the M63 broth on this pellicle formation. This study revealed higher concentrations of potassium phosphate and calcium chloride as primary factors contributing to the robust pellicle formation of the \( \Delta pimE \) mutant. When we supplemented the copper-free Middlebrook 7H9 broth with potassium phosphate and calcium chloride at the concentrations found in the M63 broth, the pellicle formation was not restored. This suggests that additional factors that are present in the Middlebrook 7H9 broth are inhibitory to the biofilm formation of \( \Delta pimE \). We are currently determining the precise medium conditions that support the pellicle formation in this glycolipid biosynthetic mutant.
The rise of antibiotic resistance in *Mycobacterium tuberculosis*, the causative agent of tuberculosis, is a global concern. The cell envelope is critical for the survival and virulence of the pathogen during infection, and its biosynthesis has been a proven drug target. Therefore, finding new targets in the biosynthetic pathway of cell-envelope components is of great interest. *Mycobacterium smegmatis* is the model for the study of this devastating pathogen. We recently identified LmeA as a cell-envelope protein that is critical for the control of mannan chain length of lipmannan (LM) and lipoarabinomannan (LAM), essential glycolipid components of the cell envelope. The deletion mutant, ΔlmeA, accumulates abnormal LM/LAM with fewer mannose residues. To understand the importance of this protein, the antibiotic sensitivity of ΔlmeA was tested using a resazurin-based viability assay. We found that the lmeA deletion leads to increased sensitivities to antibiotics such as vancomycin and erythromycin. To directly test if the increased antibiotic sensitivity is due to the defective permeability barrier, we used an ethidium bromide uptake assay and found that ΔlmeA is more efficient in taking up ethidium bromide in the cell. Interestingly, the overexpression of this protein leads to an increase in antibiotic resistance. We are currently testing if the overexpression of LmeA decreases the ethidium bromide uptake and thus makes the cell envelope less permeable.
Fluorescence Imaging-Based Discovery of Membrane Domain-Associated Proteins in *Mycobacterium smegmatis*

The highly impermeable cell envelope is crucial for *Mycobacterium tuberculosis* to resist host immune attack and antibiotic treatment. Using non-pathogenic *Mycobacterium smegmatis*, we recently discovered a sub-cellular compartment enriched with many enzymes involved in envelope biosynthesis. This intracellular membrane domain (IMD) is concentrated in the polar region of growing cells, and becomes less polarized under non-growing conditions. Because mycobacteria elongate from the poles, the observed polar localization of the IMD during growth is consistent with the localized concentration of proteins dedicated to envelope biosynthesis. While we have identified more than 300 IMD-associated proteins by proteomic analyses, only a handful of these have been verified by other experimental methods. Furthermore, we speculate that many more IMD-associated proteins have escaped proteomic identification and remain to be identified. Here, we cloned 1117 *M. smegmatis* genes that represent the core genome conserved across five species of mycobacteria, and created an arrayed library of *M. smegmatis* strains each expressing a Dendra2-FLAG-tagged recombinant protein. Screening a subset of 598 strains by fluorescence microscopy identified 30 fusion proteins that localized Dendra2 to the IMD, 19 of which we had previously identified proteomically. Of the 11 remaining IMD candidate proteins, five are annotated as plasma membrane proteins. We are using biochemical methods to independently validate these 11 candidate IMD proteins. Taken together, our newly devised strategy is effective in verifying the IMD association of proteins found by proteomic analyses and further discovering additional IMD-associated proteins.
To date, *Bifidobacterium* has been established as a probiotic bacterium which has been shown to promote both lifespan and health span in the *C. Elegans* model. However, many of the mechanisms, pathways, and genes through which these benefits are achieved have yet to be identified. *C. Elegans* serves as an impactful model for studying interactions within its gastrointestinal track as this is the main site of immune expression. Similarities in form and function of the gut epithelium of *C. Elegans* and humans allows for this research to also offer potential insights on the benefits that *Bifidobacterium* may elicit upon human consumption.

This study aims to explore if, and how, the consumption of different strains of bifidobacteria may enable *C. elegans* to live longer at a potentially higher quality. The ultimate goal of this research is in parallel with emerging evidence that the variety and fitness of the gut microbiota may govern the functionality of physiological systems beyond the digestive tract. In order to best understand how bifidobacterial consumption may affect the life and health span of *C. elegans*, there is a focus on dietary preference behaviors expressed when there is a choice between more than one bifidobacterial strain. With the knowledge that *C. elegans* innately selects its ideal food source, further investigation into why such dietary preference behaviors occur is essential in understanding how the genus *Bifidobacterium* modulates host physiological processes.
Zinc, an essential trace element, helps maintain an intestinal barrier and promotes gut immune functions. Zinc plays a critical role in cell membrane barrier maintenance as deprivation of zinc has been shown to cause a decrease in transepithelial electrical resistance, affecting the membrane permeability of intestinal epithelial cells in vitro. Zinc has been shown to block protein transporters in bacteria (Streptococcus pneumonia), so that the bacteria cannot uptake an essential metal (manganese). It had been shown that zinc has protective components in the human body as acterial respiratory diseases can be linked to zinc deficiency in the body. This study will examine the effect of zinc on bacterial uptake in CaCo-2 colorectal epithelial cells. We will test whether zinc aids in a protective barrier and inhibits bacterial internalization in CaCo-2 cells or if zinc directly promotes bacterial internalization.
Microbial nanowires is an emerging field with potential applications in a low-cost and sustainable forms of nanotechnology. Therefore, further knowledge of \textit{G. sulfurreducens} pili, which possess metallic-like conductive, is pivotal. In previous research, amino acid mutations in the PilA region of \textit{Geobacter sulfurreducens} have shown to alter the current production and the conductivity level of the pili. Aromatic amino acids have been attributed to producing higher levels of conductivity within \textit{G. sulfurreducens} pili. To further investigate the effect of single amino acid mutations, a strain of \textit{G. sulfurreducens}, designated DL1 Y61A, was created in which the aromatic amino acid was replaced with the non-polar alanine. Another strain of \textit{G. sulfurreducens}, designated PCA W51 W57, had non-polar amino acids replaced with tryptophan. The current production, using a graphite anode as the electron acceptor, for Y61A was lower than the control strain while the current production for W51 W57 was similar to that of the control strain. The pili was viewed under a TEM after protein purification. The conductivity levels, obtained through a four-probe system, is still being conducted.
Quercetin is a bioflavonoid that has been shown to be immunomodulatory and inhibit inflammation in various cell types at the optimal concentrations. My previous results suggest that quercetin could increase phagocytosis of *Staphylococcus aureus* by macrophages. The exact mechanism of action is not currently known of how it promotes phagocytosis; however, it can target intracellular signaling kinases which are vital for cellular function. Based on those results, the overall goal of this study is to determine if quercetin can influence internalization of enteric microbes using non-phagocytic cells such as human intestinal epithelial cells (CaCo-2). Bacterial invasion of epithelial cells involves mechanisms that hijack the host cell to stimulate their own uptake into the host cells. Two observed mechanisms could include bacteria remaining in the vacuole where they are originally internalizing (*Salmonella* and *Yersinia* spp.) or escape the vacuole and grow in the cytoplasm of a cell to spread to adjacent cells (*Shigella flexneri*). Most enteric bacterial infections of the gut lead to inflammation of the intestines as a host immune response. The second goal of this project is to measure the inflammation and cytokine secretion from the CaCo-2 cells after exposure to quercetin. In addition, by using a fluorescent marker on the bacteria and visualizing it using fluorescent microscopy, it is possible to determine the mechanism the enteric bacterial strains use to infect host cells.
Trachoma is the leading infectious cause of blindness worldwide. It is caused by the obligate intracellular bacterium, *Chlamydia trachomatis*. 190.2 million people lived in trachoma endemic areas encompassing 41 countries. Infections often spread via contact with dirty clothes, contaminated hands. It has been noted that in endemic areas, a seasonal increase in the prevalence of these infections coincides with an increase in the *Musca sorbens* fly population.

The objective of the current research was to determine whether flies are purely mechanical vectors in trachoma transmission or if they have biological roles. We utilized PCR, advanced labeling techniques and tissue culture to determine the presence, viability and anatomical location of the *C. trachomatis* inside *M. sorbens* in a laboratory setting.

Following pupation, 2 day old adult flies were starved for 12h and then allowed to feed on or were capillary fed *C. trachomatis* serovar B in sucrose phosphate glutamate (SPG). Flies were then harvested at various time intervals after feeding, dissected and samples evaluated via PCR and culture. We amplified *C. trachomatis* DNA from the crop, a thin-walled expanded portion of the alimentary tract used for the storage of food prior to digestion of these flies up to 24h post feeding. We also isolated *C. trachomatis* DNA from the upper portions of the alimentary tract. We confirmed the viability of isolated *C. trachomatis* through tissue culture in HeLa cells.

Our data confirms that eye-seeking flies such as *Musca sorbens* can ingest *C. trachomatis* during regular feeding. These data also confirm for the first time, that ingested *Chlamydia* remains viable inside the flies for 24-48h post feeding. There is reason to believe that they could regurgitate and transmit the bacteria at their next feeding. We believe that these findings suggest potentially effective intervention strategies through vector control.
Adenovirus 36 Infection Increases the Risk for Premenopausal Breast Cancer

There is a higher risk of breast cancer recurrence and mortality in obese women, despite optimal treatment. Certain viruses have been shown to increase adiposity in animals and subsequent obesity. While the exact mechanisms involved in infectobesity are not clear, viruses are thought to increase the replication, differentiation, lipid accumulation, and insulin sensitivity in fat cells while reducing leptin secretion. Adv36 is the only human adenovirus to date that has been directly linked with human obesity. The current study examines the prevalence of obesogenic adenovirus in mammary epithelial cells and blood from patients undergoing breast biopsy or mammoreduction surgery.

Methods: Serotype-specific PCR amplification to determine the presence of adenovirus species in patient samples obtained from human mammary epithelial cells (HMEC).

Results: The average BMI of the patient cohort was 31.1, median age 47.7 years old and there was no significant association between the presence of obesogenic adenovirus and parity. Adv36 DNA was isolated from the breast tissue and blood of 34.4% (32/93) of samples. Obese breast cancer patients had an Adv36 DNA prevalence of 69.2%, while patients with a normal BMI had a prevalence of 19.2% and overweight patients had a prevalence of 11.5%.

Conclusion: Our data strongly suggest that Adv36 DNA was present more frequently in breast tissue of women with higher BMI. These findings support a role for infectobesity in the risk for breast cancer development and suggests that the presence of Adv36 in tissue could be a biomarker of a clinical-metabolic profile, possibly preceding obesity.
Bifidobacteria are typical microbial colonizers of the infant gut. Over the course of isolating them from infants and other sources they are commonly identified using the phosphoketolase assay, a biochemical test that creates a color change in the presence of a bifidobacterial-specific enzyme. To this point, the assay is solely qualitative with maroon representing a positive result and yellow a negative result. Currently, efforts to improve the assay include adapting it to quantifying fructose-6-phosphate phosphoketolase activity, the target enzyme of the assay. Moreover, its activity will be compared amongst various species and subspecies of bifidobacteria. Accordingly, the assay has been modified to reduce the volume of reagents to fit in a single well of a 96-well plate. The potential effect that fresh ferric chloride has on the color change has been tested as well. Bacterial cultures were grown, or diluted to, OD600 values of 0.25 and bacterial cells were lysed using hexadecyltrimethylammonium bromide. The color change, or the formation of a hydroxamic acid ferric chloride chelate complex, was monitored using a plate reader at 505 nm and 515 nm before and after the addition of ferric chloride. To this point, the results indicate that there is no difference between enzyme activity and the particular species tested, with additional bifidobacteria to evaluate. The next step to improve quantification is purifying the chelate complex. By purifying the chelate complex, bifidobacteria species could be compared based on their ability to produce acetyl-phosphate, the precursor to hydroxamic acid in the complex. Adapting the assay to the plate reader increases efficiency and confidence in preliminary identification of bifidobacteria.
Due to its tropical climate, the Amazon rainforests have become a hub for agricultural industry. With a growing world population and expanding market, Amazon deforestation increased rapidly to make room for livestock pastures and plantations.

In an effort to maximize yield and combat extreme climate conditions, farmers have turned to planting new forage species as replacement, particularly the African grass species *Brachiaria*. Able to withstand a variety of environments, *Brachiaria* has become a pioneer species in providing nutritious forage to depleted areas. Its pivotal role in the agricultural industry makes it an essential plant to study on the microbial level.

As a microbial lab studying land-use change in the Amazon, we are particularly interested in the phyllosphere of *Brachiaria*. The phyllosphere, the portion of the plant above the soil and all of its associated microorganisms, is a critical component of ecosystem nutrient exchange and plant health. Our research aims to identify the natural composition and function of this microbial community, in addition to how the community may change when exposed to environmental stressors such as drought or elevated temperatures.

Our ultimate goal is to create a better understanding of the phyllosphere as a dynamic microbial community. By analyzing microbial abundance of *Brachiaria*, we intend to explore methods to maximize the beneficial plant-microbe interactions. On a global scale, we hope to find a way to apply our research to address broader issues like sustainable agricultural practices in order to protect the world’s tropical forests.
The phenomenon of the Middle East as seen through the Eurocentric perspective is often misunderstood and misrepresented throughout a timeline of timeless events. Middle Eastern culture is often romanticized for the purpose of entertainment and amusement, leaving the western world with the idea that the Middle East was and will always be the land of magic carpets, belly dancers, and camels. However, as Edward Said explains in his book *Orientalism*, this fantastic description of the Middle East is a representation created by the west, for the west, without a true understanding of the East. Orientalism fails to distinguish the desire to learn about the Arabian culture from assuming what it is actually like and using those assumptions as facts. Said doesn’t reprimand those who seek to learn about the East. He does, however, call out the Western scholar who writes about the East without truly understanding why the traditions have become what they are, and the background of every detail within the culture; to come into a foreign land, assume absolute knowledge of the people and their culture, write about it from his/her frame of reference, and publish their work to others in the west. Not only does this stereotype the East, it also creates a sense of inferiority; an ideology that “they” think, act, and speak differently – thus, viewing them as the other.
My thesis focuses on the process of identity formation among young Palestinian-Americans. These young men and women have difficulties navigating a post 9/11 United States, where Islamophobia, stereotypes of the Middle East, and negative attitudes toward the “other” are prevalent. I explore how these young people constantly create, shape, and shift their identities and how they feel a sense of belonging to both Palestinian and American communities. I argue that the experiences of these young Palestinian-Americans are different from those of other young Arab-Americans and are complicated by the events of September 11, 2001. My research begins with a literature review covering broad topics of belonging, home, discrimination, and dual identity. These topics are then analyzed in the context of the Arab-American and Palestinian-American experience. The second half of my thesis presents and analyzes in-depth interviews that I conducted with young Palestinian-Americans living in the United States. The results of the interviews are then examined in light of the topics discussed in the literature review. By documenting and analyzing the experiences of young Palestinian-Americans in the United States, my thesis adds to the literature on how young people, especially Middle Easterners, navigate their identities as both American and Middle Eastern in a place where many people hold negative views of such people.
This panel presentation with Dr. Martin Luther King Jr.’s sister-in-law, Mrs. Naomi Ruth Barber King will pay homage to the legacy of Dr. Martin Luther King on the 50th anniversary of his assassination, and will feature music, excerpts of speeches, and interview segments.

In order to honor the life work of Dr. Martin Luther King, Jr., Anthony Martin will show jazz performances that speak of the freedom struggle. Mrs. King will reflect on the past, and use Dr. King’s assassination to discuss, “Where do we go from here?” the title of Dr. King’s final book as well as the title of the speech he delivered August 16, 1967, at the Southern Christian Leadership Conference. The purpose of this panel is not simply to reflect and recount history, but to connect the history to contemporary issues.
Music is one of the most popular forms of media consumed by people every day and a huge reason that people come back can be summarized in the Blues Traveler song “Hook”, as “The hook brings you back”. The hook of a song is a major appeal of music and the better the hook, the more people will remember it for years to come. The hook of a song is basically the selling point and it varies from genre to genre and from country to country. This presentation’s goal is to deconstruct how a hook can become an earworm to a general audience and the use of recent musical hooks that are popular in the United States as a point of reference. The examination of this hook shows a link to its country's culture as if it is providing a window to the country through this creative media. Culture and music are both ever-changing as time, so a window to keep track of it would help, and that's where hooks come in. The studies of deconstructing a hook to show the culture of the United States can be applied to different countries and helps people find a relationship between other countries through hook. Looking into the hooks of the most popular music from the reggaeton genre in Puerto Rico convey to the listener a feeling that relates to the current state of that nation, and this helps build an understanding of culture.
Many saxophone technique books focus either purely on general technique, as is done in Londeix’s The Scales by Steps and by Intervals, or concentrate specifically on altissimo technique, as is done in Eugene Rousseau’s Saxophone High Tones. While Reichert’s 7 Daily Exercises was written for the flute, this book of exercises could serve as a more inclusive saxophone technique book that would help saxophonists to work on both general technique as well as altissimo technique. The purpose of this project was to examine the efficacy of Reichert’s 7 Daily Exercises as a saxophone technique book, and to create a YouTube recording of this work on alto saxophone that makes Reichert’s exercises more accessible to other saxophonists. Reichert’s 7 Daily Exercises was compared to standard saxophone altissimo technique books such as Sigurd M. Rasher’s Top Tones for the Saxophone, Rosemary Lang’s Beginning Studies in the Altissimo Register, and others. Exercises Nos. 1 and 2 were recorded using Focusrite Solo Studio recording equipment and Logic Pro X software. The video results of this project, which include both recorded audio as well as images of Reichert’s music, can serve as learning tools for other saxophonists seeking to use Reichert’s 7 Daily Exercises as a saxophone technique book. Future continuations of this project may include publication of fingerings to be used for Reichert’s exercises.
Experiencing Involuntary Musical Imagery

Getting a song stuck in one’s head is a very common involuntary cognition that most likely everyone has experienced at least once in their lifetime. This phenomenon is known as “earworms” or formally known as involuntary musical imagery and has been grouped with other involuntary cognitions such as daydreaming. Approximately 60 undergraduate students will track their personal experience with earworms over a seven day period. These students will record in a structured log book each involuntary musical imagery episodes along with qualities of the song, name of the song, and the number of times the earworms reoccurred. The expected results are that students will have more involuntary musical imagery episodes from fast tempo song than from slow tempo songs. Expected results may also show that students experience earworms for songs they like more than songs they dislike. These expected findings could possibly help music producers figure out what is considered catchy so that their music is being sold often and played a lot.
My honors project creates a listening guide for my audience related to my senior percussion recital. I will focus on the theme of counterpoint which occurs in each of the pieces on my program. Counterpoint is traditionally defined as the coexistence of multiple melodic lines simultaneously. However, in the 20th century, the term took on new dimensions, and was applied to other aspects beyond pitch, including timbre and texture. I will connect the traditional views the music of J.S Bach with modern counterpoint.

The Suite for Lute by J.S. Bach contains polyphony. By contrasting registers, Bach creates many voices out of one instrument. Similarly, Dimorphie creates two distinct, yet equal voices through the nuance of timbre, a repetitive ordering of events and antiphony. Another contrapuntal technique found in the Lute Suite is the imitation of one melodic line with another. Through the direct repetition of melodic gesture at various dynamics, Torse III creates the effect of echoes through imitation, and a large-scale sense of counterpoint through the juxtaposition of short character pieces that combine into a synthesis. Juxtaposition of textures in Links is what ties in the last piece of music for discussion.

The message that I would like to convey to the audience is that counterpoint as a musical tool is still alive today. By broadening their understanding the audience will be able connect the familiar with the unfamiliar, and gain an appreciation for modern percussion music.
Even when we are not aware, music infiltrates our minds and resonates with our feelings. Despite conscious awareness certain tones or sections of music can amplify an emotion or guide us away from it. How does it happen? What occurs from the onset of sensation that leads to perception, and how does music intersect with such emotions?

The presentation illustrates music and its choreographed interpretations. One piece of music will be played throughout the presentation in five variations. The first is played between each variation and poses a neutral sensation. The others exemplify, joy, anger, sadness, and fear.

In music, the A theme, which usually begins each piece, will precipitate chemical reactions that occur in the brain. To achieve that reaction in the music, changes in key, major or minor, meter, tempo, tone color, will occur to achieve that result. In my musical presentation, choreographed dancers will perform in accordance with the music. Their movements convey and amplify what the music will be stating. Both auditory and visual perceptions characterize this project.

The presentation exemplifies the complex emotions that accompany sensations of music, and how vital it is. Music is often taken as a simply enjoyable craft, however this presentation illustrates its much more complex impact. Music is a multi-sensory experience that extends past the initial performance.
This project is a musical performance telling the story of a gay male struggling with and discovering his sexuality. The performance will combine current popular music, jazz, and modern musical theater genres. While lovers of theater will know many of the selections, some of the interpretations will differ from the original composers' intentions to fit the purpose of this project. The storyline of this performance will depict the protagonist struggling with being an outsider in different aspects of his life. He will discuss being alone in the context of religion, family, and the outside world. Then, he will meet someone who opens his eyes and makes him realize exactly what this feeling of being “different” really is: he’s gay. Everything begins to fall into place and the world feels brighter now. A major reason for this capstone, besides being personally motivated, is that this is a storyline that is not often shown in media. When movies, television, and other mainstream media portray someone struggling with their sexuality, most of the time they already know they are LGBTQ+, and are simply “in the closet”, meaning they are hiding their identity. While this is a valid and real storyline for many members of the LGBTQ+ community, it is not the only life story, and it is important to show other points of view. In the heteronormative society that we live in, it is crucial to show that there is not a limited number of “ways to be gay.”
This project is a musical performance that is based on vocal “powerhouse” women. When saying the term “powerhouse” this means strong vocals that can portray emotions and can use the voice to stand up for human rights or controversial issues and debates.

The recital will have two musical theater pieces, and three Pop pieces. The point of this performance is to show how strong a woman’s voice can be when she wants to stand up for what is right. The strong emotional component in a piece adds to the song itself on whether or not it connects with its listener.

In the song, *Wild Hearts Can’t Be Broken*, by the artist Pink, the lyrics begin with Pink singing the words “I will have to die for this I fear, there’s rage and terror and there’s sickness here, I fight because I have to, I fight for us to know the truth.” With these words, the overriding feeling and emotion expresses a powerful sentiment of fighting for the truth. My project also includes *Woman* from *The Pirate Queen*, by Claude-Michel Schönberg, that speaks of how being a woman does not prevent them from doing what men can do. A core part of the project includes a selection from the discography of Kelly Clarkson, who uses her ability to portray a sense of emotion in a song to her advantage.
Beyond the String Quartet: How the Chamber Music Society of Lincoln Center Contributed to the Late Twentieth-Century Chamber Music “Boom” in the United States

Apart from performances by renowned string quartets, chamber music was rarely performed in the United States in large public venues, such as concert halls, in the first part of the twentieth century. Yet, throughout the 1970s and 1980s a chamber music “boom” occurred, which led to the inception of many chamber music societies that promoted varied concerts featuring a variety of instruments and composition types. The Chamber Music Society of Lincoln Center (CMSLC) played a large role in this rebirth of chamber music. This thesis documents the origin and growth of the CMSLC, as well as how the CMSLC contributed to the chamber music “boom.” In addition, it describes how the CMSLC has acted as a model for other chamber music series.

No such history has yet been written yet about the CMSLC. Much of the literature to date is in the form of newspaper articles. Using the programs from the CMSLC’s concerts, as well as reviews in the New York Times, this thesis examines how the CMSLC has succeeded through varied programming, stellar artist rosters, and the development of outreach programs. This thesis also investigates how changes in artistic leadership affected audience reception and overall programming in order to reach and retain wider audiences. By compiling the history of the CMSLC and analyzing programming methods, this thesis enriches understanding of the rise of chamber music societies in the United States and uses the CMSLC as a model for future chamber music organizations.
The beginning of the queer liberation movement is often attributed to the Stonewall Riots of 1969 with trans-women of color at the forefront. In Great Britain a few years later, the Sex Pistols became the symbols of the British punk rock movement. Although seemingly unrelated, queer identity and punk ideology intersect through the philosophy of anarchism—a movement that involved deviating from hegemonic cultural norms. Insofar as identifying on the spectrum of sexualities and gender identities other than heterosexual and cisgender is a prime example of cultural deviation, punk rock then acts as an adequate platform for activism. This paper explores the philosophy of punk music and how it contributes to queer social justice initiatives, using the music of Against Me! and Rise Against. More specifically, lyrics of their respective representative songs include personal explorations of queer identity, outside perspectives of hate crimes against the queer population, and calls to action. An exploration of music creation, dissemination, and consumption contributes to the idea that punk rock is an efficient platform for social justice initiatives, especially among marginalized populations. Unlike public protesting, which is accompanied by the danger of visibility and legal consequences, music reaches broader audiences and can inspire change in non-public spaces. In addition, this music also reaches beyond the queer population for both artists and listeners as a mode of cultural expression and musical identity.
Parkinson's disease (PD) is the second most common neurodegenerative disease worldwide, yet its etiopathogenesis is still not fully understood. PD is characterized by five major motor symptoms: bradykinesia, postural instability, rigidity, gait issues, and tremor; however, it is also associated with numerous non-motor symptoms such as dementia, sleep disorders, orthostatic hypo-tension, and gastrointestinal issues. These behavioral phenotypes are believed to be linked to the progression of Lewy body pathology from lower brainstem regions to higher order cortical regions in a pattern known as the Braak hypothesis. Mechanistic studies suggest Lewy bodies originate from a combination of aggregated alpha-synuclein and impaired autophagy, and serve as pathological markers of dopaminergic neuronal loss. We previously demonstrated that optineurin (OPTN), a cargo adapter in autophagy, expression is enriched in dopaminergic neurons and that expression is modulated in neurotoxic PD models. We chose to investigate OPTN because OPTN immunoreactivity is reported in PD Lewy bodies, the OPTN-M98K mutation was found to increase risk of PD, and OPTN is genetically linked to numerous neurodegenerative diseases such as amyotrophic lateral sclerosis (ALS), Huntington’s, Alzheimer’s, and glaucoma. Thus, we hypothesized that OPTN played an important role in PD pathology. My results showed decreased expression of OPTN and a-Syn in end-stage rats. However, I concluded that by only analyzing normal and end-stage PD models I could not grasp the full picture of PD pathogenesis. Thus, future studies looking at various stages in PD development will be done.
Microglia, the resident immune cells of the brain, play an active role in neuroinflammation and repair in the central nervous system. Exposure to toxic substances such as alcohol can lead to microglial activation and subsequent release of pro-inflammatory cytokines. Estradiol has been shown to decrease expression of pro-inflammatory factors and this effect is mediated by estrogen receptor alpha (ERα). However, it is not known whether estradiol acts directly on microglia or indirectly through other pathways or cell types. We have found that higher alcohol intake corresponds with higher microglia activation in adolescent males, but the relationship is less robust in females. Estrous cycle-dependent hormonal fluctuations could be influencing microglial sensitivity, thus altering the relationship in females. To explore these questions further we first examined whether microglia express ERα and whether co-expression changes across the estrous cycle in adult female Wistar rats. We used immunofluorescence to co-label ERα and microglial cells in prefrontal cortical tissue and quantified the proportion of microglia cells that co-express ERα. Preliminary results suggest estrogen receptor alpha expression in microglia fluctuates across the estrous cycle. These results provide a more comprehensive understanding how estradiol may differentially modulate the response of microglial cells to alcohol, and suggest this depends on the stage of the estrous cycle.
Estradiol has been shown to have protective effects in neurodegenerative disorders. Neurodegenerative disorders are often caused by neuronal cell death, which can result from the inflammatory response that is mediated by the activated form of microglia, the primary immune cells of the central nervous system. Although it has been shown that estradiol can prevent the conversion of rat microglia to their activated phenotype (Vegeto, et al., 2001), the mechanism(s) in which estradiol protects against inflammation in the brain are still not fully understood. Our preliminary study in rats indicates that microglial cells express estrogen receptor alpha (ERα), and this expression fluctuates across the estrous cycle. The goal of the current study is to directly examine the relationship between estradiol levels in the plasma and ERα expression in microglial cells in the cortex. Enzyme-linked immunosorbent assays (ELISAs) are being used to quantify estradiol levels across different days of the estrous cycle. By measuring estradiol levels in samples we will be able to verify our current qualitative estrous cycle data, which was gathered from daily cytological analysis of vaginal smears. This study allows us to test the hypothesis that microglial ERα expression relates to fluctuations in circulating estradiol, which could further our understanding of the anti-inflammatory effect of gonadal hormones.
Tract tracing is a powerful technique that is used to visualize fibers in the brain from their point of origin and to their target region. Among common tract tracing methods is the injection of viral vectors containing transgenes encoding for fluorescent proteins. The infected fibers of the circuit can be visualized in thin sections of brain tissue using confocal microscopy. However, the generation of three-dimensional mapping of the full circuit requires processing and analyzing many sections and extensive time and effort for microscopic analysis and circuit reconstruction. To circumvent these challenges, we are combining tract tracing with brain tissue clearing techniques to capture the entire axonal pathway in thick brain tissue samples. We use an anterograde adeno-associated virus expressing green fluorescent protein (GFP) to label entire amygdala-cortical neural fiber tracts projecting from the basolateral amygdala (BLA) to the anterior cingulate (aCg) portion of the medial prefrontal cortex. The brains are then processed post-mortem using CLARITY, a technique that clears lipids from the brain and makes this tissue transparent while maintaining its structure. This allows for large volume 3D-imaging of tissue via light sheet fluorescence microscopy. We expect this approach will provide a better understanding and 3D characterization of the neural pathway extending between the BLA and the aCg.
Adolescence is a crucial period of brain maturation and myelination. Disruptions during this critical period of development can lead to detrimental alterations of brain structure. Cuprizone, a copper chelator, is an agent used to induce demyelination in rodent models. Given its demyelinating effects, cuprizone is commonly used to model myelin loss or injury after exposure to toxic substances or neurodegenerative disorders. To discern the damaging effects of cuprizone on the adolescent brain, an experiment was conducted using 24 male Wistar rats. In the experimental condition, rats were fed a cuprizone diet starting at the beginning of adolescent development (postnatal day 28). We hypothesized that rats that consumed cuprizone over a two-week eating period were would have a reduction in myelin density and an increased prevalence of neuroinflammation. Data collection focused on white and gray matter areas of the mPFC and hippocampus (FM, Cg1; LeNT, DG) as well as the corpus callosum genu. After processing the tissue, microglia were analyzed in these myelin dense regions to observe their reactivity to cuprizone. The ramified morphology and relative frequency of microglia were examined via immunohistochemistry. Additionally, demyelination was visualized via luxol-fast-blue and counter staining with neutral red. In cuprizone treated rats, we observed significantly less luxol-fast-blue present in myelin-dense areas. In the same regions, analysis revealed a significant increase of microglial activation, suggesting a strong role for cuprizone inducing a neuroinflammatory response. The role of neuroinflammation will continue to be studied in this context with emphasis on determining the underlying mechanisms of demyelination.
Why do people make the choices they do? Past research indicates there may be a link between individual differences in motivation that underlie decision making. The BIS/BAS scale is an established measure that has been utilized to evaluate an individual's trait approach and avoidance tendencies. Differences in approach motivation will also be observed via electroencephalography (EEG). Past research indicated that greater frontal asymmetry was associated with higher approach motivation. One of the aims of this research is evaluate what possible role trait approach motivation may influence an individual’s response to normative violations. This research is also interested in the role individual differences in approach motivation may play in decision making. Participants performed a variation of the third party punishment game and responded to two examples of Joshua Knobe’s classic experiment. Participants also responded to a brief measure to test variation in individual differences in prescriptive and proscriptive morality. I will analyze individual differences in approach motivation, as measured by BIS/BAS and variation in frontal asymmetry, explains individual differences in moral and social decision making by correlation analysis. I believe that higher levels of trait approach motivation may help explain increased action taken during third party punishment, greater usage of prescriptive morality, and an increased likelihood to view an act as intentional.
This project analyzes differences in temporal discounting rates between populations in the United States and China. Temporal discounting rates are important because of their predictive nature in the domains of gambling, risk-taking behavior, and other problems caused by deficits in self-control. As part of a larger project investigating the relationship between exogenous factors and temporal discounting, this data set will be analyzed to look for a relationship between culture and temporal discounting rates. A relationship between culture and rates is further evidence that temporal discounting is reliant on the exogenous factors, and is not a fixed rate. The goal of this project is to further investigate the exogenous factors that influence temporal discounting and risky decision making.
Motor Initiation and Inhibition in Parkinson’s Disease: The Effect of Incentive Reward and Medication Status

Parkinson’s disease is a neurodegenerative disease that affects 7 – 10 million people in the world, with more than one million affected in the United States. Parkinson’s patients suffer severely debilitating motor symptoms (motor initiation and inhibition, akinesia, bradykinesia) due to neuronal dysfunction and degeneration of dopamine in the midbrain. Fortunately, advancing Parkinson’s research continues to recover motor deficits, primarily through Antiparkinsonian medication, but alternative, external cueing techniques have also shown great promise in improving mobility. My multidisciplinary thesis aims to further investigate the effect of visual, external cueing and incentive reward on motor control in population of ~15 elderly Parkinson’s and healthy control patients. Participants were all cognitively and clinically assessed using the Montreal Cognitive Assessment, Grooved Pegboard Test, and Unified Parkinson’s Disease Rating Scale. Performance of Parkinson’s patients on and off medication were compared to healthy, age-matched controls on a speed-rewarded Go-NoGo computer task with 25%, 50% 75% GO cues, intended to assist in movement preparation. We hypothesized that Parkinson’s patients will have greatest difficulty initiating movement off medication but will perform comparably to control participants when on medication and when presented an external cue. Finally, Parkinson’s patients will initiate movement best when the 75% visual cue is followed by a GO signal and have highest false alarm rates when the 75% visual cue is followed by a NoGo signal. Continued behavioral research studying decision making in Parkinson’s holds immense clinical potential.
Cognitive functions such as the ability to adapt behaviors to situational changes are important in learning how to change patterns of addictive behavior. Long-term addiction changes neurotransmitter levels, which in part disrupts cognitive circuits in brain areas like the medial prefrontal cortex (mPFC). Norepinephrine (NE) is a neurotransmitter that is critical for mPFC function. We investigated what role NE plays in the short-term memory of male and female C57BL/6J mice after repeated heavy alcohol and stress. For ~1 month, mice received one of four treatments: repeated forced swim stress, chronic ethanol vapor, both, or neither. Mice were then tested on their ability to recall object-context pairings five minutes after learning the pairings. Half the mice received the NE α-1 inverse agonist prazosin before being tested, thereby reducing NE action in mPFC and other regions. Prazosin-treated stress-only males performed better than their untreated counterparts, but this trend did not appear in other groups. These findings indicate that reducing α-1 NE signaling is not sufficient to reverse the impact of long-term ethanol or stress/ethanol on short-term memory. Additionally, since prazosin-treated stress-only females did not perform better than untreated stress-only females, there may be sex differences in the way stress moderates NE and cognition.
Analysis of Maternal Behavior and Pup Development in the Wistar-Kyoto Rat Model of Postpartum Depression

Previous studies in labs using the Wistar-Kyoto (WKY) animal model of depression demonstrated that WKY mothers exhibited disturbances in parenting in a 30-min test compared to control Sprague-Dawley (SD) mothers. In order to evaluate whether the differences in parenting between WKY and SD mothers were driven by the testing conditions and/or differences in pups' characteristics, this study evaluated maternal behavior and offspring physical and neurobehavioral developmental milestones during the entire postpartum period. Maternal behavior was scored every 4 min for three 60-min daily observation periods during postpartum day (PPD) 1 to PPD25. Behavioral observations occurred at regular times each day, with two periods during the light, and one period during dark phases of the 12h light/dark cycle. In addition, pups were weighed and examined daily for emergence of physical maturation landmarks/ reflexes. Physical landmarks included pinnae detachment, incisor eruption, eye opening, ear opening, and fur development. In addition, pups were tested for surface righting, palmar grasp and negative geotaxis reflexes. Results demonstrated that WKY mothers consistently exhibited reduced active components of maternal behavior and spent less time in contact with their pups than SD mothers. No changes in physical milestones of pups were noted during the first three postnatal weeks. These findings confirm that WKY mothers display disturbances in parenting, reaffirming the feasibility of the WKY strain as a model of postpartum depression, increasing its utility in identifying the mechanisms by which it disrupts parenting.
Athletes commonly use intravenous performance enhancers to help improve how they play in sports, which increases their chance of contracting Hepatitis C. The performance improvement and physical nature of sports elevates the risk of athletes injuring their spinal cord while playing. A treatment for Hepatitis-C is an immune protein called interferon alpha-17 (IFNA-17). A cell type that plays a key role in the response to spinal cord injury is the astrocyte. There is a gap in the literature regarding IFNA-17 and how it affects astrocytes in spinal cord injury healing. This study used a cell culture astrocytoma wound-healing model with fluorescent staining to visualize the results. It was found that IFNA-17 does not have any effect on healing after transection injury in astrocytoma cells. Thus, my results suggest that IFNA-17 may not affect astrocyte response after spinal cord injury, but additional studies are needed to further examine this question.
About 15 million American adults suffer from alcohol use disorder (AUD) each year. AUD impairs day-to-day functioning and can be fatal. Stress is a major factor in the development of AUD and a risk for relapse. We explored how chronic ethanol consumption and stress influences anxiety-like behavior, and the role of stress-responsive noradrenergic signaling in these changes. Adult male (n = 54) and female (n = 58) C57BL/6J mice were allowed 1-hour of voluntary drinking (15% ethanol) daily. Once drinking stabilized, a subset of mice were exposed to weekly cycles of chronic intermittent ethanol (CIE) to induce ethanol dependence, or air-control vapor exposure, followed by weekly cycles of 1-hour voluntary test drinking. During weeks of test drinking, mice received either no stress (NS) or 10 minutes of forced swim stress (FSS) 4 hours before ethanol access. Animals with a history of CIE and FSS escalated voluntary drinking across exposure cycles. After 4-6 weeks of CIE and FSS, anxiety-like behaviors were evaluated, using the marble burying task. Thirty minutes prior to marble-burying mice received either an α-1 inverse agonist prazosin (0.75 mg/kg i.p.) or vehicle. CIE and FSS both increased anxiety-like behavior, as measured by an increase in the number of marbles buried across both sexes. Prazosin significantly reduced anxiety-like behavior in females but not males. These data suggest that ethanol and stress history increase anxiety-like behavior, and that this may be mediated by noradrenergic hyperactivity in females.
Decision processing in cortical areas is heavily influenced by ascending monoamines, including norepinephrine (NE). The locus coeruleus (LC) is a small nucleus in the dorsal pons that supplies the vast majority of NE to cortical targets involved in decision procession. Previous research from our lab demonstrates that noradrenergic antagonists alter behavior, including decision outcome during a two-alternative forced-choice task (2AFC).

This study sought to characterize LC firing patterns in rats during a 2AFC task. Male and female Long-Evan rats were surgically implanted with chronic 28-channel tetrode arrays, unilaterally targeting the LC. Following a recovery period, rats were trained on a 2AFC task where cue lights (red/green) illuminated each trial to indicate which of the two laterally positioned levers would be rewarded. Rats self-initiated trials by breaking an IR beam for a variable hold until a lever cue was received. Rats were first trained and tested on a task where the probability of either lever being rewarded was set to 50%. Rats were then subjected to a test period where the probability of one lever being rewarded was biased to 70% to see how neuromodulatory output of LC was altered when task demands changed. Rats could perform up to 250 trials in a 40 minute test session. LC firing analysis is ongoing. Results from this study will add to a growing understanding of the LC’s importance in regulating task related behavior during decision making.
The Role of Visual Cortex in Memory: Does Object Recognition Depend upon Brain Regions Housing Conjunction Representations?

Recognition memory is thought to depend on medial temporal lobe structures. However, recognition memory tasks found in the literature tend to use complex high-level stimuli, such as word-pair associations. Thus the neural underpinnings of recognition memory for simple low-level features remain unclear. Recognition memory for low-level features may rely upon lower-level brain regions. In addition, one recent theory of memory predicts that recognition of a particular stimulus relies upon the brain region that represents conjunctions of the kinds of features contained in the stimulus. To test this, we conduct an fMRI study using a recognition memory task in which participants must recognize novel conjunctions of simple visual features that are individually familiar. First, participants study visual stimuli that are composed of conjunctions of simple, binary features (color, shape and spatial frequency). Next, participants are asked to discriminate between familiar stimuli seen during study, stimuli made up of features seen previously in study but combined in a novel way, and completely novel stimuli. Behavioral piloting of this task has revealed individuals can discriminate between previously-studied stimuli and stimuli that are novel combinations of familiar features. fMRI data collected during this task will be used to determine whether the recognition memory signals that underlie this behavioral performance are found in regions of visual cortex that (1) represent conjunctions of simple features, and (2) are lower-level than traditional “memory” regions such as the medial temporal lobe.
Stress and immune signaling converge in the hippocampus to alter function. Pro-inflammatory cytokine and glucocorticoid receptor signaling affect synaptic transmission in this region. Glucocorticoids are capable of regulating expression of pro-inflammatory cytokines but the precise mechanisms remain unknown. The NLRP3 inflammasome protein complex facilitates the production of mature pro-inflammatory cytokines. Glucocorticoids (e.g. corticosterone in the rat) are released from the adrenal glands, and circulate throughout the body and brain binding to glucocorticoid receptors. Acute restraint stress is sufficient to induce increases in the repressive histone modification histone H3 lysine 9 trimethyl (H3K9me3), accumulating at retrotransposons (RTs) thereby decreasing RT expression. RT accumulation has been shown to activate the NLRP3 inflammasome. Preliminary data from acute corticosterone (CORT) treated-adrenalectomized animals supports the idea that CORT is sufficient for increased hippocampal H3K9me3. Increased hippocampal H3K9me3 is effectively blocked through pretreatment of chaetocin, a H3K9me3-specific methyltransferase inhibitor. In vitro, CORT dynamically regulates RT expression -increasing expression acutely and repressing expression via H3K9me3 upon depletion. In the acute CORT treated rat, we aim to see if blocking CORT-induced H3K9me3 is permissive for NLRP3-inflammasome assembly in hippocampus. These results may suggest a novel molecular epigenetic link between stress and immune axes with significant implications for hippocampal function.
What sounds get associated with what shapes? Participants tend to associate spikey shape with a /kiki/ sound, and round shapes with a /bouba/ sound, the bouba/kiki effect. In this study, we used electroencephalography (EEG) to examine if brain responses to visual shapes are influenced by concurrent sounds. We hypothesized that congruent shape-sound pairs (round shape & /bouba/; spikey shape & /kiki/) would show stronger brain activation compared to incongruent shape-sound pairs (round shape & /kiki/; spikey shape & /bouba/).

Participants viewed half of a round shape and half of a spikey shape simultaneously, one in each hemifield. One half shape flickered at 5.45Hz and one at 7.5Hz with a fixation cross at center. Participants heard no sound (baseline) or a concurrent frequency modulated sound at 3 Hz which was congruent with one half shape but not the other. Participants monitored fixation and pressed a button when fixation turned red. Shape location was counterbalanced across trials, sound (no sound, /bouba/, or /kiki/) was counterbalanced across blocks, and flicker frequency for a given shape was counterbalanced across participants as well.

Participants were divided into two groups based on baseline signal-to-noise ratio SNR: (1) good visual activators (>= 5 SNR), and (2) poor visual activators (< 5 SNR). Preliminary data suggest that good activators tended to show smaller activation to shapes in the presence of a congruent sound, suggesting a suppressive effect induced by the sound. Poor activators tended to show enhanced neural response to shapes in the presence of a sound. Both effects were stronger at 5.45Hz than 7.5Hz. Our findings highlight the need to understand individual neuronal differences in the bouba/kiki effect.
Over 1% of the global population have intellectual disability (ID), with children of lower socioeconomic status being at a greater risk. In humans, loss-of-function mutations in β-catenin causes ID; however the underlying mechanisms are unknown. β-catenin has a critical role in cadherin-based synaptic complexes, which are known to regulate synaptic function and plasticity. Previous work from the lab has shown that mice with conditional deletion of β-catenin in excitatory neurons of the forebrain (β-cat cKO) have learning impairments and reduced long-term potentiation. There are two non-mutually exclusive possibilities that could explain these data. First, without β-catenin, stabilization of the synapse via cadherin-based adhesion could be impaired, leading to reductions in plasticity. Second, reductions in glutamate receptor upregulation during synaptic plasticity may be aberrant, as seen in β-catenin gain-of-function models from our lab. To test these hypotheses, I measured membrane protein levels via Western blot of β-catenin binding partners and glutamate receptors in the hippocampus of adult β-cat cKOs and littermate controls. With loss of β-catenin, N-Cadherin levels were decreased, but glutamate receptor subunit levels were unchanged. These data suggest that loss-of-function in β-catenin leads to learning and synaptic plasticity impairments through decreased N-cadherin levels and not due to alterations in glutamate receptor levels. The implications of these data suggest that pharmacological rescue of cadherin-based adhesion may be a promising candidate in restoring proper synaptic function in individuals with β-catenin loss-of-function.
Repeated exposure to the same or similar objects leads to faster and more accurate identification of those objects. The neural changes that are connected to these behavioral changes remain unclear. Previous studies have shown that cells in high-level areas of the primate visual system have a higher selectivity for familiar objects than novel objects (i.e., they respond to a smaller number of familiar objects). These studies have largely focused on single-cell responses in individual brain areas, but regions of the visual system are highly interconnected. To determine whether familiarity alters feedforward or feedback processing, we reanalyzed a previous dataset of local field potential recordings from the inferior temporal cortex. Local field potentials reflect the summed activity of many neurons in a small region of the cortex. Specifically, we compared high frequency and low frequency oscillations, which have been linked to feedforward and feedback processing in the primate visual system, respectively. In four monkeys, familiar objects led to stronger power in low frequencies (~5-17 Hz alpha/beta range). In two of these monkeys, novel objects also led to stronger power in high frequencies (~65-100 Hz gamma range). These results support the hypothesis that long-term familiarity leads to stronger feedback connections within the visual system.
Over 40 Million Americans live with untreated hearing loss. And untreated hearing loss is linked to the increased risk of several physical and mental disorders, including Dementia. Many people are deterred from ‘traditional hearing aids’ as they provide minimal benefit for understanding speech, especially in difficult listening situations, i.e. in background noise. Recent advances in hearing aid technology have been designed to specifically enhance semantic features of speech, and sample and reduce background noise. In providing a more clear signal with reduced distraction from background noise, understanding of speech is anticipated to increase by improving auditory processing. This study explored patient satisfaction with the new technology by giving the Abbreviated Profile of Hearing Aid Benefit (APHAB) to both new users, those who have not had hearing aids before or have not worn them consistently in the past year, and current users, those who have worn hearing aids consistently for six months or more. Study participants were given the APHAB at the start of the study and at a follow up appointment after approximately 30 days of use. Four categories of patient experience with the new technology were judged pre- and post-treatment, including Background Noise, Reverberation, Averseness to Sound and Ease of Communication. Initial results indicate significant improvements in patient experience and auditory capabilities in a vast majority of users.
Traumatic brain injury (TBI) is one of the leading causes of injury related death in the United States. Survivors often have headaches, cognitive problems, and mood swings. In severe cases, patients may lose the ability to speak or comprehend speech, severe emotional problems, limited function of limbs or be in a comatose state. TBI is frequently caused by car accidents, falls, firearm related injuries or blows to the head in athletics. Additionally, service members exposed to explosive blasts are at risk for blast induced neurotrauma, a type of injury that may have significant overlap with TBI. There is still need for an accurate TBI test for diagnostic purposes. Diffusion tensor imaging (DTI) has been found to be more accurate at diagnosing both mild and severe TBI than computed tomography, but is expensive and cumbersome to use, especially on the field of battle. The microRNA Let-7i may be a promising biomarker for TBI, as it is present in blood serum. Several studies in the past decade have observed epigenetic changes in the period after TBI. These mechanisms include DNA methylation, modification of chromatin and changes in miRNA regulation. All of these changes are potential targets for drugs, with the goal of reducing the extent of the damage and speeding recovery time. In this review, we will discuss studies that have implications for the future diagnosis and treatment of TBI and conduct a meta-analysis to gain insight into future treatments.
Most organisms possess an endogenous biological clock that governs daily behavioral rhythms in a nearly 24-hour cycle. The molecular mechanisms of circadian clocks have been studied in many species, including *Drosophila melanogaster* and *Mus*. However, the neural mechanisms underlying how circadian clocks affect behaviors is not fully understood. To address this problem, we are examining the nudibranch *Berghia stephanieae* (Mollusca, Gastropoda), which has a simpler nervous system with large and identifiable neurons. In addition, their small size poses an advantage for high-throughput behavioral analysis over previously-studied nudibranchs. We are conducting this experiment to address two goals: to identify whether locomotor activity follows a daily rhythm and to determine whether this activity is governed by a circadian clock. To identify the activity pattern of locomotion, we are using a video camera to record the activity of *Berghia* in a confined tank with artificial light over several days in a 12:12 light:dark cycle. We are then graphing the data on an actogram to look for patterns in activity levels. We will later determine the presence of a circadian clock by exposing the *Berghia* to constant darkness. If a circadian clock exists, we expect to see the patterns free-run in constant darkness with an endogenous period of around 24 hours. Lastly, we will test whether the clock can be entrained to a different light:dark cycle. This study will serve as a foundation for further investigations of how circadian clocks modulate neural circuits to produce circadian behaviors.
Though many animals communicate with sound, songbirds learn to produce vocalizations by imitation, a trait they share with a handful of species, including humans. Thus, the zebra finch (*Taeniopygia guttata*) provides an opportunity to investigate the acquisition of vocalization for communication. The zebra finch auditory cortex, known as the caudomedial nidopallium (NCM), shows neural selectivity for birdsong and is likely involved in high-level processing of acoustic stimuli. In addition to representing conspecifics’ song, the NCM is involved in monitoring acoustic feedback from an individual’s own song concurrently with its production, which is essential to the acquisition and maintenance of its vocalizations. To understand how zebra finches integrate this feedback into their own song, neural activity must be recorded alongside the actual production of song in awake animals. Unfortunately, exploring behavior and neural activity simultaneously presents technical difficulties, limiting investigations to either anesthetized electrophysiology or external observations of awake behavior. Portable and drivable electrode arrays (“microdrives”) bridge this gap, allowing for neural recordings alongside behavioral observations. Unlike conventional microdrives, these devices must be lightweight to allow songbirds to fly. As such, we created two lightweight, inexpensive microdrive designs capable of recording up to 16 or 32 channels of population and single unit activity in anesthetized and awake zebra finches, which show potential for integration with technologies such as optogenetics and microdialysis. We obtained high-quality extracellular neural recordings with auditory-evoked activity in NCM of anesthetized zebra finches. These microdrives represent a new, inexpensive platform for electrophysiology in awake and anesthetized zebra finches.
**Introduction:** The purpose of this honors thesis study is to identify common themes in goals and what inspires hope for students in working toward a goal. In the literature, hope has been associated with better academic performance (Snyder, Shorey, & Cheavens, 2002), goal attainment (Feldman, Rand, & Kahle-Wrobleski, 2009), better problem solving (Chang, 1998), and improved mental health (Griggs & Crawford, 2017).

**Background:** There are several factors that have an influence on a student’s life. Mental health, physical health, safety, stress, sleep, and traumatic events all have major impacts on a student’s ability to perform, to name a few. Minimal research has focused on what specific goals college students are setting as well as what inspires hope in students to achieve their goals. This goal of this research is to better understand how hope operates in the lives of college students and to provide insight into how to motivate them to achieve goals such as obtaining a higher GPA or graduating.

**Methods:** The research conducted was a secondary data analysis using a combination of qualitative descriptive, and coding for thematic analysis. The data were previously collected from 433 freshman university students attending a large public university in the Northeast in February 2017. Four levels of coding were applied to the students’ answers to two of the survey’s questions (positive or negative goal outcome, specificity, broad, and subthemes).

**Findings:** Freshman \( (N = 433) \) attending a large public university completed open response items about personal goals and were asked to describe what gives hope in accomplishing the goals identified. Most of the goals had a positive outcome (Type 1) with fewer having a negative goal outcome (Type 2). Common themes found among students’ goals were academic, mental health, physical health, career, and relationship.

**Conclusions:** This study added to the current knowledge base among literature surrounding what increases hope in students and thus improves the likelihood of achieving their goals. Future research could focus on how creating positive versus negative goals affects students’ hope score.
The Effect of Implementing a Resilience Tool Kit for Clients with Adverse Childhood Experiences

PURPOSE: A review of literature revealed that there is a strong correlation between adverse childhood experiences (ACE) and the subsequent development of substance use disorders (SUD), and that effective treatments include Active coping, Building strengths, Cognitive training, and Social support (ABCS). The purpose of my project is to create a comprehensive toolkit that informs readers about the correlation between ACE and SUD and provides them with treatment exercises that build on the ABCS.

METHODS: To assess the utility of the toolkit, I will create a survey that will be completed by a DNP student, a team of counselors in a recovery home, residents with substance use disorder in the recovery home, and a group of UMass Amherst nursing students. I will analyze responses by content analysis of qualitative responses and create a graph to analyze quantitative responses.

RESULTS: We expect that the participants will report that the toolkit is accessible and feasible. We also expect that they will report that it is helpful, and that they will be likely to implement these exercises in their daily lives.

CONCLUSIONS: This toolkit will inform clients and providers about how prior ACEs may be an underlying cause of current SUDs and therefore emphasize the importance of screening for ACEs. In addition, the toolkit will provide health care workers and patients about exercises they can suggest or use in their daily lives to assist in their recoveries.
PURPOSE: Pregnancy associated sleep disorders (PASD) affect up to 82% of women and are associated with increased depressive symptoms. Sleep education and use of a personal health monitoring device (PHM) to monitor sleep could improve these symptoms. To date, no studies have examined PHMs for this purpose. This pilot study will examine the feasibility and acceptability of using a PHM as an intervention for sleep self-management and subsequent change in depressive symptoms.

METHODS: This thesis is part of a pilot study with a mixed methods, experimental design. Pregnant women (n=24) will be randomized into two groups at 24 weeks gestation. Both groups receive sleep hygiene education. The intervention group also receives a PHM device (Misfit Shine 2) Depressive symptoms are measured via the PROMIS Depression Short Form 6a and Edinburgh Postnatal Depression Scale (EPDS) at 24 and 36 weeks gestation. Comparisons in mean score on the EPDS across groups at 36 weeks gestation will be made using a Mann Whitney U test. Baseline and post-intervention mean score on the EPDS for the intervention group will be compared using a Wilcoxon Signed Rank Test.

RESULTS: Data collection is on-going. It is anticipated that women in the intervention group will experience fewer depressive symptoms at 36 weeks gestation compared to the control group.

CONCLUSION: Sleep education and the use of a PHM device for sleep self-monitoring could reduce PASD and associated symptoms. This has potential to improve mental health for women during the transition to parenthood.
Reproductive Health Education in Survivors of Intimate Partner Violence

The purpose of this project is to provide education to a domestic violence (DV) shelter in the Northeast through health education. Abuse can manifest in several ways, including reproductive coercion. This phenomenon is behavior used to maintain power and control in a relationship related to reproductive health by someone who is, was, or wishes to be involved in an intimate relationship. Giving survivors the control back that they once lost is empowering, but contraceptive methods can be a difficult topic to navigate, especially for IPV survivors. Research for educational information was gathered through a literature review. In order to learn more about the population and their needs, this project included spending four volunteer hours a week at the shelter. A teaching session was provided at the shelter in February. Following the teaching session, weekly office hours were offered for a month. A toolkit was created with materials about different contraceptive methods, how they work, the levels of effectiveness, the degree of maintenance required, and what options are good for different types of people. The physical manifestation of this information was in a binder along with a lesson plan on how to continue teaching this information was left behind as a resource for the shelter.
PURPOSE: Stress is defined as a state of mental or emotional strain or tension resulting from adverse or very demanding circumstances. Stress has been noted to be at its highest during the college years. This research study induced physiological (Cold Pressor Test) and psychological stress (Trier Social Stress Test) on undergraduate students to see how this related to blood pressure readings, heart rates and saliva cortisol levels over time. The purpose of this research is to analyze that data to see if college students with a high perceived stress level will have higher blood pressure and heart rate post Trier Social Stress Test than those with a low perceived stress levels.

METHODS: Undergraduate students ages 18-22 participated in the research in a laboratory in Skinner Hall. Surveys were completed, as well as blood pressure, pulse and cortisol levels after stressors.

RESULTS: Data will be analyzed to find correlation between perceived stress and heart rate and blood pressure levels. It is expected that those with higher perceived stress will have a higher heart rate and blood pressure post stressors.

CONCLUSION: This research is important to the field of nursing due to the health effects prolonged stress puts on the body.
In the United States, one in 15 children are exposed to domestic abuse in the U.S. and 90% of those children are eyewitnesses to the violence. Children who have experienced violence are more likely to suffer effects of abuse throughout their lifetime, which may make them more susceptible to destructive behaviors and risk taking. By providing mental health education, survivors can understand how to make healthy choices and how to perform self-care. The purpose of this honors project was to provide teaching sessions and an educational resource for children at a domestic violence shelter affiliated with Safe Passage, a support center for victims of domestic abuse. Educational materials were created based on information gathered through the literature review and through time spent volunteering at the shelter. Printed copies of the educational materials were placed in a bound book, to be used by the shelter for future teaching sessions.
The purpose of this project was to provide an easier transition into college for first generation students, specifically at UMass, by implementing a program aimed at helping this cohort succeed and become more resilient. A large proportion of each year’s incoming class identify as first-generation and are forced to adapt to a new, unfamiliar environment and the demands of being a college student without sufficient guidance. Research was done through the University of Massachusetts Amherst library databases, where scholarly literature on topics of nursing, education, and psychology were accessed. Using this information, a lesson plan for an approximately forty-five minute session was created for an applicable individual or organization to use as a guiding tool. Various departments on campus were contacted to investigate the plausibility and effectiveness of the session in relation to their line of work. In the lesson plan, the content was strength-based, centered around available resources, supporting self-reflection, and encouraging the use of support systems whenever needed. Teaching with concepts of involved and engaged learning in mind assists in facilitating a thought-provoking and meaningful session for students. The proposed plan intended to help students build upon their strengths, recognize their coping skills, challenge the way they think about the world, and identify supports. This strategy to student success for first generation college students, takes into consideration the challenges this population faces and the experiences they are bringing to the university, to ensure an education that is more equitable and integrative.
Problem- It is important that parents are informed about the potential health and developmental consequences of increased screen time on their children’s health including use of tablets computers and smart phones.

Background- Parents need to be educated on how excessive use of screens to entertain and educate can affect their children. Screens can affect vision, cognitive development, and weight gain.

Interventions- Educational intervention focused on a group of teenage mothers in an alternative education program and included distribution of pamphlets, an oral presentation and discussion. Survey questions focused on family history, current screen time, and American Association Pediatrics (AAP) screen time recommendations.

Findings – Thematic analysis of written responses from a group of eight teenage mothers revealed that only half of the mothers reported reading to their children and none of them were read to as children. Two of the eight women reported hearing about the AAP’s recommendations of two hours or less of screen time per day and three set parental controls on devices. Participants tended to underestimate their screen time exposure.

Conclusions – Younger parents are in need of education about recommendations for screen time exposure for young children. Nurses working with mothers of young children need to emphasize AAP guidelines and ensure they understand the educational materials. This particular group of mothers had some language barriers, with two being primarily Spanish speaking as well as starting life with lower literacy skills as reflected in their reporting not being read to as children.
Wellness Tool Kit and Health Education for Homeless Adolescent Mothers

The purpose of this Honors Capstone Project is to provide health education to a group of homeless adolescent mothers at a shelter in Holyoke, MA and to create a wellness toolkit as a resource for staff aimed at facilitating health promotion and awareness. This specific population has unique health and wellness needs that must be appropriately addressed to promote positive outcomes for them and their children. The shelter staff has also verbalized their need for an educational resource. Nursing students have the education and background to provide the basis for a resource for this necessary health and wellness education. Guided by shelter staff needs and relevant literature reviews, two University of Massachusetts Amherst nursing students developed four educational sessions that were conducted at the shelter on the following health and wellness topics: motivation and goal setting, sexual health, health behaviors and promotion, and stress management and problem solving. The nursing students conducted each hour-long session with group discussions, educational handouts, interactive worksheets, etc. to facilitate teaching and participation. The nursing students revised the toolkit based on the feedback of the participants involved in the teaching sessions. The end result was a comprehensive binder that shelter staff can reference and use for health and wellness teaching among residents in the future.
Purpose: To identify risk factors and clinical manifestations of transfusion associated circulatory overload (TACO) in order to improve the prevention and recognition of TACO thus positively influencing patient safety and health outcomes for those receiving blood transfusions.

Methods: Data will be collected from electronic health records at Baystate Medical Center in Springfield, MA. Data to be collected includes patient health history, pre-, during, and post-transfusion vital signs, transfusion-related information from nursing and physician documentation, medication administration records, provider orders, and post-transfusion diagnostic testing.

Results: Frequencies of risk factor occurrence and clinical manifestations will be reported.

Conclusion: Based on the review of the literature, it is expected that the risk factors with the greatest frequency will include cardiovascular, pulmonary and renal disease, as well as certain idiosyncratic factors such as positive fluid balance. It is also expected that the clinical manifestations with the greatest frequency will be those related to inadequate oxygenation and increased circulatory volume such as decreased oxygen saturation, tachypnea, tachycardia, widened pulse pressure, hypertension, and crackles in the lungs secondary to pulmonary edema. These findings will help to increase knowledge and awareness of TACO among healthcare professionals in order to improve the prevention and recognition of TACO.
There is limited research or information available regarding the experience of graduate psychiatric nursing students who are using videoconference technology telemental health or face to face with a standardized patient actor. Simulation-based learning (SBL) is a helpful and effective teaching-learning-evaluation strategy available in nursing education. In a graduate online nursing program, simulation can be challenging to implement due to geographic location of students, time zone, and student schedule. Moreover, it is essential to find an effective simulation method for psychiatric nursing students to practice their learned skills in preparation for practice. Six graduate psychiatric nursing students took part in a 45-minute psychiatric case study simulation interview followed by a 15-minute debrief with faculty and the standardized patient actor. Three students participated on campus for a face to face interview and three students participated via telehealth. Findings: All six students took part an annonomys online survey regarding their experience with the simulation based learning experience. Student participants revealed high satisfaction with the simulation experience both face to face and via telehealth, highest satisfaction with the debrief experience, and most students reported wanting more case simulation in the graduate program. Conclusion: Case simulation with a standardized patient actor is an effective SBL and can be successfully implemented in person and via telehealth.
**Background and Significance:** Ehlers-Danlos Syndrome (EDS) is a rare, genetic connective tissue disorder that affects the production of collagen in the body, resulting in chronic pain, hypermobility and the need for many medical interventions. Connective tissue holds the whole body together and when the collagen in that tissue doesn’t work the way it is supposed to, it can make changes in the way people live their lives. There is often a delay in diagnosis into adolescence or young adult life due to variability in multi-organ symptoms and their severity leading to misdiagnosis and uncertainty.

**Methods:** A qualitative, phenomenological study was conducted to explore what changes this condition can make to a person’s life. Participants included five women aged 18-22 who were interviewed in person or via video chat. These interviews were later transcribed followed by thematic content analysis.

**Results:** Themes that emerged are pain limiting daily tasks, the invisibility of the disease, and uncertainty about the future of the condition.

**Conclusion:** More research needs to be done on Ehlers-Danlos Syndrome and how the condition effects health related quality of life. There also needs to be greater public awareness about this disease and health care strategies for earlier diagnosis.
A holistic centered approach to nursing emphasizes the importance of involving the individual’s psychological health, physical well-being and spirituality. Specifically, spiritual care is commonly overlooked by nurses during the care of their patients. Excluding a patient’s spirituality can impact their recovery and inhibit their return to full health. The purpose of this study is to identify nurses’ perceptions of spiritual care and its connection to healing. Based upon the HOPE and FICA spiritual assessment tools, a survey was sent to nursing faculty at a state university which asked them to reflect on their perceptions of spirituality and healing. The response rate was 32%. Qualitative analysis was applied to identify themes. The most common theme was the perception that spiritual care is acknowledging and respecting a patient’s beliefs and religious practices when providing care. The next predominant themes were the need to work with the patient and/or their families to provide care in line with their beliefs and the importance of addressing the individual holistically. Results also revealed that while a majority of nurses practiced spiritual care and related it to healing, they did not inquire how they could meet their patients’ spiritual needs while providing care. A unifying definition of spiritual care among nurses was not identified. These findings show that nurses do not include patients and families in providing for their spiritual needs. As a result of this, patients are not receiving the personalized holistic care necessary for healing.
BACKGROUND/PURPOSE: Long-Acting Reversible Contraceptive methods are highly effective methods of birth control including IUD’s and the implant. There is often a lower rate of usage with these methods due to factors such as high upfront cost, invasive insertion methods, and possible side effects. This research is aimed to understand some of the perceived and actual barriers for usage, as well as to identify any gaps in education regarding this method.

DESIGN AND METHODS: The study methodology is mixed. This project consists of a qualitative literature review as well as an attached survey. The literature approaches LARC from a variety of perspectives in order to ascertain gaps and direct further areas of research. The consent for the study will be implied through survey completion. The survey was distributed via the SON from Survey Monkey.

RESULTS: Respondents had a generalized understanding of long-acting reversible methods, while also having low rates of usage.

IMPLICATIONS: This research enables healthcare providers/educators to assess the education needs and barriers that exist with long-acting reversible contraception usage. In having an understanding of such issues, providers will be better able to expand access and understanding of this method. When options are effective and accessible, women have better health and personal outcomes. Women should be presented with highly effective and low maintenance options, so that they are free to make choices about family planning on their terms.
Purpose: To investigate the means of interprofessional collaboration and the perceptions of senior nursing students at Salem State University while reflecting upon their clinical experiences.

Methods: The study was conducted as a qualitative study and amongst 178 senior nursing students in the Salem State Nursing Program. The ten-question survey is a modified version of the SPICE-R instrument, also known as the Students Perception of Physician-Pharmacist Interprofessional Clinical Education. An optional text box was added at the end to provide additional comments.

Results: Collected data was analyzed using SPSS. Of the possible 178 senior nursing students, 44 (25%) completed the survey. 75% of students reported understanding what interprofessional collaboration is. 52.3% of students strongly agree that working with another healthcare profession enhances their education. 34.1% of students strongly agree as a nursing student, they felt needed to more of a direct participant in interprofessional collaboration while learning to care for patients in clinical rotations.

Conclusion: Based on the feedback of the qualitative study, students reported feeling satisfied with their clinical experiences in the past and an interest in preceptorship opportunities. With entry into professional nursing practice within the next year, students also reported those with previous healthcare experience feel more involved with the interprofessional team than in clinical experiences. The results provide implications for nursing educators on understanding students perceptions on interprofessional collaboration based on clinical experiences.
Tourism is one of the world's biggest industries that contributes to the world's economy. During the past few years weather has been a rising concern. Extreme weather and unpredictable changes of climate have been happening more frequently than ever before. The most recent news includes the snow fall in the Sunshine State of Florida and a record heat wave in Alaska which has had an economic effect on businesses and communities. Melting glaciers and ice caps are causing sea levels to rise more than normal, ultimately affecting popular beaches such as in Jamaica or Thailand. These drastic and unexpected changes impacts the tourism industry tremendously as many touristic destinations rely and thrive from their tourism revenues. This study is designed to promote awareness of the effects of these natural disasters caused by our unbalanced weather and what we can do to slow down extreme climate and weather change.
During the 1970’s, major industrial countries faced shortages of petrol which led to an increase in prices. The search for sustainable renewable energy sources was the result. Renewable energy is beneficial to our country and our planet for environmental reasons, and it also has a positive impact on our economy. Using scholarly literature access through the Bunker Hill Community College Database, weather statistics accessed through Stats Crunch and other energy related organizations data, this paper intends to discover how the weather has an impact on the use of renewable energy sources in the United States. Renewable energy is beneficial to our country, environment and economy yet there continues to be little movement on exhausting all possibilities of sustainable renewable energy.
In the U.S. in 2009 approximately 3.3 million children were referred to child protection service agencies for suspected abuse or neglect (Widom, Czaja, Bentley, & Johnson, 2012). Child abuse is a growing problem that can lead to mental health problems, physical health problems, and substance abuse (Swenson, Schaeffer, Henggeler, Faldowski, & Mayhew, 2010). Despite the rising child abuse cases, reports of suspected abuse remains low. (Natan, Faour, Naamhah, Grinberg, & Klein-Kremer, 2012).

The purpose of this study is to test the effects of knowledge scores of junior nursing students after a 20-minute educational session on child abuse. Will a 20-minute educational program about child abuse increase nursing students’ knowledge about the signs of abuse and how to report abuse?

Participants included nursing students at the University of Massachusetts Dartmouth in their junior year of nursing school who have not had their psychiatric clinical rotation. Forty-one nursing students with a mean age of 21.1 years (SD=.84) completed the educational session and the questionnaire. The students were given a 15-item pre-test, then were provided with a 20-minute educational session on child abuse and its associated effects, and then were given a post-test to see if they learned anything from the educational session. Descriptive statistics were computed on study variables to determine the presence of skewness and outliers. A paired t-test was used to compare pre- and post-test scores among the participants.

Analysis was performed on the sample of 41 nursing students based on the answers and the scores of the pre- and post-test on child abuse. There is a significant (p<.000) increase in scores from the pre-test to the post-test. The mean score for the pre-test was 77.7% with a standard deviation of 9.5, while the mean score for the post-test was 85% with a standard deviation of 8.1.

Results suggest that a short educational session on child abuse significantly increased knowledge on recognizing child abuse and knowing how to prevent and report it. It is clear from the research that education on child abuse is limited among health care professionals and there is a need for more education on child abuse, especially among nursing students before they enter the health care field.
Changes in Nursing Students' Knowledge and Perceptions about Homeopathic Medicine through an Educational Intervention

Background: Homeopathic medicine is an aspect of alternative and complementary medicine. This form of CAM, although widely used, has a disconnect in the knowledge that up and coming nursing students are provided. In the United States, homeopathy is used by about 6 million people for self-care; worldwide 200 million people use it (Homeopathy Research Institute [HRI], 2015). While there is research in the area, there is a lack of it concerning nursing students and how they perceive it.

Purpose: The study’s purpose is to determine the knowledge and perception sophomore-year nursing students have towards homeopathy. The study will also assess the effectiveness of a homeopathic education session on homeopathy and alternative medicine knowledge and perception in these students.

Methods: Participants completed a pre-test, which was designed by the researcher and adapted a Complementary/Alternative Health Care Questionnaire (Baugniet et al., 2000). Students then participated in a brief homeopathic education session, followed by a post-test that was identical to the pre-test.

Results: There were significant findings between the pre- and the post-test for knowledge. The students' knowledge increased from 51% to 76%. The student’s perception about homeopathy also improved.

Conclusions: The significance increase in the participants’ homeopathic knowledge indicated that the educational session was effective. The improved perception about homeopathy in the participants indicated that the session was useful in introducing the topic and providing an overview of the use of homeopathy.
Background: Postpartum depression occurs in 20% of postpartum women in the United States each year. Despite the high number of women that are affected by this disorder, postpartum depression is underdiagnosed and undertreated. Maternal depression is linked to a variety of issues that affect maternal and infant health.

Purpose: The purpose of this qualitative descriptive study is to explore the feelings of healthcare providers towards assessing patients for postpartum depression.

Methods: After IRB approval and informed consent, participants completed a demographics sheet and then answered questions regarding assessing women for postpartum depression.

Results: The results of this qualitative descriptive study indicate that there are many facilitators and barriers to screening and treatment of postpartum depression in healthcare practices. The facilitators of the study are related to the increased level of education available to aid with the diagnosis and treatment of postpartum depression, the strengths of individual protocol in screening, and the prioritizing of safety for the mother and the baby. Barriers to diagnosis and treatment were lack of knowledge in healthcare providers and the public, lack of responsibility for screening, and the lack of regulations to ensure that screening is provided.

Conclusion: The findings in this study indicate that despite postpartum depression being a serious illness, there is a lack in the screening and treatment. To improve the outcomes for women suffering from this disease, there needs to be a standardization of care throughout healthcare.
Emotional Support for Laboring Women: A Review of the Literature and Applications to Nursing Practice

The labor and delivery of a child can be one of the most important and intense events in a woman's life, and these events have the power to influence the emotional and physical well-being of a mother from that point forward. While pharmacological interventions are valuable tools to help many women cope with the physical pain of childbirth, many of these drugs have been proven to carry with them adverse effects such as respiratory depression of the newborn and a lowering of the mother's blood pressure. For this reason, the use of complementary and alternative methods to assist women in coping with childbirth was explored. A systematic analysis of the literature was conducted to explore whether having a designated support person during delivery decreased the need for analgesic interventions. Review of the research confirms the presence of labor support (a spouse/partner, midwife, or family friend), as being helpful in assisting the laboring woman cope with the pain more effectively thus reducing the need for pharmacologic interventions.
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Impact of Birth Plans on Maternal Birthing Experiences

**Background Significance:**
Many women facing childbirth, especially first-time mothers, do not know what to expect during the childbirth process, and may feel joy as well as fear. A formalized *Birth Plan* is one method utilized by women to ease anxiety, gain a sense of control, become knowledgeable, and communicates their desires for the childbirth process to their health care providers. A *Birth Plan* is formulated by the expectant woman and includes the includes plans from women for interventions such medication and anesthesia administration, position assumed during birth, and postpartum care.

**PICO:**
The impact of birth plans on postpartum woman’s birth experience, and the effect unexpected changes to the plan were studied.

**Literature Review:**
A review of literature found that control during the labor process has a key role in a woman’s satisfaction with her birth experience. Furthermore, if a woman felt she had control over unexpected changes, she was likely to report a positive birth experience. It is important for healthcare providers to consider the laboring mothers’ desires and expectations when providing care during the intimate process of childbirth.

**Recommendations for Nursing:**
Care during labor should be individualized and may evolve, as childbirth is unpredictable. It is important to communicate any changes to the birth plan to ease anxiety and to promote a favorable birth experience for the woman and infant. Nurses are directly involved in the provision of care for laboring women, acting as an advocate and maintaining the woman’s sense of control throughout the experience.

**Conclusions:**
A formal Birth Plan may contribute to a positive childbirth experience, and in turn result in better outcomes for both woman and infant.
In early April, I am participating in Westfield State University’s annual service trip to Guatemala with other nursing peers and faculty. I will conduct a qualitative study on lice prevalence and treatment in children at selected sites in Guatemala. Physically assessing the children’s heads will accompany group discussions conducted in Spanish. While there are older data on other Central American countries, there seem to be no specific data regarding lice prevalence in Guatemala. According to data from surrounding countries, my hypothesis will be that about fifty percent of the children we work with in Guatemala will have lice. I will collect and analyze data and research how the people of Guatemala currently view their own health and treatment methods in relation to lice. I am focusing on the assessment section of the nursing process during this trip and will continue my research on next year’s trip.
Background

Childhood obesity is a persistent public health concern. In the U.S. an estimated 12 million children are obese. Obese children are at an increased risk of poor physical, social and emotional health outcomes, and more likely to become obese adults. After-school programs provide an important opportunity for health-related interventions with children. The aim of this systematic review is to identify the impact of after-school obesity prevention programs on improving nutrition knowledge, attitudes, self-efficacy and subsequent behavior change.

Methods  This systematic review used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). PRISMA is a 27-item checklist designed to assist authors reporting systematic reviews, particularly those that evaluate interventions. Databases accessed include Web of Science, PubMed, Agricola, and ERIC, identifying community-based after-school nutrition interventions targeting children ages 15 and younger. Our search focused on interventions that demonstrated a change in children’s nutrition-related knowledge, attitudes, behaviors, and self-efficacy.

Results  Between 2000 and 2017, there have been 35 studies that meet the inclusion criteria. Physical activity was a variable in 17 of these studies, and the remaining 18 studies were exclusively aimed at changing nutrition related knowledge, attitudes, and behaviors. Of these 18 studies, 54% (n=19) focused on behavior change, 17% (n=6) on self-efficacy, and the remaining 29% (n=10) aimed to impact a combination of knowledge, attitudes, and behaviors. Common strengths of interventions were large sample size, randomized-controlled trial design, and inclusion of follow-up studies.

Conclusion  Preliminary results indicate that multi-component after-school interventions may be most effective in changing children’s nutrition knowledge, attitudes, behaviors, and increasing self-efficacy. This systematic review will be used to inform the development of a multi-state collaboration on after-school nutrition programing.
Studies suggest that increased consumption of fruits and vegetables decreases breast cancer risk, however the association is weak possibly due to difficulties in measuring intake at times relevant to breast development and correlating this with cancer decades later. One way of overcoming this difficulty is measuring the effects of diet on intermediate biomarkers in young women. Levels of circulating cytokines are associated with breast cancer risk and modified by diet, and may be ideal intermediate biomarkers. We previously conducted a pilot intervention study in which lactating women increased their consumption of fruits and vegetables to 8 – 10 daily servings per week for 12 weeks. Analysis of breastmilk collected at baseline and at 12 weeks showed that compared to the control group, women in the intervention group had increased levels of the hormone adiponectin, consistent with decreased breast cancer risk. In the present study we are investigating whether changes in adiponectin levels were driven by changes in DNA methylation of the adiponectin gene (ADIPOQ). We predict that milk samples with higher levels of adiponectin will have decreased promoter methylation of ADIPOQ. In addition to adiponectin, we will examine DNA methylation of the leptin (LEP) and interleukin-8 (CXCL8) promoters as those cytokines also changed among women in the intervention group. To analyze promoter methylation of ADIPOQ, LEP, and CXCL8 we will perform pyrosequencing of amplicons from bisulfite-modified DNA from the 40 milk samples obtained during the pilot study, one from each breast from each of ten women at baseline and week 12.
This systematic review aimed to examine the literature on fish consumption during pregnancy and its associations with childhood asthma and cognitive changes. Literature was organized and analyzed according to PRISMA guidelines. Articles involving fish consumption during pregnancy were reviewed. Out of 40 articles, three longitudinal studies investigated the relationship between fish consumption during pregnancy and cognitive changes among those children at 3 and 5 years of age. One study investigated the association between fish consumption during pregnancy and asthma after birth. Ten articles investigated the behaviors towards fish consumption during pregnancy among different immigrant populations. The other 26 studies focus on factors, such as mercury contamination, that influence fish consumption among pregnant women. We found that the prevalence of fish consumption among pregnant women ranged from 50 to 75 percent. Studies in the U.S. reported 50 percent of pregnant women consumed 2 ounces or less of fish a week. Evidence demonstrated a positive association between fish consumption during pregnancy and higher cognitive development scores. However, there was insufficient evidence to support the association between the incidence of asthma or allergies and fish consumption during pregnancy. Research is needed to further examine the frequency of fish consumption among pregnant women in the U.S., the barriers to meeting dietary guidelines for fish consumption, and the mechanisms by which fish consumption during pregnancy impacts cognitive development and immune function in children.
Food insecurity is a widespread and persistent issue, affecting 13.4% of United States citizens and 10.3% of all Massachusetts residents. Food insecurity influences families of lower socioeconomic status to rely on low-cost foods that correlate to poorer diet quality, reduced or skipped meals, and serious subsequent health conditions. Government nutritional programs, like SNAP and the National School Lunch Program, have demonstrated effectiveness in improving dietary practices and alleviating food insecurity. To better understand the current dynamics of food insecurity, a literature review was conducted utilizing research compiled from peer-reviewed journals and federal documents related to school nutrition standards and community programs. This research revealed shortcomings in past nutrition legislation and provided models to inform future reforms that promote improved diet quality in schools and communities. Analyzing community programs, such as mobile produce markets, demonstrates that the most effective initiatives incorporate education and adjust to meet the needs of their targeted population. Further research is needed to understand the intersection of environments, such as schools, homes, and communities, to improve diet quality, address detrimental effects of food insecurity, and provide tools for developing healthy skills in the future. Nutritional and political infrastructure in schools and communities can be improved through implementation of reform that accounts for the diversity of stakeholders and takes on a well-rounded approach to addressing poor diet quality.
The purpose of this literature review is to discuss the knowledge and current understanding of anthocyanins and their effect on cardiovascular diseases. For this review, original research and review articles were obtained using PubMed, Science Direct, and Google Scholar using the keywords: flavonoid, polyphenols, anthocyanin, vegetables, fruits, berries, heart disease, inflammation, and atherosclerosis. Articles were limited to publications from 2007-2017.

Fruits and vegetables that contain anthocyanins such as eggplant, blueberries, and cranberries have been proposed to decrease the risk for cardiovascular disease. Proposed mechanisms include prevention of high blood pressure by increasing vasodilation. Anthocyanins have also been shown to decrease measures of inflammation, such as C-reactive protein and monocyte chemotactic protein 1. Anthocyanins can modulate enzymatic activity leading to a decreased release of these inflammatory proteins. Anthocyanins also have antioxidant properties that can reduce cellular oxidative stress. The effects of anthocyanins on blood pressure, inflammation, and oxidative stress may be protective against the development of atherosclerosis. Therefore, a diet rich in colorful fruits and vegetables is recommended to ensure adequate consumption of anthocyanins to optimize cardiovascular health.
The school food environment plays an important role in determining students’ overall diet quality, a measure of the high consumption of nutritious foods and low consumption of sugary, processed foods. Given the current prevalence of obesity among U.S. elementary and college-aged students, 17% and 36.5% respectively, it is imperative to consider the healthfulness of foods provided in school. Various environmental factors contribute to the nutrient quality of the food that a majority of public school students eat while in school. We reviewed literature examining the healthfulness of foods provided in public schools nationwide and in Massachusetts more specifically; and the integral roles that the surrounding food environment, school demographics, nutrition policies, unhealthy competitive foods, and a la carte items can play. Literature was compiled from databases such as Google Scholar and Gale Academic OneFile. Findings indicate that poor nutrition is associated with low-income, rural schools that have higher populations of minority students and less healthy surrounding food environments. Additionally, low diet quality is linked to increased competitive food and beverage consumption, and shorter lunch periods. Policymakers must regulate the school food environment to prioritize a variety of nutritious foods, and either reform or limit access to less healthy choices through efforts like selling fresh food in refrigerated vending machines. Since school policies affect a wide range of populations, policymakers must also consider how a combination of interventions, such as community involvement and implementing a nutrition curriculum, could address the issue more comprehensively for inter-sectional communities.
Natural antioxidants that are widely used in the food industry provide health benefits that may prevent diseases. This experiment evaluated the total phenolic content (TP), antioxidant activity and alpha-glucosidase inhibitory activity of three varieties of flowering plants from the solanaceae family, Physalis philadelphica (Green Tomatillos – GT), Physalis ixocarpa (Purple Tomatillos – PT), and Physalis pruinosa (Strawberry Ground Cherries – SGC). These unique fruits are not typically used in food production and may possess health benefits that will promote their industrial use.

All samples were purchased from a small organic farm in Orange, MA, homogenized and oven-dried (50°C). The dried samples were ground to a fine powder and extracted (5g) in 90°C water (100mL) for 1 hour. TP content was determined using the Folin-Ciocalteau’s method, antioxidant activity was then determined using a DPPH free-radical scavenging method, and alpha-glucosidase inhibitory activity was determined using yeast-derived alpha-glucosidase. PT exhibited the highest TP content (8.39 mg/g GAE) and SGC the lowest (3.51 mg/g GAE). The antioxidant activity seemed to correlate with our phenolic content observations. The glucosidase inhibitory activity is currently under investigation. Completion of this work will provide preliminary results for the potential further evaluation of the three fruits belonging in the solanaceae family.

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Baking as a thermal process is utilized in creating products ranging from breads to pies, which is primarily controlled through time and temperature in relation to the type and quantity of product prepared. However, continuous monitoring of quality of product during process through manual observation is necessary when product formulation is altered. This becomes labor intensive and can be prone to observation errors, leading to product loss or poor quality. The objective of proposed research is to utilize thermocouple and data acquisition system paired to modified electric oven on a load cell to record temperature and product moisture loss in real-time. The data is then be integrated with product parameters and utilized to improve current heat and mass transfer models. The developed models will enable creating a customized baking time and temperatures for baked goods, based on their size and composition.
Evaluation of the Total Phenolic Content, Antioxidant Activity, and Carbohydrate Hydrolyzing Enzyme Inhibitory Activities of the Skins of Six Potato Varieties

Food-industry manufacturing practices result in significant amounts of waste accumulation. One example is potato-processing for the production of potato chips, and other potato-based products where potato skins are commonly unused. In this experiment, six varieties of potato skins (Baby Gold/BG, Baby Red/BR, Red/RE, Russet/RS, Sweet Potato/SW, Batata/BA) were evaluated for total phenolic content (TPC), antioxidant activity, and inhibitory activity against carbohydrate-hydrolyzing enzymes.

Potatoes used in experiments were purchased from a local supermarket, peeled and oven-dried (55°C). Five grams of dried samples were extracted in 100mL of water at 90°C for one hour and then concentrated to 50mL. The concentrated samples were subjected to C18 column extraction removing any interfering sugars and evaluated for TPC (using Folin Ciocalteau’s method), antioxidant activity (using DPPH free-radical scavenging method) and carbohydrate-hydrolyzing enzyme inhibitory activity. SW had the highest TPC (2.54mg/g GAE), while RE had the lowest TPC amongst the samples (1.12mg/g GAE). All samples had DPPH free-radical scavenging activity at the tested doses, both RU and SW showed the highest activity (76% and 41%, respectively at the same tested dose). Plus, the inhibitory activity of the samples on yeast alpha-glucosidase will be analyzed for each sample.

Utilizing commonly unused byproducts like potato skins is a priority within the food-industry to prevent food waste generation. Health-related research within these byproducts can help shed light on their effective utilization for possible development of health-beneficial food-ingredients.
Nonalcoholic fatty liver disease (NAFLD) is the most common chronic liver disease worldwide that starts with simple steatosis, and progresses to non-alcoholic steatohepatitis (NASH), cirrhosis, and cancer. Due to limited treatment options, it is now an imperative task to seek potential therapeutics for preventive care and disease management. Recent epidemiological evidence reported that consumption of a plant-based diet is inversely associated with NAFLD/NASH. Among them, 3,3'-diindolylmethane (DIM), a condensation product of indole-3-carbinol found in cruciferous vegetables, was reported to have anti-inflammatory, anti-obesogenic, and anti-carcinogenic properties. Thus, the goal of the study was to determine the effect of DIM on the development of steatosis. The current study used HepG2 human hepatocytes with treatment of 600 µM of fatty acid (FA) mixture (oleic acid:palmitic acid = 2:1) to induce steatosis as an in vitro model for NAFLD. DIM was not cytotoxic up to 25 µM for 24h with or without FA treatments. Treatment of DIM at 25 µM along with FA treatment did not affect total fat accumulation, however, when DIM was treated after FA treatment significantly reduced fat accumulation by 14% ($p<0.0001$) compared to the control. Under steatosis conditions, DIM upregulated genes associated with FA beta-oxidation, including carnitine palmitoyltransferase I α. Further experiments need to be completed to further evaluate the molecular pathway of which DIM exerts its beneficial effect in steatosis model, and to validate its therapeutic potential and efficacy.
Purpose

To create a vegan oatmeal butterscotch cookie using chia gel or soy flour as an egg replacer.

Methods

A control and two variations were prepared. Chia gel or soy flour replaced eggs. Semi-trained panelists (n=7) rated external and internal appearance, aroma, flavor, and texture (1-5, 5 being “optimal”). An overall product score was calculated for each variation. Height and diameter were measured. ANOVA with LSD post-hoc adjustments assessed differences between variations. Total kilocalories were determined using ESHA Food Processor software.

Results

The chia variation rated lowest in sensory analysis. Significant differences: overall product score was higher for control (4.3+0.4) than for chia (2.8+0.2) and the control had a higher tenderness score (4.4+0.5), mouthfeel score (4.4+0.5), and flavor score (4.1+0.7) than chia (2.9+0.7, 2.3+0.5, and 3.0+0.6, respectively). Soy cookies were the tallest (18.9+2.7mm); control (11.8+2.0) and chia (11.0+1.3) were shorter. Control width (88.4+4.2) was greater than chia (80.3+3.3) and soy (68.3+3.8). There was no difference in calories; all variations were 160kcal/cookie.

Discussion

Previously, soy flour cookies have been found to provide taller products due to increased protein content. Chia seed and soy flour products typically rate higher in sensory analysis than control cookies due to flavor and texture, but this was not consistent with this experiment’s results. The chia cookie was least acceptable. The soy cookies resulted in a product with high sensory characteristic scores, demonstrating a suitable alternative to eggs in cookies.
Rapidly growing urbanization and changing climates are reducing the amount of potentially arable land in an age of rapidly increasing populations. Additionally, harsher extremes in weather patterns are expected to decimate or decrease yields in areas normally used for agriculture. The loss of these vital crops will likely lead to famine unless offset by other factors. To combat the effects of harsher climates and decreasing land availability, this paper considers the ramifications of using genetic modification technology to insert favorable genes into crop plants to produce a phenotype capable of increased crop yields and an improved ability to withstand weather extremes. Additionally, this technology can be used to increase the nutritional output of these plants and impart immunity to common plant diseases. To understand how genetically modified (GM) crops can help to change this paradigm I study past examples of genetically modified crops, their successes and their established drawbacks. Special attention is paid to the dangers of producing an experimental crop for human consumption. In addition to their ability to produce life sustaining food crops, GMOs are frequently used to sustain farming practices which have detrimental effects on the environment. These harmful effects include the toxification of land and water as well as loss of biodiversity and disruptions in the food chain. By studying both the potential benefits and observed failings, I build an argument to support the future development of new GM crops.
Sustainable Farming versus Industrial Farming

This project will be a thorough investigation of the two types of meat farming: sustainable and industrial; and will determine which outweighs the other in terms of ethics; not only environmentally, but also in the ethics of business. Should the quality of life of the animal before being slaughtered be considered even if the end result is for us to eat it? Is the treatment provided to animals in industrial farming causing harm to humans who eat the meat? Are these factors more important than how much land it requires to let animals be free range? Does the financial factors of how many jobs are provided by industrial farming equate enough good to outweigh the right of the animal? With all these factors considered, this project will take stance on ethical and environmental benefits for each sustainable and industrial farming while analyzing the concerns each pose.
Much of today's technology cannot function properly without a reliable source of energy. Cars specifically are a large contributor to the consumption of fuel. Conventionally, fossil fuels have primarily powered our vehicles, but they can be damaging to the environment. Through the emission of carbon dioxide, more heat is trapped in the atmosphere, causing global warming. Air and water pollution are also affected by the burning and acquisition of fossil fuels. Because they are non-renewable and geographically concentrated, certain areas of the world have less access to fossil fuels, and these resources are being depleted faster than they were created. This poses a major ethical issue. Future generations are at risk if people continue to use this form of fuel to power cars; however, fossil fuels have become a principle aspect of economies, populations, and politics. Can the world function primarily on the use of alternative methods of powering cars, and if not, is it ethical to continue to use what the earth has given us if it benefits humans?
In recent years, scientists and philosophers have expressed alarm about the growing problem of environmental degradation. The major concerns of that are global warming, climate change, increasing population and food production, GMO - its negative effect on the environment, and lastly, biodiversity loss. All of which are equally important and cannot be avoided if our environmental crises are to be solved. However, it is imperative to dig deeper into the root causes of environmental degradation in order to fix the surancing problems. We cannot succeed in finding a solution without shedding light on humans in ways they value nature. Which is why this research project is mainly focused on how modern technologies and development causes the disconnection between humans and nature, which in turn causes human negligence of nature and therefore, leads to environmental destruction. Furthermore, this project consists of in depth comparison between pre-industrial society to modern day society in America and the distinct roles each play in today's global issues.
BACKGROUND: Liquid fabric softener is used to soften clothes during a wash cycle; while, dryer sheets are specially treated cloth squares that soften clothes during a dry cycle. Fabric softeners are designed to relax the fibers and make the garment feel softer. However, using too much fabric softener results in a greasy coating on the outer layer of a garment. **OBJECTIVES:** (1) Identify appropriate textile fibers with a standard washer and dryer setting to acquire soft hand feel. (2) Investigate which form of softening method worked best leaving a clean and soft touch. **METHOD:** White T-shirts with different fiber composition will be washed in same washer setting with and without fabric softener. Washed T-shirts (both with and without softener) will then be dried with dryer sheets and the remaining T-shirts (washed without softener) will be dried without dryer sheets maintaining same dryer setting. This process will take place three times over a period of three weeks. Then, a comparison will be made in terms of clean and soft touch using subjective hand feel evaluation, fabric stiffness test (cantilever method), and drape co-efficient (BS 5058-1973). **EXPECTED FINDINGS:** The t-shirt washed with fabric softener and dried with dryer sheets will maintain a softer and cleaner touch. **CONCLUSIONS AND IMPLICATIONS:** This study will demonstrate the best way to soften garments without damaging them or leaving them with an unpleasant residue.
Nanotechnology is a new field of research that is rapidly developing due to the huge implications and high efficiency that is demonstrates in many domains. Medicine by result has high expectations from this new technology in diagnosis, treatment and even prevention of numerous diseases such as cancer. Nano medicine is the emerging approach that consist of using particles and structures of nano scale which range in size between 1-100 nano meters. They are characterized by their massive surface area which makes them extremely reactive in biological systems. As it is the subject of intensive research in the last decade, it is also a topic that raises many questions regarding its possible side effects such as toxicity, uncontrolled function, and self-assembly. In this paper we are going to examine the recent research on the possible applications of Nanomedicine as well as the ethical considerations that should be taken.
The study of morality is one of the central pillars of philosophical inquiry. There has been a long standing debate between moral realists and anti-realists over the foundations of morality. Moral realists, such as Richard Boyd, claim that the source of morality lies in the relationship humans have to one another and the world. This paper aims to improve our understanding of the foundations of morality through the analysis and critique of various meta-ethical realist and anti-realist positions.
Americans, even the poorest class, have access to life saving medical care and supplies regardless of our income or ability to repay our healthcare debt. While us Americans rack up thousands of dollars in healthcare expenses for treatment of even the most minor wounds or illnesses here in the United States, there are politically vulnerable countries losing millions of people a year to death due to the lack of the most basic sanitary medical supplies and equipment. Repurposing our waste by sending it to these less fortunate countries would decrease the number of deaths due to lack of proper care and supplies in financially vulnerable third world countries. This would reduce our cost for disposing of excess waste in the hospital and clinic setting here in the United States, in addition to reducing the impact on the environment by decreasing the actual amount of landfill waste, all while simultaneously saving lives across the nation by providing the salvaged supplies to those less fortunate humans in dire need of sterilized supplies that would otherwise be discarded and ultimately hurt our world by overfilling our landfills versus saving lives of those desperate for what we take for grant and discard.
In this study, the effects of noise pollution are observed based on the habits of baleen whales, and other life that are vital to the ecosystem. Whale populations are negatively affected by the amount of noise pollution in the ocean. This can be proven through correlative studies of whale behavior, and changes in said behavior over time.

According to us.whales.org, “For whales and dolphins, ‘listening’ is as important as ‘seeing’ is for humans. Noise pollution threatens whale and dolphin populations, interrupting their normal behavior, driving them away from areas important to their survival, and at worst injuring or sometimes even causing the deaths of some whales and dolphins.” Noise pollution is seen to disrupt migration patterns, breeding, and cause increased levels of stress, as well as kill many larvae and plankton that serve as a main food source for marine life.

There are currently no international regulations of noise in the marine environment, although it is recognized as a form of pollution, according to the Animal Welfare Institute. Noise pollution is damaging to marine life, with the population of marine mammals being affected greatly based on their dependence of sound to life. Solutions to the noise pollution of the ocean such as adding silencing modifiers to ships and finding alternatives to seismic airgun blasting to protect our delicate ocean ecosystem.
There are several factors that have contributed to the decline of bee populations over the last several years. The correlation between human impact on their environment and their decline is hard to deny. A movement to aid pollinators is in full swing, but is it doing more harm than good? Are small so called natural hives making an impact on the big business of industrial beekeeping? Using a widespread understanding of environmental ethics, this paper will examine the ethical implications of both industrial and backyard beekeeping in an effort to answer these questions.
What should our environmental approach be? Are we a part of nature? How should we view nature? These are big questions, and this project will aim to explore them, and offer a meta-ethical perspective to answer them as best as can be done.

Our approach to nature has been anthropocentric for quite some time now, with devastating aftermath. Documentation has been rich regarding the deleterious effect our domination of the earth has had upon nature, as this project will show. But now that we are realizing the damage we’ve done to nature, and the myriad ways in which that is wrong, we have opportunities abound to correct our errors. So what should our approach be?

Deep ecology and environmental antinatalism may argue that we should abandon our claim to the earth if we are to repair it, or that we are too harmful to the environment to retain a major stake in its mending. This project will argue that the approach to guide our environmental repair must prioritize humanity to some degree because we are the origin of normativity, because humans have individual moral worth and deserve to live as a part of nature, and because the best chance for the most repair lies with us still being around. The ultimate goal would be for humanity to achieve a mutually beneficial balance between us and nature, and this project will assess how this goal can interact with previous ethical and philosophical positions on nature.
Languages are not formed democratically - did anyone sign up to learn English when they were born or agree to use the grammar and diction that they depend on for communicating with the world? Languages have their own inherent politics - languages have different ways of referring to the same concepts, and these differences presuppose political relationships between the speaker and the referent. A Marxist-Leninist analysis of language combines a critical examination of the institutions from which language spreads along with a precise description of examples of the ideology hidden behind words in the English language. This analysis is important because language dominates our thoughts and our speech - it dominates our relationship with ourselves and our relationship to the world. This analysis can be done by looking at how countries and groups are labelled in different languages, and what these labels signify on a political level. Examples include China, Burkina Faso, and the Ivory Coast. To taint language (and therefore thought) with pre-constructed ideology is to exercise significant control over a population by conforming their thoughts and debates to a mold. Being able to identify ideology in language and communicate and think outside of it is a vital skill for any population wishing to exercise true freedom of conscience.
We investigate the properties of quasi-statically evolving black holes during inflation driven by a classical scalar field. With the analytic Schwarzschild-de Sitter metric as a background, perturbative solutions to the Einstein field equations allow us to study black hole and cosmological horizon growth, as well as other quantities of interest. More recent work aims to map the energy density and determine its asymptotic (far field) behavior, and to compute fluxes of currents obtained through contractions of the stress-energy tensor. Additionally, quasi-normal mode solutions of the Klein-Gordon equation in the background spacetime are sought, with the eventual objective of describing particle production by a small quantum scalar field correction.
Traditional photovoltaic cells use semi-conductive silicon to drive their light to electricity conversion process. Although this has become a cheap process to mass produce, there are drawbacks that keep these panels from reaching their maximum efficiency. Due to properties of the semi-conductive silicon most panels have a dependence on temperature around 0.5% maximum power output loss per 1 degree Celsius rise in temperature. By keeping a solar panel at room temperature, the power output on a hot summer day can be improved by 10-15%. It has been found that by applying water to the upwards facing surface to intermittently cool the panel, the power output can be improved by up to 8%. The possibility of reusing rainwater to drive this cooling has been explored. Using MATLAB the evaporation rate and longevity of rainwater reserves has been estimated to investigate the feasibility of such a system. Using these results a design has been created that would reuse rainwater to cool the solar canopies existing in three UMass parking lots.
The Muon g-2 experiment aims to measure the precession rate of a muon to that of a proton in a magnetic field to a higher precision than ever before, the results of which will elucidate whether there exists physics beyond what is currently known. The project requires an extensive measurement of the magnetic field created to precess the particles. In this paper I detail my efforts to contribute to this measurement by optimizing a faraday optical magnetometer for measurement on time scales on the order of the decay of the muon. The time-scale is important as the magnitude of the magnetic field must be precisely known at the moment the muon decays.

The bulk of the work has been optimizing a known design - namely an SF-59 crystal inside a solenoidal magnetic field - in order to be able to detect signals of around 0.8 milliGauss (around 1000th the strength of the earths magnetic field) inside the apparatus. This has been developed through attempting to reach signal to noise ratios of 40:1, using a known magnetic field strength, powered with a known current generated by a function generator. This paper explores the many methods of shielding, amplification, subtraction and boosting in an effort to achieve superior signal detection in a noisy environment with the faraday magnetic field measurement apparatus.
Interfaces between two liquids such as oil and water occur everywhere in daily life including in food and biology. Microscopic particles have a strong attraction for liquid interfaces and tend to form layers at them. In this research, we focus on the interface between oil and water and explore ways to stabilize oil droplets in water (i.e., emulsions) using particles. Salt ions dissolved in liquid can be made to favor either the oil or water, which can lead spontaneously to a separation of charges and an electric field at the interface. This electric field can attract particles, which form a layer and protect the droplets from coalescing. We measure the effect of a salt, tetrabutylammonium perchlorate (TBAP) on particle binding and emulsion stability. We use silica spheres suspended in water. We find that emulsions are only stable with TBAP concentrations of $3 \times 10^{-4}$ M and greater. An increase in nanoparticle concentration was found to increase the threshold value of [TBAP]. The [TBAP] threshold value decreased when we used a different oil that was less polar. We also find that droplets can be destabilized by adding salt (e.g., NaCl) to the water, which offers a very intriguing possibility to disrupt emulsions on demand. These results help improve the effectiveness of inexpensive clay and silica particles compared to other particles that require chemical modification, thus expanding the range of applications that are possible. Results from this study can be useful towards understanding emulsions better for uses in cosmetics, paints, or 3D printing.
Significant evidence, both astrophysical and cosmological, points to the existence of dark matter. The fundamental nature of dark matter, however, remains unknown. One appealing candidate for dark matter are weakly interacting massive particles (WIMPs). Direct detection experiments aim to observe the low energy scattering of dark matter off normal matter, and detectors based on noble liquid technology lead the way in WIMP sensitivity. To this day, no conclusive WIMP signals have been observed. The DarkSide experiment uses a liquid argon target in a dual-phase time projection chamber to search for WIMP dark matter. The DarkSide-50 experiment is located at Gran Sasso National Laboratory (LNGS) in Italy and its argon target was obtained from underground sources, shown to have much reduced argon-39 radioactivity than atmospheric argon. It nonetheless contains measurable amounts of the radioactive contaminant krypton-85.

This work describes the analysis of Monte Carlo simulated as well as real data from the DS-50 detector to search for a tell-tale delayed coincidence signature of krypton-85 decays to the rubidium-85m state. The results of this search provide valuable information about the backgrounds inside of the detector as well as on its energy and spatial resolution, thus aiding in the search for WIMPs.
The microtubule cytoskeleton is an essential network used for intracellular transport and cellular structure. It is highly dynamic and regulated in space and time by many classes of associated proteins. One important class of regulators is the microtubule-severing enzymes, hexameric ATPase enzymes that can cut microtubules anywhere along their lengths. The mechanism of microtubule severing is not fully understood. The carboxy-terminal tail (CTT) of the tubulin dimer is essential to the severing process, but we find that microtubules lacking the CTT can be depolymerized by katanin. This implies that the mechanism for katanin severing is distinct from depolymerization. To further probe the mechanism of the role of the CTT in katanin severing, we have created a small, fluorescently-labeled tail peptide using bacteria’s expression and purification. We have started initial single molecule imaging of the tail peptide, which we will combine with the katanin severing enzyme to measure binding and hexamerization kinetics of the tail and katanin together. This substrate will be used for single-molecule and bulk experiments to determine stoichiometry, reaction rates, and binding affinity constants.
Microtubules are the underlying structures of essential cellular structures such as the mitotic spindle, primary cilium, and neuronal axon. Self-organized patterns caused by motors have been explored, but very few of these are resulted in biologically-relevant organizations. We explore more biological self-organized patterns of microtubules using macromolecular crowding and crosslinking microtubule-associated proteins to drive novel states during microtubule polymerization. We find that the phases and patterns depend very sensitively on the filament length and the percentage of MAP65 crosslinkers present. Specifically, there is a range of concentrations that result in spindle-like “tactoids” that could act as model mitotic spindles. We will investigate whether similar microtubule organization, and filament lengths, are observed in another crosslinker, PRC1 with several different controlled lengths of microtubules. This work will allow new research on the self-organization of the mitotic spindle using a systematically controlled in vitro reconstitution system.
We introduce pair production in field theory describing the decay of vacuum to a system of two point particles connected by one (or more) struts. Specifically, we derive exact solutions to the Einstein Field Equations describing a pair of point particles connected by one or more struts in 2+1 dimensional spacetime. From these solutions, we compute the total action of the configuration, and from the action we compute the probability of vacuum decaying into this state. Ultimately, we intend to use this configuration, and its corresponding probability, to gain insight into a point-particle description of inhomogeneities in the inflationary universe in the realistic 3+1 dimensional case.
The Fermilab g-2 experiment will measure the precession of muons in a magnetic storage ring. The experiment requires a precise measurement of the magnetic field to an accuracy of 70 ppb. This is done by measuring the Larmor precession frequency of protons using pulsed NMR. Since almost everything in the experimental setup creates a magnetic field, there are many small factors that affect the magnetic field and the precession rate of the muons. Even the pulsed NMR probes used to measure the field perturb the field. I’m using MATLAB to simulate how the Larmor precession frequency yields information about the local magnetic field. Eventually I am going to analyze real data, and look at some systematic effects such as the effect of the probe on the measurement.
Facing unpredictable climate changes, maintaining a sustainable agriculture depends on the availability of genetically diverse cultivars. The traditional European grapes (e.g. Pinot Noir) are cultivars of a single species. In contrast, emerging grape cultivars (European-American hybrids) take advantage of the tremendous genetic diversity of the native American grape species (about 30 species). In the traditional European grape varieties, shoot and fruit thinning is known to influence fruit juice quality (ripening time, sugar, acidity) and help reduce pesticide usage. Little is known regarding these effects on emerging European-American grapehybrids. Our multiyear project, started in 2015, quantifies the effect of thinning practices and their cost on these emerging hybrids. In this research we ask the following questions: (1) What is the effect of shoot and/or cluster thinning on grape quality? (2) How does it vary across grape varieties and years? (3) How does it compare between table and wine grapes? (4) How much is gained in terms of disease control and quality and does it outweigh the labor cost of thinning?
Discover Nature’s Benefits

Instinctively being outdoors is enjoyable while experiencing the beauty of nature and the freedom associated with it. The purpose of this project is to emphasize the benefits of nature at many levels, including physical, psychological and spiritual. Participating in outdoor activities not only provides more opportunity to learn about nature, it also opens minds. Outdoor classrooms are more common and offered at varied levels of education ranging from pre-school to university students. Also, there are documented spiritually benefits in being active outdoors, while simply walking in the woods or by the ocean. Being in the wilderness encourages practices of yoga and meditation that is known to limit anxiety and stress. This project will develop an immersive experience in nature that will allow for a learning and entertaining event. A scavenger hunt would be a method to encourage participates to be active outdoors, while learning about nature. This can be simulated on smart phones allowing the participates to search for landmarks, while walking a path using their phones as a GPS device. The results of engaging in outdoor activities leads to increase in physical fitness, psychological benefits of dopamine released and the strength of mental health with improved learning capacity. The conclusion of this study aims to demonstrate the benefits of outdoor activity that allows participants to learn about nature, while enjoying the physical, psychological and spiritual rewards.
Plants and arbuscular mycorrhiza fungi (AMF) interact in complex ways. Under certain conditions, the fungi trades nitrogen, phosphorus and water in return for carbon and photosynthates from the plant. Growing conditions, such as nutrients, can influence this symbiosis. We manipulated AMF and nutrient concentration to investigate their effects on lettuce (*Lactuca sativa*) biomass. We hypothesized that when the plant was nutrient stressed, the fungi would compensate, resulting in higher lettuce biomass. In a controlled greenhouse, we organically grew *Lactuca sativa* for eight weeks. Our manipulations consisted of four treatments, a base level (5-2-4) fertilizer without AMF, a base level of fertilizer with AMF, a low level of fertilizer with AMF, and a high level of fertilizer with AMF. After eight weeks, roots were harvested to check percent colonization. We weighed dry leaf biomass and measured root length, leaf length, and number of leaves. We found that low fertilizer with AMF treatment had the same amount of biomass as the treatment with base level fertilizer and no AMF. However, the base level fertilizer with AMF had lower biomass than the base level fertilizer without AMF. Our findings suggest that AMF can make up for a lack of nutrients when nutrients are scarce, which is consistent with what other studies have shown. However, in plants grown with AMF and abundant resources biomass was reduced, which highlights the context dependency of the symbiosis.
The recently described black oak gall wasp, *Zapatella davisae* Buffington, a stem galling wasp, has caused extensive damage and mortality to black oak trees, *Quercus veluntia*, of coastal Massachusetts, USA. Natural enemies in the form of parasitoid wasps exist to regulate outbreaking populations of gall wasp in native habitats; however, parasitoids have not yet established enough in novel habitats to cause sufficient mortality to *Z. davisae* and thus do not prevent gall wasps from attaining outbreak densities. The goals of this study were to determine present year parasitism rates of *Z. davisae*, and to collate historical gall wasp densities to determine if a top-down relationship between gall wasps and parasitoids exists. Our hypothesis was that parasitoids serve as top-down pressures and function to control populations of *Z. davisae*. Present year parasitism rates were obtained through an emergence census of gall wasp communities from sites on Nantucket, Martha’s Vineyard, and Cape Cod, Massachusetts, USA. Historical gall wasp densities were obtained through dissection of branches from the same sites. Percent parasitism rates were determined to be 28.6%, 90%, and 68.8% on Nantucket, Martha’s Vineyard, and Cape Cod respectively. The trend of historical densities is consistently shown as an increase in population size followed by a crash, likely facilitated by parasitoids. *Z. davisae* populations in Nantucket have not yet experienced a population crash however, based on data from Martha’s Vineyard and Cape Cod, outbreaking populations of *Z. davisae* are likely to crash in coming years.
Abstract A ray of light from the sun starts the ultimate signaling cascade in a plant. The organelle in the plant that receives this signal is the chloroplast. The pathway started from this interaction has an impact not only on photosynthesis, but also on plant growth and development. The signal cascade that begins when light rays hit the chloroplasts is the reason why certain plants are able to thrive in constant sun versus plants that thrive in shaded environments. *Sertaria viridis* is a model C4 grass, able to thrive in high amounts of sunlight. The introduction of a mutation, resulting in a down-regulation of the gene responsible for chloroplast division, will result in *S. viridis* with larger chloroplasts than the wild-type. The increase in size of the chloroplasts could potentially increase the surface area available for light absorption, making the *S. viridis* with the larger chloroplasts better fit to survive in low light environments. By linking size of chloroplast to the well-being of a plant as a whole, crop canopies may be able to house more diverse plant species.
Plants interact with both their belowground and aboveground environments, but the interaction between these different domains is under-studied. The belowground environment can directly and indirectly affect plant aboveground interactions via changes in nutrient acquisition, biomass accumulation, defense against antagonists and floral traits. We examined how plant interactions with the belowground biotic and abiotic environment scale up to alter floral traits and, in turn, pollinator health. Soil-dwelling mycorrhizal fungi are considered plant mutualists, although the outcome of the relationship can depend on environmental conditions such as nutrients. In a 2x2 factorial design, I asked whether Nicotiana tabacum (tobacco) plants grown with or without mycorrhizal fungi in high or low nutrients affect nectar and pollen alkaloids previously shown to reduce bumblebee disease. I collected pollen and nectar for analysis and to feed to bees infected with the common gut parasite Crithidia bombi. My results show that mycorrhizae delay flowering phenology and can increase pollen alkaloids, depending on nutrient conditions. Furthermore, tobacco pollen and nectar from plants grown under all conditions except AMF-/high fertilizer, reduced bee infection load relative to the control diet, to varying degrees. These results underscore the importance of whole-systems studies to predict ecological outcomes relevant to managing pollinator health.
Why do migrant laborers in the Gulf states still choose to work there, given the harsh living and working conditions that they suffer from? Since the oil boom in the Gulf, the Arab citizen populations have diminished due to the influx of expatriate labor from outside the region - notably of South Asian or Southeast Asian nationality. The circumstances of migrant laborers working within the kafala system in the Gulf have sparked international attention regarding the region's intent towards preserving and promoting human rights. However, the remittances that these laborers earn in their assigned states make up a considerable portion of their countries' GDP, and can be the only source of income they have. What is commonly considered to be a “resource curse” in the Gulf states, where the rents of natural resource wealth of a state lead to more autocratic policies, might be considered to be a transnational phenomenon in the migrant labor market between sending and receiving states. Sending countries’ governments have been unwilling to reform domestic policies to generate economic growth, since they can use their expatriates as a means of revenue, which explains why migrants continue to endure working in the GCC. This project explores the relationship of Bangladesh, the Philippines, and Kerala with the GCC and their involvement in the kafala system, the power dynamic of the citizenry in the GCC that enable this system to be in place, and the external and internal motivations of expatriates who continue working in the Arabian Gulf.
Our nation is facing a serious deficit of female leadership in elected office. Even though they comprise about 50 percent of the population and electorate, less than one in four officials at every level of government are female. If women are given equal opportunities to run for office then the number of women in office should reflect that. Instead, the numbers indicate that there is a problem with the candidate emergence and selection process in U.S. politics. The system of fair and equal representation appears to be broken. This paper is an attempt to discover why women are less likely to be elected to office than their male counterparts. In it I will first go through the steps in the candidate emergence process, identify barriers women face, and which points in the process they occur at. Then I will put forth a proposed government program designed to close the gender gap in elected office. I will use both scholarly research and original data, gathered through surveys and interviews, to demonstrate that it is the most effective and efficient solution to close the gender gap.
Political commentators have offered evidence that the “polling misses” of 2016 were caused by a number of factors. This project focuses on one explanation, that likely voter models – tools used by pre-election pollsters to predict which survey respondents are most likely to make up the electorate and, thus, whose responses should be used to calculate election predictions – were flawed. While models employed by different pollsters vary widely, it is difficult to systematically study them because they are often considered part of pollsters’ methodological black box. Instead, I build what likely voters should look like from the ground up. Using Cooperative Congressional Election Study (CCES) surveys from presidential and mid-term election years over the last decade I develop a set of likely voter models that meet any pollster’s needs, allowing them to accurately predict the composition of the electorate by using a combination of traditional voter screen questions, demographics, and variables typically considered in structural election forecasting models and to accurately and effectively communicate election predictions by incorporating a range of different turnout estimates.
On March 11, 2011, the Great East Japan Earthquake caused a tsunami that resulted in the Fukushima nuclear disaster. Although the government of Prime Minister Naoto Kan immediately shut down all active nuclear power plants in the wake of the disaster, each subsequent administration has sought to increase Japan’s reliance on nuclear energy. My research seeks to understand why the Fukushima nuclear disaster caused Japan to counterintuitively strive towards historic levels of nuclear energy production that are almost twice the values seen before the Fukushima nuclear disaster. I argue that Japan’s emphasis on self-sufficiency in its definition of energy security prevented the abolition and reduction of nuclear energy not only because other alternatives would increase its reliance on imported energy, but also nuclear energy can help curb climate change challenges. This thesis strives to contribute to the literature on energy security by conducting a case study on Japan that examines how state interpretations of energy security react in light of the nuclear disaster and public response.
Racialized Medicine: Bias in Treatment of Cardiovascular Disease and Pain Management

The sources of racial-ethnic minority group health disparities derive from a range of historical and current economic and political policies that promote socioeconomic disadvantage, the key determinant of health outcomes. Bidil is an FDA approved drug, to treat heart disease that is specifically targeted to one racial-ethnic group, despite the fact that clinical trials showed its general effectiveness. The FDA’s action can only be seen as giving tacit support to the idea of fundamental, genetic, differences between racial groups. These reductionist assumptions also likely explain the under-prescription of opioids to African-Americans. This thesis examines both developments and concludes with policy recommendations that include prohibitions on racially-targeted drugs and requirements medical educational that provide sounder understanding of human variation, and cultural competence.
There has been a proven correlation between health and social status. This presents as a health gradient, health correlating with social status. The more prominent the social status, the better the health people find themselves in. There are a few populations who are more unique and do not fit into a typical social category. The homeless population is one of these unique populations. An examined look at the policies, housing opportunities, job opportunities, the economy, and the disadvantages experienced by the homeless population allow for an understanding of how their health reflects the social determinants. Examining the approaches of other countries to combating homelessness provides ideas for how to formulate a comprehensive policy to assist the homeless population here in the United States, and thereby improve the health of that population.
Despite statutory protections, it is rare for longstanding sanctions to be imposed against perpetrators of farm animal cruelty. Such incidents represent a brutal trend in America’s food industry, as investigations continue to reveal the malevolence that lives on within factory farms; these recurring instances of negligent oversight subsequently prompt a rather pertinent discussion surrounding the implementation of regulatory measures, as federal entities such as the United States Department of Agriculture should be held accountable for the enforcement—or lack thereof—of enforcing policy.

With this foundation, I am conducting a policy analysis regarding regulatory protections for farm animals. This includes an assessment of policy language, content, implementation, and results, so as to provide a comprehensive overview of this area and identify shortcomings in each stage of the policy-making process. My research has thus far allowed me to analyze the lapses in safekeeping within the context of contemporary governance, and from this I have been better able to determine the grounds on which this perpetual maltreatment is deemed permissible.
This project analyzes Argentine immigration policy using discourse analysis of public statements made by the government of President Mauricio Macri. The case of Argentina provides an opportunity to understand the development of “crimmigration,” the intersection of criminal and immigration law, as a response to the “liberal paradox,” the tension between the economic logic of openness and political logic of closedness central to traditional liberalism. Liberal states use crimmigration to maintain sovereignty despite the constraints of the liberal paradox. The merger of criminal and immigration law consolidates legislative and executive power to implement restrictionist immigration policies. By comparing the experience of Argentina to United States, I argue that crimmigration is best understood as a deepening of the liberal paradox, maintaining economic openness while converging criminal and immigration law so as to gain greater control over undesirable immigration populations. These reforms aim to stifle the progression of contemporary rights-based liberalism so as to sustain the liberal paradox. The development of crimmigration in Argentina has also revealed how these reforms include a concerted effort to disempower the judiciary so as to hinder the courts from institutionalizing rights-based liberalism by protecting immigrants’ rights based on their personhood. I will examine how this discourse has served to legitimate and normalize restrictionist immigration policies in Argentina. Hegemonic norms of political discourse have previously promoted a more expansionist approach whereas the Macri administration has attempted to bend the judiciary to the will of the executive.
The 2016 election is over and some would say the dust is settled and it is high time for all to move on. Others aren’t so sure. For them, the election was reality-shattering and without an anchor to rely on they were lost with a new perception that was strange and unsettling. Elections are increasingly dependent on digital tools including social media, and 2016 was no different. It offered a candidate, Trump, who regularly set the news cycle through these platforms. Fake news was a distinct weapon used by politically motivated groups and agencies, both domestic and foreign, to manipulate voter opinions. It played into human faults: the bias and stereotypes we use to construct our *umwelt*, a term used by neuroscientist David M. Eagleman to describe how animals that co-exist in the same environment experience completely different realities. Co-host of WYNC’s On the Media stresses that we use our umwelt to define the *Umgebung*, the larger reality. My research delves into how differently motivated groups were able to take advantage of the online world to manipulate millions of people. Also, I will study how this phenomenon has affected society since then. Fake news entrenches individuals into complicit behavior that may allow for the social deaths of ‘others’ who exist ‘out there’. In fact, hate crimes against many minorities and vulnerable groups have spiked since 2016. More propaganda attacks are expected as the midterms approach.
There is a long and well-researched understanding that the way in which a political actor uses language depends greatly on their partisan affiliation. There is no doubt that those language differences spill over into the vast amounts of communication political actors conduct through their social media accounts. This means that social media posts of political actors provide a rich window into the language differences of political factions. This paper will specifically look at the twitter posts of the senators in the 115th Congress. Using tools like word and n-gram frequency, sentiment analysis, and text clustering, the paper will construct a network which describes the political factions each senator falls into.
Because troops and veterans typically do not have to worry about treatment costs and whether their medical needs will be met, the microsphere that is the United States military and its associated Veteran’s Affair healthcare system is a prime community to analyze universal healthcare. Military rank, an identifier of socioeconomic status, is one such axis by which health outcomes can be measured. However, when compared to the United States as a whole, the United States military healthcare system reduces the stratification of health problems based on socioeconomic status but is not perfect. It mitigates, but does not eliminate these inequalities. This thesis uses the U.S. military to offer insight into how socioeconomic status affects health outcomes in a standardized universal system and compares these outcomes to other non-universal systems.
In 1847, a dam was constructed on the Hadley Falls of the Connecticut River to harness the available power for industrial production. The dam and canal system were privately-owned until recently, when they were sold in 2001 to the City of Holyoke, although small turbines within the system are still privately-owned. Holyoke Gas and Electric has been municipally owned since the early 1900s, but it should also be noted that while the system is municipally owned, it is not municipally operated. The firm functions outside of the city’s budget, and makes decisions via a board of directors, appointed by the city’s mayor. This could mean that Holyoke Gas and Electric’s interest align with its ratepayers and at odds with Holyoke residents. Our goal is to determine how the ownership structure of a hydropower asset affects its operating behavior and how this ownership structure changes the way the dam’s profits and electricity are distributed. We hope to see what this case reveals about the viability of municipally-owned hydropower in regards to sustainable, local economic development. We will be conducting interviews of members of the Holyoke community who are impacted by the dam and conduct an analysis of documents from the last 20 years. We aim to understand this case as an example of how municipally-owned hydropower may differ from privately-owned hydropower assets with regard to financial and electricity flows, and the implications these flows have for local development.
The death of U.S. Supreme Court Associate Justice Antonin Scalia triggered a fourteen month appointment battle which spanned two White House administrations, two nominees, and two invocations of obscure senatorial practices. This appointment battle is often characterized as symbolic of the hyperpolarization and hyper-politicization of the current climate in Washington. However, when situated within the broader history of judicial appointments, it is evident that the Scalia episode is a continuation of, rather than a deviation from, guiding principles of judicial politicking. This thesis examines how the recurrent trends in judicial appointment history reveal the Senate’s role in shaping the federal judiciary. A study of records surrounding the United States Constitutional Convention suggests that the Founding Fathers fully anticipated a politicized judicial appointment process within which the Senate could exercise broad influence and authority. Moreover, an examination of various failed High Court nominations likewise suggests that the politicization of selecting Supreme Court jurists is not a modern trend. This thesis maintains that the Senate’s role in the appointments process has always been tumultuous, vacillating between blatant obstructionism and deferential timidity. These fluctuations are important because they illustrate the existence of a very real and absolutely crucial limit on executive power. This thesis concludes that the depiction of the Scalia confirmation battles as anomalous is a misnomer and that the episode following the Justice’s death was surprisingly ordinary.
To many conservatives the greatest achievement of Donald Trump’s presidency was the appointment of Neil M. Gorsuch to the Supreme Court of the United States. As the youngest sitting justice (just 50 years old) Gorsuch will, barring an unforeseen catastrophe, help shape the positions of the Court for decades to come. It is therefore necessary to determine what approach or approaches he applies in his work in an effort to predict the likely outcome of some of the more controversial cases that he will inevitably rule on in his time on the bench. By evaluating various works by neoconservative constitutional interpretational theorists and a brief evaluation of natural law theory as articulated by John Finnis (whom Gorsuch earned a Doctorate in Philosophy under), Conley seeks to construct a spectrum of neoconservative thought and thinkers. Conley then turns applying this spectrum to the academic and legal writings of Gorsuch himself to determine where he may fall on the spectrum. This discussion will allow academics, lawyers, jurists, and laymen to better predict Gorsuch’s positions and the arguments that may or may not sway him in a given direction.
In the wake of the aborted confirmation of Supreme Court nominee Merrick Garland and the impending Masterpiece Cake Shop v. Colorado Civil Rights Commission (2017), much attention has been given to the Supreme Court and its composition. Yet this thesis asks a broader question, what is the proper role of the Supreme Court when it comes to deciding issues of great social significance? In essence, this thesis questions the very assumptions that Americans have pertaining to the Supreme Court.

Organizationally, this thesis has three main sections. The first offers an analysis of the conflicting theoretical perspectives over the Supreme Court's proper role in American society, which will then establish the premises of the overarching models concerning how the justices ought to act in cases involving significant social change. The second section analyzes scholars' competing empirical claims regarding the Supreme Court's role, if any, in promoting substantial social change. The concluding section of the thesis outlines this author's proposed models for how the Court ought to act based on the type of social issues that litigants present to it.

By addressing the question of the proper role of the Supreme Court, the models presented could be used to add another lens through which scholars and citizens alike can evaluate Supreme Court decisions. At a minimum, this thesis should raise awareness and make scholars and citizens alike think critically about how much power the Supreme Court wields in deciding the direction of society.
A Historical Analysis of the Development of Healthcare Systems within the Market-Based Economies of the United States and Canada since the Mid-Twentieth Century

This research offers an historical analysis of the political and economic factors throughout the past century that led to the development of different health care delivery systems in the United States and Canada. The U.S. and Canada share many similarities, including population size and economic structure, but have diverged paths in terms of healthcare policy. The United States provides minimal and highly fragmented coverage to select populations, while Canada’s Medicare for All system guarantees equal coverage to all its citizens. This thesis considers the divergence by analyzing the influence of corporations, public opinion, and politics on policy development. It concludes that unlike the United States, a combination of political factors, including differing public perceptions about "free markets" in Canada, facilitated the implementation of an equal-access healthcare delivery system. In the United States, private interests (doctors, insurance companies, hospitals) wielded more power in the 20th century, and thus prevented the creation of healthcare policy that would ensure full-coverage for all Americans.
My project focuses on how study abroad, family, and culture all contribute to the process of identity formation. Studying abroad is a novel, life changing experience that exerts a profound impact on one’s identity. White American college students who study abroad find themselves identified as foreign, as American, and as a minority probably for the first time in their lives. The culture shock and reverse culture shock that result from this experience can cause a disruption to one’s identity that needs to be resolved. Digital storytelling is a tool that allows authors to express themselves through narration, images, video, and music. It is a creative and therapeutic process that assists authors in piecing together their sense of self after a disrupting experience like studying abroad. My own series of digital stories focuses on my Italian family background, my upbringing, and my recent journey abroad to Italy, in which I traced family roots in an attempt to understand more about my own identity as an Italian-American. Through digital storytelling I pieced together my childhood ethnic identity as an Italian person and the American identity that I was aware of for the first time while I was abroad. By returning to a hyphenated sense of self, I was forced to resolve my identity disruption, which I explored through digital storytelling.
Young women are engaging in non-suicidal self-injury (NSSI) and eating disorder (ED) behaviors at increasingly higher rates. Current literature speaks to the prevalence of NSSI and eating disorders among young women, draws connections between emotional functioning and prevalence of NSSI/ED behaviors, and supports the comorbidity of NSSI and EDs. However, there is little research exploring the interactive effects of emotional functioning and distress tolerance as predictors of different types of NSSI and ED behaviors.

Participants come in for two in-person sessions followed by a two-week online daily diary. The data will come from a comprehensive diagnostic interview completed during the first session, and results from questionnaires and a pain task completed in the second session.

The predicted results are that participants who suffer from low emotional functioning and high distress tolerances are more likely to engage in NSSI behaviors like cutting and burning, and/or ED behaviors like purging, restriction, and over-exercise whereas participants with low emotional functioning and low distress tolerances are more likely to engage in ED behaviors like binge eating. Participants with high emotional functioning are unlikely to engage in any NSSI or ED behaviors.

Being able to better predict these different risky behaviors will enable mental health professionals to adequately implement prevention measures with at-risk populations.
The proposed research is part of a larger, community-based intervention aimed at reducing prenatal stress and depression among a low-income sample of first-time parents. Previous research has shown that stress in the perinatal period plays a significant role in adverse birth outcomes, maternal mental health and future child development. Less is known about how different types of stress assessments, meaning self-reported stress (assessed through questionnaires), chronic stress (assessed through hair samples), and diurnal stress patterns (assessed through saliva) are related to each other. In addition, few studies have addressed how these indices of stress are interrelated during the prenatal period. The proposed research addresses some of these gaps in our knowledge. The first goal of this research is to examine the feasibility of assessing biomarkers and self-report measures of stress among low-income, first-time mothers and fathers. For example, how compliant are participants in collecting hair cortisol measures, salivary cortisol samples and self-report measures. The second goal is to develop user-friendly, on-line tutorial videos to teach expectant parents to collect their own samples and, in so doing, increase compliance and feasibility. The final goal will be to examine the relationship between parents' self-reports of stress and hair cortisol levels during the prenatal period. We currently have preliminary data on 8 couples participating in the intervention and plan to collect data on 16 more couples in the intervention group and 24 couples in a control condition.
In recent years, yoga has gained popularity in the west, and has even made inroads as a component of treatments for mental health difficulties. Despite the burgeoning research on the effectiveness of yoga-based interventions, it is unclear to what extent the physical practice confers benefits relative to the philosophical underpinnings. The absence of a clear measure of the philosophical underpinnings of yoga practice is a barrier to such research. To address this gap in the research, we have developed a novel measure of yoga philosophy. The aim of this study was to validate this measure and examine its association with mental health outcomes. We hypothesized that yoga philosophy will be positively associated with mindfulness, and negatively associated with ADHD symptoms, emotion regulation difficulties, perceived stress, and anxiety/depression symptoms. Participants included yoga practitioners and teachers from the University of Massachusetts Amherst campus, and from workers on Amazon Mechanical Turk (MTurk). We will present data on the internal consistency and structure of this novel measure, as well as its associations with psychological wellbeing. These findings have implications for the study of yoga in mental health.
The current study is part of a large multifaceted investigation to identify affective factors contributing to diagnostic errors in medicine. In a pilot study, Isbell et al. (2017) interviewed emergency medicine (EM) physicians and nurses to explore (1) negative emotions that providers experience in the emergency department (ED), (2) providers’ perceptions of how these emotions influence diagnostic reasoning and cognitive processing, and (3) strategies to reduce adverse influences of emotion (Isbell et al., 2017). Results revealed that providers experience considerable frustration and anger in the ED, have some awareness of the possible adverse impact of these emotions, and employ strategies to compensate for this. The current qualitative study builds on these findings to identify and explore triggers that lead EM providers to experience specific negative emotions. Triggers include particular "types" of patients (e.g., psychiatric patients, demanding patients, substance users, “frequent flyers”), communication challenges, and hospital conditions (e.g., patient volume, patient boarding). Participants are EM physician and nurses from several Massachusetts hospitals. Ongoing qualitative interviews and analyses continue to inform our understanding of emotional experiences in the ED, effects on decision-making, and possible interventions to improve diagnostic reasoning. Results will also inform subsequent research aimed at creating methods to experimentally manipulate provider emotions to allow us to investigate their causal impact on clinical reasoning in controlled experiments. Taken together, this work contributes to the long-term goal of improving diagnostic accuracy through increased understanding of how emotions affect medical providers' cognitive processing.
Given the unique challenges adoptees encounter, it is important to consider how and whether these challenges could impact their ability to form strong social connections. This study examines relations between positive adoption affect and peer attachment within adolescence and emerging adulthood (EA), the stability of positive adoption affect and peer attachment over time, and whether the scores on one construct during adolescence predict the scores on the other during EA.

Participants included 139 adoptees (46.8% males) who were domestically adopted as infants. Adoptees were administered questionnaires during adolescence ($M_{age}$: 15.77) and emerging adulthood ($M_{age}$: 24.97). Positive adoption affect was measured with the Adoption Dynamics Questionnaire (Benson, Sharma & Roehlkepartain, 1994) and Peer Attachment was measured with the Inventory of Parent and Peer Attachment (Armsden & Greenberg, 1987).

Data were analyzed using correlations to look at within-wave relationships and regressions to look at longitudinal relationships. Positive affect and peer attachment were positively correlated in EA ($r = .33$, $p < .01$) but not in adolescence. Positive affect in adolescence predicted both positive affect in EA ($b = .52$, $p < .001$) and peer attachment in EA ($b = .21$, $p = .024$). Adolescent peer attachment did not predict peer attachment or positive affect in EA. Variations in this pattern of findings by age and gender will also be discussed. These findings will offer further information into the correlates of attachment in adoptees and could be applicable in clinical settings.
Reducing the Mental Health Stigma: An Evaluation of Biogenetic Education and the Contact Hypothesis

Psychoeducation is an increasingly important approach to educating both those affected by mental illness and the general public. Education and advocacy are key elements in reducing mental health stigma, but the messages may sometimes have unintended negative consequences. My study aims to evaluate these messages and discover the best ways to present information about mental illness to reduce stigma. Specifically, we are testing the effectiveness of pairing a biogenetic educational video with a video showing people with mental illnesses discussing their disorders (contact video) in reducing stigma. 128 undergraduate participants were randomly assigned to view a TED Talk on mental illness (education condition) or a TED Talk on an irrelevant topic (control condition), and then were randomly assigned to either the contact video (contact condition) or to no video (control). Pre and post stigma levels were compared using questionnaires and responses to vignettes. Data collection is in progress, and results will be available soon. We hypothesize that pairing a biogenetic educational video with a contact video will produce a positive change in attitudes towards mental illness from baseline compared to no videos or the two videos separately. Such findings are expected to have important implications in how public service announcements and educational materials are designed and delivered in an effort to reduce the stigma associated with mental illness.
Hindrances in the Hiring Process

In a society dictated by achievements, it is often difficult to determine if a person’s qualifications for a job are the result of their actual achievements, or are tainted by biases imposed by a job candidate’s cultural background. The professional field is currently flooded with gifted individuals of tremendous diversity, but prior research has demonstrated that some individuals are perceived to be more or less qualified than they truly are simply because of their race. This study explores the possible biases in hiring decisions when immigrant job candidates have different accents, revealing different cultural backgrounds. To investigate this, we conducted an experiment in which Caucasian participants were randomly assigned to listen to an audio-recorded interview (with identical content) with one of four job candidates with mixed (i.e., ambiguous) qualifications: (1) an Asian male immigrant with an Indian accent, (2) an African male immigrant with an African accent, (3) a European (Caucasian) male immigrant with a British accent, or (4) a Caucasian American male (control condition). We hypothesized that the immigrant of Asian decent will be perceived more favorably than the immigrant of African decent, who will be perceived least favorably. These perceptions are expected to impact hiring decisions. Competing predictions were made for the Caucasian job applicants and will be evaluated. Data collection is currently in progress. The results of this study promise to shed light on the effects of an often-neglected variable (candidate accents) on perceptions of job candidates, and will hopefully inform hiring practices.
The process of memory is comprised of three stages: encoding, consolidation, and retrieval. Memories become unstable during the retrieval phase or via a reminder cue and become vulnerable to modification. In order for the memory to re-stabilize, it must be consolidated again via the process of reconsolidation. The goal of this study was to determine whether sleep plays a role in this process. Previous studies strongly suggest that sleep facilitates the process of memory consolidation, but few studies have observed the effect sleep has on memory reconsolidation. Forty young adults aged 18-30 encoded a set of 30 image-location pairs (Set-1) in the evening (Session 1) and then performed a recall task the next morning following a night of sleep (Session 2). Approximately one week later (Session 3), either in the morning (wake condition) or the evening (sleep condition) participants received a reminder task of the set they encoded during Session 1 and also encoded a new set of image-location pairs (Set-2). Twelve hours following Session 3, participants received recall tasks of both sets of image-location pairs (Session 4). It was hypothesized that if sleep facilitates memory reconsolidation, then participants in the sleep condition would perform with higher accuracy on the final recall task of Set-1. Preliminary results show that participants in the sleep condition have significantly higher memory accuracy on Session 4 recall of Set-1 compared with participants in the wake condition. This suggests that sleep facilitates memory reconsolidation.
Emotional memories tend to be highly salient across the human lifespan. They are also consolidated, or stabilized, by sleep in young adults. Robust documentation of this process does not exist for populations of young children, such as preschool-aged children (i.e., around three through five years). At this age, children nap routinely, enter an expanding socio-emotional world at school, and experience vast neurological development. This study aimed to determine whether naps influence emotional memory consolidation in young children using a novel emotional storybook task. Children from preschools across western Massachusetts were read emotional storybooks and their recall of negative and neutral events in the storybooks was probed at three time-points: (i) in the morning, immediately after reading a storybook; (ii) in the afternoon, after a nap or equivalent time spent awake (within-subject, order counterbalanced); and (iii) the following morning, 24-hours after reading the storybook. Given the evidence of emotional memory consolidation in young adult sleep, we predict that children will show improved recall for storybook events following a daytime nap period compared to an equivalent interval spent awake. Moreover, we predict that this effect will remain 24-hrs later, reflecting a lasting benefit of sleep following learning. Preliminary data from 23 children trend in support of these hypotheses. Significant results will clarify emotional memory processing in young children and help to inform the structure of naps in preschool classroom curricula for healthy socio-emotional development.
Self-Injurious and anxious behaviors are problematic behavioral patterns which affect humans and non-human primates alike. These behaviors are associated with a malfunctioning of one of the body’s primary stress response systems, the Hypothalamic Pituitary Adrenal (HPA) axis. Research has been conducted linking the HPA axis with the gut, through what is known as the gut-brain-microbiota axis. Research conducted on mice has shown that probiotics have been effective at restoring gut health and HPA axis functioning. Though it is well-understood in mice, probiotic intervention has not yet been thoroughly investigated in humans or non-human primates. In this blind crossover experiment, rhesus macaques were treated with a multi-strain probiotic known as VSL#3. It was hypothesized that as these subjects were treated with probiotics, their anxious behavior would decrease. Anxious behavior was measured with the Novel Object test: reduced latency to inspect and manipulate novel objects indicated a reduction in anxious behavior. If VSL#3 is associated with a reduction in anxious and self-injurious behavior, this will provide evidence to support future probiotic treatment. Though future probiotic research in humans will be warranted, this experiment is an essential next step. These findings could cause immense benefits for humans and non-human primates affected by SIB, bringing us closer to effective treatment.
The purpose of this study is to determine if educational media, in the form of positive video portrayals of mental illness and informational graphics, can reduce mental health stigma. As a highly influential force in today’s society, the media plays a powerful role in cultivating public attitudes, especially toward persons with mental illnesses. The media’s continuous misrepresentation of mental illness allows for the spread of misinformation, the wrongful association of violence with illness, and negative attitudes and intolerance towards persons with mental illnesses. Following models from prior research studies, the current study utilizes an experimental design featuring two stimuli: a short video clip portraying a young adult with depression and an informational graphic of mental health statistics. Participants are randomly placed in one of three groups, signifying the number of stimuli they were exposed to. After stimuli exposure, participants’ attitudes toward people with mental illnesses are assessed, as well as public and self-stigma surrounding help-seeking behaviors. In comparison to no stimuli exposure, participants who saw both the video clip and the informational graphic are predicted to report more positive attitudes toward persons with mental illnesses and help-seeking behaviors. Exposure to the informational graphic is also predicted to have an additional increased positive effect on attitudes. This highlights the need for not only more realistic media portrayals of persons with mental illnesses, but also the importance of explicitly informing the public about these conditions to stop the spread of misinformation.
Psychology and Inequality: Investigating the Relationship between Economic Insecurity and Mental Health Outcomes

Over the past decades there has been an increase in psychological distress in populations worldwide. While there has not been a significant increase in mental health disorder diagnoses, the incidence of mental health problems are higher for individuals with greater economic insecurity than those without. This thesis examines that relationship by identifying some of the most prevalent psychological effects and mental disorders that develop as a result of poverty, unemployment, and inequality. Additionally, this research will investigate solutions including policy changes that can be implemented to reduce inequality and economic insecurity, thus reducing the likelihood of developing psychological disorders.
Bayesian Reasoning is a form of thinking where someone updates the probability that a hypothesis is true based on new information. The extent to which new information changes existing beliefs is based on the ratio of two probabilities: the probability of observing the new information if the hypothesis is true versus false. For example, learning that someone owns a piano increases the probability that they know how to read music, because people who can read music are more likely to own a piano than people who cannot. The most effective way of learning and implementing Bayesian Reasoning has yet to be determined. Bayesian Reasoning is usually explained in terms of a mathematical equation, but Bayesian problems can also be solved in terms of spatial relationships in a visual display. In this experiment, participants were instructed in the visual technique and then they attempted to discover the structure of the underlying mathematical equation without further instruction. Results will show whether learning the visual technique makes the underlying math more intuitive to students, even to the point that they can figure it out on their own without direct instruction.
Depression is characterized by feelings of sadness, severe despondency, anxiety, low self-worth, and isolation that can occur at any age and is contributed to problems with emotional regulation (ER). Due to potential impacts on parenting and children’s development, how depression and related contributing factors are operating in women with children is of particular interest. There’s empirical evidence, and theoretical emphasis, on the role chronic socioeconomic (SES) stressors (e.g., single parent, low income) has on maternal depression and parenting. In the current study, we examine whether there’s socioeconomic stress differences in the association between the mothers’ depressive symptoms and their various levels of emotion regulation. The sample includes a wide SES range of 153 21-52 year old mothers of 3-7yr old children living in southern urban/suburban areas. Mothers self-reported indicators of sadness, fear/anxiety, and discomfort, as well as their ER strategies of cognitive reappraisal and emotion suppression. During a lab visit, experimenters also collected heart rate variability/vagal tone information during challenging cognitive tasks; vagal tone can be used as a measure of physiological stress resistance and ER. We hypothesized that the anticipated association between poorer ER and higher depressive symptoms would be amplified in the most stressed group of mothers—meaning, those with the most SES stressors would show the strongest link between ER deficits and depressive symptoms. This may indicate the critical role that having adequate emotion regulation plays in protection from depressive symptoms, especially for women who are facing chronic parenting and SES stressors in their lives.
Full-time students today face a dilemma: a student carrying a 15-credit load is expected to devote 40 hours towards class time and outside work, but they may be expected by their parents to hold part-time jobs to potentially help offset the ever-increasing cost of tuition or provide their own source of income. This expectation to devote 40 hours per week does not reflect the culture of students today, and is an expectation of an old belief system. School hours and work hours add up, and stress can result from this seemingly impossible balance of being a full-time student and part-time worker. This poster presentation will report findings of a survey based research project devoted to exploring the relationship between full-time school, part-time work, and the resulting stress. Through non-probability quota sampling of 20 college students, my survey reports on student definitions of stress, their overall length of sleep, and GPA. The research and results serve as a testament that this set of expectations should be challenged and updated so that they reflect student culture today, where students can healthily serve both as full-time students and part-time workers. With this research in mind, professors may begin to realize what students face every day: the question of how to complete all assignments successfully and on-time, have time to go to work, and truly gain a meaningful education.
The researchers set out to find the underlying reason for the emotional association to color, hypothesizing that an individual’s personal experiences are the most influential factor affecting the emotional association to color. The study consisted of a convenience sample of 50 college-aged participants responding to a researcher-led interview involving the colors red, yellow, green, blue, black, and white. The data supported the hypothesis, demonstrating that 5 out of the 6 inquired colors elicited responses demonstrating the presence of personal experience influence on the emotional association to color. The current research suggests implications and applications for color and emotion associations on college campuses. The research may extend to other demographics, but there is no certainty.
Comparing the Effects of Auditory, Visual, and Taste Stimuli on Working Memory

Past research has explored human memory for visual and aural experiences, but much less is currently known about other senses and our memory for them. The current study compares working memory (i.e., the ability to temporarily store information over a short period of time) for sights, sounds, and tastes. Using an N-back task, participants were tested for their memory of visual, auditory, and taste cues at varying delays. Accuracy was highest for auditory and lowest for taste. As the delay length increased, working memory performance also decreased. These findings show that while sights, sounds, and tastes may have different rates of accuracy, they all conform to qualitatively similar patterns of recognition and interference.
The present study investigated biases toward people who have been home-schooled and hypothesized that participants would rate a person who attends public school more favorably than a person who is home-schooled. Additionally, several variables predictive of prejudice such as social dominance orientation, right wing authoritarianism, and modern racism were hypothesized to be correlated. Participants consisted of undergraduate students from Framingham State University. Implications related to prejudice are considered.
How Plus-Sized Women Are Compared to Average-Sized Women

Participants will consist of Framingham State University students. The purpose of this study will look at how people perceive plus size women compared to average weight women. We hypothesize that the plus size character will be perceived as inferior to the average weight character in the scenarios. Participants will be exposed to one of two scenarios and respond to a four-point inferiority scale. To measure inferiority, participants will respond to a seventeen-item questionnaire. Collected data will be entered SPSS to measure levels of significance.
The present study investigated gender bias and hypothesized that the male will be more favored by participants than the female in a powerful position. Additionally, we believed that more men would show favoritism towards the male in our study. Participants consisted of undergraduate students at a northeastern public university. Implications related to prejudice are considered.
Research indicates that the mental health status of a parent heavily influences future outcomes for his/her offspring, specifically in regards to the child’s mental health. Data shows that children of parents with mental illness are themselves more likely to show symptoms of mental illness, especially when considering depression or anxiety-based illnesses. These children are also more likely to be less satisfied in their future careers, relationships, and suffer from health problems. However, research has failed to address how these consequences may differ when comparing a mother to a father. This study will examine the perceived effects of parental sex and the presence or absence of diagnosis of a mental illness pertaining to the parent on child outcomes and parental success. A sample of 100 undergraduates will be randomly exposed to one of four scenarios where the parent’s sex and a diagnosis or the lack of a diagnosis for a mental illness will be manipulated. Following the scenario, a series of questions regarding child outcomes and parental success will be answered. Additionally, participants will complete items regarding their own experiences regarding mental illness, followed lastly by a demographic questionnaire. It is predicted that a diagnosed parent will elicit more favorable perceptions of the child’s outcomes than an undiagnosed parent. It is predicted that mothers, whether diagnosed or not, will be perceived to have a larger impact on the child’s outcomes than the father. It is also predicted that mothers, whether diagnosed or not, will be perceived to have a larger impact on the child’s outcomes than the father. Lastly, it is predicted that parents whom are diagnosed will be perceived more critically than those whom are undiagnosed. Implications of parents with mental illness on child outcomes will be discussed.
Modern Social Views on Women’s Pregnancy Status and Age Differences

Women in society are expected to follow certain time frames throughout their life, especially when it comes to starting a family. The age of when a woman gets pregnant is often how society defines the person they are and their capability to have a child. The present study investigated pregnancy status and age where it was hypothesized that younger aged pregnant woman would receive more social biased attitudes from society compared to an older aged pregnant woman. Additionally, several variables predictive of prejudice such as social dominance orientation, right-wing authoritarianism, and modern racism were hypothesized to be correlated. Participants consisted of undergraduate students at a northeastern public university. Implications related to prejudice are considered which can shape the views that people have on women and the perceived time that is appropriate to have a child.
There are disastrous demographic effects on a population when massive, catastrophic death is brought about by contagious disease; moreover, individuals in the population can be severely affected psychologically by these outbreaks. Fear is one of the basic emotions that is thought to be hardwired, from birth, into all people. Its purpose and complexity have been, for many years, the focus of countless studies, and it has been researched thoroughly by psychologists. Through a variety of academic works, memoirs, and research, this paper will analyze the psychology of fear and its effect on society during massive outbreaks of contagious diseases. It will examine the interplay between psychology, society, and disease outbreak, paying particular attention to responses and attempts to manage the fear on a personal and societal level, as well as how the outbreaks changed society.
Power posing is generally known as a way in which individuals orient their bodies into a dominant or “stretched out” stance in order to boost their confidence in stressful or anxious situations. The purpose of this study was to examine the ways that participants who used power posing may enhance levels of confidence in relation to the participants performance on the Stroop task versus a rest group who did not engage in any power poses. Participants were asked to record their answers to a fifteen slide Stroop task created specifically for this study, and then they were given a brief survey that involved self-reporting levels of confidence and self-esteem as well as related questions about time spent on hair, makeup, and typical attire. Results showed that there were no significant effects in terms of the use of power posing in relation to confidence or self-esteem. The only significant effect that was found was the power posing group performed slightly better than the rest group in terms of the number of correct answers on the Stroop task.
This study examined the differences in perception of traditional and non-traditional masculinity. There were 40 undergraduate participants with a mean age of 21.36 years, 71.3% of whom were women. Participants completed a scenario-based questionnaire that asked them to report their attitudes toward Jeff, the scenario character, who was presented as either traditionally masculine or more traditionally feminine. Modern racism, right-wing authoritarianism, and social dominance orientation were also assessed. Results showed varying significant difference in perceptions of masculinity. Participants in the masculine condition were more likely to say that Jeff had many heterosexual friends, would make them feel uncomfortable, was confused about what it means to be a man, and was aggressive toward other people. Participants in the feminine condition were more likely to say that Jeff was comfortable with who he is, was sensitive to other people’s feeling, was often bullied growing up, and was sexually attracted to other men. These significant results may be the result of interpreting traditional masculine behavior as heterosexual and feminine male behavior as otherwise, which could perpetuate conformity to gender stereotypes and reinforce current societal connections between heterosexuality and gender conformity. Further researchers may benefit from studying a more diverse sample, with different age groups and gender nonconforming individuals.
The present study investigated participants' perceptions of the importance of diversity in classrooms, and hypothesized that ethnic minority students will feel a level of connectivity with their professor if also a minority than a white professor, and white majority students will rate ethnic minority professors less favorably due to assumption of the Equal Employment Opportunity Act (EEOA). Additionally, several variables predictive of prejudice, in group and out group bias, and subtle racism were hypothesized to be correlated. Participants consisted of undergraduate students at a northeastern public university. Implications related to prejudice are considered.
The achievement gap for first-generation college students in higher education exists in part due to differences in class culture that account for the ways students interact with the university’s resources. Significant research highlights the importance of social support in relation to academic outcomes for college students. The purpose of this study was to better understand students’ support network in relation to engagement with university resources and academics at Bridgewater State University (BSU). Additionally, comparisons were done for students who were identified as first-generation (FG) and continuing-generation (CG) students. The project consisted of two parts: an online survey study and an interview study. The survey examined the perceived level of support from family, friends, and peers in relation to use of institutional resources and academic outcomes. The results of the correlation analyses indicate social and academic support from friends to be significant and positively correlated with learning outcomes. Findings revealed higher levels of campus social and academic support to be positively correlated with learning and overall GPA. Additional analysis showed no significant difference in the relationships when comparing for FG and CG status. Pairwise comparisons between support source and support type revealed students feel significantly more academic and social support from family and friends compared to campus. The interview study was conducted with a smaller sample of FG students to gain insight into their experiences as the first in their families to attend college. The goal was to understand areas the university may better support its students, and to create more equal opportunities for academic success. Future research could further explore support from campus and the relationship between engagement with faculty and learning outcomes.
Effects of Classroom Instruction in a Visualization Method for Bayesian Reasoning

In general, individuals with low math skills and math anxiety have trouble reasoning on the basis of probabilistic information, a useful skill in STEM-related careers and everyday decision-making. Bayesian reasoning is the critical technique needed to optimally adjust beliefs based on new information. Our research has found that this technique can be implemented using a visualization consisting of interactive bars to represent the probabilistic information. Our participants were asked to determine hypothetical voters’ stances on an issue based on whom they voted for and general voter information. They were given the percentage of people overall who support the issue, the percentage that voted for the candidate out of all the people who DO support the issue, and the percentage that voted for the candidate out of all the people who do NOT support the issue. Half of our participants received training and testing of this “bars” visualization in their weekly discussion for Dr. Jeffrey Starns Statistics in Psychology course. The other half used a method that relies strictly on mathematical equations. One week later, we retested the participants and introduced a group activity to evaluate their ability to connect the bars visualization with the mathematical operations. The results of this study demonstrate that Bayesian reasoning can be taught in a short amount of time in a classroom setting. Additionally, we found that people can retain their understanding of the material after a week, reflecting the effectiveness of the training.
This paper explores the basic aspects of socialization in Eastern and Western schools including the influence of authority dynamics, peer group dynamics, observational learning, and operant learning. It is proposed that cultural differences in school systems may make students more susceptible to recruitment by cults. Currently, it is estimated that there is a greater percentage of the population involved in cults in China (0.7%) than in the United States (0.025%). Socialization processes involved in cult indoctrination and the similarities and differences to the processes involved in socialization in school are discussed.
Research shows that across race/ethnicity, White students are more likely to play drinking games (DGs) than racial/ethnic minority students (Zamboanga et al, 2009). This current study aims to extend previous research by examining how DG type, alcohol type, frequency, and quantity differ between Whites and persons of color (POC) to address the limitations in past research. Current data analyses are based on survey data from 165 male college students, ages 18-30, who play DGs. 74% identified as White, 16% as Asian/Pacific Islander (API), and 10% as Hispanic/Latino. Data collection is ongoing; however, the observed proportions of minority students who play DGs are consistent with previous research (Pedersen & LaBrie, 2006). Results indicted beer was the most common drink consumed during DGs across groups. Hispanic/Latino men were more likely to consume shots during DGs than White men and White men were more likely to have played Beer Pong, compared to API men. Groups significantly differed in the total number of drinks typically consumed during consumption games; White men consumed significantly more than API men. Consistent with previous research, we found relatively few between group differences (LaBrie et al., 2012). Future research should consider community, school (same/different-ethnicity role models and friend group composition) and individual-level risk factors (academic standing, school commitment, and impulsivity) which may impact minority college student’s DG behavior (Bersamin et al., 2005; Cleveland et al., 2005).
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A Qualitative Analysis on the Reasons Female College Students Return to Their Ex-boyfriends

This qualitative research is a consideration of relationships today in college from the female's' perspective, and seeks to find reasoning as to why women return to their ex-boyfriends. Using a selection of questions, this paper’s main content is conversations with eight different women, all of whom have experienced a relationship with a break in the middle of it. The questions aim to determine the nature of the relationship, breakup and reunion as well as to gather personal feelings throughout the same timeline. Patterns and anomalies were drawn from the stories and then compared with findings from past related psychological studies that either validated or refuted the conclusions from these accounts.
This present study will attempt to provide evidence that a positive first impression will lead to initial attraction, regardless of physical attractiveness. But considering the importance of physical attractiveness in past attraction research, physical attractiveness will be examined alongside first impression to determine if the two variables interact. A simple 2 x 2 factorial design, then, will expose participants to one of four possible groups containing one of the following stimulus profiles: positive first impression and attractive; positive first impression and unattractive; negative first impression and attractive; negative first impression and unattractive. After exposure to the stimulus profile, participants will fill out the Interpersonal Attraction Scale, a self-report measure that looks at three different dimensions of interpersonal attraction: physical, task, and social attraction. Only items relating to physical and social attraction will be analyzed and a simple 2 x 2 between subjects ANOVA will be performed to determine if any difference between group means is statistically significant. It is hypothesized that a positive first impression will lead to initial attraction regardless of physical attractiveness. However, it is also hypothesized that there will be significant interactions between positive first impression and attractive and negative first impression and unattractive.
Is Aggression toward Women Linked to Revenge-Seeking or Not Being Able to Appropriately Express One’s Emotions, Particularly Post-Rejection?

Rejection can elicit a wide range of revenge or retaliatory responses from the offended (Downey, Feldman, & Ayduk, 2000). While this can take many forms, we examine the link to sexual assault. Men who adhere to hypermasculine gender roles are more prone to aggress against women. The purpose of this study is to examine the relationships between restricted emotionality (a masculine gender role norm) and revenge with sexual assault history in a survey sample, and in a lab rejection-aggression paradigm (Hot Sauce Allocation Paradigm; HSAP). It is hypothesized that revenge motives and restricted emotionality will be positively correlated with both measures of aggression. Undergraduate college men (n = 293, ages 21-28) completed an online survey; 55 completed a subsequent lab experiment, which included an experimentally manipulated rejection from a ‘dating partner’ (female confederate with whom they had a 10 min conversation; 50% rejected, 50% accepted future date request) and the HSAP. The amount of hot sauce given to the woman, despite knowing she doesn’t like hot sauce, was an indication of ost-rejection aggression. There was a positive correlation between both restricted emotionality and revenge with total number of sexual assaults perpetrated, in our survey data; however only revenge was a significant predictor in the regression model. When both restricted emotionality and revenge were entered into a GZLM (with gamma distribution to address skewness), again, only revenge was a significant positive predictor. Future research should consider how other masculine gender roles norms relate to men’s aggression toward women.
Emotions can be portrayed through several modalities, including faces and voices. We examined how the perception of emotional faces is influenced by exposure to emotional voices. Previous studies suggest exposure to a visual emotion (e.g. happy) results in an aftereffect in the opposite direction, biasing perception of a neutral face towards the opposite emotion (e.g. anger) (Rutherford et al., 2008). We used adaptation to quantify emotional processing for matched (congruent) compared to unmatched (incongruent) visual-auditory emotional stimuli. We expected stronger aftereffects for congruent versus incongruent stimuli. However, our previous work found no difference in adaptation strength between congruent and incongruent conditions. Here we modified adapting faces to be less visible by embedding them in white noise. We hypothesized this might increase multisensory integration, following the principle of inverse effectiveness which states integration should be most efficient when individual stimuli are less effective (Stein & Meredith, 1993).

During baseline, participants viewed emotionally charged faces morphed on a continuum (80% angry - 80% happy). During adaptation, participants viewed either congruent (100% happy faces in white noise and happy crowd sounds) or incongruent visuo-auditory stimuli (100 % happy faces in white noise with angry crowd sounds). For each participant, we determined the unique point where the face was judged equally happy or angry, the point of subjective equality (PSE), at baseline, then quantified changes in this PSE post-adaptation relative to baseline.

Our preliminary results suggest adapting to happy faces tends to induce stronger aftereffects when emotional voices are congruent versus incongruent. This suggests that integration of emotional information may be more effective when faces are less salient.

Kaitlin Parent, Valerie Goutama, Sarah C. Izen, and Vivian M. Ciaramitaro
Attention allows the mind to selectively focus on or ignore stimuli in the environment. Some studies show attention is a shared resource across the senses: allocating more attention to one modality, i.e., vision, yields less attention to another modality, i.e., audition. Ciaramitaro and colleagues (2017) found that as visual load, or visual task difficulty, decreased, performance on a concurrent auditory task improved. Studies also find improved visual performance in video-gamers compared to non-gamers (Castel, et.al., 2005; Strobach, et.al., 2012). Here we examined how changing visual attention demands affect auditory attention, crossmodal attention, by measuring auditory performance in video gamers compared to non-video-gamers.

Participants performed two concurrent tasks. In the visual task, participants were presented with a rapid visual stream of 5 letters in each of two intervals. In the low visual load condition, they reported which interval contained white letters. In the high load, they reported which interval contained more of the letter ‘A’. In the concurrent auditory task, they reported which interval contained a modulated sound. We examined changes in auditory performance as the visual task demanded more or less attention. Auditory performance was quantified by estimating the auditory stimulus supporting 75% correct performance, auditory threshold, for each of the two visual load conditions. We hypothesized that video-gaming experience improves crossmodal attention, diminishing differences in auditory performance with changing visual task demands for video gamers compared to non-gamers.

Our preliminary results support our hypothesis: video-gamers show smaller differences in auditory thresholds as visual task demands increase compared to non-gamers. Our results support and extend previous studies, suggesting that video-game playing enhances not only visual attention but also attention across our visual and auditory senses, crossmodal attention.

Newton Jordao, Hui Mei Chow, & Vivian M. Ciaramitaro
Multisensory information arising from a single event is integrated across our different senses. Previous literature has revealed that the magnitude of integration depends on stimulus salience and varies with stimulus synchronicity. Here we explore how synchronicity and salience interact to optimize and disrupt the integration of visual and auditory information.

Participants viewed images on a monitor, while auditory stimuli were presented right and left of monitor center via speakers. A visual stimulus, a Gabor patch, was presented left or right of monitor center, pulsating at 1Hz from monitor background to different levels of maximum contrast, which varied from trial to trial. The auditory stimulus, a white noise, also pulsed at 1Hz from no sound to some maximum loudness, 5 saliences which varied from trial to trial. Stimuli were presented either in-phase (IP), out-of-phase (OP), or with no sound to determine visual baseline (B). Participants indicated they detected the visual stimulus via an eye movement, recorded using a Tobii eye tracker. All conditions were randomly interleaved.

We expected improved visual detectability, quantified as a lower threshold, in IP compared to OP, with largest improvements at mid-level salience, and weakest improvements at the smallest and largest salience. Given variability, data was split based on whether IP enhanced detectability relative to B at mid-level salience, where we expected the strongest effects.

Preliminary results revealed maximal IP compared to OP benefit at the mid-level salience in participants where IP was beneficial relative to B. However, we found the opposite, maximal OP compared to IP benefit at this same salience, in participants where IP was detrimental relative to B. Further research is needed to understand factors underlying individual differences.
Interpreting the emotions conveyed in faces is a crucial component of social interactions. Yet, our perception of faces is influenced by factors such as face gender. For example, Becker and colleagues (2007) found angry-male faces were detected faster and more accurately than female faces. In the current study, we used a face adaptation paradigm to investigate the processing of happy and angry male and female faces. Repeated exposure to a positive or negative emotion, can alter perception of subsequent faces: after exposure to negative faces, emotionally neutral faces are perceived as more positive. We tested emotional adaptation in high (HSA) and low (LSA) individuals. We predicted HSA individuals might remain vigilant and sensitized towards negative emotions, because of weaker adaption to negative emotions, and/or stronger adaptation to positive faces. Furthermore, we expected them to adapt less to anger for male vs female faces, since male faces are perceived as more threatening, and to adapt more to happy female vs male faces. We quantified adaptation strength, each participant’s point of subjective equality (PSE), where a face is equally likely to be judged angry or happy, and the shift in PSE post-adaptation relative to baseline for male and female faces. Our preliminary results support our hypotheses. Compared to LSA, HSA individuals tend to show weaker adaptation to angry male faces while also showing stronger adaptation to happy female faces.
Neuroscientific research with musicians has increased exponentially due to music positive effects on brain development. Behavioral advantages in divided attention, cognitive development, and cognitive maintenance in both healthy and injured brains are observed as consequences of musical training, which allows for adeptness across the senses, crossmodal adeptness. The growing body of research in this area corroborate with the assumption that, when certain conditions are met, highly trained musicians can outperform non-musicians in tasks of divided attention.

We quantified the efficiency of crossmodal attention using a dual task to examine the extent to which changes in visual task demands effect auditory processing. In our dual task participants performed a concurrent visual and auditory task. The visual task consisted of a less attention demanding task (discriminate colors between two set of letters), and a more attention demanding task (which set of letters contain more of a target letter). The concurrent auditory task required discriminating which of two sequentially presented sounds was frequency modulated. We examined changes in auditory performance as the visual task demanded more or less attention. Auditory performance was quantified by estimating the auditory stimulus supporting 75% correct performance, auditory threshold, for each of the two visual load conditions. We hypothesized that musical training would improve crossmodal attention, diminishing differences in auditory threshold with changing visual task demands such that musicians would outperform non-musicians.

Our primary results suggest that in female musicians auditory performance was more influenced by increases in visual load than non-musicians, whereas in male musicians auditory performance was less influenced by increases in visual load than non-musicians. Thus, participant gender, not just musical training seems to influence the efficiency of crossmodal attention.
Cognitive distortions (CDs) represent common ways individuals’ biases influence how they perceive situations. CDs are often found in automatic thoughts (ATs), cognitions representing negative perceptions. Although originally observed in depression (Beck, 1991), individuals experiencing Social Anxiety Disorder (SAD) express CDs. SAD is characterized by significant anxiety regarding at least one social situation (American Psychiatric Association, 2013). Individuals with SAD tend to experience increased negative thoughts (Heimberg & Becker, 2002). Theory implicates possible CDs in individuals with SAD; however, limited empirical research suggests which CDs are present in the ATs reported by clients or the relationship between CDs and SAD symptoms or treatment outcomes. The current study explores the variety of and relations between CDs represented by ATs and symptoms of and response to treatment for social anxiety. Participants (n=53) include clients diagnosed with SAD participating in a cognitive-behavioral group therapy (CBGT; Heimberg & Becker, 2002). During treatment, clients reported their ATs to a potentially anxiety-provoking situation. A team of four trained coders labeled each AT with the best matching CD based on a list developed by Heimberg and Becker (2002). The variety and frequency of specific CDs were calculated to explore whether specific patterns of CDs are associated with SAD symptoms and response to treatment. Preliminary analysis suggests that the CDs of mind reading and fortune-telling were the most commonly coded ATs reported by clients. Implications for development of effective treatments for SAD will be discussed.
For the past 50 years, the risk for mental illness has been studied through the lens of the diathesis-stress framework, which views carriers of certain genes as having psychiatric vulnerability to adverse environmental events. This model underscores the interacting influences of gene polymorphisms with environmental cues in the etiology and expression of mental disorders. Yet while many gene variants have been identified, most research has focused on single gene effects, and how these are moderated by stress. Little research has been directed toward polygenic effects. Likewise, few studies have explored adaptive functions. Our study aims to fill the gap by looking at gene by gene by environment (GxGxE) interaction using the candidate gene variants of the serotonin transporter (5-HTTLPR) and brain-derived neurotrophic factor (BDNF) on measures of social cognition. Our hypothesis is that a GxGxE analysis will show an interaction effect on social cognition in response to adverse childhood conditions. For this, a sample of 100 college students were recruited, genotyped for 5-HTTLPR and BDNF polymorphisms, given the adverse childhood experience (ACE) measure and a battery of social cognitive tests. While analysis is ongoing, our report will include results from GxE and GxGxE interactions for measures on social cognition. These results, while providing important data for the social cognitive effects of stress on carriers of gene polymorphisms, will also demonstrate the need for further research using polygenic by environment approach, as well as testing beyond psychiatric symptoms for possible adaptive benefits.
Drinking games (DGs) promote fast-paced drinking and increase the risk of developing extreme heavy drinking behaviors. While frequency of consumption is often examined, few studies have examined how different drinking profiles (regular, heavy episodic, extreme heavy episodic) and DG play in one's home (weekdays and weekends, weekends only, occasionally/never) are associated with DG motives for starting and ending game play. Men, ages 18-30, and who play drinking games (N=172) completed an online survey. Heavy episodic drinkers (HED; 5-9 drinks) and extremely heavy episodic drinkers (EHED; 10+ drinks) were more likely than casual drinkers to play DGs for Competition, Novelty, Social, Fun, and Manipulation reasons; the Boredom reason had an ABC pattern of mean differences. Weekend/day and weekend only drinkers play DGs for Competition, Coping, Boredom, and Novelty reasons more often than men who occasionally or never play DGs at home. The Fun reason had an ABC pattern of mean differences. Weekend/day drinkers end DGs more often due to Extreme Circumstances (e.g., passing out) than the other groups, and weekend only drinkers end DGs more often out of Conformity or Boredom reasons. Findings indicate that men with HED and EHED drinking profiles and men who live in homes where DGs are played weekend/days endorse a wide range of reasons for playing and ending DG play, suggesting multiple motives would need to be targeted to effectively reduce DG behaviors.
Jealousy induction occurs frequently (84%) in romantic relationships (Mattingly et al., 2012). Partners use various tactics to induce jealousy, including: talking about past or current relationships, flirting, dating or sexual contact with others, and lying about potential others (Fleischmann et al., 2005). Jealousy induction is motivated more by situational goals than characteristics of the relationship or individual (Sheets et al., 1997). A situational goal for early developing relationships is determining one’s relationship status. We examine the relationships between jealousy induction, motives and “secret tests” usage to reduce uncertainty about one’s relationship status (Baxter & Wilmot, 1984). College students (n=263, 54% women) completed an online survey with Mattingly et al.’s (2014) Jealousy Induction and Motives for Inducing Jealousy Scales and the Secret Test Scale (Wegner et al., under review). Motives were positively correlated with jealousy induction and secret test usage, with the exception of directness tests (i.e., directly ask partner about status). The motive to strengthen the relationship was the strongest and most consistent predictor across the 7 secret test regression analyses. The power/control motive predicted triangle tests (flirt with someone else to see if they get upset). The revenge motive predicted separation tactics (e.g., waiting for other person to call first). Results support previous research indicating jealousy induction is most often used to strengthen one’s relationship. This is among the first studies to examine jealousy induction in early relationship stages. Future research should also consider the number of dates and relationship length in relation to secret tests and jealousy induction.
Mindfulness entails self-regulating attention to bring awareness towards one’s lived experiences whilst adopting an orientation denoted by openness, acceptance and curiosity. It is usually examined in relation to its effects on intrapersonal qualities (e.g. anxiety, stress) and as a tool for psychotherapy, but little work has focused on its interpersonal effects. The current study examines how trait mindfulness predicts the quality of interpersonal interactions. After assessing trait mindfulness, 70 same-sex, zero-acquaintance dyads interacted in a high vs. low self-disclosure setting and afterwards completed a measure of closeness, self-disclosure, responsiveness, enjoyment of interaction and affect. The actor-partner interdependence model (APIM) was used for dyadic analysis. Results of the study showed mindfulness predicted responsiveness whereas partner mindfulness predicted enjoyment of interaction. Both actor and partner mindfulness predicted more positive emotionality following the interaction. Findings of the study highlight the contribution of mindfulness on relationship quality in addition to personal wellbeing.
The current experiment investigates the effects of race-related words on the categorical perception of race. Specifically, I will investigate the role that these words have on a person’s ability to perceive different races. Participants (n = 100) will complete a standard, two-part categorical perception task in which they will view morphed (blended) faces of two individuals of separate races. In the current experiment, participants will match these faces to several different race-related words presented as pairs, as well as perceptually to pictured endpoints. I predict that certain race-related words (known as “separate race-related words” e.g. “Black” vs. “White”) will affect the categorical boundary differently from other race-related words (e.g. “Black/White” vs. “not Black/White”) as well as from pictured endpoints. Such differences would suggest that a person’s race is perceived differently in the presence or absence of specific race-denoting category anchors. Moreover, I predict that categorical perception (i.e. the increased ability to determine whether a target face was the first or second of two faces when the two faces were previously identified as from different categories compared to belonging to the same category) will be best modeled by “separate race-related words” compared to other race-related words and pictured endpoints. The predicted results will provide for a better understanding of how racial terms alter people’s perceptions of race. This experiment is one of many recent categorical perception studies, which examine the role of language and more specifically race-related terms.
Enhancing Parents’ Health and Well-Being: Testing the Feasibility of a Prenatal Intervention for Low-Income Parents

The present study examines the feasibility of implementing a community-based parenting preparation program aimed at (1) reducing maternal and paternal stress and depression, (2) increasing parents’ knowledge and preparation for childbirth, and (3) strengthening the co-parenting relationship. Research indicates that prenatal stress can have long term effects on parental mental health as well as infants’ cognitive and social development. Dysregulation of the physiological stress system during pregnancy has been linked to increases in postnatal stress and depression, which can lead to negative outcomes for the expectant parents, their relationship, and their infant’s development. The current project examines how a six-week, group-based, psychoeducational prenatal intervention, in the second trimester of pregnancy, reduces stress and depression among expectant parents and reduces infant stress at birth compared to a control group. Participants complete pre- and post-interviews where mental health, relationship quality, and knowledge about birth and development are assessed. Participants also provide hair and saliva samples to assess cortisol, a stress hormone. To date: one of the three six-week intervention programs has been conducted with 8 couples expecting with their first child. Two more intervention programs are scheduled for March and June. The feasibility of the intervention is evaluated through attendance data, parents’ evaluations of the programming as well as the curriculum fidelity. In addition, pilot data will be examined to test for differences in pre- and post- measures of mental health, co-parenting and parenting knowledge.
Around the world people are beginning to stand up and share their stories of sexual harassment and abuse. This literature review examines the shift in attitude towards speaking out about the abuse. Recently, in the United States, the attitude has moved from one of shame and embarrassment to that of empowerment and support for those who have been a victim of sexual harassment. Differing views of sexual harassment across three different countries, the United States, France, and Britain are presented. Cultural differences in the definition of sexual harassment and how it should be perceived, particularly by females are discussed. Included in the review is a discussion of the “Me Too” movement as it relates to the three countries above. The history of the movement, the attitude of the public, and the impact the movement has had on victims of sexual harassment is examined. This review offers a comprehensive view across three countries on the issue of sexual harassment.
Research has indicated that humor style does relate to depression levels. Despite the common belief that comedians are always content, studies have shown otherwise. Research has shown that using humor and being exposed to it may be an effective coping mechanism. Evidence also suggests that an individual’s humor style does play a factor on well-being and levels of depression. This study presents a brief history of comedy and depression, provides a closer look at 2 comedians, 1 male and 1 female, and examines styles of humor as they relate to depression in light of research findings. Well-being and levels of depression are discussed in relation to comedy and humor styles.
This literature review examined multiple resources to reveal the contributing factors of the success of the situational comedy Friends. The resources provided in this review further explore the progression of sitcoms, theories behind humor, and the success of Friends. The Incongruity and Superiority Theory was used to examine the humor in four episodes. The success of Friends was discussed by analyzing multiple contributing factors. The relatability of being independent for the first time and laugh tracks were examined as potential components of success. Friends was the first sitcom to revolve around a friends-dynamic, straying from the family-type dynamic that was previously present. All of these elements were considered when analyzing and discussing the success and humor within the situational comedy Friends.
In the United States, it seems that when a customer walks down the aisles of a grocery store, there are abundant amounts of color coming from every direction. Colors can influence and affect a consumer’s food choice. A color, such as blue, seems to increase the likelihood that a consumer will choose a particular food. Initially, a pilot food survey will be collected to identify food items with similar taste profiles but are healthy or unhealthy. Approximately, 90-100 undergraduate students will view a short image presentation then fill out questionnaires including personal information. There will be 2 plates placed in front of the participants during the image presentation; one red plate and one blue plate with equal portions of the healthy and unhealthy food. The amount of food will be measured prior to and after the participants leave to measure if it was consumed. The expected results from this study are that the participants will be more likely to choose food from the blue plates over the red plates. Participants are expected to choose unhealthy food over healthy food. The benefits of these finds may help to explain how colors can impact on consumer’s attention while choosing and consuming food as well as how marketing executives can use color to their advantage.
When engaging in a conversation about exercise, some may feel offended or be afraid to talk about the topic. It is common knowledge that engaging in exercise has physical benefits. While training is an essential part of any athlete’s life, not all athletes include aerobic and strength training in addition to their sport-specific training. There are many benefits that come with exercising. These benefits include helping you feel happier, losing weight, improving muscle and bone health, decreasing the chances of chronic disease, reducing pain and much more. This study aims to investigate and compare the physical health of athletes who do not exercise outside of their sport-specific training to novices who exercise regularly. It will also look at different types of exercise (cardio, strength, flexibility) and the amount of exercise performed to find the exercise technique that best improves physical health. The study will consist of approximately 100 Framingham State athletes and non-athletes. Both groups will complete assessments about their exercise habits and personal physical health. Afterwards, participants will be asked to answer questions about their demographics. The expected results are that non-athletes who exercise regularly will have better physical health than athletes who do not exercise regularly outside of their sport-specific training. This study will clarify the importance of exercising for the purpose of improving physical health, especially for athletes who do not find exercise to be a part of their everyday lifestyle.
Religious people and non-religious people may be expected to live very different lives, but this is not always the case. This study explores non-religious peoples’ view on religious peoples’ levels of acceptance of others’ lifestyles. Previous findings show that religious people are often viewed as having low acceptance of other peoples’ lifestyle choices. Approximately one hundred participants from Framingham State University’s undergraduate program will be questioned for this study. Each participant will read a scenario than complete a question packet including how the scenario character will react or behave. Half the participants will read about a religious person, while the other half read about a non-religious person. Participants will also share personal info, including what religion or belief they identify with. The expected results are that non-religious people will see religious people as being less accepting than non-religious people. This study will show if there is a difference between how people are viewed on acceptance of others’ lifestyles based on being religious or not.
College students all over the world experience times of great success, as well as times when hard work still results in unfortunate disappointment. Students’ stress level is often dependent upon how good they feel about themselves, such as self-esteem. One-hundred and three university students completed an experimental packet that included recalling a past success or failure, a manipulated version of the Stress-Arousal Checklist (SACL), Rosenberg’s Self-Esteem Scale (SELF), a newly constructed Parent Scale, and a demographics sheet. The SACL appeared to accurately assess much stress a certain situation could elicit from an individual. The results showed that participants with high self-esteem should have significantly more perceived stress than participants with low self-esteem. There was no significant difference found between a participants’ stress level when recalling a time of failure versus a time of success. As a post hoc, a test was run to determine if there was a connection between the type of parenting styles a student experienced growing up and their stress level. Having to recall certain situations may not explicitly elicit a difference in stress level, however how students feel about themselves does.
Factors That Contribute to Goal Achievement and Goal Failure

When it comes to the discussion of goal achievement, there are many people who have successfully accomplished goals, while many other people have quickly given up on their goals when faced with an obstacle, a difficulty, or an inconvenience. Often people set goals for themselves, and sometimes these goals are easily achievable, while other times, goals require more hard work and dedication. Approximately 5 successful entrepreneurs will be identified and interviewed. With a series of structured interview questions, the present study aims to unveil some of the underlying reasons tied to goal failure and goal achievement among successful entrepreneurs such as emotional wellbeing, self-sabotaging techniques, and fears that are tied to goal chasing. The expected results of the study may show common internal factors and motivators that contribute to the success or failure of goals. These results will allow people who have set goals, to understand where they currently are in life and what needs to be changed in order to properly nourish goals. It will also help people with goals understand how to properly set goals that will bring success more frequently.
In the present time, large families are rare and come with unique challenges and benefits. Religion, especially Catholicism, can often be a predictor of larger family size. Religion observance and higher levels of religiosity correlates with higher life satisfaction (Steger & Frasier, 2005). In the current study, approximately 50 participants from highly religious large families, defined as 4 to more children, will complete a self-report questionnaire regarding their experience as a member of a large family. In addition, assessments religiosity, overall satisfaction with life, and other personal information will be collected. The expected results are that highly religious participants from large families will have higher levels of life satisfaction, and identify more benefits than challenges with being in a large families. This study aims to clarify whether there are positive experiences of people from large families who are also highly religious, and to assess their overall life satisfaction.
Perception is a key component of society. As people age, they become better critical thinkers. We start to think about judgements bestowed upon us and we engage in judging others. A large factor in society is the notion of race. This is used to unfairly judge the people around us. One important aspect is to understand how a person perceives another to judge them. Once this is understood one can start to think about how this can potentially be detrimental to our growth as individuals and as a society. A two-assessment scenario-based questionnaire was given to approximately 80 Framingham State University students consisting of 50% African-Americans and 50% Caucasian students. The expected results are that those who think that individuals of a different race judge them poorly will begin to, in return, attribute negative qualities to that entire race. These negative attributes will then urge people to only form relationships with people they can identify with racially. This study will help to understand the underlying factors that encourage people to negatively link behaviors of one individual from a certain race to all individuals belonging to that race.
Attention is an important part of how people function on tasks in their everyday lives. One study examined if noise and time of day affects attention and if noise and anxiety affects attention (Smith, 1991). To add onto that research, the present study aims to investigate if a noise disturbance will cause attention to be undivided or divided; as well as if the attention will affect performance, through accuracy and speed, and induce anxiety. The study will consist of approximately 100 students from Framingham State University. Participants will be randomly assigned to one of four groups: a non-proctored setting with noise disturbance, a proctored setting with noise disturbance, a non-proctored setting with no noise disturbance, and a proctored setting with no noise disturbance. In each setting, participants were assigned the same three minute math exam with multiplication problems. After three minutes, participants stop the exam and will answer questions on their demographics and a collection of questionnaires such as the Achievement Anxiety Test (Alpert & Haber, 1960). The expected results are that participants in the non-proctored setting with no noise disturbance will do better than those in the non-proctored setting with noise disturbance. To add on, participants in the proctored setting with noise disturbance will have more anxiety than participants in the proctored setting without noise disturbance. This research aims to addresses the impact of attention of university students on functional task performance, in regards to accuracy and speed, and anxiety.
Nobody likes to be underprivileged, but when portrayed as an ‘underdog’ they may be seen as the favorite. People often have favorable opinions of underdogs, as shown by the common phrase “everyone loves an underdog”. Also, perceptions of people can differ depending on whether they are privileged or underprivileged. Approximately 100 undergraduate students will read one of four scenarios depicting 4 competitors on the TV show “Project Runway”. Using the definition that an underdog is an individual who has talent, and a disadvantage, each of the four depicted competitors will be described as advantaged/disadvantaged and talented/not talented. The participants will then complete a questionnaire assessing their perception of the competitors’ future success. The expected results are that the participants will favor the talented/disadvantaged competitor over the not talented/advantaged competitor, and that the underdog competitor will be seen as having a successful future. In today’s tense social climate, these findings may help reveal what factors influence people’s opinions on underprivileged people.
Eyewitness testimony is often a critical component of deciding whether a suspect is innocent or guilty. There is ongoing scrutiny over the accuracy of eyewitness reports, given the frequency and consequences of false accusations of innocent people. As non-pristine conditions during eyewitness lineup identification adversely affect the predictive relationship between confidence and accuracy (Wixted and Wells, 2017) it is important to investigate a range of factors which may affect the condition of the identification process, such as emotion. Despite that the most commonly experienced emotion after a crime is anger (Ingram, 2002; Orth & Maercker, 2009), there is a lack of research on its role in memory in a forensic context and its effect on the quality of the identification procedure. The current study is an online experiment which utilized Amazon's Mechanical Turk for participant recruitment in order to examine the effects of anger on the relationship between eyewitness confidence and accuracy. Participants assigned to induced anger or emotionally neutral conditions were asked to watch a filmed mock robbery and then make a subsequent lineup identification. We discuss how anger interacts with participant memory for the perpetrator’s face and to what degree this emotion ought to be taken into consideration in a forensic context. This work begins to fill the current gap in literature on the effects of anger on eyewitness identification confidence and accuracy as well as aiding in increasing the validity of the current identification process.
It is a norm in our society to be goal oriented. From the moment we are born we have been set up to reach certain milestones like the first time we crawl, to our first steps and to our first words. There is always a certain end goal to reach. That excitement from when you first get your license, to when you get your high school degree, to even finding that person and getting married. A lot of these goals we take for granted and don’t look at them as goals because we see it as a part of life. People graduate, people drive and people get married it’s a norm, but what if this wasn’t a norm for everyone. People who struggle with mental illnesses might have different goals than those norm goals our society sees. Things such as being able to walk down the street, finding a ride to work or even cooking your own meal are all things we might not see as a goal, but people battling illnesses like anxiety or schizophrenia will. The purpose of this research project was to look at different ways residential treatment places handle resident goal attainment and if they are successful for people handling mental illnesses like schizophrenia. Throughout the research I found that goal attainment plans are successful for people handling mental illnesses like schizophrenia. Setting goals and working towards them has shown in increase in change of behavior positively, because of the increase in motivation from others (Wade, 2009).
The study of Love has overlapped among disciplines for thousands of years. As social beings we are driven to describe it and understand how it can be one of the most powerful emotions that we feel. In recent years, social neuroscience has dominated the study of Love and how it objectively functions as a cognitive emotion. With the heightened desire to remain objective, the field at large has lost the desire to intertwine our cognitive functions with our subjective experiences towards the emotion. It is also rarely compared to other emotions leaving little room for understanding how love and other emotions interplay. The current research is divided into two experiments that seek to understand how relationship satisfaction, jealousy, and passionate love intertwine through self-report and analysis of electrode frequencies using an electroencephalogram (EEG). The first study was a survey that looked at self-report responses on relationship satisfaction, passionate love and jealousy. Results showed passionate love was positively correlated with relationship satisfaction and negatively correlated with jealousy. The second study was an EEG analysis which looked at neural responses in the frontal lobe when passionate love and jealousy were elicited. Results for the second study showed that alpha wave averages positively correlated with passionate love and beta wave averages were higher throughout each participant. Both studies validate previous research on passionate love and imply a necessity for new research methods for studying the emotion in the future.
OSPAN Measures Predictive of Real-World Executive Functioning

PURPOSE: Executive functioning (EF) refers to higher-order cognitive processes that are essential to daily functioning. Literature suggests that “gold standard” performance-based measures of EF are not predictive of executive behaviors in everyday life (e.g., decision making, emotion regulation). However, research with young adults indicates that Operation Span (OSPAN), a working memory task primarily used in research settings, is associated with real-world executive behaviors; no research to date has explored these relationships in older adults. Determining the predictive nature of this performance-based measure on self-reported EF can aid in clinical evaluations with younger and older adults with cognitive complaints. This study will determine associations between the OSPAN task and self-reported EF in older and younger adults. I hypothesize that poorer OSPAN performance will be associated with greater self-reported executive difficulties in both groups.

METHODS: Healthy younger (aged 18–34, n=25) and older adults (aged 65+, n=25) will complete OSPAN and the Behavior Rating Inventory of Executive Function-Adult (BRIEF-A), a self-report questionnaire of EF.

RESULTS: If my hypothesis is supported, hierarchical linear regression analyses will indicate that poorer OSPAN performance predicts greater self-reported EF difficulties (measured by the BRIEF-A) in both groups, controlling for relevant covariates.

CONCLUSION: Significant associations between the OSPAN task and the BRIEF-A would suggest that the OSPAN may be a useful tool to include in clinical evaluations to predict functioning in younger and older adults with cognitive complaints. A lack of an association between these two measures may suggest that these measures assess different components of EF.
The Effects of Napping on Motor Memory in Preschool Children

Napping enhances declarative memory consolidation, emotion self-regulation, and attention allocation in preschool children. Nevertheless, whether naps enhance children’s procedural memory (i.e., motor skill learning rather than verbal recall) remains unclear. Thus, the aim of the present study is to examine the impact of mid-day naps on motor memory in preschool-aged children using a mirror tracing task. The study uses a within-subjects design with a nap condition and wake condition. In each condition, children were tested on a mirror tracing task, which provides a measure of motor learning, at three time points: in the morning, after the midday nap/wake condition, and 24 hours after encoding. Given previous research, we hypothesize that children will perform better on the mirror tracing task after a period of sleep and that this benefit will extend to 24 hours later after a bout of overnight sleep. Preliminary results suggest the benefit of the mid-day nap arises 24 hours after encoding despite children performing slightly worse after the nap than after an equivalent period of wake. It is possible that the children perform worse after the nap condition because the memory trace is being parsed apart during memory reactivation in the nap and is restructured/organized during the overnight sleep interval (where you achieve deeper stages of sleep that support the mechanisms of consolidation). These preliminary results suggest mid-day naps hold a unique function in motor memory consolidation and this information can be used to guide policy on nap regulation in preschools throughout the country.
Knowledge acquisition depends on many factors that are conscious and unconscious. Material interactivity, learning atmosphere, cognitive load, and prior knowledge play a very important role in learning (Sweller, 2010). Shtulman (2017) demonstrates how tensions between intuitive knowledge and scientific knowledge persist across the lifespan. We acquire many intuitive biological concepts that shape our lives and how we perceive the world as we grow from childhood to adulthood. These childhood intuitive knowledge help us to make sense of the world. Through the development of essentialist and teleological beliefs, we are able to interpret many biological concepts without any scientific basis. Unfortunately, as we grow and begin studying scientific theories based on empirical evidence, these intuitive theories continue to hang on and impede the learning process. For instance, research has shown that people who have taken college level courses in biology still experience cognitive conflicts in areas like evolution, germs, genetics, and physiology (Shtulman and Harrington, 2015). This paper examines the basis of intuitive knowledge, its persistence after we have learned scientific theories, and why we make poor judgments, and neglect scientific evidence during decision making process.

*Key words:* Intuitive theories; Essentialism; Teleology; Cognitive conflict; Scientific knowledge
The purpose of this research is to increase understanding of how college students perceive sexual assault when men are the victims. This focus is important because of the absence of literature about male sexual assault victims. I hypothesize that the results will show that participants will engage in a substantial amount of victim-blaming. This will be tested through a mixed-methods, anonymous, online survey of hypothetical scenarios in which participants will be asked to provide open-ended and closed-ended responses to the scenarios. The survey will be preceded by a disclosure/consent statement about the sensitive subject of the survey. The participants will be asked through Facebook to respond to the survey, generating a purposive sample. The only criteria are that they are over 18 years of age and that they are a college student. The results of this study will indicate the amount of victim-blaming that goes into perceptions of male sexual assault victims. The results will hopefully provide some insight into the dialogue that needs to take place and the attention that all victims of sexual assault deserve. These results will help formulate that dialogue and hopefully change previously held conceptions of sexual assault.
Social media is an integral part of young adults’ daily lives. Specifically, interpersonal relationships, including dating, are portrayed in the media in both positive and negative ways. While previous studies have investigated social media’s effect on relationships in general, more research is necessary to closely examine dating and romantic relationships. This study sought to explain the delicate relationship between social media, dating, and relationship satisfaction among young adults. Participants included 120 female undergraduate students from a northeastern university who were randomly assigned to view a Facebook page with a picture of a young adult male pictured with or without a female and with or without an “in a relationship” status. Participants perceived the male with a relationship status as, “in a relationship” as having higher relationship satisfaction than the male whose Facebook Profile did not include a relationship status, regardless of whether his profile included a female in his profile picture. Implications of history effect, the role of profile pictures, and the importance of being transparent about being in a romantic relationship are discussed.
Social media platforms are considered to be one of the most popular, addicting, and easily accessible sources of communication. The purpose of this experiment is to further examine research on the association between social media usage, narcissism, and self-perception on popular photo sharing social networking platforms (i.e. Instagram, VSCO, Snapchat). To examine this correlation, approximately 100 participants will be asked to fill out a self-report questionnaire of their social media usage, personality traits, and demographics. It is hypothesized that participants who use social media regularly will have higher levels of narcissism and self-perception than participants who do not use social media regularly. It is also hypothesized that participants who sometimes post on social media will have lower levels of narcissism and self-perception than participants who regularly post. Lastly, it is hypothesized that participants who post selfies on social media will have higher levels of narcissism and self-perception than participants who do not post selfies.
Among today’s youth and young adults, piercings are one of the most popular body modifications. Body modification has become an important factor in self-expression, and prior research has shown that body modifications affect perceived attractiveness (Swami et al., 2012). The purpose of the present study is to test if piercings on different genders have an effect on perceived attractiveness. The research design is a 2 (gender: male or female) X 2 (piercing: yes or no) between-subjects design. Participants will be randomly assigned to view a scenario with an accompanying photo. The four possible photos are of either a pierced female, a non-pierced female, a pierced male, and a non-pierced male. The two photos of males are identical with the only difference being the presence of a nose piercing or not, and the same goes for the photos of females. The participant will then be asked to rate the physical attractiveness of the person through a questionnaire containing 17-items, each on a 6-point Likert scale. It is hypothesized that overall, those with piercings across both genders will be rated as less attractive. It is also hypothesized that females with piercings will be rated lower on measures of attractiveness than males with piercings.
The purpose of this research was to investigate how the presence of music, either during a study period or during a recall period, can affect memory for words. The experimental design was a 2 (music type: rock or classical) X 2 (music present during encoding: yes or no) X 2 (music present during retrieval: yes or no) between-subjects design. One hundred sixty undergraduates from a New England university were randomly assigned to one of the eight experimental conditions. Participants were shown a list of thirty words on a computer screen, presented as a list. The list was presented for one minute. During the word presentation, participants were either exposed to classical music, exposed to rock music, or not exposed to music. After a distractor task that consisted of 12 multiplication problems, participants were asked to recall as many of the words as they could in any order. During the recall, participants again could be exposed to either classical music, rock music, or no music. The dependent variable was the number of words correctly recalled. It was hypothesized that classical music will have higher rates of word recall than rock music. It was also hypothesized that music during encoding and music during retrieval phase will have a higher rate of words recalled. Lastly, it was hypothesized that music during encoding phase but not during retrieval phase will have a lower rate of words recalled.
The purpose of the study was to explore if skin tone and shirt color effects perceived attractiveness. This was a 2 (skin tone: dark or light) X 2 (shirt color: red or blue) between-subjects factorial design. Participants included 80 Framingham State University students. Participants were given a survey that contained a photograph of a model whose skin tone was manipulated, a background story, attractiveness measures adapted from McCroskey and McCain (1974), and demographic questions. The attractiveness measures included measures of task, social, and physical attractiveness. We hypothesized that participants would perceive the model with the red shirt as more attractive than the model in the blue shirt. Moreover, we hypothesized that participants would perceive the lighter skinned model as more attractive than the darker skinned model.
In the recent years there has been an increased focus on sexual assaults on college campuses. The purpose of this experiment is to examine whether men or women perceive the severity of a sexual assault differently, and to measure perceptions of the victim’s self-esteem. This study is a 2 (participant gender: male or female) X 2 (sexual assault severity: low or high) between-subjects design. First, equal numbers of male and female undergraduate participants will read a scenario of either a high or low severity sexual assault case. Then participants will then be asked several questions on the self-esteem of the victim. It is hypothesized that the female participants will perceive the self-esteem of the victim higher than the male participants. Also it is hypothesized that participants exposed to the high severity sexual assault scenario will have lower scores on the perceived self-esteem of the victim.
The Human-Animal Interaction Study: Do People Prefer Animals over Humans?

The purpose of this study is to investigate whether participants are more willing to help an animal during an accident than other humans. To test this hypothesis, 100 participants will be exposed to a photograph and a scenario related to a hit and run scene. The experimental design is a 2 (victim: human or animal) X 2 (familiarity: yes or no) between-subjects design. The scenario will describe the victim of the accident as being either a familiar person or not (the participant's sister or a stranger) or a familiar dog or not (the participant's own dog or a strange dog). Participants will then fill out three questionnaires: The Willingness to Help scale, The Pet Attachment scale, and The Human Attachment scale. We hypothesize that participants who are exposed to the scenario of a familiar person or pet will be more likely to help than participants who are exposed to the scenario of an unfamiliar person or pet.
Memory is the ability for the mind to remember information. It is widely known that repetition can help improve memory and the ability to recall information. This study focuses on how word length and repetition affects ability to recall information. The study is a 2 (word length: three letters or six letters) X 2 (repetition: once or five times) mixed-factor design, with word length as a within-subjects variable and repetition as a between-subjects variable. The word list contains 40 words, exactly half of which are three letters long with the other half being six letters long. Approximately 100 participants will either be exposed to each word once for five seconds, or they will be exposed to each word five times for one second each. The order of word presentation is randomized; for the five exposure repetition condition, the same randomized order is presented for each repetition. This design keeps the total exposure time for each word constant across repetition conditions. The dependent variable is the number of words correctly recalled in any order. It is expected that those who rehearse the word list five times will recall more words than those who rehearse the word list only once. It is also expected that the three letter words will be easier to recall than the six letter words. Finally, it is expected that those who rehearse the word list five times will recall more of the six letter words than those who rehearse the word list only once.
Humans are constantly looking and reading text, but is the color of that text important for our memory? Despite research examining color and memory, there has yet to be a general consensus of the effect of text color on memory. The current study is a one-factor between-subjects design. The independent variable in this study is text color, either being blue, black, green, or red. Approximately 160 participants will be given a list of 30 words to study. After a distractor task, consisting of demographic questions, participants will be asked to recall the words in any order. The dependent variable in this study is the number of words correctly recalled. The hypotheses for this study are that words presented in black will be remembered the best compared to the other colors and that words presented in green colored text will be remembered the least.
Dopamine is a central nervous system neurotransmitter that acts within the striatum and prefrontal cortex; thus, it is responsible for our ability to learn from outcomes and make reward-based decisions. Eyeblink rate (EBR) has been found to be a noninvasive measure of dopamine function at rest in the brain; thus, EBR could be used to study a person’s reward motivated decision-making behavior. Prior literature has demonstrated that higher EBR has been found to be associated with higher dopamine function at rest, more impulsive behavior and less inhibitory control. In this study, we studied differences in EBR among younger and older adults in order to determine whether individual differences in dopamine levels account for performance in reward-based decision-making tasks. The current study aims to study around 50 undergraduate students and 20 adults, ranging from 50-85 years old. The tasks used included a computerized speed-rewarded Go/NoGo task, a task that measured risk and ambiguity preference and behavioral questionnaires. We also tracked resting EBR using novel eye-tracking glasses designed by the computer science department which are able to detect pupil dilation and blinking. Thus, the tasks captured EBR, impulsiveness, inhibitory control, and economic decision-making measures. We look to correlate these measures to differences in eye blink rate to understand if there are any differences in dopamine levels and/or how decision-making changes between young and old adults. This can shed light on how and why people tend to approach decision making differently as they age.
Marijuana, considered a gateway drug, is associated with memory impairment. Stereotypes of male marijuana smokers as forgetful “stoners” are common in the media and marijuana has been legalized in some states. Research on gender differences and memory is not clear. Thus, the goal of this study was to examine the perceived influence of marijuana and gender on memory, seriousness of memory impairment and use of memory aid devices. It was hypothesized that marijuana users would have more memory problems than marijuana non-smokers. One hundred and nineteen participants received one of four different scenarios depicting a male or female marijuana user or non-marijuana user. Participants then completed measures of memory, seriousness of forgetting and memory aid use. Results indicated scenario marijuana smokers were perceived to have worse long-term memory than nonsmokers. The study’s limitations consisted of having a sample size of mostly white Caucasian males who identified as nonsmokers. Future research should investigate a diverse group of gender and ethnicity, as well as having equal groups of smokers and nonsmokers.
Combating “Trans”gression: Perceptions of Violence toward Transgender Individuals Based on Gender Identity and Race

There are an estimated one million plus overall transgender adults living within the United States, many of whom are often subject to multiple forms of violence, including harassment and assault. Those rates of harassment and discrimination increase for transgender individuals if they are also a racial minority. In this study, the researcher examined the perceptions people have about violence toward transgender individuals based on their gender (transgender male-to-female, transgender female-to-male) and racial identity (White, Black, Latinx). There were 182 undergraduate participants, 33% of whom were men, 64.3% were women, and 1.6% identified as non-binary or a third gender. The majority of participants identified as Caucasian (55.8%), while 17.6% identified as African-American/Black, 11.6% as Hispanic/Latinx, 9.4% as Multiracial, and 5.6% as another race. Participants completed a scenario-based questionnaire measuring likelihood to intervene in a situation of transgender-based harassment on a public subway. Results showed no statistically significant difference in likelihood to intervene based on the gender identity of the harassed individual, nor was there a significant interaction between gender identity and race. However, there was a statistically significant main effect for race, such that participants were reported being least likely to intervene in a situation where the harassed individual was Latinx. Findings from this study could help identify challenges with transgender-based violence intervention, as well as aiding in a deeper understanding of struggles at the intersections of various minority identities.
Aberrant patterns in reward processing have been highlighted as an underlying risk factor in the development of psychopathology. Typically, reward processing has been examined using object-based rewards (e.g., money). However, limited research has explored differences in processing non-social and social stimuli in children, let alone how differences in social contexts can affect the neural markers of motivation and reward processing in this age group.

The current study investigated differences in neural processing stimuli portraying distinct social reward and nonsocial reward contexts. Forty-three children (22 females; $M_{age}=8.49$ years) were asked to view and rate 150 pictures. Pictures were divided into an interpersonal reward category, which included social interaction, an intrapersonal reward category, which included happy faces, a non-social reward category, which included object-based reward images, and a neutral category. Two event-related potentials (ERPs), the N400 and the late-positive potential (LPP), were used to examine motivational salience toward reward images. Parent report of the child’s behavior was also collected.

Results revealed that interpersonal stimuli elicited a significantly lower N400 than object and intrapersonal reward stimuli, respectively ($F(2, 80)=3.15, p=.027, \eta^2=.070$). For the LPP, there was an interaction between gender and picture category ($F(2, 80)=3.26, p=.043, \eta^2=.075$). Females had significantly larger LPPs in response to intrapersonal ($p=.039$) and interpersonal ($p=.081$) images compared to object reward images, whereas males exhibited the opposite pattern (i.e., object LPPs > interpersonal and intrapersonal LPPs). Partial correlations showed that attenuated N400s and enhanced LPPs to intrapersonal images were related to externalizing and internalizing symptomology ($p's<0.03$), as well as emotional lability ($p<0.01$). Parent report of adaptability skills were related to enhanced N400s and attenuated LPPs to intrapersonal images.

The current study supports our hypothesis that differences in neural markers of motivation in children are influenced by distinct social and non-social reward contexts; further, findings indicate that these patterns are affected by gender. Additionally, problem behavior was associated with specific patterns of attention to specific reward contexts. Overall, results highlight reward contexts, gender, and attention timing as important factors to consider when examining the relations between reward processing and psychopathology.
Both popular and scientific literature has indicated that negative stigma towards feminists exists. Additionally, previous research has addressed that both identified gender and identified feminism, individually encourage discrimination at the workplace. The purpose of this study was to examine the impact of both gender and feminist affiliations on likelihood to hire. Participants included 120 undergraduates who were randomly assigned to read one of the four resume conditions depicting a male or female whose leadership experience was in a group that was feminist affiliated or not. Participants completed measures on likelihood to hire, perceived weakness, and perceived stereotypical gender traits. It was hypothesized that applicant’s with feminist affiliations would be less likely to be hired than applicant’s whose resumes did not include feminist affiliations. After examining how stereotypical feminine and masculine traits are perceived at the workplace, researchers predicted that there would be differences in perceived femininity and masculinity among males and females who do and do not identify as a feminist. As expected, gender and feminist affiliation on a resume influenced the applicant’s perceived femininity. Male non-feminist were viewed as having the lowest stereotypical feminine traits compared to female non-feminist and male feminist, but not the female with the feminist affiliation. Unexpectedly, females with feminist affiliations were not perceived to have more stereotypical masculine traits than females without feminist affiliations or males. Finally, results show that despite the condition, all applicants were likely to be hired for the entry level job. Implications are discussed.
The purpose of this study was to investigate whether being a commuter or a resident student and number of weekly work hours were associated with undergraduate students' academic achievement, academic motivation and support systems. Past research has shown personality types and being the first generation of attending college play a role in academic motivation. Furthermore, stress level has been found to be associated with students' academic motivation, especially for commuters because they tend to work more hours than on-campus residents. Even though there were many studies on academic achievement and motivation and support systems, there is still a lack of research investigating students' perceptions of academic achievement and motivation in relation to employment and commuter or on-campus resident status. For this study, participants included 120 undergraduate students from a small state school. Participants were assigned one of four different scenario depicting a college who was either an on-campus resident or a commuter, and worked on average, 25 or 15 hours per week. Participants then completed measures of the scenario character's support systems and academic motivation. The researcher hypothesized that the commuter scenario character working 25 hours per week, would be perceived to have less support systems and more academic motivation than the commuter character working 15 hours per week and the resident working 15 or 25 hours per week. Results indicated no perceived differences in academic motivation or social support across conditions. Study limitations as well as implications for student motivation and expectations are discussed.
College is a time of transition and change and for many, ignites a sense of freedom from authority figures such as parents. Once on their own, college students may take advantage of their new freedom by utilizing the coping behaviors that have been modeled by parents and authority figures such as drinking alcohol or reject them. The present study will examine college students' drinking behaviors in relation to their experiences with parenting styles (authoritarian, authoritative, permissive, and neglectful) and parental modeling of alcohol consumption. The study will also examine the perceived effects of parental modeling of alcohol use and parenting style on drinking behavior. It is predicted that participants will perceive the character with parents who use alcohol to cope to consume alcohol more frequently than those who are not exposed to alcohol use. Furthermore, participants will perceive neglectful parents to have a weaker relationship with their parents than the other three parenting styles. For participants, parental modeling of alcohol consumption will be positively correlated with participant alcohol consumption. Expectations for coping with the transition to college and parenting styles will be discussed.
Perceptions are strong predictors of actual academic achievement and motivation (Song, Bong, Lee, & Kim, 2015; Young, Johnson, Hawthorne, & Pugh, 2011). While past research has examined actual academic motivation and achievement (Berger & Archer, 2016; Goodman, Miller, & Olatunji, 2012; Tourangeau, Nord, Le, Sorongon, & Narjarian 2006), fewer studies have examined perceptions of achievement and motivation, and there is scant research examining the perceived impact of SES and gender on achievement. This study examined the perceived effects of gender and SES on intrinsic academic motivation and academic achievement. It was hypothesized that female scenario characters with high SES would be perceived as having the highest perceived academic motivation and achievement. Participants included 120 undergraduates who were assigned to one of four conditions depicting a high or low SES and male or female, and then completed measures of perceived intrinsic academic motivation and academic achievement. Results indicated a statistically significant interaction for perceived academic intrinsic motivation; female high SES characters were found to have higher perceived academic achievement than females with low SES. Findings are consistent with previous studies on gender, SES, motivation and achievement. Understanding perceptions may inform faculty, administrators, faculty and parents with ways to reduce bias and create a more just learning environment.
While there is a considerable amount of research regarding college retention, student success, and benefits to living on campus as opposed to off campus, there is a lack of research that explores living in a single dorm without roommates. The purpose of this study is to investigate the perceived social and academic differences between college students who live in either on-campus or off-campus housing, and either with or without roommates. Participants will include 120 undergraduate residents at a small state university. Participants will be randomly assigned to one of four housing-type scenarios (on-campus without roommates; on-campus with roommates; off-campus without roommates; or off-campus with roommates) and will be asked to rate a scenario character’s satisfaction with life, loneliness, and academic achievement, as well as self-report their number of roommates, own happiness, loneliness, academic involvement, social involvement, and sense of belonging. This study will add to the growing body of research regarding student housing choice and its relationship to student success and college retention and may inform interventions designed to enhance student satisfaction and retention.

Keywords: satisfaction with life, loneliness, academic achievement, on-campus housing
The purpose of the study is to evaluate perceptions of a medically-based treatment (the treatment and care of a patient using only conventional medication) versus a multidisciplinary therapeutic treatment (the treatment and care of a patient using conventional medicine in combination with alternative approaches) for patients with schizophrenia and depression. A sample of 120 participants will be recruited from a small state university in the Northeast. It is anticipated that participants will range from 18-25 years of age, will be approximately 60% female, and 30% ethnic/racial minorities. Participants will be randomly assigned to read one of four scenarios describing a character with either schizophrenia or depression, and undergoing either a medically or multidisciplinary based treatment. Participants will then complete Novelli’s (2006) HealthStyles Survey, measuring attitudes towards mental illness, and a researcher-devised Treatment Scale measuring treatment success. The hypotheses are: (H1) that participants will perceive a multidisciplinary therapeutic approach as more effective than a medically-based approach; (H2) participants will perceive scenario characters with depression as having more effective treatment outcomes; (H3) participants will perceive scenario characters with depression as benefitting the most from a multidisciplinary therapeutic treatment. The data will be analyzed using the attitudes toward mental illness measure as a covariate, while also examining the perceptions of treatment (IV1; medical or multidisciplinary) and disorder type (IV2; depression or schizophrenia) on treatment success (DV). Results of this research could help identify influences to patient buy-in for various treatment approaches as devised by clinical, medical, and alternative practitioners.
Socioemotional, cognitive, and physical well-being can be maintained through participation in activities and social engagement. It is important for both older and younger adults to be involved in stimulating activities to promote positive well-being across the lifespan. Large social networks, relationships, and support are key factors in psychological health (Barnes, Mendes de Leon, Wilson, Bienias, & Evans, 2004; Myers & Diener, 1995). The current study explored the impact participation in activities had on overall well-being among both older and younger adults. A total of 59 participants took part in the study, 34 younger and 25 older adults. Younger adults were students at Worcester State University while older adults were residents at a local assisted living facility. Participants completed questionnaires regarding their physical and social activities, a measure of processing speed, and two measures of socioemotional well-being. As expected, younger adults spend more hours participating in activities daily than older adults. Older adults, however, spent more days out of the week engaged in activities than younger adults. While non-significant, participation in activities led to higher well-being scores among both older and younger adults. Findings from this research will support the importance of engagement and participation throughout the lifespan due to the benefits on overall well-being across the lifespan.
Formal science and math education involves learning about a host of complex topics. Student learning is often supported through the use of textbooks. These textbooks are highly visual, containing numerous images of different kinds (Mayer, 1993). Students must often compare the elements within a figure—parts of a structure, steps in a process, etc.—to glean an important abstract relationship. The present study evaluated existing textbook images with respect to their support for visual comparisons. The research team analyzed figures from the top U.S. math and science textbook publishers to identify how corresponding elements are depicted within each image. Our coding identified several factors that could help vs. hinder visual comparison, including the spatial alignment of corresponding elements, the number and type of intervening elements between corresponding elements, and color matches vs. non-matches between elements. Spatial alignment (cf. Matlen, Gentner, & Franconeri, 2014) was evaluated by identifying the primary axis, organizational layout, and placement of corresponding elements. Our coding discovered that textbook images frequently involved multiple comparisons, indicating that the figures are informationally dense and meant to convey numerous relationships to the reader. The coding also revealed substantial variability in the presence and types of cognitive supports for comparison. Some textbook images contained numerous supports for noticing and mapping relevant correspondences. Other images had qualities that could actually make visual comparison more difficult. This research raises important considerations for the design of effective visualizations in middle school math and science textbooks.
Student Service Members/Veterans at Worcester State University: Sense of Support, Strategies for Learning, and Adjustment to College

Military downsizing following the close of large scale operations in Iraq and Afghanistan have led to a period of increased college enrollment of student service members and veterans (SSM/V) (Rumann and Hamrick, 2010; Sander, 2012). These students share many traits with non-traditional students that impede their transition and adjustment to college, and both groups are less likely to complete college than traditional undergraduates (Horn and Carroll, 1996; Horn and Premo, 1995; Pellegrino and Hoggan, 2015). This study compared SSM/V to traditional and non-traditional students in three areas: Sense of support, adjustment to college, and motivated strategies for learning. This is a quasi-experiment, where the quasi-independent variable is the type of student, with three conditions: student service members / veterans, traditional undergraduate students, and non-traditional students. Participants included 122 university students, aged 18 through 68, including 29 SSM/V, 33 non-traditional students, and 60 traditional undergraduates. Dependent variables were measured by the Sense of Support Scale (Dolbier and Steinhardt, 2000), the Student Adjustment to College Questionnaire (Baker and Siryk, 1989), and the Motivated Strategies for Learning Questionnaire (Pintrich and De Groot, 1990). An independent samples t-test will be performed to evaluate the differences between groups of students in their sense of support, adjustment to college, and motivated strategies for learning. The findings will contribute to our understanding of how the SSM/V community adjusts to college, and could be used to help colleges better serve the SSM/V community in their transition from military to academia.
Hand preference is an expression of hemispheric lateralization and can correlate with cognitive functions and emotional traits associated with one brain hemisphere. Previous research in marmosets has indicated that left-handed individuals are more anxious than right-handed individuals. In the present study, we tested this hypothesis and also examined potential relationships between hand preference and cognitive performance in a sample of 28 males and female middle-aged (4-5 years old) common marmosets (*Callithrix jacchus*). Hand preference was assessed in a simple reaching task with 50 trials. For each subject, a handedness index (HI) was computed by subtracting the number of left-handed responses from the number of right-handed responses and dividing by the total number of responses. Stress reactivity was assessed through urinary cortisol levels during a temporary social separation task and a behavioral measure of stress. Cognitive performance was assessed via a reversal learning task administered on touchscreen. We found that HI was positively correlated with baseline cortisol levels ($r = 0.38$, $p = .05$), indicating that more strongly right-handed individuals tended to have higher basal cortisol. Additionally, this relationship was strong in females ($r = 0.717$, $p <.005$) but not significant in males ($r = -0.22$, $ns$). HI was not a significant predictor of reversal learning performance in either sex. These results support the idea that some aspects of the HPA axis are modulated by hand preference and biological sex but do not support the contention that left-handers are more anxious than right-handers.

Vaughan, E., Lacreuse, A., Workman, K.
Materialism and Subjective Well-Being: A Conceptual Meta-analysis

Since before the days of the ancient Greeks, theorists and lay people alike have questioned the nature of a desirable life – what constitutes a high quality of life; what is it that makes life worth living? Time and time again, answers to these sorts of questions seem to converge around the notion of subjective wellbeing (SWB), or in broad terms, whether a person is subjectively happy with his or her own life. At the same time it is popularly presumed – though debatably, groundlessly so – that the accumulation of material wealth (as measured by income level, GDP, and so on) is a sure route to enhancing SWB. The present paper draws from prominent literature on the psychology and neuroscience of SWB to outline its structural elements and examine the validity of material wealth as one of its primary determinants. A comprehensive literature review sets out the major distinction between the hedonic (emotional) and eudemonic (cognitive) branches of SWB, followed by a meta-analysis of several studies no more than a decade old that addresses specifically how materialism impacts each branch. The results of this analysis reveal that material wealth is generally a correlate of the eudemonic component of SWB, but that this correlation holds only in certain conditions and up to a certain level of wealth. More reliable indicators of SWB include physical health and the state of interpersonal relationships. It is the hope that these findings rouse some skepticism in readers about the value of material wealth.
The correlation between academic achievement gap and poverty, specifically among ethnic and racial minorities, continues to be a critical issue in education and our society in general. Previous research on this topic identified a myriad of environmental and psychological factors that play a role in academic standings of American students living in poverty. Proposed ways to make improvements through environmental changes asserts that familial variables have greater impact on academic success and transcends the responsibility of the state and schools. This paper will focus on how we can attack the psychological variables. Bandura (1950) purports that the greatest impact on youth learning comes from role models with whom the youth identifies. Dweck theory of “growth mindset” (Dweck, 2003) on the other hand, asserts that if children are helped to understand that they can become “smarter” through effort, they will increase their effort and thereby achieve higher academic success. Assuming Bandura’s and Dweck’s assertions are correct, we can apply these concepts to academic learning as well. Examining the impact of role models and the growth mindset theory in education in particular, this paper suggest that the scarcity of minority role models and less efforts thwarts ethnic and racial minority students from striving at school. This paper therefore encourages parents, teachers and close member of student to be their primary role model and thereby increase the likelihood of academic success.
The purpose of this study is to identify which variables encourage and prevent participants from cycling on the Columbia Greenway Rail Trail and in Westfield, Massachusetts. One thousand Westfield, MA residents were randomly selected to participate. Residents who chose to participate completed an online survey that asked about their attitudes, demographics, and use of the rail trail. We expect to find that participants who cycle, do so for exercise and recreation purposes. Distance to the trail and fear are expected to be related to reduced bicycle use frequency. We also expect to find that participants will have positive perceptions about cycling and the Columbia Greenway Rail Trail. These findings are relevant to anyone seeking to encourage others to engage in cycling more frequently, and for implementing practical changes to the Westfield community that will allow more residents to engage in cycling and other health related behaviors.
Despite a growing literature base on the utility of evidence-based treatments (EBTs) for psychological difficulties, there are several barriers to accessing these treatments in diverse populations. The aim of this project was to summarize existing research on cultural views of mental health problems and their psychological treatments within cultural minority communities, with a focus on cultural adaptions of EBTs. A selective review of empirical literature, found on PsycINFO, on cultural stigma of mental illness and treatment within minority communities as well as the necessity for the adaption of treatments to fit non-western cultural beliefs and practices. Based on the literature, there is a prevalence of negative views towards mental illness within ethnic minority communities which may contribute to the delay in treatment seeking in these populations. Other factors that may contribute to the inadequate access to care include negative experiences with the quality of services provided as well as the lack of cultural representation within the treatments themselves. Recommendations for future research are made, including increasing cultural competency in the research and provision of EBTs to enhance existing treatments’ universal applicability.
In the field of adoption research, birth fathers (Bf) are a significantly understudied population, and information is limited and dated. The longitudinal Minnesota-Texas Adoption Research Project (MTARP) has been following adoptive families and adopted children’s birth mothers for 30 years. The current project addresses the understudied relationship between emerging adult (EA) adoptees and their Bfs. Using both quantitative and qualitative data from MTARP’s Wave 3 (2005-2008, n=167), this project explores how changes in contact with Bfs relate to adoptees’ satisfaction with open-relationship arrangements with the Bf. Some evidence suggests that adoptees’ contact with Bfs is typically positive, but there is less information on how contact change influences relationship satisfaction. The impact of changing contact on satisfaction with openness arrangements will be assessed using regression. Qualitative themes in feelings and perceptions regarding the Bf will be used to support analysis of quantitative findings. Using the Consensual Qualitative Research paradigm, qualitative information is being coded from semi-structured interviews with EA adoptees exploring topics related to adoption history, their stories, birth family contact, and family relationships. Satisfaction with the openness arrangement has been coded from interviews. Preliminary analyses show that of 167 EA adoptees, 69 have identifying information, and 34 have contact with their Bfs. Thirty-two EA adoptees have experienced contact changes with Bfs between age 15 and W3. Findings from this project will contribute to our understanding of the importance of Bfs within the adoptive kinship network, and their impact on adoptees.
Adverse childhood experiences are defined as “the experience of an event by a child that is emotionally painful or distressful, which often results in lasting mental and physical effects (NIMH, 2015, p. 1). Approximately 60% of adults have encountered at least one adverse childhood experience (Slowikowski, 2009, p. 1). Adverse childhood experiences are known to increase the risk of depression, alcoholism, number of suicide attempts, and to increase contingent self-worth (Slowikowski, 2009, p. 3). However, no study to date has examined adverse childhood experiences, depression, attachment, contingent self-worth, and shame simultaneously. In an ongoing study 100+ participants from Westfield State University will complete an online survey regarding adverse childhood experiences and its correlates. Preliminary results will be presented at the conference. Expected findings will expand our understanding of the relationship between adverse childhood experiences, depression, attachment, contingent self-worth, and shame and possible interrelationships. I hypothesize that there will be a correlation between adverse childhood experiences, depression, attachment, contingent self-worth, and shame.
The purpose of the present study is to examine the effects of verbal working memory on visual search tasks. Previous research has shown that assigning an articulation task such as repeating “the” will interfere with verbal working memory. There are two groups of participants: one group is assigned a verbal suppression task and the other is not. It is believed performing the verbal suppression task and a visual search task simultaneously will block the ability to verbally encode the visual search targets. The stimuli used in the visual search display are colored Ts. Two Ts of different colors are flashed at the participant for one second at the beginning of each trial, indicating the possible targets for that trial. Next, the search display of 10 colored Ts appears. Participants are expected to respond to the presence or absence of the target colored T among distractor colored Ts. As participants search for the target Ts, they are holding the colors in working memory to guide their search. The verbal suppression subjects should be forced to use a purely visual memory representation of the targets. The ultimate goal is to better understand how items are represented in working memory and how they are used to guide visual search. Eye movements and response times are tracked as measures of performance and search efficiency on the visual search task.
Fingernails as a Biomarker of Chronic Hypothalamic-Pituitary-Adrenal Axis Activity

This thesis investigates differing family dynamics of members of the Mbenjele foragers in the Republic of the Congo in relation to levels of cortisol and testosterone in fingernail clippings. Currently, hair cortisol is routinely used as a noninvasive biomarker of chronic exposure to steroid hormones. Fingernail clippings represent a more universal noninvasive matrix for assessing chronic hormone exposure as they offer collection ability for those with short to no hair as well as for populations with cultural restrictions around cutting of the hair. There has been some limited precedent in the literature establishing fingernails as a biomarker. In the present study, fingernail clippings from 133 participants were collected in Republic of the Congo in collaboration with Dr. Lee Gettler’s lab at Notre Dame. Samples were collected from children and parents of differing degrees of family dynamics. It is expected that children in families with greater marital conflict will show higher cortisol levels; children in families in which fathers are rated as being less involved with parental care and poorer provisioners will show higher cortisol levels; mothers and fathers with greater marital conflict will show higher cortisol levels, and among adults, those who experience greater day to day ethnic conflict/threat with the nearby, neighboring Bantu-speaking farmers will show higher cortisol levels.
How Blockbuster Films Portray Post-Traumatic Stress Disorder and Where They Fall Short

Often in war films such as “American Sniper” and “Thank You for Your Service,” PTSD is displayed accurately. Both service members struggle with the reintegration process. After serving multiple tours in the middle east, it is easy to see why. However, this project is going to challenge these blockbuster films and shine a light on a different form of PTSD within the ranks of the military; sexual assault. According to Protect Our Defenders, 14,900 members were sexually assaulted in 2016. Furthermore, one-third of sexual assault victims in the military are discharged after filing a report. The victims that received a discharge were also statistically inclined to receive a discharge other than honorable (general and dishonorable.) Sexual assault in the military is a problem for both men and women. The very people that swore to protect this nation are inflicting tremendous pain on their brothers and sisters. By making a film about sexual assault in the military, it would support the troops and it would show other possible candidates for the armed forces that this misconduct is not taken lightly. Society tends to think in order to develop PTSD, you have to be a hardened combat veteran like in “American Sniper” and “Thank You for Your Service,” but this is hardly the truth. Anyone inside and outside of the military can develop PTSD from a traumatic event such as sexual assault.
Authoritarianism and Well-Being after the 2016 Presidential Election

The 2016 United States Presidential Election elicited a variety of emotions in citizens across the United States. During the campaign trail, Donald Trump’s controversial rhetoric both excited and terrified citizens (e.g., his endorsement of harsher immigration laws, building a wall along the southern U.S. border). This division within the country continued upon his election into office and his subsequent inauguration. While many of these divisions fell along the lines of social groups (e.g., race, gender), personality differences may have also played a role. Specifically, perhaps people who were more authoritarian, such that they believe in the need for a stronger government, were more satisfied with Trump’s proposed policies and with the results of the election. Additionally, since they did not feel negatively affected by the outcome of the election, they may also have been experiencing greater well-being (e.g., less depressive symptoms, higher life satisfaction) overall.

In conclusion, we found that participants’ satisfaction with the election and overall well-being after the presidential election varied as a function of individual differences, specifically, authoritarianism. People who were more supportive of a stronger, rigid, and authoritative government reported greater satisfaction with the election and better well-being in comparison to those who did not support those same beliefs.

Brianna Forte, Deborah Wu, and Jiyoung Park
Although self-damaging behaviors such as substance abuse, disordered eating, and non-suicidal self injury (NSSI) are associated with suicidality, it is unclear to what extent these factors may interact in the prediction of suicide risk. Based on the interpersonal psychological theory of suicide (Van Orden, Witte, Gordon, Bender, & Joiner, 2008), suicide risk increases in the presence of both desire for suicide and acquired capability to inflict self-injury to oneself. The aforementioned behaviors- substance abuse, disordered eating, and NSSI are likely to reflect both of these factors, and the increased engagement in such behaviors may confer greater acquired capability. As a result, we hypothesize that greater engagement in a greater number of self-damaging behaviors are associated with greater suicidality. Participants in this study are 115 university students who completed self-report measures for course credit. Regression analyses will examine this association.
Throughout its history, the United States has become a home to millions of immigrants but immigrants are nonetheless often met with discrimination and prejudice. One form of prejudice is dehumanization (i.e., ascribing “less than human” traits to people). Prior research has found that dehumanization often leads to discriminatory behavior towards immigrants but has not examined how the type of immigrant influences dehumanization. This is an important gap because the reason for migration influences people’s attitudes towards immigrants (Verkuyten, 2005). My research addresses a gap in the current research and investigates the extent people dehumanize immigrants based on whether they came to the United States voluntarily (i.e. economic interests) or as a refugee escaping from persecution. Study 1 of the project was a comparative survey in which participants were asked to rate to what extent refugees and voluntary immigrants and refugees experience a variety of emotions. In addition participants were asked to what extent they believed a series of characteristics applied to refugees and voluntary immigrants, their personal feelings towards them and their support for immigrant policies as well. The study found that people tend to assign more human-like traits to voluntary immigrants rather than refugees. The study also found that political attitudes predict people’s’ attitudes towards immigration policy. The results from this study help identify what groups are more dehumanized and help understand people’s attitudes towards migrants coming into the United States.
When presented with the choice of two check-out lines at the grocery store, one will contemplate which line will be faster by making an approximation, not by explicitly counting the number of people or groceries in each line. This capacity to estimate numerical quantity is thought to play a fundamental role in acquiring skills dealing with symbolic quantitative concepts and different subdivisions of math skills, especially in young children. In this study, a novel approach was utilized using electroencephalography (EEG) in children between the ages of 5 and 12 to measure and individually analyze objective measurements of the representation of number, size, or spacing of a dot array. The same children later performed a series of mathematical competence tests that measured abilities from different disciplines of math, including arithmetic and geometry. The neural signatures and behavioral data were compared for each of these tests in order to determine whether or not the neural sensitivity to number and other non-numerical magnitudes can serve as predictors for performance on behavioral math tests. It is predicted that neural signatures to spacing will contribute to performance in geometry ability, whereas neural signatures to number will contribute to arithmetic ability. This would suggest a contribution of neural sensitivity to numerical and non-numerical magnitudes to mathematic performance, specifically the relationship of children's implicit encoding of numerosity and spacing in the visual cortex of dot arrays with how well children perform arithmetic and geometry.
Every language has constraints in regard to which speech sounds can co-occur. For example, in English, /s/ can be followed by /l/, but not by /r/. Language users implicitly acquire these phonotactic constraints when learning a new language. We tested whether adults can use such newly learned constraints to speed up word recognition. During exposure, participants will hear words from an artificial language while also seeing four pictures displayed on a computer screen. Due to feedback, participants will learn which picture each novel word refers to. Critically, all novel words are constrained as to which consonants can co-occur. Participants learning the same-place language will hear words with two consonants that have the same place of articulation (e.g., *peapa*). Participants learning the different-place language will hear words with two consonants differing in their place of articulation (e.g., *peaka*). At test, all participants hear other novel labels, while their eye movements to printed words are tracked. Critically, two of these printed words are identical except for their second consonant (e.g., *peaka* vs. *peapa*). If participants use newly-learned constraints to predict the identity of the word, then – while hearing the first syllable, that is, before hearing the disambiguating second consonant – listeners should fixate more on the item that satisfies the constraint in the language they had learned than on the one that violates the constraint. This result would show that phonotactic constraints allow listeners to predict how a word continues, hence speeding up word recognition.
Cortisol, the human stress hormone, is the primary glucocorticoid and key component in the human physiological stress response system. When detecting a stressor, the human body reacts via the Hypothalamic Pituitary Adrenal (HPA) Axis. As mother and child cortisol are linked, researchers at UCLA have set out to establish if high mother HPA Axis activity before and during pregnancy affects the executive functioning levels of her child. Researchers will examine whether changes in child hair cortisol from ages 3.5 to age 4.5 are associated with worse executive functioning performance at age 4.5 compared to NIH Toolbox test results collected at age 3.5. In order to do so, ~150 lower-income mother child dyads from various counties in the USA will be tested in a longitudinal study. At children age 3.5, mothers and children will be interviewed, hair samples will be collected, the Differential Ability Scales (DAS) will be administered to children. All hair cortisol (HCC) samples will be processed by myself in Dr. Jerrold Meyer’s laboratory at Umass Amherst. If the results align with our hypotheses, we expect to see higher mother preconception and prenatal HCC levels corresponding with higher child HCC levels throughout the collection points in the child’s life. In addition higher child HCC levels will, in theory, lead to less executive functioning of the child by age of 4.5, shown in lower NIH Toolbox scores, and less established relationships between the mother-child dyads.
Teen Pregnancy in South-Central United States

In the United States, teen pregnancy among girls (ages 15-19) is an important public health problem that requires immediate attention. According to the Center of Disease Control (CDC), in 2015, the national for teen pregnancy was 22.3 births per 1,000 females. Although the overall national average is declining, many states lag behind these national rates. The states with the highest teen pregnancy rates are Mississippi (32.6 births per 1,000 females), Texas (31.0 births per 1,000 females) and Louisiana (30.6 births per 1,000 females). We searched for trends and risk factors for teen pregnancy using Pubmed and the CDC website. Risk factors for teen pregnancy include ethnicity, access to contraception, socioeconomic status, and sexual education policies in school. For example, non-Hispanic Black girls continue to have the highest rates of teen pregnancy, and young women are twice as likely to become pregnant after the first time of sexual intercourse if they do not have access to contraception. We will describe previous interventions designed to address this problem and recommend tailored interventions for these high-risk regions in the South Central U.S.
Food insecurity is a problem affecting individuals all over the world and in the United States. Many food insecure individuals do not have adequate access to healthy and nutritious foods, leading to poor dietary choices, and consequently obesity. This is important as childhood obesity is at epidemic rates in the US with 17% of children obese in 2014. Childhood obesity can lead to chronic health problems such as diabetes and heart disease, and lower life quality. Many families living with food insecurity have low-income; 14.5% of low-income children are obese. Louisiana has among the highest rates of food insecurity in the United States, with an insecurity rate of 18.3% by household. After Hurricane Katrina, food insecurity exacerbated even further. A systematic search of peer-reviewed literature was conducted using PubMed and national agencies such as the Center for Disease Control to examine and understand food insecurity and other risk factors for childhood obesity in Louisiana. Risk factors for food insecurity include living in a rural area, access to transportation, and socioeconomic status. Protective factors included increasing access to fruits, vegetables, and whole grains. We will examine childhood obesity prevention programs, and make intervention program recommendations for Louisiana residents living with food insecurity. These recommendations will include investment in the incorporation of healthier foods in school lunches throughout the state of Louisiana.
In the United States, it is estimated that 1.2 million people are living with human immunodeficiency virus (HIV). Despite advances in healthcare, an estimated 50,000 people in the United States are infected with HIV each year. The United States Government has created the National HIV/AIDS Strategy (NHAS) with the goal of reducing the number of annual HIV infections by 25% for 2020. To understand how resources can be efficiently allocated, a model must be developed to understand the progression of HIV in the United States. An important component of this model is to simulate the transmission of HIV through America’s injection drug use (IDU) population. I will discuss our work in developing a new evolving contacts network algorithm (ECNA) to simulate individual-level interactions in a sample population representative of America’s IDU population. We are using an agent-based network model (ABNM) to simulate distributive and receptive needle sharing between people infected with HIV and their susceptible IDU contacts. When a susceptible agent becomes infected, its susceptible contacts are added to the model, thus evolving the network over time. Contacts are added such that the average degree and clustering coefficient of the ECNA converges to that of America’s IDU network. The purpose of this type of model is to minimize the information lost when scaling down the IDU population and minimize the computational cost of using an ABNM, while maintaining modeling accuracy.
Manufactured doubt is a description of the strategies used by industries, organizations, and individuals to legally, politically, or scientifically obscure the harmful effects of their products or work. Through a literature-based review of relevant texts, my analysis aims to compare and contrast varying strategies from five different cases: coal, tobacco, climate change, Atrazine, and the sugar industry. Important literature of note includes: Naomi Oreskes' *Merchants of Doubt*, David Michaels' *Doubt is Their Product*, papers by Tyrone Hayes regarding Atrazine use, the New York Times' Anahad O'Connor article (*How the Sugar Industry Shifted Blame to Fat*), *Sugar Industry and Coronary Heart Disease Research* by Cristin Kearns et al., and the Center for Public Integrity publications regarding black lung. Case-studies of representative examples were conducted to gather data on the varying methods used by involved parties to manufacture doubt. I find that both the strategies and the conditions for manufacturing doubt depend on the type of group trying to obscure facts, the groups over which they have power, and other invested parties. By discovering this information, more effective methods for identifying and countering instances of manufactured doubt can be generated. This research will also answer the question of who can manufacture doubt, which relates to emerging platforms for doing so, including the role of citizen scientists and social media. By distinguishing the breadth of tactics and motives, whether they are financial, authoritative, or otherwise, an improved definition of manufactured doubt is produced.
In Texas, limited access to reproductive health care, primarily abortion services, puts an undue burden on some of the state’s most vulnerable female populations. Insurance restrictions and legislative measures in the state have limited abortion insurance coverage to cases of life endangerment. Coupled with these restrictions, 96% of Texas counties have no clinics to provide abortions. This is a barrier to the reproductive health of Texas women as 43% of them live in counties lacking these clinics. This disparity results in women having to travel over 100 miles to seek a safe and legal abortion provider, and procure funding for these procedures on their own. In addition, throughout the U.S. and especially in Texas, lack of health insurance limits the ability of women of childbearing age to obtain reproductive health services. According to the 2016 American Health Rankings, almost 30% of women aged 18-44 in Texas were uninsured. A review of literature was conducted using PubMed and keywords such as “abortion access”, “Texas”, “women”, “healthcare”, “reproductive health”, and “risk factors.” Risk factors affecting access to reproductive health care in Texas include: income level, insurance, distance from a clinic, and the current laws/policies in place regarding women’s health. Those who have a higher income level have better insurance and therefore better access to care. Another protective factor affecting Texas woman is closer proximity to clinics. We will examine interventions to address this problem with the hope of being able to recommend new and improved interventions focusing on women in Texas.
First responders, specifically police officers and emergency medical services (EMS) personnel, have one of the highest rates of suicide and suicidal ideation among all job professions. According to the Center for Disease Control (CDC), rates of suicide among female first responders were 14.1 per 100,000 and 34.1 per 100,000 among males. In contrast, rates of suicide were 7.9 per 100,000 people in office and administrative support personnel. The literature was gathered through PubMed as well as through CDC databases. Risk factors for suicide in this population included experience of post traumatic stress disorder symptoms (PTSD), alcohol consumption, inconsistent sleep schedule, shift work, employment status, and rural vs. urban work setting. Protective factors include familial support. We will examine previous intervention programs designed for first responders and make new recommendations for interventions designed to lower the rate of suicide and suicidal ideation in this population with a focus on police officers.
Hydraulic fracturing (HF) is a relatively new process of unconventional oil and natural gas (UOG) collection. Currently, we know that there is a dramatic expansion of HF-UOG operations, in which leaks and spills of the chemicals used in these processes are of common occurrence. In fact, UOG chemicals have been detected in areas surrounding HF-UOG operations. Many of the individual chemical constituents found in hydraulic fracturing fluids are endocrine-disrupting chemicals (EDCs) which have shown immune, respiratory, gastrointestinal, neurological, renal, reproductive, developmental and hepatic toxicity. Our exploration of prenatal exposure to HF-UOG chemicals builds off prior work from our lab and the lab of our collaborators. Here, we examine the effects of early life exposure to a mixture of 23 chemicals commonly found in HF-UOG operations on the developing mammary gland. My project aims to evaluate the effects of this UOG mixture on the expression of hormone receptors in the mammary gland, and evaluate the effects of exposure on the long-term morphology of this tissue. Prior studies found modest effects of UOG chemicals on estrogen receptor expression, but other receptors have been unexplored to date. Completion of this project will allow us to determine whether a complex chemical mixture alters expression of more than one receptor in the mammary gland, and whether the effects of UOG chemicals on the mouse mammary gland are long-lasting.
Exposure to Propylparaben during Pregnancy and Lactation Alters Mammary Gland Morphology

It was long thought that hormones and endocrine disrupting chemicals (EDCs) produce long-term effects in animals undergoing rapid development (i.e. gestation), but not during adulthood. For this reason, many studies of EDCs examining effects during gestational exposures have ignored the mother, who is inevitably co-exposed. Recently, a small number of studies have suggested that pregnant rodents may be sensitive to EDC exposures during pregnancy and lactation, showing long-lasting effects. In this study, we evaluated the long-term effects of the xenoestrogen propylparaben (PP), found widely in personal care products, on the mouse mammary gland after exposures during pregnancy and lactation. PP is detectable in a vast majority of the population’s urine, with the highest levels observed in pregnant women. PP is known to bind estrogen receptor (ER)β, which may play a role in genomic surveillance in the mammary gland. We hypothesize that PP exposures interfere with mammary gland development, yielding permanent changes after mammary involution. To address this hypothesis, we exposed female mice to PP or vehicle during pregnancy and lactation. A second control group of non-pregnant females were also included. Five weeks after weaning, mammary gland tissues were collected and evaluated for effects on mammary histoarchitecture, protein expression, and gene expression. Our analyses reveal long-term effects of PP on mammary gland morphology and gene expression. These changes are consistent with studies of other xenoestrogens performed by our lab, suggesting that estrogenic EDCs affect the mammary gland during pregnancy and lactation.
Endocrine disrupting chemicals (EDCs) like Bisphenol S (BPS), a structural analog of Bisphenol A (BPA), mimic the actions of endogenous estrogens, resulting in abnormal development of estrogen-sensitive organs like the mammary gland. Embryonic exposure to BPS is especially concerning when considering the key developmental stages occurring in utero. The goal of this study is to evaluate mammary tissue morphology at embryonic day 16 and determine whether low dose BPS exposure alters gland development in exposed male mouse embryos. Since male mammary glands are structurally less developed and highly sensitive to estrogenic EDCs, these organs act as a simple model tissue to evaluate the effects of putative xenoestrogens. We employed DNA extraction followed by PCR and agarose gel electrophoresis to sex each embryo. We sectioned fetuses exposed via their mothers to vehicle or one of two doses of BPS from pregnancy days 8-16 and performed immunohistochemistry to quantify the number of cells expressing estrogen-receptor α in the mammary tissue. Androgen receptor expression, responsible for the sexually dimorphic development of the mouse mammary gland, was also characterized using immunohistochemistry analysis. Dissection microscopy was used to measure overall mammary gland area and characterize any structural abnormalities. Including other data collected from pubertal and adult male mice exposed to low doses of BPS during gestation, we anticipate this work will address fundamental questions of how environmental estrogens can disrupt development of the mammary gland and contribute to mammary diseases including cancer.
Health Inequalities and Pharmaceutical Drug Costs in the United States

The United States is a world leader in biomedical research and the development of pharmaceutical drugs. However, high costs affect prescription drug accessibility for millions of Americans, and as a consequence health outcomes are worse than they should be. The costs of pharmaceutical drugs are rising in the United States and many other countries, despite the fact that the public invests substantially in basic science and research that leads to the development of these products. In comparison to other rich nations, the United States does less to control costs and guarantee access to pharmaceutical drugs. This research documents how widespread this problem is, especially for those who lack the financial resources to access the drugs they need.
This study reviewed literature on and presented a digital case study of the application of yin-yang principles in Traditional Chinese Medicine (TCM). Yin-yang theory can be considered the Chinese correlative to cosmology, used to interpret the balance of the inner body. Dong Zhongshu (Tung Chung-Shu), a great theorist in the Han Empire, integrated yin-yang theory into Confucianism and transformed the perspective of the theory in TCM. Practitioners of TCM apply yin-yang principles when diagnosing illnesses and establishing treatment protocols for patients. For this study, we reviewed the literature on the application of yin-yang in TCM using textbooks and articles listed in the following databases: Google Scholar, PubMed, Science Direct, and HHS Public Access. Studies on TCM use in China, as well as those establishing a Western quantification of yin-yang, are included in this review. Digital story-telling was used to ground the literature review in the context of community TCM experiences with a case study of the lead author’s 100-year-old great-grandfather, a TCM practitioner. This approach builds on the inter-generational transmission of knowledge among traditional healer families. Literature supported claims that yin-yang principles are associated with benefits to human health, including prevention and treatment of chronic diseases, improved immune system functioning, and the control of hepatitis C. The application of yin-yang principles in TCM can potentially complement Western medicine in preventing, diagnosing, and treating illnesses. Further research is needed to understand the application of yin-yang in TCM and associated health benefits.
The CDC states that 1 in 5 school aged children in the United States are obese, a statistic that has tripled since the 1970s. Obesity is defined as having a body mass index (BMI) of greater than 30 kg/m². Research has shown that childhood obesity is a precursor to a number of chronic health conditions such as teenage diabetes, cardiovascular disease, and hypertension. Risk factors associated with childhood obesity are unhealthy lifestyle habits and environments, SES, and education. The overweight and obesity rate for children in the city of Springfield is 41% which is significantly higher than the state of Massachusetts at large. The median household income for Springfield is significantly lower than its surrounding cities. Though a racially diverse population, the majority of community members are Hispanic—a racial group that has been identified as being more susceptible to childhood obesity. A thorough literature review will be conducted in order to identify interventions implemented through schools and other community organizations in the U.S. that have been shown to be effective in preventing and combating childhood obesity. Using this research, we will develop a set of recommendations for programs and policies to address childhood obesity specific to the city of Springfield.
The seventh leading cause of death in the United States is Diabetes Mellitus. This group of disorders impairs the body’s ability to metabolize glucose, and increases an individual’s risk of heart attacks, kidney failure, limb amputations, and blindness. Nearly 30.3 million people in the U.S. are affected by one of these metabolic disorders; approximately 7.2 million of those people are undiagnosed and unaware of their condition. National reports reveal prevalence rates are higher among Native Americans and continue to increase. Our goal is to identify programs for treating and/or preventing diabetes among Native Americans. Common risk factors can include financial and social strain, improper consumption of unhealthy foods and/or not eating meals on time. We predict Native American populations with low quality community programs will have higher prevalence rates. We will conduct a literature review to identify programs and policies shown to be effective in addressing risk factors for diabetes and to reduce rates of diabetes cases. We will build recommendations to be specifically made for the Navajo Nation in New Mexico, Utah, and Arizona by examining programs directed at Native Americans. Early diagnosis and proper treatment is the key to living a healthy life, so high quality intervention programs should be able to help these populations manage their diabetes more effectively.
Type 2 diabetes is a chronic metabolic disorder in which the body cannot process blood sugar. The CDC estimates that approximately 30.3 million Americans (9.4% of the entire population), have type 2 diabetes. Diabetes remains the 7th leading cause of death in the U.S. according to Healthy People 2020. If left untreated, this disease can lead to significant complications such as heart disease, stroke, and hypertension. These are not only burdens to the individual, but significant burdens to the healthcare system. According to the American Diabetes Association, diabetes in Louisiana has been growing steadily since 2005 to approximately 13.9% of the total adult population. In the New Orleans area specifically, the prevalence of diabetes in adults is approximately 12%. We will conduct a literature review to study the scope of the issue as well as identify and recommend intervention programs to lessen the impacts of community and individual risk factors. These may include policy changes shown to be effective in urban populations. The results of our study will highlight the ongoing risk factors for diabetes in New Orleans and suggest interventions specific to this community.
Medical practice and healthcare delivery seem to vary across different cultures. Interestingly enough, America is the only industrialized nation without universal healthcare and recent political upheaval has caused issues in terms of the American method of healthcare delivery, dividing the nation into two groups of people: those who support universalized healthcare and those who do not support it. As a result, Americans have looked to other healthcare models for inspiration in solving this healthcare dilemma. The Danish model reflects the principles of the social welfare system, which strives to provide governmental support to all individuals and to create a system of equality and solidarity among all. Unlike the American healthcare system, the Danish model is financed through public taxation and tailors its healthcare delivery in a way that maximizes cost-effectiveness. The ultimate question, however, is whether this system is sustainable for the long-term when taking into account changes in the national demographics. Through an extensive literature review using journal articles from the UMass library databases and google scholar, I will be looking at different aspects of the system to assess the quality and sustainability of the Danish healthcare model as well as how the Danes themselves perceive their healthcare. Additionally, I will be comparing and contrasting the Danish model against the American model to determine if any aspects of the Danish model could potentially be applied to the American system to improve American healthcare.
Hormesis Research Funding

The topic of hormesis research funding has been a point of deliberation within the scientific community for many years. A common belief is that the majority of hormesis research is funded by the private sector. With this assumption may emerge questions revolving around potential bias of such research. To provide some clarification to this issue, all hormesis research articles were obtained through online databases for five year increments starting with 1995 and ending with 2015 and were subsequently categorized by their funding source. A total of 710 articles were found for those years and 383 of those reported their funding. Reporting funding is not required by law and until more recently was not encouraged or required by funders and scientific publishers. The analysis revealed that the assumption that the majority of hormesis research is privately funded was false, with the public sector (i.e. federal and state governmental agencies) exclusively contributing to 77% of the reported research funding. Going forward, funding transparency for scientific research as a whole is needed. The lack of requirement for reporting funding sources within the scientific community can cause suspicion and hinder the research from being legitimized by the public. With funding transparency could come the more accepted use of the hormetic model in risk assessment along with the currently employed dose response models (e.g. threshold and LNT).
Vaccination for measles, mumps, and rubella (MMR) is an important public health practice that prevents multiple infectious diseases from spreading through populations. States within the United States have varying vaccination requirements for children. According to the American Academy of Pediatrics, in 2016 the number of children ages 19-35 months who received the vaccination for MMR in the state of California was lower than the national average (89.3% vs. 91.1%), putting the state at an increased risk for outbreaks. In 2015, a measles outbreak occurred where 88% of the 125 confirmed cases were residents of California. We conducted a literature review of vaccination rates and studies on the Centers for Disease Control and California State Health websites, as well as in PubMed, to identify risk and protective factors for childhood vaccinations. Risk factors for failure to receive a vaccination included religious or ideological exemption in private schools, mistrust of health officials, and lack of commitment within social circles. In this investigation, we will describe previous interventions to address the problem and recommend new interventions tailored to children ages 19-35 months in California, based on this information. To increase rates of vaccinations, widespread knowledge of MMR vaccine efficacy and how the child directly benefits from vaccinations will be necessary.
Poliovirus causes a much-feared paralytic disease that impacted modern 20th century society in terms of our social, political, medical, and even financial responses to epidemics. The disease of paralytic polio affects only a small percentage of those infected with poliovirus. The seemingly random nature of the disease, progressing to paralysis and then to a higher risk of death, encouraged scientists to find measures of preventing the disease altogether. A great competitive effort to develop and market safe vaccines led to changing modern concepts about how epidemics should be addressed. Mass vaccination programs required the development of political and public health policies to support the major role immunizations play in ensuring public health. The need to fund vaccine campaigns led to the development of disease specific interest groups who were focused on spreading awareness and raising funds. Poliovirus serves as a template for how we approach modern epidemics today. Through the efforts of the Global Polio Eradication Initiative (GPEI), many countries became polio-free and similar measures were developed to address other infectious diseases, through the development of more effective immunization systems.
The Relationship between Acrylamide Exposure and Cancer in Disproportionately-Affected Populations

Acrylamide is a chemical belonging to the amide class of organic molecules that occupies a wide niche of uses, from research laboratories to the plastic, paper and dye industries. Acrylamide is also formed rapidly when starch is heated during the process of cooking, and newfound evidence has linked acrylamide to the development of certain cancers. When acrylamide is consumed, it is converted to glycidamide, which is known to cause DNA mutations in the body. The World Health Organization (WHO) has estimated that the average exposure per person in the general population lies between 0.3 and 0.8 micrograms per kilogram of body weight, with children and certain populations having average exposure multiple times higher than the estimated values (WHO, 2002). Acrylamide exposure disproportionately affects certain populations such as industrial workers, wastewater treatment workers, or researchers working in laboratories. This research will examine the rates of acrylamide exposure and cancer development in disproportionately affected populations such as occupational workers. It will compare these rates to the average human’s daily dietary consumption of acrylamide. This paper will also determine the varying severities of exposure from acrylamide formed in heated starchy foods; i.e. frying and grilling. Further research will give insight into whether or not acrylamide exposure disproportionately affects populations of low socioeconomic status, as people of low SES or people in food deserts typically eat more fried fast foods than higher income populations.
Bisphenol S (BPS) is a widely used chemical often used as a replacement for BPA. It is found in products such as plastic containers, paper receipts, and canned food. Although the effects of BPA are well understood, BPS remains poorly studied. However, because of the related chemical structures of BPS and BPA, it is suspected that BPS will act similarly to BPA. The mammary gland has been shown to be sensitive to both BPA and BPS. Prior studies revealed that mice exposed to BPA during early development manifest lactation deficits in adulthood. Therefore, we hypothesized that exposures to BPS during perinatal development would alter the function of the mammary gland during lactation. We evaluated the effects of BPS exposed female mouse mammary glands on lactation day (LD) 2 and LD21 using morphological tools, histopathology tools, and immunohistochemistry. Significant effects on morphology and histopathology were observed at LD2 and LD21. Ongoing evaluations of proliferation and expression of hormone receptors are likely to shed light on the mechanism by which BPS affects function of the lactating mammary gland.
Endocrine disrupting chemicals (EDCs) are chemicals that interfere with the function of the endocrine system. Some including Bisphenol- A (BPA) and Bisphenol-S (BPS), which are found in consumer products, mimic the actions of estrogen. Exposures to EDCs at vulnerable periods of life, such as during prenatal development or during puberty, can affect how organs such as the mammary gland function in later life. Previous studies of several EDCs, including BPA, suggest that exposures during prenatal development can influence the production of milk in adulthood. The goal of this study was to examine the effects of developmental BPS exposure on milk production and composition in adult female mice. We hypothesized that early life exposures to BPS will impact the morphology and differentiation of the lactating mammary gland and disrupt the production of high-quality milk. Mammary glands were collected from perinatally exposed mice at lactational day 2 and analyzed with qRT-PCR. We are specifically focusing on expression of milk protein genes. Completion of this project will shed light on how exposures to xenoestrogens during a vulnerable developmental period can impact the milk quality produced in adulthood. Because breastfeeding is an important factor in the health of an infant, understanding how environmental chemicals interfere with breastfeeding could provide important opportunities for interventions that could have positive impacts on infant mortality and other childhood infections and diseases.
Mass violence like the school shooting that recently occurred in Parkland, Florida forefronts how the nation's struggles to explain gun violence to issues of mental health. Legislation has been enacted to limit individuals diagnosed with mental illness from acquiring firearms in an effort to prevent violent outbreaks. This controversy has major implications not just in the mental health community, but to the American public in the sense that they see loners, people with social difficulties, as potential violent perpetrators. My research focuses on how United States gun control policies create an inaccurate stereotype that belittles an entire group of people. It also aims to demonstrate how certain state and federal gun control policies endanger doctor patient confidentiality and ostracize the mentally ill: these policies are known as, “reactionary gun control legislation”. Dr. Jonathan Metzl, Professor of Psychiatry at Vanderbilt University, breaks down the mental health/gun violence discussion into commonly misinterpreted stigmas or beliefs. He disproves these stigmas with evidence as well as his psychiatric insight. Moreover, individuals with mental illness are far more likely to be victims of violent crime than perpetrators. We often see the perpetrator's mental health come into question after a major tragedy, the American public seeks to find quick accountability for the crime, and the media creates the outlet for the public to make their assumptions.
810 Auditorium  11:45-12:30  Board 34
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Multilevel Contributors and Meanings Associated with Indigenous Youth Suicide

Our poster will explore the multilevel contributors and meanings associated with Indigenous youth suicide and the accompanying possibilities for prevention. Findings from academic articles, Indigenous films and art will present a variety of factors driving and intersecting with the issue of Indigenous youth suicide in North America. Prevention resources from Indigenous and academic communities will outline possibilities for action that can be applied to other health issues and populations. The poster presentation will invite others to explore the issue and how it may apply to their lives and understandings.

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The prevalence rate of Type 2 Diabetes (TD2M) in Massachusetts is 8.5 cases per 100 people, with over 450 thousand self-reported cases of the disease in patients 18 or older. TD2M development is highly influenced by lifestyle such as sedentary activity, diet, and other learned behaviors. Most studies regarding perception of TD2M are focused on older adults who are at a higher risk for developing the disease. However, research suggests that significant lifestyle habits are formed during young adulthood, and these behaviors can put young adults at risk for major chronic diseases later in life. The purpose of this study is to better understand the perceptions and perceived risk of TD2M among college students and how those perceptions correlate with nutritional habits. This study will provide relevant information on the current thoughts and behaviors of Worcester State University students regarding nutritional habits and TD2M. This information can help health educators plan targeted interventions for this population in order to prevent the onset of TD2M and other chronic diseases later in life.
This study demonstrates the feasibility of skillful forecasts of changes in influenza incidences using specific humidity as a short-term predictive tool. Shaman and Kohn (PNAS 2010, 106(9), 3243-3248.), showed that low specific humidity (wt. water vapor/wt. dry air, hereafter SH) allows water droplets with influenza virus to saturate more readily into the air, shrink in size, and stay suspended in the air for long periods of time. In turn, this increases the likelihood of infections via airborne transmission of the virus. Unlike previous research, which used data from uncommon influenza mortality, we obtained weekly counts from 2010-2017 of positive laboratory influenza tests from seven counties within the contiguous United States. We calculated SH from NOAA weather stations within each of the seven counties. We find a large, statistically significant, and non-linear negative relationship between influenza incidence and SH. A 1 g/kg decrease in SH leads to a rise in influenza infections from 40% to 170%, depending on the county. A step-function relationship is likely between the two parameters, and quantifying the break point in SH is ongoing. This work potentially allows public health professionals the ability to anticipate and prepare for a potential influx of patients with flu or flu like symptoms, lessening the burden imposed on hospitals and healthcare facilities during flu season.
The Organization for Economic Cooperation and Development (OECD) reported that relative to GDP, the U.S. continues to spend nearly twice that of other countries though achieving poor health metric rankings. The OECD also reports that on average overall administration costs make up 3% of health care expenditure. The United States spends over 8%, the developed world’s highest. One solution to this inefficiency can be found in technology, in the form of electronic health records (EHR), and specifically the use of blockchain. Using scholarly literature available through the University of Massachusetts Amherst library database, blockchain technology white papers, national health data, and other salient publications and electronic media, this thesis examines blockchain technology, its implications for EHRs, and how this combination can create an effective model of health care delivery which mitigates health inequities. While not changing the more fundamental causes of health care cost and inflation, blockchain technology in health care would save vast sums of money, liberate funding, allow health data to be shared easily from provider to patient, and facilitate collaboration to evaluate the increasing amount of available health information to provide quality and preventive care to improve health at a population level.
The aggressive breast cancer subtype TNBC (Triple Negative Breast Cancer) represents a diverse group of cancers characterized by a lack of expression of estrogen receptors (ER), progesterone receptors (PR), and the amplification of varying tumor genes. In the United States, high rates of TNBC incidence occur in women with BRCA1 mutations and African American women, and such cases are often associated with metastasis, co-morbid diseases, and high mortality rates. Current research disagrees on the differences and causes behind varying survival rates of African American vs. white American women. Some experts argue that an individual’s biology alone determines TNBC incidence or outcome whereas others assert that the persistence of differences suggests that social disparities in healthcare, nutrition, and safe neighborhood access may drive aggressive biology. In order to understand the potential intersections of genetics and inequalities, the relationships between the social determinants of health and TNBC propensity and vulnerability, must be mapped. Connections may exist between disparities in income and nutritional access, resulting in co-morbid disease such as diabetes, and ultimately activating signaling networks such as WNT-miR34-p53 which can in turn trigger aggressive tumor formation. Thus the following work analyzes the connection between disparity and biology in TNBC incidence and outcome for American women through visuals of pathways linking genetics, epigenetics, and disparities.
The United States is currently suffering from a severe public health crisis in the form of opiate abuse. According to the CDC, an average of 115 Americans dying every day due to an opioid overdose. This research seeks to better understand the factors that have contributed to this crisis in the United States and the best approaches for addressing the epidemic. It is conducted through a comparative analysis of the United States, Canada, and Portugal, focusing on systemic risk factors for opioid addiction instead of individual ones. It finds that socioeconomic inequalities exacerbate individual risk factors for opioid abuse. Portugal's approach, that emphasizes decriminalization and focuses on harm reduction and prevention, has proven more effective in addressing the problem.
Rates of suicide are high among the community of lesbian, gay, bisexual, transgender, queer, intersex, and asexual (LGBTQIA+) youth. For example, LGBTQIA+ youth are 2.5 times more likely to attempt suicide than their heterosexual counterparts. The Centers for Disease Control and Prevention (CDC) found that nearly one-third (29%) of LGBTQIA+ youth had attempted suicide at least once in the prior year compared to 6% of heterosexual youth. A literature review was conducted using PubMed and data from national agencies, including the CDC and the National Health Institute (NHI). Risk factors for suicide in this population include race, depression, geographic location, low socioeconomic status, low social support, threats of violence, and traumatizing social interactions. For example, according to the 2015 national Youth Risk Behavior Survey (YRBS), 10% of LGBTQIA+ youth have been threatened on school grounds with a weapon. Due to traumatizing social interactions, LGBTQIA+ youth are at an increased risk for post-traumatic stress disorder (PTSD) and depression which, in turn, are major risk factors for suicide. Protective factors include a strong, supportive social system and high socioeconomic status. We will examine previous interventions used to address this issue, and make recommendations for future interventions targeting LGBTQIA+ youth in America.
Intimate partner violence (IPV) is a significant and ongoing problem that affects women daily in the United States. According to the World Health Organization, IPV is classified as, “any behavior that causes physical, psychological, or sexual harm in an intimate relationship.” Approximately 27% of women in the United States have experienced some form of intimate partner violence with one in three women in Massachusetts having endured rape, physical violence, or stalking from their partner. IPV contributes to the growing rates of injury and death among women. We searched PubMed and the CDC for information about rates and risk factors for IPV. The data shows that women are more likely to be victims of IPV. Risk factors for IPV against women include age, marital status, race, and partner’s history of abuse. Women with higher levels of education, who are economically independent, and have adequate social support, have less risk of IPV. We will evaluate interventions that are already in place to reduce the occurrence of IPV. Through our research we will work to make recommendations for new interventions to address this public health problem specific to women in Massachusetts.
Research is sparse that demonstrates the beneficial effects of using a Telepractice platform to deliver Speech Language Pathology (SLP) intervention services to individuals with Autism Spectrum Disorder (ASD). Published research to date provides “some” emerging evidence of using Telepractice to deliver SLP interventions in real-time to individuals with ASD. Research also supports that computer-based instruction (e.g., Telepractice) is beneficial to some individuals with ASD in that they exhibit an increase in motivation and attention, a decrease in inappropriate behavior, and the potential to increase learning compared to traditional On-Site methods. This study was conducted to empirically investigate student outcomes with respect to percent accuracy, percent assistance and student-clinician satisfaction when SLP intervention were provided using Telepractice vs. On-Site to students with ASD. Participants consisted of 2 cohorts comprised of 6 SLP graduate clinicians and 6 students with ASD between the ages of 12-14 years. An alternating ABC vs. ACB single subject research design was implemented to evaluate student outcomes. Level of satisfaction was also studied when SLP interventions were delivered using Telepractice vs. On-Site with the 6 students with ASD. To date, satisfaction surveys support that students with ASD rated SLP services delivered via Telepractice slightly higher (4.375/5) compared to students with ASD receiving services On-Site (3.975/5). However, SLP clinicians rated services as equally effective when intervention was delivered via Telepractice (3.95/5) vs. On-Site (3.75/5).
Auditory Processing in Autism Spectrum Disorders

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder prevalent in approximately one in 68 children and is generally characterized by a qualitative impairment in communication, social communication and social interaction. Some individuals with ASD exhibit atypical speech characterized by high pitch vocal quality, monopitch, monoloudness, or atypical prosody. The presence of speech atypicalities may have adverse effects on the social communication for some individuals with ASD, thus possibly hindering their acceptance into peer groups and society. There is a paucity of research regarding the underlying mechanisms to explain the presence of atypical speech characteristics in individuals with ASD. One theory suggests that the speech atypicalities associated with ASD are due to abnormal auditory processing abilities. This study compared the auditory processing abilities of 11 teenagers with ASD between the ages of 14-19 years matched for receptive language, age and gender to a control group of 11 typically developing (TD) peers. Participants’ auditory processing abilities were screened using the SCAN-3 Test for Auditory Processing Disorders. The SCAN-3 results were analyzed with respect to similarities and differences to motor speech execution, motor programming and planning abilities, expressive-receptive prosodic abilities, and expressive-receptive language. This study sheds insight into the atypical prosodic and behavioral characteristics exhibited by individuals with ASD compared to their TD peers with respect to receptive and expressive prosodic, auditory processing, speech, and receptive-expressive language abilities.
Using Preferred Visual Stimuli to Deliver Telepractice Services to Children with Autism Spectrum Disorder

Research supports that individuals with ASD show an affinity for technologies, suggesting that Telepractice models may be more captivating for delivering Speech-Language Pathology (SLP) intervention services compared to traditional On-Site therapy. This study investigated using a Telepractice (synchronous videoconferencing) platform to investigate: 1) the type of visual stimuli preferred by children with ASD and their SLP graduate clinicians when services were delivered via Telepractice; and 2) if certain goals and objectives were delivered more effectively via Telepractice versus On-Site. Six (6) SLP clinicians delivered speech-language interventions to six (6) students with ASD, between the ages of 12-14 years. Students with ASD received services from one SLP clinician for one 45-minute session weekly for one academic year. An alternating single subject research design was implemented. Three of the six students with ASD started SLP interventions On-site for Phase 1 then rotated to Telepractice services for Phase 2 (OnsiteàTeleTx). The remaining three students began Phase 1 with Telepractice, then rotated to On-site for Phase 2 (TeleTxàOnsite). Research outcomes included analysis of video recordings to assess students' latency time, percent accuracy and percent prompting per activity. Students with ASD also completed satisfaction surveys following intervention to assess personal preferences for specific stimuli during intervention. Graduate clinicians rated effectiveness of the same visual stimuli following each intervention session, in addition to correlating student satisfaction to percent accuracy and prompting per activity. Students with ASD showed a preference for video animation and pictures. Graduate clinicians found that both pictures and written text were equally effective.
Violent undertakings of individuals with autism spectrum disorders and the social and psychological effects it has on them.
In the 2016 fiscal year, the United States admitted 84,995 refugees coming from all different parts of the world. Refugees are people that have been forced to flee from their countries due to the threat of persecution, war, or violence. Various studies have shown that 10-40% and 5-15% of refugees experience post-traumatic stress and major depression, respectively. Children and adolescents have higher rates ranging from 50-90% of PTSD, and major depression from 6-40%. The objectives of this study are to examine the factors that contribute to the prevalence of mental health within the refugee population and discuss preventive measures and mitigation strategies that exist in recent literatures. The University of Massachusetts Amherst Library database will be utilized to perform this literature review. Recent literatures indicate that pre-migration trauma such as war, violence and/or family separation predispose refugees to mental illness and further worsen by post-migration stressors such as lack of social roles, poverty, unemployment, etc. There needs to be a more holistic approach that includes social, economic and cultural considerations to addressing mental health issues among the refugee population in the US.
Impacts of Inadequate Access to Mental Healthcare in Rural Areas

According to the Rural Health Information Hub, 18.7% of residents in non-metropolitan areas struggle with a mental health condition. Rural residents experience many barriers, such as socioeconomic status and access to transportation, that limit their ability to obtain the health care they need. Mental healthcare facilities themselves are sparsely located and scarcely available for at-risk populations. This leads to individuals having to travel for hours or across state lines to access services. People of low socioeconomic status are at increased risk of poor mental health outcomes because of factors such as unemployment, food insecurity, and homelessness. When mental healthcare is not accessible, individuals experience poor health outcomes such as stress, loss of social support and premature death. Rural areas also experience higher rates of suicide. Loss of social support can include loss of familial support and isolation within the community. Protective factors against mental illness in rural communities are high socioeconomic status, positive peer role models and supportive community relationships. Using databases such as the Rural Health Information Hub, PubMed and PsycInfo, this paper will review peer-edited journal articles to address this issue. Potential search terms include rural, United States, mental health, healthcare access, socioeconomic status, depression and stress impact. With this information, causes of these disparities can be identified and used for potential future public health interventions. These findings will allow the field of public health to better direct essential, efficient and targeted mental health services to rural populations.
Refugee populations are at a higher risk of developing mental health illnesses such as major depression and post-traumatic stress disorder (PTSD). Rates of PTSD are up to 10 times higher among refugees in the US than in the general population because of past traumas, forced relocation, discrimination, social exclusion and lack of opportunities in the country of resettlement. Since 1980, the US has admitted more than 2 million refugees. In 2015, the estimated number of Haitian immigrants and refugees in the US was 676,000. Refugees can find access to mental healthcare hampered by physical, language, and cultural barriers. The current administration’s new policy to terminate temporary protected status of Haitian refugees living in the US by July 2, 2019 could also exacerbate mental health issues. The primary objective of this study is to evaluate rates of depression and PTSD among Haitian refugees living in Florida and give recommendations to improve health outcomes using peer-reviewed journals from the University of Massachusetts library database, relevant research programs, and state and federal census data. We intend to look at evidence supported policies being implemented in other refugee communities that can be applied to limit the effects of these barriers on the Haitian refugee population. In order to address the heightened risk of depression and PTSD in Haitian immigrant communities, the United States healthcare system must be developed in specific areas targeting issues that may be preventing efficient care.
The Youth Leaders Program increase protective factors including school engagement, feelings of competence, a sense of cultural identity, and self-efficacy. Likewise, this program aims to reduce negative health outcomes associated with substance abuse, relationship violence, and bullying. According to previous research, suicide is attributed to more than one cause, therefore, prevention strategies targeting multiple risk factors are more likely to be successful (Wexler et al., 2016). By focusing on wellness promotion rather than primarily offering training for suicide intervention alone, more Alaskan youth suicide could be prevented.

Databases such as PubMed and Google Scholar were used to find the peer-reviewed articles and studies for this research. The search words and phrases used include “bullying prevention,” “youth leaders,” “healthy relationships,” “substance abuse prevention in schools,” “youth development,” “student leadership,” “youth development in schools,” “suicide prevention,” and “suicide prevention in schools” and “peer mentoring programs,” looking for specific cases where the intervention had been successful. Once a broad spectrum of topics and curriculum ideas were identified, school leaders in Bering Strait, Alaska were consulted. These leaders and school counselors decided which areas require the most focus and which interventions will likely be the most successful in their school district. The curriculum will be developed for bullying prevention, substance abuse prevention, suicide prevention, healthy relationships, and youth development. The project will include several lessons for each topic that will be developed specifically with Alaska Natives/ American Indian populations in mind. Additionally, we will create a facilitators guide. The presentation will provide an overview of this curriculum, and will describe one module in depth to give the audience insights into this youth-facilitated curriculum developed in collaboration with school districts in rural Alaska.
Sierra Leone is home to the highest maternal mortality ratio in the world. Most recent estimates show that for every 100,000 live births in the country, around 1,360 women die as a direct result. The most common causes of maternal death are bleeding, pregnancy-induced hypertension, infection, unsafe abortions, and cases of anemia and malaria while pregnant. The underlying factors that result in this significantly elevated risk of maternal death in Sierra Leone are linked to a severe lag in quantity, and most importantly the quality, of health facilities and services offered in the country. Expectant mothers’ ability to access this care is also of paramount importance, with many women citing distance and unaffordability as deterrents in seeking and receiving care. Maternal death is highly preventable, so long as qualified and skilled staff are available to assist mothers from antenatal through postnatal care. The purpose of this research project is to explore existing literature regarding maternal mortality in Sierra Leone, and formulate recommendations of the most effective avenues in decreasing these figures. These recommendations will be focused on increasing access to comprehensive, quality health care services for pregnant women in Sierra Leone that are affordable for all. For this literature review we will utilize reputable databases such as PubMed Web of Science, and the WHO, potential search terms including “maternal mortality,” “Sierra Leone,” “healthcare access,” “health inequities,” and “prevention.” This research will analyze the most accurate, up-to-date figures regarding maternal mortality in Sierra in order to formulate effective recommendations to alleviate the problem.
Infant mortality is defined by the Center for Disease Control as the death of an infant before his or her first birthday. According to the CDC, in 2015 the infant mortality rate in the United States was 5.9 deaths per 1,000 live births compared to Sweden, which was 2.5 in 2010. Within the United States, however, infant mortality rate is highly variable between and within states. According to the CDC, in 2016 the infant mortality rate in Massachusetts is 3.9 and in Mississippi it is 8.6 per 1,000 live births. Mothers in these rural areas have a higher prevalence of risk factors that lead to infant mortality such as maternal age, obesity, physical inactivity, excessive drinking, and teen births. In low income and rural areas, access to proper health care may be limited. The lack of primary care can affect the mother’s education on proper prenatal care, and can lead to complications. Throughout the paper we will look further into access to health care, average education levels of mothers, single parenthood, and lifestyle factors that ultimately prove why SES plays such a major role in infant mortality. The goal of this paper is to research effective programs that currently exist and see how we can implement similar programs among mothers with low socioeconomic status in these communities, in hopes to reduce their risk for infant mortality.
In recent years, there has been a drastic increase in the number of Massachusetts residents who have become addicted to opioids. Thus, this poster will focus on the relationship between socioeconomic status and access to healthcare which can affect one’s likelihood of suffering from opioid addiction. This epidemic affects a wide array of people and populations from lower income to higher income. People are not fully aware of how addicting this prescribed medication can be and can suffer negative consequences as a result. Research has found that eight in 12 people within Massachusetts who have died from opioids were prescribed by a physician. Prescriber education plays a significant role in decreasing the prevalence of opioid dependence amongst Massachusetts residents. Additionally, it is important to examine where people are receiving their first dosage of painkillers, then keep in contact with people throughout their prescription journey. Thus, prescription-monitoring programs have had major success in helping to decrease the number of people who become in opioid dependence. More research is needed to support whether preventive strategies are more effective than allopathic treatment. Policy changes will be proposed to address the health disparities associated with opioid addiction.
For my thesis, I am examining the current screening methods and prevention strategies for *Vibrio cholerae* in Latin America and the Caribbean. I have spent a majority of my research understanding *V.cholerae* at the molecular level. I then analyzed various studies and health organization reports from major cholera outbreaks around the world. I am able to determine where prevention methods were successful and also able to identify subtle differences between the prevention methods of advanced and less advanced countries. Based upon the research conducted, I am able to identify reasons for which the prevention methods were only effective in certain environments. I am currently looking at technology from 2016 and 2017 that could be or is currently being tested in cholera endemic areas. Including an analysis of some of the newer technology being developed, may show that some of the deficiencies in current methods could be easily filled through the use of a specific tool. The inclusion of newer technology may address some of the current issues in screening methods such as more timely responses and more accurate reporting. I am working as a part of a lab and we plan on combining our research together and seeing how we could implement our knowledge towards to the cholera epidemic in Haiti.
The Significance of Urban Green Space in Promoting Community Health and Physical Activity

28.0% of Americans, or 80.2 million people, aged six and older are physically inactive. Physical inactivity is a risk factor correlated with cardiovascular disease, diabetes mellitus, cancer, obesity, joint disease, and depression. Increasing evidence has shown an opportunity to control this modifiable risk factor through urban design. Parks within one kilometer of participants homes also resulted in increased physical activity. An increase in trees and cities has also shown a correlation with improved health outcomes, including lower obesity rates and better social cohesion. Although residents in urban areas benefit from easier access to health care and education compared to rural counterparts, the sedentary lifestyle and lack of green space act as constant threats to physical health. This research seeks to examine the connection between accessibility to parks and green spaces and physical activity outcomes in adult urban populations. Scientific articles from EBSCO Host, PubMed, and ScienceDirect will be used to gather data. We hypothesize a positive correlation between green space availability and overall physical activity. Further research should examine the effectiveness of organized intervention programs in green spaces that promote physical activity. This research provides a compelling argument for policy makers to fund initiatives that preserve and implement cost-effective parks in cities as a means of promoting physical activity.
Children with Developmental Language Disorder (DLD) experience marked difficulty acquiring their ambient language in the absence of any other overt symptoms (Bishop et al., 2016, 2017). A wealth of research is available to guide identification and treatment of preschool-aged children with DLD in the area of grammar (e.g., Gladfelter & Leonard, 2013; Rice & Wexler, 1996). Specifically, within grammar, finite verb morphology or finiteness (morphemes that convey verb tense and agreement) appears to be the most noticeable deficit in these children during the preschool years. The current study addresses a gap in the literature regarding the identification of best methods of documenting progress following grammatical treatment for DLD. Pre- and post-treatment language samples from six children who received treatment for finiteness (Hoover & Storkel, 2013) will be analyzed and the following five measures will be derived: mean length of utterance in morphemes (MLU; e.g., Brown, 1973); number of different words; number of different verbs; a finite verb morphology composite (Bedore & Leonard, 1998); and tense and agreement productivity score (Hadley & Short, 2005). Given the children's most marked deficit is within finiteness and that this was also the focus of their treatment, we predict measures more narrowly focused on finiteness to be a more accurate reflection of treatment progress than more global measures of grammar. Results will 1) inform best practice for speech-language pathologists’ measurement of goals pertaining to grammar and 2) motivate future studies examining best practice for assessing progress following treatment for DLD.
This study will examine young children with a condition called Developmental Language Disorder (DLD) (formerly referred to as specific language impairment – SLI; Bishop, 2017). DLD is a heritable language disorder affecting 7% of monolingual kindergarten children in the United States (Tomblin et al., 1997). It is the most common form of pediatric language disorder. Children with DLD experience a number of linguistic and cognitive challenges, but this study will focus on beginning to build a comprehensive profile of vocabulary skills in children ages 5 – 7 years with DLD in comparison with two control groups: 1) same-aged peers who have unimpaired language skills and 2) typically developing children who are younger than the DLD group but who have a receptive vocabulary size equivalent to the DLD group. Weak vocabulary skills place children at risk for academic failure given their critical role in reading and writing. To address our goal of comprehensively examining vocabulary skills, we will administer three tasks – each measuring a unique aspect of vocabulary. Recruitment and data collection is ongoing for this study, but the eventual findings will be used to motivate intervention studies aimed at improving vocabulary for children with SLI with the ultimate goal of lessening the impact of having poor language on the lives of affected children.
Sierra Leone is home to the highest maternal mortality ratio in the world. Most recent estimates show that for every 100,000 live births in the country, around 1,360 women die as a direct result. The most common causes of maternal death are bleeding, pregnancy-induced hypertension, infection, unsafe abortions, and cases of anemia and malaria while pregnant. The underlying factors that result in this significantly elevated risk of maternal death in Sierra Leone are linked to a severe lag in quantity, and most importantly the quality, of health facilities and services offered in the country. Expectant mothers’ ability to access this care is also of paramount importance, with many women citing distance and unaffordability as deterrents in seeking and receiving care. Maternal death is highly preventable, so long as qualified and skilled staff are available to assist mothers from antenatal through postnatal care. The purpose of this research project is to explore existing literature regarding maternal mortality in Sierra Leone, and formulate recommendations of the most effective avenues in decreasing these figures. These recommendations will be focused on increasing access to comprehensive, quality health care services for pregnant women in Sierra Leone that are affordable for all. For this literature review we will utilize reputable databases such as PubMed Web of Science, and the WHO, potential search terms including “maternal mortality,” “Sierra Leone,” “healthcare access,” “health inequities,” and “prevention.” This research will analyze the most accurate, up-to-date figures regarding maternal mortality in Sierra in order to formulate effective recommendations to alleviate the problem.
According to the Rural Health Information Hub, 18.7% of residents in non-metropolitan areas struggle with a mental health condition (1). Rural residents experience many barriers, such as socioeconomic status and access to transportation, that limit their ability to obtain the health care they need. Mental healthcare facilities themselves are sparsely located and scarcely available for at-risk populations. This leads to individuals having to travel for hours or across state lines to access services (2). People of low socioeconomic status are at increased risk of poor mental health outcomes because of factors such as unemployment, food insecurity, and homelessness. When mental healthcare is not accessible, individuals experience poor health outcomes such as stress, loss of social support and premature death. Rural areas also experience higher rates of suicide (1). Loss of social support can include loss of familial support and isolation within the community. Protective factors against mental illness in rural communities are high socioeconomic status, positive peer role models and supportive community relationships. Using databases such as the Rural Health Information Hub, PubMed and PsycInfo, this poster will review peer-edited journal articles to address this issue. Potential search terms will include rural, United States, mental health, healthcare access, socioeconomic status, depression and stress impact. With this information, causes of these disparities can be identified and used in the future for potential public health interventions.

These findings will allow the field of public health to better direct essential, efficient and targeted mental health services to rural populations.

1. https://www.ruralhealthinfo.org/topics/mental-health
Acrylamide is a chemical belonging to the amide class of organic molecules that occupies a wide niche of uses, from research laboratories to the plastic, paper and dye industries. Acrylamide is also formed rapidly when starch is heated during the process of cooking, and newfound evidence has linked acrylamide to the development of certain cancers. When acrylamide is consumed, it is converted to glycidamide, which is known to cause DNA mutations in the body. The World Health Organization (WHO) has estimated that the average exposure per person in the general population lies between 0.3 and 0.8 micrograms per kilogram of body weight, with children and certain populations having average exposure multiple times higher than the estimated values (WHO, 2002). Acrylamide exposure disproportionately affects certain populations such as industrial workers, wastewater treatment workers, or researchers working in laboratories. This research will examine the rates of acrylamide exposure and cancer development in disproportionately affected populations such as occupational workers. It will compare these rates to the average human's daily dietary consumption of acrylamide. This paper will also determine the varying severities of exposure from acrylamide formed in heated starchy foods; i.e. frying and grilling. Further research will give insight into whether or not acrylamide exposure disproportionately affects populations of low socioeconomic status, as people of low SES or people in food deserts typically eat more fried fast foods than higher income populations.
In recent years, there has been a drastic increase in the number of Massachusetts residents who have become addicted to opioids. Thus, this poster will focus on the relationship between socioeconomic status and access to healthcare which can affect one’s likelihood of suffering from opioid addiction. This epidemic affects a wide array of people and populations from lower income to higher income. People are not fully aware of how addicting this prescribed medication can be and can suffer negative consequences as a result. Research has found that eight in 12 people within Massachusetts who have died from opioids were prescribed by a physician. Prescriber education plays a significant role in decreasing the prevalence of opioid dependence amongst Massachusetts residents. Additionally, it is important to examine where people are receiving their first dosage of painkillers, then keep in contact with people throughout their prescription journey. Thus, prescription-monitoring programs have had major success in helping to decrease the number of people who become in opioid dependence. More research is needed to support whether preventive strategies are more effective than allopathic treatment. Policy changes will be proposed to address the health disparities associated with opioid addiction.
In the 2016 fiscal year, the United States admitted 84,995 refugees coming from all different parts of the world. Refugees are people that have been forced to flee from their countries due to the threat of persecution, war, or violence. Various studies have shown that 10-40% and 5-15% of refugees experience post-traumatic stress and major depression, respectively. Children and adolescents have higher rates ranging from 50-90% of PTSD, and major depression from 6-40%. The objectives of this study are to examine the factors that contribute to the prevalence of mental health within the refugee population and discuss preventive measures and mitigation strategies that exist in recent literatures. The University of Massachusetts Amherst Library database will be utilized to perform this literature review. Recent literatures indicate that pre-migration trauma such as war, violence and/or family separation predispose refugees to mental illness and further worsen by post-migration stressors such as lack of social roles, poverty, unemployment, etc. There needs to be a more holistic approach that includes social, economic and cultural considerations to addressing mental health issues among the refugee population in the US.
Scientists are discovering exciting new genetic engineering techniques and progressing at an unprecedented rate, leading to a lack of oversight on the possible consequences of innovative practices and the misuse of information. The dual-use dimensions of genetic engineering increase the possibility of dire consequences, leaving individuals vulnerable and raising fears about non-state groups exploiting new techniques to enhance the virulence or spread of lethal pathogens. Existing legislation does not adequately address these developments, especially in the field of synthetic biology and the growing viability of CRISPR-Cas technology.

This thesis argues that the public is woefully underprepared for an attack and a shift in focus is needed to prevent crises. In order to support this argument, this thesis examines bioweapons regulation, responsible conduct of research, dual-use of genetic engineering, and an overview of scientific responsibility frameworks. These frameworks will be analyzed and dissected to create an improved, implementable plan for scientific responsibility in the face of increasing biological threats to humans and the ecosystem.

Recommendations on the best feasible framework are given for promoting safe discoveries and holding scientists accountable for genetic engineering practices. This includes improvements to current regulations, adopting a universal code of conduct for scientists, and promoting international cooperation to uphold these standards. The model needs to be enforced worldwide to prevent a genetically engineered, virulent pathogen from killing civilians and to ultimately minimize the threat that synthetic biology presents to the public.
Starting in 2014, Ebola Virus Disease (EVD) ravaged through the population of West Africa, primarily affecting Guinea, Liberia, and Sierra Leone. With over 28,000 infections and 11,000 deaths, the deadly outbreak was the largest recorded, demanding extensive efforts from both local and international healthcare workers and public health officials. Tragically, the disease took months to properly diagnose and EVD spread rapidly to communities and the clinicians treating them. While the epidemic officially ended in 2016, a comprehensive analysis of the strengths and shortcomings of the medical management of the disease could be used to better prepare for future infectious disease outbreaks. Using scholarly literature accessed through EBSCO host and PubMed, news articles, first-hand accounts, and governmental reports and press releases, this thesis assesses how the epidemic was managed from a treatment perspective. By analyzing the amount of experienced healthcare workers present, education provided to local healthcare staff, and funds allocated by international aid agencies, recommendations for the management of future outbreaks are highlighted. Findings concluded that better diagnostic and patient triaging strategies need to be implemented. Additionally, educating healthcare workers more effectively including local citizens in decision-making needs to be executed. Given the slow response of international aid in this outbreak, future efforts will need to focus on decreasing the time spent supplying medical facilities with supportive care. Additional studies in health policy, governmental and non-governmental organization response, and medical diagnostics are needed.
The Effects of Indoor Air Pollution on Health in Low-Income Housing in the United States

**Background**

Indoor air pollution is a growing problem as quality of indoor air has been shown to have a high concentration of pollutants, and in low income housing, it is even worse. The United States Environmental Protection Agency (EPA) standard for indoor air pollutants is $35 \, \mu g/m^3$, but a study showed that particle levels in low income housing can exceed several hundred. Indoor air pollution is attributed to short-term health problems such as irritated eyes, nose and throat, and long-term diseases, such as respiratory diseases, heart disease, cancer, and more. The aim of this paper is to examine indoor air pollution in low income housing to find an intervention strategy to improve indoor air quality.

**Methods**

A literature review will be conducted among peer-reviewed sources in order to identify how low income housing in the U.S. increases risk for air pollution related health outcomes. We will research intervention strategies that have reduced these risks, and compare them in order to figure out the most practical intervention strategy.

**Results**

After conducting a preliminary search of literature, we can conclude that people who live in low-income housing are disproportionately impacted by indoor air pollution compared to the rest of the population. The quality and location of low-income housing are risk factors for indoor air pollution related health incomes.

**Conclusion**

We will recommend an appropriate strategy for addressing the disproportionate exposure to indoor air pollution among people who live in low-income housing.
Infant mortality is a serious public health concern in the United States. In 2015, over 23,000 infants died before the age of one. Data from the Centers for Disease Control and Prevention shows that non-Hispanic black mothers experience infant mortality rates that are 2.3 times higher than non-Hispanic white mothers. The purpose of this study is to explore why infants born to black non-Hispanic women have a higher infant mortality rate compared to infants born to white, non-Hispanic women and recommend evidence-based interventions to reduce infant mortality among black women. Research will be conducted by utilizing databases, such as PubMed and PsycINFO to find peer-reviewed articles regarding infant mortality. Keywords include infant mortality rate; black, non-Hispanic women; risk factors; and interventions. Current literature and statistics show that risk factors that result from institutionalized racism, such as low socioeconomic status, lack of access to healthcare, and affordable housing, has contributed to the disparity in IMR experienced by black mothers. The racism and sexism that black women face throughout their lifetime triggers a stress response that can cause their health to deteriorate more quickly than other ethnic groups and has the power to negatively impact their infants. By examining current literature of successful interventions to decrease IMR, this study will propose recommended reforms that need to take place at the various levels of the socio-ecological model of health in order to improve health outcomes of infants born to black mothers.
Mental Health - Binge Eating Disorder among Young Adult Females within the United States: A Look at Strategies and Intervention

Background: Binge Eating Disorder (BED) is currently the most common eating disorder in the United States, affecting 3.5% of adult women. Because the age of onset for BED is around 18-29 years old, we focused our research on that population. According to the National Institute of Mental Health, BED is characterized by recurrent binge eating episodes during which a person feels a loss of control and marked distress over their eating, but they are not followed by purging, excessive exercise or fasting. As a result, people with BED often are overweight or obese. The purpose of this study is to identify effective prevention and treatment methods for BED.

Methods: Through a literature review of peer-reviewed publications, we will identify key risk factors for BED among young adult females in the United States. Based on this search, we will also identify potential interventions.

Results: Based on a preliminary search of literature, the major risk factors for BED are a history of mood disorders, weight-related bullying, dieting or restrictive eating habits, body dissatisfaction, and a history of neglect or abuse. Based on this research, we will recommend three evidence-based interventions to address the major risk factors associated with developing BED.

Conclusion/Recommendations: We will construct strategies and make recommendations that would be most effective to prevent and treat BED. We will also identify underlying health issues associated with BED and suggest possible interventions for these.
Objective: To examine how food-insecurity can have adverse effects on childhood development in rural areas of Texas in the United States.

Background: Food insecurity can be defined as the state of being without reliable access to a sufficient quantity of affordable, nutritious food. A lack of proper nutrition during childhood has been shown to negatively impact education and social skills. Food insecure children have more cognitive and behavioral problems when compared to their food-secure peers. Texas has the highest number of children than any other state in America with 27.1% of the children being food insecure. South Texas has the highest rate of child food insecurity in the nation with 48% being considered at risk for hunger.

Participants: The studies used in this review were conducted in rural areas of Texas, USA. The focus of the research will be done on food-insecure school-aged children.

Methods: Studies will be accessed using the databases PubMed and Google Scholar. Keywords will include: “food-insecure”, “rural”, “development”, “nutrition”, “children”, “effects”, ”household”, ”Texas”. To find interventions, other keywords will include ”SNAP”, ”transportation”, ”school lunch program”.

Results: Preliminary research indicates that food-insecurity is directly related to negative outcomes of physical and mental development in children. Other research showed access to federal nutrition programs, food banks and participation in school nutrition programs as a way to reduce the number of food insecure children.

Conclusion: Preliminary research indicates that SNAP, school lunch programs and better public transportation are possible interventions to address food insecurity in children.
Tobacco Use of Adolescents in Low-Income Communities in the US

Background

- Tobacco is a billion-dollar industry and is also considered the leading cause of preventable deaths like cancer, lung diseases, etc. About 36.5 million people smoke with about 3,200 adolescents having their first cigarette every day. Individuals with low socioeconomics are also at high risk to smoke which results in a higher risk of diseases. Our aim is to identify the impact of tobacco use on adolescents in low-income communities in the United States and identify methods to decrease the use.

Methods

- We will produce a literature review using peer-reviewed articles on how adolescents are affected by tobacco use and ways we can reduce their usage.
- We will analyze laws regarding tobacco including raising the age to purchase to 21 and banning flavored tobacco and investigate how these interventions could be implemented in states where teen tobacco use is more prominent and assess the effectiveness. Additionally, we will review other evidence-based interventions that are working towards reducing tobacco use in adolescents.

Results

- Past and recent scientific studies indicate that gender, family background, and urban environments are risk factors in predicting an adolescents’ use of tobacco.
- Additionally, race and education level are critical in determining tobacco usage in youths. We will examine the effectiveness of different laws, strategies, and interventions on the reduction of tobacco use among low-income adolescents in the United States.

Conclusions

- We will recommend practical, evidence-based strategies and alternatives that support the prevention of tobacco use in adolescents in the United States.
Substance abuse affects about 23.5 million Americans, many of whom will end up in the criminal justice system. Substance use disorders are defined by the Diagnostic and Statistical Manual of Mental Disorders as “when an individual persists in use of alcohol or other drugs despite problems related to use of the substance.” Risk factors for developing a Substance Use Disorder (SUD) include external factors (peer pressure, drug availability) or other environmental factors, and internal factors, such as genetic predisposition and mental health disorders. This paper will explore alternative interventions besides incarceration to help rehabilitate people with SUD’s, focusing on addicted people who are at risk for incarceration.

Our initial research, focused primarily on articles published in the past decade, shows that there are alternatives currently being implemented, working both as replacements to incarceration for individuals dealing with substance abuse, and as measures to help prevent people with SUD’s from becoming involved with the criminal justice system to begin with. We plan to thoroughly analyze these and similar sources to help address our research goals.

Preliminary findings indicate little support for incarceration as an effective intervention. Suggested alternatives include cognitive behavioral treatments, and motivational interviewing, among others.

Our study hopes to identify and recommend quality interventions in order to reduce the number of people living with SUDs, and to demonstrate that incarceration is not an effective tool at rehabilitating people with SUD’s.
In the United States, up to 15% of couples are infertile and in approximately 40% of those couples, the male is either the sole or a contributing cause. The role of the mitochondrial copy number is increasingly recognized as a potential marker of oxidative stress. Epidemiological evidence suggests that during spermatogenesis, the mitochondrial DNA content is increased in infertile men. Epigenetics is the study of heritable changes in gene function that do not involve changes in the DNA sequence and one of the most common forms of controlling gene expression is methylation, which represses gene transcription. The objective of this study was to examine the relationship between sperm mitochondrial copy number and DNA methylation. Sperm samples (N = 48) were collected from males going through ART at Baystate Medical Center as a part of the SEEDS cohort. Genomic sperm DNA was bisulfite converted and employed on the 450 K Array, which provides genome-wide coverage of 485,577 methylation sites. A multiplex PCR approach with three targets was used to obtain mitochondrial copy number. We identified co-regulated regions by generating clusters of CpG sites and then identified differentially methylated regions from clusters associated with mitochondrial copy number. Our analyses showed that mitochondrial copy number was associated with 929 individual CpG sites and 301 differentially methylated regions. We also observed that 72.1% of the CpG sites showed an increase in methylation with mitochondrial copy number. Ontology analyses showed that these associated CpGs were located in genes involved in growth, development, as well as cell function and maintenance. In sum, our results provide evidence that sperm mitochondria copy number is epigenetically regulated. Such knowledge may offer opportunities for targeted therapies to reduce male factor infertility.

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PTSD is becoming a more and more prevalent thing in movies and tv shows, but why was it not paid as much attention to years ago? Famous movies like *American Sniper*, *Thank You for Your Service* and many others have challenged the idea of that PTSD is not a real disease and people do not get effected by it. PTSD, also known as post traumatic stress disorder is a TBI, or traumatic brain injury. Some of the symptoms include flashbacks, nightmares, trouble sleeping, frightened by a loud noise and, when in public, constantly being at alert. The 2017 film called *Thank You for Your Service* follows the story of a group of soldiers in Iraq. They were involved in many violent battles along the way, such as bombings and sniper attacks. While I like the fact that the movie shows the toll on the soldiers when they get back home, there is much that is left out. Many recent movies show PTSD is only a combat thing and that it can only happen to infantrymen or people on the front lines. PTSD can occur from anything, whether it be combat or hearing that your best friend died. Countless strides have been made in the right direction by the movie industry, but now comes the real test: challenging the idea of PTSD only being a combat related mental illness.
Clostridium difficile is a gram positive, spore-forming, multi-drug resistant bacterium that is currently the number one cause of nosocomial antibiotic associated diarrhea. According to the Centers for Disease Control and Prevention (CDC), in 2015 C. difficile caused almost half a million infections among patients in the United States. From these patients, about 29,000 died within 30 days of the initial diagnosis, and about 15,000 of those deaths can be attributed directly to C. difficile. Over the years, the number and severity of C. difficile infections (CDIs) have increased, and the CDC has listed C. difficile as an urgent public health threat. Using the UMass Amherst database and Pubmed, this study will assess and critique current prevention protocols and treatment methods for C. difficile. Then, gaps in current antibiotic stewardship programs (ASPs) will be identified to show that ASPs that include better surveillance of antibiotic use and restrictions on antibiotics should be implemented in all clinical settings to reduce the amount of antibiotic overuse and misuse occurring today. This study finds that alternative treatment options, such as fecal microbiota transplantation (FMT), immunotherapy, and probiotics, offer promising ways to prevent CDIs and recurrent infections, thus showing that they deserve additional attention and greater focus in current stewardship efforts.
The main question to be addressed under this project is if there are certain illnesses or ailments where EMS yields improved outcomes and to identify what the better options are in situations where EMS doesn’t yield improved outcomes. Recent studies have quantified the difficulty of response times in emergency situations. Whether it be traffic, the GPS giving wrong directions, or difficulty getting into buildings, there are a variety of reasons that an ambulance might be delayed to the scene. This is particularly relevant when it comes to time-sensitive afflictions (i.e. strokes and myocardial infarctions). Depending on the level of EMT, there is also little that EMTs can do for these afflictions on an ambulance other than transport to the hospital as quickly as possible. After extensive analysis of secondary data from literature in the field, this project aims to determine which chief complaints under, and under what conditions, would it be better for someone to not call for an ambulance and instead immediately drive to the hospital. Due to the prevalence of emergency medical services across the country, the conclusions of this data can be far-reaching and potentially yield better patient outcomes.
There are approximately 1.5 million Americans over the age of 65 who are living in one of 17,000 nursing homes. The dual pressures of increasing demand for beds and rising costs contribute to a growing crisis in assuring the quality of care and oversight of nursing home facilities. This thesis examines how nursing home facilities are rated in Massachusetts and identifies violations that continue to occur in facilities according to federal reports. This study finds that the daily abuses that occur in nursing homes do not receive nearly enough attention; nursing home residents are often unable to advocate for themselves. By allowing this abuse and neglect to continue, we are truly failing the frail.

While the importance of medical attention and sanitation are the most measurable types of neglect and unquestionably important, this study argues that these aspects of care receive an unbalanced amount of attention that comes at the expense of the rampant problem of the emotional and social neglect of residents in nursing homes. Emotional neglect is commonly the most ignored category of abuse due to the difficulty in quantifying an individual’s quality of life. This thesis proposes that there is inadequate attention and oversight of emotional and social neglect. Following a review of current conditions and standards of care in Massachusetts nursing homes using existing surveys and federal violation reports, this thesis concludes with a proposal to add survey questions under the environment category of the current rating system to better address overall quality of life and offers an important first step to initiate institution-wide change.
College athletes represent a potentially high risk population for developing melanoma due to their elevated exposure to ultraviolet radiation. This project seeks to determine what the current attitudes, beliefs, and practices are among college level athletes regarding melanoma prevention. It presents information on sunscreen use, tanning bed use and tanning practices, sunburn incidence, and overall ultraviolet radiation exposure. Six relevant articles pertaining to athletes in the United States were found using PubMed and EBSCO Host. Each study administered a self-reporting survey to college athletes, asking about beliefs and practices related to sun safety and skin cancer prevention. Main findings indicate high sun exposure (15 hours/week) and low levels of preventative measures among athletes. There is a low rate of sunscreen use (up to 85% of athletes do not use sunscreen) and a high rate of sunburns (up to 84%). Athletes demonstrate misunderstanding about the risk of tanning, and up to 52.8% used a tanning bed in the past year. Given the results of the study, I have developed an interventional resource for athletes, coaches, and athletic administration that aimed towards improving current melanoma prevention in college athletes.
Reducing the Burden of Diabetes in New Orleans

Type 2 diabetes is a chronic metabolic disorder in which the body cannot process blood sugar. The CDC estimates that approximately 30.3 million Americans (9.4% of the entire population), have type 2 diabetes. Diabetes remains the 7th leading cause of death in the U.S. according to Healthy People 2020. If left untreated, this disease can lead to significant complications such as heart disease, stroke, and hypertension. These are not only burdens to the individual, but significant burdens to the healthcare system. According to the American Diabetes Association, diabetes in Louisiana has been growing steadily since 2005 to approximately 13.9% of the total adult population. In the New Orleans area specifically, the prevalence of diabetes in adults is approximately 12%. We will conduct a literature review to study the scope of the issue as well as identify and recommend intervention programs to lessen the impacts of community and individual risk factors. These may include policy changes shown to be effective in urban populations. The results of our study will highlight the ongoing risk factors for diabetes in New Orleans and suggest interventions specific to this community.
Low-cost sensors are increasingly being used for air quality monitoring, both in research settings and in community projects. However, concerns about their performance, accuracy and stability over long periods of time still remain. Accuracy of a small, portable air quality sensor can be most directly tested through the comparison of its data recording under different weather conditions in direct comparison with a reference instrument. In a field study between November 3rd and November 27th, 2017 at Ashburnham, Massachusetts, nineteen small sensors collected air quality data on particulate matter (PM) and carbon monoxide (CO) data at eight peripheral locations around a point pollution source. The field research was conducted at a school in Ashburnham, which utilizes a large wood pellet boiler. Two small sensors were also collocated with reference instruments at the central location while a series of small sensors were placed around the periphery of the sampling area. Weather data including wind speed and direction, temperature and relative humidity were also collected at the central location. The study aims to understand the impact of specific weather conditions, especially wind on the performance of the peripheral sensors. The hypothesis states that peripheral sensors that have wind directly blowing from the pollution source (stack) towards them would show a significant increase in air pollutant concentrations. Based on initial analyses, there was an increase in concentrations in relation with wind speed and direction.
The seventh leading cause of death in the United States is Diabetes Mellitus. This group of disorders impairs the body’s ability to metabolize glucose, and increases an individual’s risk of heart attacks, kidney failure, limb amputations, and blindness. Nearly 30.3 million people in the U.S. are affected by one of these metabolic disorders; approximately 7.2 million of those people are undiagnosed and unaware of their condition. National reports reveal prevalence rates are higher among Native Americans and continue to increase. Our goal is to identify programs for treating and/or preventing diabetes among Native Americans. Common risk factors can include financial and social strain, improper consumption of unhealthy foods and/or not eating meals on time. We predict Native American populations with low quality community programs will have higher prevalence rates. We will conduct a literature review to identify programs and policies shown to be effective in addressing risk factors for diabetes and to reduce rates of diabetes cases. We will build recommendations to be specifically made for the Navajo Nation in New Mexico, Utah, and Arizona by examining programs directed at Native Americans. Early diagnosis and proper treatment is the key to living a healthy life, so high quality intervention programs should be able to help these populations manage their diabetes more effectively.
Measurements of air quality provide critical insights in environmental epidemiology. Meta analyses of many population-level epidemiological studies show significant evidence for a positive association between exposure to air pollution and overall morbidity and mortality rates. However, forming exposure-response relationships between pollutants and health outcomes can be challenging as the concentration of the compounds of interest are usually very low and vary greatly in both time and space. Additionally, individuals have unique exposure patterns that cannot be easily discerned using many current methods that extrapolate air pollution concentrations between spatially and temporally sparse data points. The introduction of personal wearable and in-home air sampling devices has allowed a closer study of individual exposure patterns by significantly increasing spatial and temporal resolution of air monitoring systems. Currently personal sampling devices fall into two broad categories: passive sampling devices (PSDs) and active sampling devices (ASDs). While PSDs do not have the power constraints, bulkiness, nor implementation complexities of ASDs, they are limited by how many samples they can take and depend on the wearer's movement and other unreliable conditions to provide air flow over a sampling matrix. This project seeks to increase the practicality of an existing ASD design so that its potential functional benefits over PSDs can be leveraged. This will be done through minimizing the power usage, exploring alternative mechanical and electrical designs, and reducing the enclosure volume of the current design.
Nitrogen dioxide, NO₂, is a gaseous air pollutant formed through both natural and human processes. In humans, exposure to NO₂ correlates positively and significantly with increased respiratory and cardiovascular health risks, including heightened sensitivity of children with mild-to-moderate asthma to inhaled allergens. The primary sources of personal exposure to NO₂ are transportation emissions and natural gas stovetops, though in some areas smog produced by industrial combustion constitutes another significant source of exposure. This study examines the personal and ambient NO₂ exposures within the seventh-grade class of students at the Renaissance School in Springfield, MA to assess potential health risks posed to the community by the current air quality. The personal exposure of the students was measured using silicone wristbands and compared to a map of ambient NO₂ derived from 40 ambient air measurements taken from across the study area. The measured personal and ambient exposures were also compared to the EPA’s C-LINE model of predicted ambient NO₂ from roadway emissions.
Air pollution is a major public health concern due to the strong evidence from epidemiological and experimental studies demonstrating adverse health effects. Specific groups of pollutants have been associated with enhanced adverse health, including volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs). Current laboratories methods for assessing exposure to these panels of compounds are tedious, limiting the feasibility of evaluating personal exposure on a larger scale. With the aim of enhancing sample analysis throughput, we designed a novel low-cost wearable passive sampler for measuring personal VOC and PAH exposures. Our sampler uses a glass-encased magnetic bar coated with a polydimethylsiloxane (PDMS) film to sequester and concentrate a wide range of organic compounds. This small PDMS coated bar (1 cm length, 0.5 cm diameter) has been housed in silicone wristbands to promote wearability, providing an improved representation of an individual’s exposure. To further streamline the analysis process, VOC and PAH compounds collected on the PDMS film are thermally desorbed directly into a gas chromatography time-of-flight mass spectrometer for separation and quantification. Results profiling personal exposures to 34 to 37 targeted compounds collected over exposure periods from a range of rural, suburban and urban microenvironments will be presented. Personal exposure was characterized to a range of sources including transportation and industry as well as environmental pollutants from household cleaning and personal care products.
The CDC states that 1 in 5 school aged children in the United States are obese, a statistic that has tripled since the 1970s. Obesity is defined as having a body mass index (BMI) of greater than 30 kg/m². Research has shown that childhood obesity is a precursor for a number of chronic health conditions such as teenage diabetes, cardiovascular disease, and hypertension. Risk factors associated with childhood obesity are unhealthy lifestyle habits and environments, SES, and education. The overweight and obesity rate for children in the city of Springfield is 41% which is significantly higher than the state of Massachusetts at large. The median household income for Springfield is significantly lower than its surrounding cities. Though a racially diverse population, the majority of community members are Hispanic—a racial group that has been identified as being more susceptible to childhood obesity. A thorough literature review will be conducted to identify interventions implemented through schools and other community organizations in the U.S. that have been shown to be effective in preventing and combating childhood obesity especially specific to the inner city, mixed ethnic racial population like Springfield. Using this research, we will develop a set of recommendations for programs and policies to address childhood obesity specific to the city of Springfield.
Refugee populations are at a higher risk of developing mental health illnesses such as major depression and post-traumatic stress disorder (PTSD). Rates of PTSD are up to 10 times higher among refugees in the US than in the general population because of past traumas, forced relocation, discrimination, social exclusion and lack of opportunities in the country of resettlement. Since 1980, the US has admitted more than 2 million refugees. In 2015, the estimated number of Haitian immigrants and refugees in the US was 676,000. Refugees can find access to mental healthcare hampered by physical, language, and cultural barriers. The current administration’s new policy to terminate temporary protected status of Haitian refugees living in the US by July 2, 2019 could also exacerbate mental health issues. The primary objective of this study is to evaluate rates of depression and PTSD among Haitian refugees living in Florida and give recommendations to improve health outcomes using peer-reviewed journals from the University of Massachusetts library database, relevant research programs, and state and federal census data. We intend to look at evidence supported policies being implemented in other refugee communities that can be applied to limit the effects of these barriers on the Haitian refugee population. In order to address the heightened risk of depression and PTSD in Haitian immigrant communities, the United States healthcare system must be developed in specific areas targeting issues that may be preventing efficient care.
Infant mortality is defined by the Center for Disease Control as the death of an infant before his or her first birthday. According to the CDC, in 2015 the infant mortality rate in the United States was 5.9 deaths per 1,000 live births compared to Sweden, which was 2.5 in 2010. Within the United States, however, infant mortality rate is highly variable between and within states. According to the CDC, in 2016 the infant mortality rate in Massachusetts is 3.9 and in Mississippi, it is 8.6 per 1,000 live births. Mothers in these rural areas have a higher prevalence of risk factors that lead to infant mortality such as maternal age, obesity, physical inactivity, excessive drinking, and teen births. In low income and rural areas, access to proper health care may be limited. The lack of primary care can affect the mother’s education on proper prenatal care and can lead to complications. Throughout the paper, we will look further into access to health care, average education levels of mothers, single parenthood, and lifestyle factors that ultimately prove why SES plays such a major role in infant mortality. The goal of this paper is to research effective programs that currently exist and see how we can implement similar programs among mothers with low socioeconomic status in these communities, in hopes to reduce their risk for infant mortality.
Assessing the Gaps in the Dental Safety Net: A Comprehensive Look at the Socioeconomic Disparities in Preventative Dental Care

Lack of access to preventative dental care leads to a higher risk of infectious diseases such as caries, gum disease, or greater infection. Since lower socioeconomic status is associated with reduced access to healthcare in general, this thesis looks at the defining relationship between the lack of insurance or personal coverage, and reduced access to preventative dental care. Analyzing data of United States dental care across the states, there are multiple public policies that inadequately support the needs of those of low socioeconomic status. This thesis examines the relationship between various insurance coverages and the frequency of dental problems, and thereby allows for discussion on the correlation between access to preventative dental care and reduced presence of greater dental issues. Lastly, this thesis offers practical solutions to improve the gaps in the dental safety net so that all Americans have access to a full range of dental care services.
The American Medical Association has no mandatory protocol regarding the implantation of cochlear implants in children with congenital severe to profound hearing loss/deafness. The controversy regarding the medical procedure for children born with hearing loss/deafness begins with the difference between Deaf and deaf. Although the words seem to be same, the difference between the capital and lowercase “d”s indicate an important distinction. Deaf, with a capital “D”, indicates people who connect with the Deaf community, communicate with sign language and closely identify with Deaf culture. Deaf, with a lowercase “d”, are people with hearing loss who opt for ways to communicate through aural habilitation and hearing devices. Since there is no required protocol, when a child is born with hearing loss/deafness, the parents make the decision of whether or not to implant/use assistive devices. This presentation will analyze three public policy options proposing different ways to support a child born with hearing loss/deafness. Each policy alternative will explore the pros and cons from a medical standpoint and from a humanistic/social justice approach addressing the perspective of the Deaf community. Language learning, between verbal language and visual language, will be the main criteria for each policy argument. The alternatives include allowing parents to make the decision for the child; giving the child a choice of implantation at a certain age; and making implantation mandatory within the first two years for children who qualify for cochlear implants.
In the realm of public policy, there is perhaps no question more contentious and fraught with loaded ethical and moral questions than the one asking how government should value human life. Yet in a world with limited resources and unlimited problems, life must indeed be valued somehow. The current method, value of a statistical life (VSL), measures people’s willingness-to-pay (WTP) for gradual reductions in risk of mortality in different areas of risk. VSL estimates vary according to differences in WTP among different populations separated by demographic characteristics such as income, age, and occupation, raising questions on the ethics of valuing human lives at different prices. Exploring some of the most salient identifiable concerns stemming from these disparities, and then considering them in the context of established philosophical conceptions of equality and fairness, this paper argues that there is, in fact, inadequate distributive justice existing in the methodology of VSL as currently practiced by policymakers. The questions posed and issues discussed in this paper fundamentally speak to how we, as a society, allocate public resources, and how we define equality.
Fitchburg State University has grown tremendously over the years since opening as the State Normal School in Fitchburg in 1894. As the school has evolved from a teacher school to a four year University, so have their policies and plans regarding urban planning. Both the City of Fitchburg and Fitchburg State University have different goals in mind, but how do they collaborate to better benefit the community? I am taking an in depth view to see how the progression of the school has affected the city’s urban planning in the past, how the current plans in action are playing out, and what the future projections are and how it may change the city’s future; alongside the University.

More importantly, my research is looking into how a growing University has affected an old historic, industrial city and where the future will lie. Specifically, how the newly inducted President, Richard Lapidus, has been trying to expand the University into the city. He has begun to do so recently by purchasing the Theatre Block on Main Street in Fitchburg and is in the process of being redesigned into a game design space and entrepreneurship area above a newly renovated Theatre. I have extensively researched by conducting thoughtful interviews with the Mayor of Fitchburg, Stephen DiNatale, as well as his Chief of Staff, AJ Tourigney. I have compared my discussions between the city staff with Vice President of Finance and Administration at Fitchburg State University, Jay Bry. By interviewing these individuals, I have been able to delve deep into the urban planning process in Fitchburg, Massachusetts.
In the past year Puerto Rico was devastated by Hurricane Maria, plunging the island into darkness and revealing the vulnerabilities of the island and the people. As a small island nation, sensitivities of Puerto Rico to climate change effects include sea level rise, varying temperatures and extreme weather events. In the wake of Hurricane Maria, the electric supply was especially hard hit due to an outdated grid, an in-debt utility company, slow-moving repairs and inadequate resources. Moving forward, Puerto Rico faces the challenge of restructuring the electric system in a way that embraces renewable and resilient energy sources, as well as improving the island’s economy. This thesis analyzes current proposals to privatize the island’s bankrupt power utility (PREPO) and alternative proposals that call for expanded renewable energy and funding sources that would make a new, reliable electric system possible for the vulnerable island of Puerto Rico. In light of this analysis, this study calls for increased aid to support the initial costs of shifting the electric grid to renewable energy. The case study of Puerto Rico and its efforts to develop an effective and resilient system provide a promising framework for vulnerable countries that need to increase renewable sources and other innovations in the electric sector.
The United States has been admired as one of the wealthiest nations, yet one situation that has recently risen to prominence is the accessibility and affordability of dental care to all across the nation. As a result of this issue, a state in particular that wants to actively fix this issue is Massachusetts. Massachusetts is currently in the process of approving a legislation for the emergence of mid-level dental providers. However, currently, there are two mock versions of the legislation under debate. Through an analysis of the current dental care distribution, both legislation will be analyzed and recommendations for the future of this new field will be offered. More specifically, the analysis will show that there are heavier issues at the core of this problem rather than a lack of dental providers.

This paper aims to provide background on the economic state of the United States along with the current dental care and health care system. It also plans to analyze the legislation that are currently being proposed and offer recommendations for the future of this bill and the future of this field. The paper utilizes interviews and research from a variety of databases to analyze this timely and controversial issue.
Over 4 billion people do not have any access to the internet. Numerous organizations emphasize the role of the internet in providing information that can improve economic development and entrepreneurship in an economy. However, governments are faced with high costs and a lack of infrastructure when attempting to provide internet access to their residents. Companies are testing potential solutions using Wi-Fi emitting balloons and solar powered drones, but these solutions are in extremely early stages. While we wait for the future of the internet, the World Economic Forum predicts that 45% of the globe still lacks access to advanced information available through the internet.

This presentation demonstrates a work-flow designed to improve educational resources into areas of the world that lack internet access, as well as offers the opportunity to utilize technology implemented in Malawi through an interactive workshop. The World Librarians bridges the digital divide by providing open access information through a process titled Commons-based Peer Production. Peer Production means that people from a variety of organizations can participate in our project. World Librarians partnered with “ShiftIT”, a Malawi based non-profit and “World Possible”, a global non-profit, to develop a work-flow based on a “Requester”, “Courier”, and “Searcher” model, which allows institutions with internet to share content with those that do not via an entity in the Requester’s region. World Librarians believes that the sharing of educational resources through a democratic demand-based information sharing system is the solution to the digital divide.
In my presentation, I plan to explain how to develop a feature length screenplay. I will focus specifically on my own current process for writing a dramatic feature length screenplay, and explain what influences I had when coming up with the idea. My presentation will include references to texts that I have read in order to help me during the process, and an explanation of why I focused so heavily on character descriptions and character development. The presentation will be aided by the use of a PowerPoint slideshow.
Language Politics in the Moroccan Educational System

Following French colonization and the subsequent post-independence nationalist movement, the Moroccan educational system has struggled to reconcile educational curriculum in French and Arabic. During the Protectorate years, the colonial administration began to install French teachers and curriculum into public schools; however, during the post-independence nationalist wave, the government came under pressure to re-introduce Standard Arabic in schools. Today, in public schools, students begin by taking classes in Arabic and learning French as a second language, but in higher education, many subjects are taught entirely in French with little or no instruction in Arabic.

This thesis investigates academic outcomes, such as graduation and literacy rates, as well as professional outcomes for graduates entering the workforce. It uses a combination of original research and synthesis of literature to explore educational outcomes for Moroccan students; the original research is comprised of in-depth interviews with Moroccan students and educators about their experiences with public and private schools.

The thesis concludes that the implementation of Arabization language policy in the Moroccan education system has led to negative learning outcomes for students and decreased career opportunities. Both students and teachers find that students struggle with language acquisition, language differences in academic subjects, and the transition from Modern Standard Arabic in primary and secondary education to French in higher education. However, with the introduction of several policy changes, namely early and thorough bilingual education with high-quality instructors, Morocco has a bright future in terms of language in education.
A Call for the Formation of a Coherent Theory of Ability

The future progress of our global society depends upon our capacity to leverage human ability potential -- so that the maximum number of people develop and utilize their abilities to the greatest extent possible. Yet, no academic field exists that examines this critical challenge from an interdisciplinary perspective. This paper explores and advocates the inauguration of a new line of theoretical inquiry and discourse called “Ability Theory.” Drawing from scholarship in fields as diverse as economics, philosophy, sociology, semiotics, rehabilitation psychology, disability studies, occupational therapy, developmental/cognitive psychology, business, and education, this study explores the various contradictions between different ability paradigms present across disciplines. Further, it provides material evidence of, and clearly defines, the gaps these contradictions create. It then examines the synthesis that can be achieved when these paradigms and conflicts are understood through a more integrated lens. This analysis explores various needs, both discursive and material, left unanswered by these theoretical gaps and speculatively describes the various anticipated benefits to society that would result from the development of this new conceptual approach towards ability. Particularly as new pedagogical and activist praxes are developed, proliferated, and implemented, this paper explores the potential to facilitate the direct application of the results of this theoretical work for as many people as possible. Finally, the paper lays out some early tenets designed to provide a foundation for future theoretical development and attempts to outline some fruitful trajectories along which that development might occur.
This paper advances a historical account of the specificity and transformation of capital-labor relations in the United States. It outlines one prominent Marxian theoretical approach, the “social structure of accumulation” (SSA) school, and argues that this approach is limited to describing the phenomena it seeks to explain, due to empiricist methodology. This limitation manifests in the framework’s identification of institutions (direct forms through which the indirect process of capital accumulation is organized) as the driving force in the process of capitalist development. As a result, the SSA approach is unable to explain the relation of national and global dynamics in the capitalist economy, the relation of the political and economic forms of capitalist society, and the processes which differentiate the working class. An alternative theoretical approach is put forward on the basis of two essential insights from the Marxian critique of political economy. First, institutions are to be understood as forms of realization, and not determining factors, of the general indirect social relation of capital. Second, the dynamic of capital is essentially global, and national only in form. On this basis, an alternative historical analysis of capital-labor relations in the US is developed, which explains the changing institutional frameworks of capital accumulation as mediating forms of the production of relative surplus value on a global scale, the process in which capital achieves its historical potency.
This paper will examine the impact of alternative trash reduction through Vermiculture composting. The goal is to assess whether or not alternative trash reducing methods along with recycling can have a positive impact on trash volume. This research evaluates how local policies around waste influence, or detract from alternative practices of trash management. This paper considers what impact Worms could have on communities if given access to food scraps and common scrap paper at community recycling centers.

Secondly, this paper considers alternatives to traditional methods of trash disposal through organic means such as food waste composting. Particularly relevant to this research is the use of worms to act as anaerobic composters of organic scraps. This paper considers what impact Worms could have on communities if given access to community recycling centers of food scraps and common scrap paper.

Finally, this paper hopes to establish a possible alternative method that can be introduced to any urban community, where multiple families and neighbors contribute and collect their daily food scraps for worm composting. In addition to evaluating the benefit of this alternative waste management system, this research considers the side benefits of worm composting as a source of rich soil amendments through its liquid bi product sometimes called worm tea. This research will also evaluate the educational potential to transform neighborhood-levels understanding and implementation of small sustainable practices like composting to reduce carbon.
Serious delinquency (minor crime, especially that committed by young people) is a major problem in American society. Past research indicates that many variables correlate with delinquency and that many Adverse Childhood Experiences tend to increase the risk of later delinquent behavior. Among these risk factors are birth trauma, child abuse and neglect, ineffective parental discipline, family disruptions, conduct disorder and hyperactivity in children, school failure, learning disabilities, negative peer influences, limited employment opportunities, inadequate housing, and residence in high-crime neighborhoods. This research paper explores the causes and prevention of Juvenile Delinquency. With that, I will like to indicate how schools deal with Juvenile Delinquents, the role society partake in preventing Juvenile delinquency, how does an adolescent get back to normal life after serving their time and how does the society help them not to get back into juvenile detention.
HIV/AIDS remains a significant problem in sub-Saharan Africa, even though international efforts have been working in the region for the last fifteen years. This presentation examines HIV/AIDS data from four international health organizations: the ONE Campaign, PEPFAR, the WHO, and the UN. Findings suggest UN’s Fast Track goals will not be met by 2020, which will jeopardize eradicating HIV/AIDS by 2030, unless changes to programming are made. First, women and girls who are HIV positive in the sub-Saharan Africa should follow the WHO’s Treat All Approach to prevent HIV transmission and those who are HIV negative should be placed on pre-exposure prophylaxis to prevent infection. Second, pregnant women should follow the WHO’s Treat All Approach in order to prevent mother to child transmission. Third, non-medical interventions such as reducing gender-based violence and increasing access to education should be increased. Fourth, men’s health should be changed to help reach the Fast Track goals. These changes would include discrete testing services for men to encourage them to know their HIV status and get treated and an increase in voluntary male circumcisions to reduce infection rates. Funding is a major barrier to these recommendations. In order to close the funding gap, the US must keep its funding at current levels and G7 countries and middle and low income nations must increase their funding levels.
Big Brothers Big Sisters is a non-profit organization that provides mentoring to high-risk children in Hampshire County. I have been working with this organization as a mentor and a board member for the past 2 years. One problem that plagues this organization is the lack of permanent mentors, as the majority of the Bigs recruited are college students, who are a transient population. This causes challenges for children who need a long term mentor (Grossman & Rhodes, 2002). My project for this organization will focus on the recruitment of more permanent mentors in Hampshire County and effective methods of recruitment. This will start with researching other similar mentor recruitment models to determine if there are best practices to learn from. Next, I will help to create a virtual platform on which the board members of Big Brothers Big Sisters can communicate and plan events more easily, versus the in-person meetings, which not everyone can attend. The goal of this is to increase the effectiveness of the board, and lead to more mobilization (Seethamraju, 2014). Part two of this plan will be creating a collaborative resource of possible yearly tabling events with the contact information for that venue. Creating this resource will involve attending community events, and creating relationships with the appropriate contact people at this event. The goal of creating this resource is that it will help Big Brothers Big Sisters coordinate board members to recruit local and more permanent mentors.
Mass incarceration and the school to prison pipeline are names given to the institutional forces of the criminal justice system in the U.S. which facilitate a cycle of poverty, racism, and incarceration among millions of people. This study used past scholarly literature to examine current issues with the fight against mass incarceration and to show how keeping youth out of the system and providing alternatives to incarceration can be effective. To build upon this, there was value in hearing from those who have first-hand experience to learn how best to address this problem and its relation to mass incarceration. By conducting interviews with formerly incarcerated men who have a juvenile history and experience with the system, I was able to get a more detailed account of how they were affected by their experience as a juvenile and what they feel needs to be done to better the way juvenile youth are handled. Through outreach to correctional facilities in Western Massachusetts, I was able to recruit five formerly incarcerated men to be interviewed. These interviews were transcribed and coded in order to yield a pattern of results showing…

*This study is not yet completed and the results and conclusion cannot be reported in the abstract at this time.*
For many years, the people of sub-Saharan Africa have suffered as a result of insufficient water sources. This is due to physical and economic water scarcity. Though the water crisis affects everyone, there is a severe impact on women. Each day, women of sub-Saharan Africa are burdened by responsibilities related to water collection and provision for their households and community. The added role limits the social mobility and physical well-being of women. This issue needs to be viewed as a matter of environmental justice for substantial change to take place. When seen as an issue of environmental justice, the burden women bear can be observed at the individual, household, and community level. This paper draws on previous research and case studies to identify areas where women are disproportionately burdened by the water crisis in sub-Saharan Africa. Topics in this paper include health risks, impact on women as individuals and community members, benefits improved water sources would have on children, and how meaningful inclusion of women would positively influence the current problems. This paper also discusses what is meant by “improved” water sources and what these improvements result in practically. This paper offers that non-governmental, and governmental organizations should focus relief efforts on women as they are the most severely oppressed by the water crisis. As women benefit from these improvements, the community as a whole would benefit. Access to reliable and sustainable water sources would reduce health risks and complications that result from the current water crisis.
Ever since E! debuted their wildly successful reality TV show, *Keeping Up with the Kardashians*, in 2007, the Kardashian-Jenner family has become a seemingly permanent societal fixture, maintaining their cultural omnipresence for a decade and counting. Their unceasingly documented existences have undoubtedly impacted people’s thoughts, behaviors, and beliefs, and the family’s reach has proven to transcend time, countries, and generations. Despite the public’s warring praise and criticism, these six women—Kourtney, Kim, and Khloé Kardashian and Kris, Kendall, and Kylie Jenner—show no signs of slowing or stopping their infiltration and manipulation of our society and its perception of truth. My research contemplates how an inquiry into the anatomy of how the Kardashian-Jenners became and stay relevant in such a fickle, fast-paced world clarifies their widespread social influence. According to author Daniel Arthur Harris, the Kardashian-Jenners’ significance has been spurred on by journalists’ shamelessly fabricated, yet attention-grabbing headlines that relentlessly flood both traditional and social media platforms. This constant exposure has allowed the Kardashian-Jenners to, as Harris explains, use their notorious surnames as billboards that impose a slew of products, brands, and lifestyles upon impressionable viewers. Regardless of whether or not you “keep up” with the Kardashian-Jenners, delving into the history of their family, their rise to and maintenance of their fame, and their widespread social influence is crucial to comprehending how these six popular icons shape culture and redefine the public’s perception of reality.
Racial inequality has caused minority groups to be socioeconomically stunted through decades of laws and regulations impacting meaningful growth in their communities. As a capitalist nation, the United States creates an economic Darwinism that exacerbates social issues present in our society. As access to programs, home ownership and economic institutions became limited to some groups based upon racial identity, potential for growth was severely limited. These impacted communities highlight the link between racism and poverty. My research asks how a social construct like racism affects poverty rates and economic inequality, leading to what is called the Inner City.

Legislation and cultural bias led to sweeping regulations such as Redlining, which is the practice of denying services, either directly or through selectively raising prices, to residents of certain areas based on the racial or ethnic composition of those areas. According to Thomas Shapiro, Brandeis University, Institute on Assets and Social Policy; the racial gap in median net worth tripled from 1984 to 2009, expanding to $236,000 from $85,000. Much of the difference was home equity; a form of asset that provides long-term financial stability and can increase economic prospects for families and communities. The issue of economic inequality in the United States is significantly impacted by decades of social inequality. The prevalence of these fiscal gaps in particular groups is compelling enough to examine how the racial divide contributed.
Where Hearts and Minds May Leave, the Soul Will Forever Remain: A Search for the Increase in Young Veterans' Suicides

Being fatally injured on the battlefield is no longer a veteran's biggest threat. The biggest threat is here among us, hiding in plain sight. One that is silently claiming the lives of 22 veterans each day in the form of suicide. In a Department of Veterans Affairs study in 2014, 73.3% of suicides were males between the ages of 18-29. “Of the 20 suicides a day that we reported last year, 14 are not under VA care. This is a national public health issue that requires a concerted, national approach.”- VA Secretary Dr. David J. Shulkin. Unfortunately, civilian healthcare providers are often ill equipped or ill trained to deal with the complexities of veteran’s healthcare. Correspondingly, the greatest number of suicides seem to occur where the VA Healthcare Systems have the worst ratings or less populated areas. For example, Massachusetts alone holds one of the highest and lowest rated facilities in the country. One being the Boston VA Medical Center which is rated top in the country while the North Hampton VA Medical Center is rated of the lowest. My primary search delves into why male Veterans between 18-29 are the most at risk of committing suicide. Additionally, whether there is a correlation between the high number of suicides and the development of the brain. Lastly, has the lack of accessibility to care played a role in the veterans suicide.
Thinking of the Youth: Factors That Contribute to Juvenile Delinquency

This study examines factors that contribute to juvenile delinquency. This research will provide insight as to what exogenous (social and/or environmental) factors can be modified to improve juvenile life course. Social learning theory suggests that people learn by observing and imitating others. Hypotheses based on this theory test if negative relationships and negative treatment by others lead juveniles to commit delinquent acts. This study is a secondary analysis of data from the Adolescent Health survey, a national longitudinal study of grade school children. It examines correlations between negative behaviors experienced by juveniles and a consequent propensity towards committing delinquent acts such as theft and/or violent behavior. Given the multiple factors that can affect juvenile development, it is possible to see where problems can arise when juveniles feel physically unsafe and socially insecure. This study seeks to determine if negative treatment and experiences can be detrimental to juvenile development. Identification of such a link can pave the way for further research on life course development for juveniles. This, in turn can create new pathways for effective community based, and/or family-based, programs that target these specific environmental and/or social factors that can lead a juvenile to commit acts of delinquency.
Weather Relation to Consumer Consumption

In Massachusetts, all four seasons can be witnessed within a 12-month period. From winter, through spring to summer and fall. These four seasons create a constant change in the needs of state occupants. Although several factors affect our purchase decisions as consumers such as our basic needs and comfort, there is a very important factor which is often talked about but not really noticed. That factor is the “weather” and it has one of the biggest impacts on our purchase decisions. Common examples that spring to mind when one talks about weather are; ice cream selling on hot days, umbrellas when it’s raining, or hot coffee when it’s cold. However, the weather affects practically every consumer purchase decision. The food we eat, the clothes we wear, what car we drive, holiday bookings, what type of house we buy and even how we buy what we buy. It affects our emotional state, drives our purchase decisions, and dictates how much we are willing to spend. Understanding this relationship can pay huge profits for both consumers and brands that provide these products and services in the most impactful way.

This research seeks to study purchase decisions with respect to weather and climate (weather dependent) and to look for or provide a guide to making smarter decisions which can save cost, expenses and money.
6,300 immigrants living in Boston currently have a Deferred Action for Childhood Arrivals (DACA) status. Many of these immigrants represent the Latino community in Boston, however, there are only two representatives in the Boston legislature that represent the Latino Community. This is important because policies surrounding DACA and other immigration issues are passed by people who may not understand the life of being a child who has only known the United States as home despite having citizenship elsewhere. The solution is to have young Latinos run for political office and to become more involved in politics. But, many young Latinos do not know the options that are available to get involved. Boston Public Schools should be required to teach civics in all schools so that students become aware of the role that they play in making a change in society and learning about how to become more involved politically. This research aims to show how learning about civics increase civic participation, which not only helps DACA youth but also our country.
Many of us have moods that are changeable like the tides. For many of us, those moods are dictated by many things including the weather. We know what happens to our brain on drugs, but what happens to our brain on sunlight? And how about rain? First, a lack of sunlight can cause “Seasonal Affective Disorder”. Second, temperature can also affect mood, and this is a result of energy usage. Last but not least, raining makes everything more difficult. Even though raining can't directly affect our hormones or energy, it can affect our lifestyle in ways that are not conducive to a good mood. The weather relate to human emotions, and human emotion relate to our healths. This study aims to find out how weather affect human emotions.
Weather builds person's trait, changes person's attitude and impacts person's decision. This research informs the information and opinions with statistic data of two US cities in comparison. It demonstrates the connection between weather and outdoor activities. Weather impacts people’s mood and attitude in which link to outdoor events, such as sightseeing, driving, eating out, etc. This research uses the average daily temperature of Boston and Hawaii since 1995. In addition to weather, which other factors influence a person's design to participate in outdoor activities? Even though Boston and Hawaii have the different weather average, there may be some commonalities. This research will explore how weather ultimately influences outdoor activity engagement.
How Skin Changes in Each Season

The first thing that we notice about a person is their skin. We may notice the color, the complexion and even the firmness. Skin can tell us how old a person is, what type of work a person performs, and other social factors. This study aims to understand the effects of different weather on human body, especially skin care. One of the most important roles of the outer shell that people present to the world every single day is their skin. Due to the unsteady weather in the United States, from warm summers to snowy winters, human's skin in all over the body notifies by variety of concerns from acne to dry patches. With the knowledge, not only women but also men can choose different types of treatment for skin that prevent from wrinkles, redness, dryness, sebum fluidities, skin allergies or harmful UV ray. During cold weather like autumn and winter, human's skin begins to dry and crack so that moisturizing the skin daily with non-comedogenic face cream is necessary. The humidity of summer softens skin, brings back the moisture lost in winter, but the skin also gets worse as the weather gets hotter in some ways. Whether there is raining, sunny, cloudy, or snowing, human need to use sunscreen because sun exposure can cause skin cancer, dark spots and wrinkles. Therefore, this study can help each person understand the effects of weather to their skin, and choose the right protection.
Winter weather create deadly risks for drivers, however with 113 deaths per year, extreme heat has become the deadliest weather hazard. This study is designed to identify the effects of weather conditions on car accidents. The first part will compare the weather conditions of New-York and Boston from 1996 to 2015, then the second part will use this data to show the effects of weather on car accidents. More than 12,000 people died in the US in car accidents, due to winter precipitations, also the number of children across the USA who have died of heatstroke when left in hot cars was at record high in 2010. By combining statistical and sociological methods, people are now aware of the danger of driving too fast during winter precipitations or leaving a child in a car during extreme heat. To put in a nutshell, weather conditions affect people in ways that can be either harmful or deadly, and this, inform us on the importance of that matter.
Millennial Work Environment

One morning my brother sent me a link to a YouTube video of a businessman who broke down the reasons why millennials have a hard time becoming impactful in the workforce. When I first started working at this "high end" boutique at 18 years old that was exciting and I thought that maybe this could lead me to believe I could become a big part of this store. I made sure that I took advantage of this misunderstood opportunity and sell everything I was told to sell. I realized my paycheck could be spent in a week and thought about how hard I work for it. A main problem is that millennials were taught that if they wanted something they can obtain it, however that want is just a thought and not much of an action. Millennials need to make more of an effort to make an impact in anything and need to understand that any type of goal they set out are going to take time and not going to happen after 1 days of work. We need to take mental notes and adjust whenever we feel stuck. As we use our most powerful tool which is the brain we could find solutions that'll bring us to where we need to be. We need to upgrade our lifestyle and expose our minds to things we don’t think is normal or comfortable. We need to break that barrier of fear and do things in unnatural ways.
Obesity increases the risk of diabetes, heart disease, stroke, and arthritis. The influence of weather and obesity is significant to understand. The influence that weather has on many areas related to obesity including exercise and diet. This research intends to look at the weather patterns and obesity rates in at least one U.S. city. The questions of how weather affects eating patterns, exercise rates, and even moods will be addressed. This study will look at statistics from Stats Crunch as well as looking at scholarly journals to understand and explore the relationship between weather and obesity.
Weather’s Effect on Gun Violence

The amount of gun violence in the United States is far above any other industrial nation. With the United States averaging 29.7-gun related homicides for every million people in 2017. Compared to other nations like Switzerland with an average of 7.7-gun related homicides per 1 million people. This research aims to understand the reasoning on why this happens and the connection it has to weather and gun violence. With Switzerland being cold we can see that the gun violence is very low compared to the United states. With the united states having varying seasons we can actually use two different cities in two opposite seasons to understand gun violence. Does colder weather have an affect on gun violence or does warmer weather have an affect on gun violence. It is however hypothesized that colder weather areas do have less crime and that warmer weather areas tend to have more crimes. With the comparison of both Chicago Illinois and Monroe, LA the data will prove the hypothesis to be correct.
It is to argue that winter weather can affect our health. Studies have shown that Flu viruses are more stable in the cold air. Research has proven that during winter time there is a sharp rise in the incidence of respiratory infections. Although you can still come in contact with the flu in the summer, it is very unlikely. Last year's winter, laboratory-confirmed cases of flu in Massachusetts since October 2017 now stand at 8,152. In 2017 research has shown that the number of Californians under 65 who've died under 65 has jumped to 42 people. This research aims to bring awareness to how the weather can make people sick.
Drawing a comparison from the weather data of two American cities, Boston and Miami, demonstrates the relationship of weather patterns and the use of renewable energy. This study reveals that living in colder regions of the United States is less environmentally sustainable than living in warmer regions. According to the EIA, in 2015, 27% of Massachusetts households used fuel oil to meet their primary home heating needs, more than five times higher than the nationwide average of 5.1%. Though Boston is ranked as one of the top 10 cities in the US for energy efficiency and has risen as a national sustainability leader, in actuality, weather patterns in colder regions show the energy demand for climate control. This proposes a re-examination of the sustainability in living in warm climates versus cold climates and the additional environmental benefits that can be achieved in warmer cities. If warmer cities use their climate conditions to their advantage, they can reduce city spending on expensive fossil fuel power plants by transitioning to renewable energy while simultaneously cutting the cost of American ratepayers. Public records for city budgets and funding in sustainable energy sources support this idea. This economic gain is known as the triple bottom line, where financial, social, and ecological stability is equally satisfied. This study will illustrate how the triple bottom line is the best economic model for a sustainable future.
The current study focuses on the misuse of both prescription and non-prescription stimulants among adolescents. These include diet pills, pep pills, and stay awake pills. The misuse of stimulants has become a continuous problem among the youth in our society, and that has driven us to focus on studying this phenomenon. We analyzed our data from the data set Monitoring the Future (MTF): A continuing Study of American Youth. This cross sectional study was collected by the University of Michigan, Institute for Social Research, and Survey Research Center in 2006. The project employs univariate, bivariate, and multivariate analyses to test assumptions guided by the social learning theory, general strain theory, and social bond theory. Our expected results include reasons as to why youth in society are misusing prescription and nonprescription stimulants. Within our findings we expect to see how peer influence, motivation, and economic strain play a role in the actions adolescents are taking in their lives.
The purpose of our research was to examine what social factors lead to alcohol and marijuana abuse among adolescents. Alcohol and marijuana abuse among adolescents is a widespread issue that affects many families. We conducted our research using the 2006 Monitoring The Future Survey of 130 private and public schools across America. They gathered a sample of over 14,000 high school seniors. We analyzed data utilizing bivariate and multivariate techniques on adolescents relating to their alcohol and marijuana abuse with the goal of finding patterns to combat the issue. Based on problem behavior theory and social learning theory, we expect that demographics, personal relationships, and social institutions will affect the likelihood of adolescents abusing alcohol and marijuana. The results gathered from the data will suggest the root causes of this prevalent matter within our society.
After six incidents of racially offensive graffiti found on doors of dorms of African American students at Framingham State University, no one has been held accountable. This study aims to explore how this situation has affected the experience of students of color on campus, and to assess differences between how the situation is perceived by these students on the one hand, and by their white peers on the other. I am interested in how this situation has affected African American students and their perceptions of (1) their own safety, (2) sense of belonging and identification with the wider campus community, and (3) the faculty and administration of the University. I will also compare the attitudes and concerns of African American students with the attitudes of white students. I will use structured interviews and survey questionnaires to ask both groups of students about their perceptions and experiences in connection with the hate crimes. These instruments will allow me to compare the two groups, and possibly to identify opportunities to improve the climate on campus. Interviews and surveys will be complemented with ethnographic observation of African American student life at Framingham State. My poster will describe the situation affected by African American students, present my findings, and contextualize my findings with information about the demographics of the student body and history of the University.
This study investigates what factors influence adolescent risky behavior, such as substance abuse and delinquency. We chose to utilize the National Longitudinal Study of Adolescent Health 1994-2008 with a sample size of 15,170 students. We expect to find that students with a close relationship to their parental figure(s) will have a lower chance of engaging in risky behaviors and/or gang activity. Utilizing social learning, social disorganization and strain theories, we anticipate adolescent involvement in risky behavior are attributed to unequal opportunity in educational and employment resources, and ineffective socialization. Although adolescent behavior has been widely researched, we add to the conversation by investigating the causation of such behavior. Our findings can be used in tandem with other research to provide possible policy implications.
What Factors Influence Opinions on Adoption: Race, Sexual Orientation, and Support for Diverse Adoptive Families

The present study analyzes how acceptance of diverse cultural norms, such as same-sex couples and biracial families, influence opinions towards diverse family adoption. We utilized data collected by the Baylor Religion Study from 2005-2008. They gathered a random sample size of 1,721 Americans eighteen and older. By applying Theory of mind and Attachment Theory we aspire to test potential existing relationships among our variables. To test our assumptions, we utilized various methods of analysis ranging from univariate to multivariate. We expect to find that individuals who are more accepting of diverse cultural norms will be more supportive of diverse family adoption. Our research efforts aim to explore culturally developed stigmas concerning adoption and in turn, reduce them. These results have potential to influence our current society towards more culturally open habits by examining how various factors are related to perceptions of diverse family adoptions.
This study examined the characteristics that are associated with different types of homicide. Our research looked deeper into the meaning of homicides, specifically what characteristics are associated with intimate partner homicide and stranger homicide. According to the feminist theory, we expect that males are likely to commit intimate partner homicide against females and involve one victim and one offender. By using the social disorganization theory, we expect stranger homicides to be more common in the southern United States. According to routine activities theory, your access to firearms can lead to stranger homicides. We also expect that engaging in drug crimes increases the likelihood of stranger homicides. We used the 2012 Uniform Crime Reporting: Supplementary Homicide Report dataset consisting of 13,063 homicide cases to test our hypotheses. Our project conducts a range of analyses through multivariate levels. We expect that an offender’s gender, region, weapon, and situation are all associated with different types of homicide. We intend to educate the public of the implications of the characteristics of specific types of homicide and potentially decrease homicides by bringing awareness to these causes.
This study looks to investigate the relationships between age, race, size, language, grades, and sexual orientation and cyber-victimization among school students. Additional factors, such as Internet use, level of activity, and physical victimization are also considered. Discovering the possible relationships each variable may have to cyber-victimization allows for the identification of factors that increase or decrease one’s likelihood of becoming a cyber-victim. Such findings would result in meaningful and useful information about cyber-victimization in adolescents, and create new research in a field that has very few findings in a ‘cyber-dominated’ world. This secondary analysis study uses indicators from the Youth Risk Behavior Surveillance System (YRBSS) dataset, a longitudinal study conducted between 1991 and 2015, which used multi-stage cluster sampling of all public, Catholic, and other private school students in grades 9 through 12. This study uses the Cyber-Routine Activities Theory, which posits that cyber-victimization is prevalent due to the types of online behavior that adolescents exhibit and the level of parental guardianship in children’s online activities. The hypotheses predict that demographic characteristics of respondents related to their behavior online and exposure to cyberbullying will influence the likelihood of cyber-victimization. Findings are important for providing guidance for research and for parents and school personnel in determining actions to follow in reducing the rates of cyber-victimization in school-aged adolescents.
The purpose of this study is to examine the effects of child abuse. While much research has been done on child abuse, little has been done on the effects of child abuse either immediately after the abuse has taken place or in terms of long-term consequences. The knowledge of these effects helps us better understand the potential negative impact on mental health and negative personal and social behaviors that may follow abuse. The current study is a secondary analysis of data collected through the National Longitudinal Study of Adolescent Health, a survey done from 1994 to 2008. The guiding hypothesis for this study is that there could be many detrimental effects that abused children endure into adulthood that include, but are not limited to, depression, substance abuse, and delinquency. The theory that guides this research is “Labeling Theory”. Labeling theory argues that one’s self-identity and behavior may be influenced and, to a large degree, determined by how one is described or categorized. It relies on the concepts of self-fulfilling prophecy and stereotyping. It is known that abuse victims often carry negative self-images and stereotypes. This research investigates the ways in which these negative factors may influence subsequent behavior in adulthood. Such knowledge could lead to improved efforts to promote mental health and positive personal and social behaviors among those abused in childhood.
Gun Support: What’s Racism Got to Do with It?

Research has shown a correlation between race and guns, however attitudes towards guns due to racial prejudices seem to be less studied. This research highlights the effect of racialization in society as a cause for whites’ support for guns. Critical Race Theory (C.R.T) is used to expose implicit biases within individuals. The perpetuation of racial stereotypes along with the killings of minorities has contributed to the continuation of this issue. In the midst of these social injustices, Donald Trump has been reaffirming a white normative society.

This research uses the PEW Research Center’s August 2016 Political Survey. These data are cross-sectional and provide a nationally representative sample of 2,010 adults, age 18 or older. The data set contains variables that identify race, political association, the perceptions of guns, as well as the perceptions of minorities. The hypotheses seek to find if C.R.T is supported when bivariate and multivariate analysis is conducted.

It is expected that respondents with more discriminative ideologies will believe guns are more for their protection. It is also expected that respondents with discriminative ideologies will believe that the government should not infringe upon their second amendment rights. This will draw out both “white fear” and C.R.T.

If findings show that attitudes towards guns are affected by racialization this will reveal “white fear” as an underlying theme in gun policies passed. This will show that in order to make proper decisions in terms of safety we must first eradicate these biases.
Previous research indicates widespread issues of substance use, abuse and their possible links to delinquency. Current research on Agnew’s General Strain Theory connects academic strain and its influence on delinquency, substance abuse and use. In the American education system, students are expected to strive for academic success because it is a culturally-defined goal. Students who do not meet this academic success for reasons such as lack of resources, and poor funding, experience strain. A cross-sectional analysis of the 2006 Monitoring the Future survey utilizes data from students in grade 12. The total sample size of this study is 14,814. Bivariate and multivariate analyses are used to test six sets of hypotheses that focus on General Strain Theory with each examining the relationship of the student’s perception of their school ability and perception of their average grade with alcohol use and abuse, drug use and abuse and delinquency. Over time, academic strain builds up from receiving poor grades, which leads to students experiencing copious amounts of stress. Students are likely to turn to illicit drugs or alcohol to reduce or take the focus off the individual's academic strain. These results would pose strong findings that are relevant to today’s youth regarding academic strain possibly leading to substance abuse, use, and delinquency. With better understanding in this field, researchers can help the youth recognize and become more aware of the possible correlations between substance abuse, use, and delinquency.
To understand the consequences and concerns raised by the opioid crisis, one has to understand the risk and the approval of drug use. This study hopes to show that there is a link between risk of heroin and prescription drugs, as well as approval of marijuana/alcohol and prescription drugs. The Rational choice theory is used to understand people’s actions and reasons behind using prescription drugs from seeing heroin as harmful. Social learning theory is used to understand how people learn from others and approve of the use of harder drugs. Data used for the study are from the 2014 wave from the National Survey on Drug Use and Households. We hypothesize that as fear of opioids increase, prescription drug use increases. We also hypothesize that if parents approve of marijuana/alcohol use, the user will progress and use prescription drugs. The expected findings suggest if heroin is seen as harmful, more people will switch to prescription drugs. Also, if parents approve of marijuana/alcohol use, users will turn to prescription drugs. Given the public concern of the opioid crisis and heroin epidemic, the results imply that heroin use is associated with parents approval of other substance uses and prescription drugs.
This study aims to identify factors that could affect the overall mental and physical health of individuals. The researcher studied the effects of sex, age, marital status and employment status, as well as exercise and sleep, on the individuals' physical and mental health. Secondary analysis of data from the Behavioral Risk Factor Surveillance Study, using a telephone survey with over 400,000 adults in the United States aged 18 and older, was conducted. This research applied Social Cognitive theory to determine if individuals will make logical decisions to exercise and get more sleep if they know it has improved the mental and physical health of others. It was hypothesized that there will be significant relationships between the individuals' demographic characteristics and their mental and physical health, especially when sleep and exercise are factors. There was a clear pattern demonstrating that individuals who got more sleep had better overall health than those who did not. Exercise influenced physical health but had less influence on mental health. Another key finding was that once married individuals' health was much poorer than was the health of those who were married or never married. The results of this study, by demonstrating the value of choosing to exercise and get more sleep, could help individuals improve their health and reduce physician visits. Physicians can use this research to advise their patients on ways to improve their health.
Which Program Will Come out on Top? A Study of the Effectiveness of Sex Education Programs in America

Throughout the United States, policies have been implemented that reduce funding to comprehensive sex education programs. The purpose of this research is to develop an understanding of which form of sex education program, abstinence-only or comprehensive sex education, is most effective in preparing students for sexual activity and potential outcomes of sex. By applying social learning theory it can be argued that behavior modeled in class varies between the two forms of sex education, which will influence a student’s behavior. Data gathered from the Henry J Kaiser Family Foundation’s 1999 Sex Education in America survey allows insight into the experiences of students that are in grades seven through twelve from both abstinence-only and comprehensive sex education classrooms. By conducting bivariate analysis of students responses to this survey, it is expected that comprehensive sex education will be more effective than abstinence-only education in preparing students for sexual encounters, use of contraceptives, and developing an understanding of potential outcomes from sexual activity, such as STDs and pregnancy. These findings would suggest that it is more beneficial to students to be informed on topics regarding sexual activity rather than being left uneducated on the subject. These findings would allow school systems to be more informed about which form of sex education is more effective. Schools would also be able to reconstruct their sex education programs to be more informative and beneficial to students.
With the ever-growing population of immigrants living in the United States and the heightening derogatory public disposition in response, it is important to understand the personal and systemic dynamics concerning those entering the United States, particularly immigrant children growing up in America. This study focuses on these children, using the Children of Immigrants Longitudinal Study (CILS), which was conducted in three cities and consists of survey data from children of immigrants taken on three occasions: in 1993, when the respondents were in 8th or 9th grade; in 1995, when they were about to graduate high school; and in 2001, around age twenty-six. Responses were examined to determine the legitimacy of segmented assimilation theory concerning the assimilation and acculturation of children of immigrants in the United States through bivariate and multivariate tests of the hypotheses. It was hypothesized that certain concepts would appeal to differing paths of assimilation as dictated by segmented assimilation theory. Transnational engagement is expected to have a negative impact on both assimilation and acculturation, while social capital and education are expected to have a positive impact on assimilation and acculturation. It is expected that the results will show the systemic struggle children of immigrants face in the demanding process of acculturation and assimilation into an entire nation that not only rejects differences but often faces them with abhorrence and suspicion, as well as delineating which immigrants will be accepted by larger society and permitted economic and social success, and which will not.
The present study used a classroom activity, based on the premise of the 2015 feature film "Circles", held in two different sections of Principles of Sociology as an opportunity to observe if in-class group dynamics could represent a microcosm of everyday interactions, in which groups constantly judge individuals as either being a part of their “in-group” or a member of their “out-group.” The initial hypothesis offered was that salient characteristics such as race, gender, and sexual orientation would play a key role in this decision making of who is in and who is out. However, the methodology used was grounded-theory approach in order to allow the data to inform the final conclusion. Data collection included semester long observations, group voting data, informal interviews, and a final exit survey of those voted out of the “in-group” at the end of the semester. After an exhaustive review of the data, the researchers found that salient characteristics such as race and gender did not in fact play a role in the students’ decision making. Rather, students’ voted for those who violated the informal norms and mores of the group by not succumbing to conformity expected by “in-group” members. Therefore, the researchers concluded that these in-class interactions do reflect larger social forces experienced by individuals in everyday life.
The purpose of this study is to examine sex education programs used in public schools throughout the United States. Past studies have found that the United States has high levels of STDs and teen pregnancies (Collins, Alagiri, Summers, Morin 2002). This research compares the influence of two types of sex education curriculums: abstinence-only and comprehensive (abstinence-plus) programs on risky sexual behavior. This project uses the Sex Education in America 1999 dataset, comprised of two nationwide telephone surveys: one of the public, and the other to school principals. The sampling design was a stratified sample of 1,759 respondents, 18 years of age or older, including parents of the respondents. The predicted findings of the study anticipates that adolescents who are exposed to abstinence-based sex education may be more likely to want more information on pregnancies, sexually transmitted diseases, use of contraceptives, and how to be prepared to engage in sexual intercourse compared to adolescents exposed to comprehensive sex education. Research on sex education is significant because sexual outcomes is a growing concern as the numbers remain high every year of different illnesses such as a variety of STDs and HIV/AIDS. The information that students learn about sexual behaviors could effect their sexual outcomes. This study will contribute to the larger conversation on which sex education curriculum is more effective for adolescents to attain safe sexual behaviors taught and apply it to their world.

Keywords: Adolescents, Sex Education, Abstinence-only programs, Comprehensive program, Sexual Behaviors
Approximately 9 out of every 1,000 children in the United States suffer from some form of maltreatment each year (CDC 2012). Past research has suggested that social factors, such as divorce or the economic status of a family’s neighborhood, put children at a higher risk for victimization (Holmes 2007, Coulton et al. 2009). This study examines if factors such as household income or substance abuse in the home put children more at risk for different types of victimization. The research uses data from the Behavioral Risk Factor Surveillance System (BRFSS) to study the causal risk factors for child victimization. The BRFSS is a telephone and in-home survey conducted by the Center for Disease Control and Prevention (CDC) from 2009 to 2010. Routine activities, social disorganization, and learned helplessness theories are used to further explain situations where children could be more at risk for victimization. More specifically, this study predicts that children living in homes and neighborhoods with higher levels of social disorganization will be more at risk for victimization. These theories add to the research on child victimization by introducing elements that may put children at a higher risk based on particular situations. This study is significant in contributing to the research surrounding child victimization, which will allow communities and families to protect children from potentially dangerous situations.
First-generation students compose a percentage of college student bodies that is growing every year. This change in population composition makes it important to examine the workings of this group, as well of potential social influences that might affect the population’s success rates. We have used the idea of “generational” studies to examine the social and historical differences between groups of people born in different brackets of time. While the difference between individual’s and their ancestors is a distinct area of research, examining the interplay of generational shifts alongside new experience from one generation to another produces a more nuanced picture (Kertzer, 1983; Goldrick-Rab, Pfeffer, 2009). Parents with college experience produce larger amounts of college-related expectations for their offspring than do parents without college experience. These expectations are passed down to their children. Having higher expectations for college academic achievement might be related to higher completion rates of degree programs (Domina et. al, 2011). This could leave first generation college students at a slight motivational disadvantage compared to non-first generation students, leading to lower completion rates. The purpose of this study is to examine what factors might contribute to the possible first generation students’ at Worcester State University feelings of lower academic motivation, involvement, and holistic support. First generation students at Worcester State University have lower feelings of academic motivation and involvement on campus (Tesfey, Briesacher, 2017) because of the lack of adequate preparation, transition, and integration from high school into the college sphere.
As many know, there is a rising epidemic of drug and alcohol abuse that is leading to the death of numerous individuals. Unfortunately, drugs and alcohol are substances far too common for both commuters and residents at Worcester State University. At Worcester State University, I have researched programs and students' understanding about drug abuse, alcohol abuse, and services accessible. This research explores the current services available to students, how many students are currently using substances on campus, and what knowledge students have regarding the university's services.
Tell Me "Y": The Causes of Juvenile Delinquency among Millennials

This study focuses on the relevance of drugs, sex, alcohol, and family dynamics neglect in delinquent juveniles. It is important to discuss the reasons behind juvenile delinquency so that future studies can help prevent the continuation of such issues. Previous studies have conducted surveys and interviews that shows that an earlier exposure to illicit drugs, alcohol, and other deviant behavior can result in further behavior in later life. This research includes a combination of surveys from the National Longitudinal Study of Adolescent Health and follow up interviews taken in 2014. This study examines how factors such as home environment and their exposure and use with drugs and alcohol influence juvenile delinquency and associated behaviors. A juvenile’s association with drugs and alcohol can lead to an earlier arrest record and changes in their overall behavior. The relationship that a juvenile has with their parents, focusing on neglect and abuse, may have a strong impact on the juvenile’s behavior, both in home and in school. Similar behavior may be seen in juveniles that are earlier exposed to sexual activity. By looking into a juvenile’s behavior can help determine the severity of the delinquent behavior that may continue to display. Additionally, this study predicts that the more positive influence that a juvenile experiences in early life, the less likely they are to commit delinquent behavior in the future. This study is significant because addressing these issues in society can make for a more effective treatment for juveniles ultimately leading to a better future.
Immigration has always been a divisive issue in the United States (U.S.) creating controversial opinions about which rights immigrants should be entitled to. The research aims to understand the relationship between American citizens and immigrants through identifying various factors that contribute towards citizens’ positive or negative attitudes of immigrants. This study uses data collected by the General Social Survey (GSS) (2010). This study examines factors that impact attitudes towards immigrants, such as family composition, education level, socioeconomic status, and employment. The expected findings in this study indicate contradictory attitudes towards immigration. For example, U.S. citizens may have better opinions of immigrants who have higher levels of education while having more negative opinions of immigrants with higher wages, despite the two factors of employment often being associated. This contradiction displays how U.S. attitudes fluctuate depending on forms of capital immigrants obtain. The study will contribute to the ongoing debate about immigration and develop a better understanding about how immigrants in the United States are viewed by Americans.
Experimenting with drugs is no new act among adolescents in the United States. High school is a time for discovery and for many, rebellion. By analyzing the data from the 2014 National Survey of Drug Use in Households (NSDUH), this study examines why some adolescents go past the point of drug experimentation, and into the territory of addiction. The study will be examining 13,600 children under eighteen years old within the 2014 NSDUH. Differential Association Theory, General Strain Theory, and Social Control Theory are used as a guide for exploration. These three theories provide insight to the belief that adolescents become more susceptible to addiction and recidivism when their bonds to family, positive role models, and school are strained or nonexistent. Past research lacks the acknowledgement of recent changes in drug legislation such as the legalization of marijuana in many states and the impression left on adolescents. New findings from this research will contribute to adolescent drug use prevention by understanding the causes produced from societal factors.
Tamar Braxton, Kenya Moore and Nene Leakes are three of TV’s most notorious reality stars. Their razor-sharp wit and trendsetting catchphrases (“Shade” “You tried it” “Miss Thing”) have set social media ablaze and redefined the way that American society communicates with one another. But the birthplace of many of those catchphrases lies in House/Ballroom culture; the LGBT Black and Brown competition series and alternate familial structure that inspired Madonna’s hit song “Vogue.”

This presentation aims to highlight cultural appropriation at the intersection of gender, class, and what the author has deemed “palatability politics.” Utilizing participant observation, the goal is to identify the terminology founded in ballroom culture and subsequently track its’ success when presented through the lens of cisgender, heterosexual women who seek to make their mark on the cultural zeitgeist. A longtime participant who has attained superior social standing within the hierarchy of ballroom, the presenter seeks to illuminate those terms that were birthed from poor Black and Brown, trans* and queer young people on the ballroom runway. Additionally, the presenter will respond to how ballroom terms have served to enhance the fame and social standing of cishet Black women on television who co-opt those witticisms from their stylists, YouTube, etc. From the Real Housewives to RuPaul, the “Tweetable” words of today have an origin and a journey. Those who would attend this lecture will learn where that journey began.
The goal of this research is to explore the relationship of identity salience (Serpe 1986) and activism in policy debate. Policy debate is an academic form of debate that is research intensive and highly intellectual in terms of international relations, public policy, philosophy, and much more. Students who participate in this form of debate are trained to engage in higher order thinking and develop critical argumentation and thinking skills through this fast-paced and highly intellectual form of debate. This research analyzes not only the relationship between being a debater and becoming an activist, but also investigates the implications of participation in policy debate.
Worcester’s public spaces are made for public use, but in some cases parts of the public are excluded from these spaces. This exclusion can happen by design, location, accessibility, or policy. Worcester, Massachusetts, along with many cities around the world, has come up with ways to include and exclude parts of its population. This paper will show where and how Worcester has created spaces that are inclusive and exclusive in three ways. Decisions made to accommodate the population's lifestyle needs in public spaces. Decisions made for accessibility in the city’s public spaces. Decisions made for citizen participation in the public process. Public spaces that will be taken into consideration include the Worcester Common, Elm Park, Crompton Park, and Worcester's Public Policy. A better understanding of what is a public space, how "public" is the space, and how Worcester can be proactive in including more of the city’s population into those spaces.
With the rise of recent xenophobia, ethnic groups are exploited through exclusion. This paper discusses “the stranger” as ethnic groups throughout industrialized Worcester history and observes them through conflict theory and structural functionalism. This combination creates the “Yin-Yang theory”, which supports the importance of diversity seen in Worcester’s inclusive efforts as a leading example for other communities.
LGBTQ+ rights movements, actions, and trends in the United States in the 20th century have been strongly influenced by the social and political use of space. In this paper, space is studied through a Marxist lens where space is a product of social forces and serves as a tool of thought and action. The spaces examined tend to be public-private spaces as sites of contestation, struggle, transformation, liberation, and cooptation. Through a critical analysis of queer texts coupled with participant observations of gay nightlife in Worcester, this paper chronicles the importance of queer spaces, gay and lesbian bars, challenges to those spaces, and the internet as a platform of queer space. There is strong consensus that queer spaces are vital to safety and resistance. This paper contributes to past historical LGBTQ+ analysis by including the factor of the changing queer environment, considering new sites for queer spaces, and examining how queer people create spaces for freedom and expression.
Puerto Ricans make up a majority of Great Brook Valley tenants. This paper will explore Puerto Ricans’ impoverished status in Worcester, the need for housing assistance, and the dangers of leaving or being evicted from an established Puerto Rican community. 

Great Brook Valley was constructed in the 1950’s to provide temporary housing for returning World War II veterans. A shift happened after an emerging Hispanic population in the 1970’s made Great Brook Valley their home. The social inequalities Puerto Ricans have endured in Worcester, Ma has created a dependence on the income-based rent provided. In 2011 Worcester Housing Authority (WHA) launched A Better Life Program, which mandates WHA tenants, under state subsidized family public housing, be forced to either work, go to school, or commit to 30 hours of community service per week. This paper will answer if the State and WHA should force people out if the systems already in place, which lead to the dependence on Public Housing, are not sustainable for Puerto Ricans to thrive.
The purpose of this research project will be to analyze and assess the socio-economic influences of immigrants focusing primarily on their roles in urban environments within the US. Using the city of Worcester, MA as a population sample we will be collecting and analyzing qualitative data through structured interviews with local immigrant entrepreneurs. Interviews will be recorded, transcribed and archived with the Urban Studies department for ongoing research. At a time where the political climate is hostile towards immigrants it is important to take an objective look at how exactly these immigrants are impacting the city. Part of doing this research includes training through the CITI Program where student researchers become certified to research vulnerable individuals to ensure safety of the volunteers.

In Worcester 21 percent of the population are immigrants and 37 percent of local business is immigrant owned. From food service to information technology immigrant entrepreneurs in Worcester display great diversity and innovations. Not only do these individuals create revenue for the local economy through business but many of them are putting their children through local colleges. While considering the socio-economic impacts of our immigrant neighbors and the role they play in the city it will also be a goal of this research to highlight areas of strain within the community. By identifying common points of hardship among the immigrant business population we hope to provide potential mitigation through suggesting improvements with public policy.
The purpose of this case study is to determine the feasibility of establishing a women’s professional baseball league in North America within the next ten years. Thorough research has uncovered several common issues that have plagued both current leagues and defunct leagues: (1) Lack of sufficient sponsorship agreements, (2) lack of affiliation with profitable men’s professional clubs and (3) the role of women sports in US society, have all hampered growth of professional women’s leagues in the United States. The basic design of this study was interpretive; the researcher gathered information on all sports leagues around the world to find common themes and issues that occur across leagues. Key themes include: (1) leagues do not establish a proper idea of what operation costs are, (2) leagues do not identify and target appropriate sponsors, partners, investors, and television and media deals, and (3) they are founded on the back of Olympic success but lack foresight for creating a sustainable competition in the US Market. For a women’s professional baseball league to survive it will have to control and minimize costs, accumulate media rights deals, sponsors and investors early and often, establish a partnership and affiliation with baseball leagues and women’s baseball leagues overseas. Most importantly, the league must make a concerted effort to change the perception about women as baseball players and professional athletes.
The Acute Effects of Exercising with Increased Breathing Resistance

PURPOSE: To assess the acute physiological, perceptual and performance implications of exercising with a commercially available training mask that increases breathing resistance. METHOD: This study will take place in the Human Performance Laboratory in the Department of Sport and Movement Science at Salem State University. Thirty healthy male participants between the ages of 18 and 35 years old will take part. Participants will complete four different cycling tests including: a VO2max test with normal breathing resistance i.e. no mask; a VO2max test wearing a mask that increases breathing resistance; a self-paced 5-km time-trial (TT) with normal breathing resistance i.e. no mask; and a TT wearing a mask that increases breathing resistance. DATA ANALYSIS: The normality of the data will be assessed using the Kolmogorov-Smirnoff test. The acute influence of increased breathing resistance on VO2max and TT performance will be determined by comparing VO2max and TT scores with and without breathing resistance using a paired T-test. The alpha level will be set at 0.05. HYPOTHESES: Performance on a VO2max test and TT will be negatively influenced when a commercially available mask that increases breathing resistance is worn, compared to when the same tests are performed with normal breathing resistance (alternative hypothesis).
As global temperatures rise, livestock are increasingly succumbing to a condition known as heat stress, which affects livestock fertility, meat quality, and milk production. One of the causes of these detrimental effects of heat stress is an improper balance of hormones normally present in the animals. However, previous experiments show hormone supplementation can counteract hormone imbalances caused by heat stress in cattle. In preliminary studies, there have been encouraging results, showing an increased pregnancy stability in heat stressed cows supplemented with progesterone as shown in one study, the treatment of heat-stressed dairy cows with supplemental hormones lead to greater pregnancy rates. An important next step for hormone supplementation is to apply this procedure to other affected livestock, such as sheep. Like in cows, studies show heat stroke can lead to lower levels of progesterone in sheep, which is responsible for maintaining their pregnancy. The ability to reverse heat stress symptoms would lead to healthier, more productive livestock, and would prevent losses with respect to meat, dairy, and wool production, helping farmers and the economy as a whole.

This study will test progesterone levels of sheep exposed to heat stress conditions. Progesterone levels will then be compared to those of heat-stressed sheep injected with artificial progesterone to test the effectiveness of supplemental progesterone on overall progesterone levels and fertility rates. Furthermore, this experiment will test if replenished progesterone levels will lead to more successful full-term pregnancies.
As climate change continues to cause fluctuating average temperatures, concerns grow regarding the future of our global food systems. These fluctuations in weather negatively impact agriculture and wildlife by supporting an environment which stimulates pathogenic microbes and thusly causes beekeepers to dispense more pesticides. Bees, our primary source of pollination, rely heavily on consistent temperatures and flowering times in order to maintain a healthy colony size. The symbiotic relationship between crops such as apples, almonds, and blueberries with honey bees is crucial for production. The plants need pollination from the bees and the bees need the pollen from the plant. However, as the bee population has continued to decline, humans have turned to alternative solutions. The response ranges from humans pollinating by hand to the development of bee-sized drones to be operated remotely by humans. With the cost of physical labor and development of future technology taken into account, it is therefore logical to question the potential effects of future pollination technologies as we prepare for a world wherein bee populations struggle intensely. To compare which of the two is the best alternative, we will analyze the cost against the efficiency of each technique to quantify which could be a potential replacement to the declining bee population.
Many industrial and agricultural processes influence the progression of climate change and environmental pollution. Remediation techniques being employed as corrective and/or preventive strategies for environmental pollution can be obtrusive and lack control and desired sustainability. These strategies are controversial as they can be potentially toxic to the environment, so a more sustainable alternative should be sought after. Evidence demonstrates the success of certain fungi species as a tool to naturally degrade pollutants from soil. The pollutants can include recalcitrant pesticides, dioxin, persistent organophosphates, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, some explosives, and a variety of organic solvents. It is evident that fungi is a natural tool for remediation of contaminated ecosystems, and both cost-efficiency and sustainability are compared to current remediation technologies.

A facility in Grafton, Massachusetts utilizes several mycoremediation techniques; this facility is assessed for cost effectiveness, start up procedures, maintenance, and overall environmental benefits. Data from their remediation processes has become available for analysis and is comparable to other remediation techniques. This allows us to consider the feasibility of using mycoremediation techniques on a larger scale.

Our tactics will be applied to Lake Victoria Basin (Nzoia, Kenya), where pollutants are affecting crop yields and environmental remediation is sought after. Pleurotus floridianus has demonstrated its ability to absorb heavy metals and break down pollutants. Using P. floridianus for mycoremediation tactics, we expect contamination levels to diminish and the hierarchy of organisms to be more diverse.
Growing grapes in New England and doing it organically? Yes it is possible. Organic viticulture is growing quickly in the US and only recently newly bred varieties adapted to New England conditions have made this possible in cooler climate. In this project, students get real experience growing grapes but with the potential to experiment and make mistakes in a buffered learning environment. In the short-term, this project explores grafting many combinations of grape varieties and rootstocks and the use of various cover crops to improve the site quality. The ultimate goal of this project is to train students with real experience and let them explore the most sustainable methods to use on local vineyards where less predictable climates are becoming the norm.
Is Halloween Doomed for New England? The Impacts of Climate Change on *Plectosporium tabacinum* Geographic Viability

The world is getting hotter and wetter, and its weather more extreme. As a result, plant pathogens are now spreading around the globe to new environments and are marching towards the planet’s poles at an unprecedented rate that rivals that of global warming. In recent years, a new type of pathogenic plant fungus, *Plectosporium tabacinum*, has arrived in southern New England and has the potential to decimate the region’s pumpkin, summer squash, and zucchini crops. For years, *P. tabacinum* has plagued a wide range of Eurasian cucurbits, and in 1988 the fungus took its first steps in America. Starting in Tennessee, over the course of a decade *P. tabacinum* marched north—first to Virginia and then Illinois before arriving in Massachusetts in 1999. *P. tabacinum* thrives in cool, wet weather, so as southern New England continues to warm, the pathogen is predicted to move northward towards New Hampshire, Vermont, Maine, and upstate New York. Our approach to this issue will be an analysis of biological process models to provide criteria in which to better quantify transmission, reproduction, and survival ability for *P. tabacinum* in these new environments. In addition, we aim to use these models as well as climate data from New England and New York to predict where *P. tabacinum* will go next and what can be done to prevent an outbreak. The proposed final product would be a map of *P. tabacinum* predicted advancement.
The greenhouse gas carbon dioxide (CO2) contributes significantly to global warming and is released through human and natural activities such as deforestation, fossil fuel burning, volcanic eruptions, and cellular respiration. Atmospheric carbon dioxide is transferred and stored into reservoirs known as sinks. The ocean, as a sink, absorbs and stores carbon dioxide in the form of carbonic acid, H2CO3, which effectively lowers the pH of the ocean through the release of hydrogen ions. One devastating effect of climate change, ocean acidification, results in the rapid decline of varying aquatic species such as those with calcified shells. Studies measuring the effects of rising oceanic CO2 levels and decreasing pH levels reveal that the survival of young developing oysters and oyster larvae are sensitive to lower pH levels. Calcified species play an important role in many aquatic ecosystems and food chains, and many possibilities for acclimating oyster species to a more acidic environment exist, especially in the field of genetic engineering. By utilizing CRISPR, shellfish genomes may be modified to contain acid or heat tolerant proteins. These proposed methods will be evaluated in terms of efficacy and feasibility and subsequent conclusions will be made.
Water We to Do?

Freshwater is in limited supply, and agriculture alone utilizes 70% of it. With drastic climate change becoming an issue of increasing severity, the lack of freshwater is only exacerbated, resulting in impacts like more frequent and longer droughts. Changes in water consumption must be implemented to prolong our water supply for future generations.

Utilizing non-potable water, or water that cannot be consumed by humans, but can be used for other purposes, such as agriculture, is a way to potentially evade this issue. Through treatment methods, such as chlorination and UV radiation, wastewater can be recycled and used for agricultural purposes, conserving freshwater supplies.

Post treatment, non-potable water has been shown to contain nitrogenous compounds similar to those found in fertilizer. Based on this, we therefore hypothesize that growing plants in non-potable water will produce similar results as to growing them in freshwater with added fertilizer. We will grow rice plants with three different types of water (reverse osmosis fresh water, non-potable water, and freshwater plus fertilizer), to see if the non-potable water does, in fact, help growth and to what degree. By using non-potable water as opposed to freshwater, it is possible to not only reduce water consumption, but to also reduce fertilizer usage.

While there are viable options to reduce our water usage, their implementation is still limited. There need to be both political and social changes to educate, and only then will it be possible to substantially decrease the amount of freshwater utilized for agricultural purposes.
Soilless and high-efficiency growing systems are going to be a necessity in the future, with the threat of climate change and our ever-growing world population each posing problems to agriculture. Conventional agriculture has grave environmental consequences, as its practices contribute to loss of sequestered carbon, soil degradation, environmental pollution, and loss of forested land cover. The growth of global stressors on agriculture, in the forms of drought and land degradation, have made it evident that a cultivation solution is needed. This research will aim to scientifically determine which vertical system (aquaponics vs. hydroponics) makes for a more efficient alternative to conventional farming. The factors to be tested and compared include total water use, nutrient requirements and output, waste water, energy requirements, plant performance, and economic factors. This research is expected to find the combination of hydroponics and aquaponics as a viable and promising solution to the common problems associated with traditional farming. In this research we will ask the following questions: (1) How can vertical farming reduce use of natural resources? (2) What would be more cost effective, Hydroponics versus Aquaponics? (3) What will the impact be on cost and reduction of transport and emissions?
There is a strong symbiosis between grape plants and the bacteria and yeasts that live in vineyard soil and on grapes. These microorganisms make up a grape plant’s microbiome; an important factor in the health of the plant and quality of the final wine product. The microbiomes of traditional grape varieties have been thoroughly studied, however, little to no research has focused on cold climate grapes. The recent successful breeding of cold climate grapes has generated a surge in the wine production industry using these new cultivars. Therefore, discovery and categorization of these yeast and bacterial species is essential to wine quality and will guide future sustainable farming practices pertaining to cold climate grapes. The Eastern US is a center of biodiversity for grapes and we expect a parallel biodiversity in co-evolved microorganisms. This project sets out to determine (through DNA Sequencing) the species of yeast and bacteria that make up the microbiomes in the soil around the root system and on leaves and berries of grapes. By using grapes native to the area and in the established vineyards of Northeastern America we hope to answer two questions: (1) whether the biodiversity of microbiomes parallels the biodiversity of native grape species and (2) what is the effect of agricultural practices on native microbiomes.
Herbicide residues can remain in agricultural soil long after they are applied, resulting in unintended damage to crops not specifically targeted by the herbicide. Farmers transitioning from herbicide use as their main weed management on their no-till systems to organic no-till management systems may have herbicide residues in their soil from previous herbicide application; biochar is a method farmers can use to effectively manage the herbicide residues present in their soil.

Our proposal serves to evaluate different application methods for the remediation of organic pollutants (herbicides) in farms making the shift toward organic production. Our aim is to compare broadcast application with subsurface banding, their effectiveness in removal of herbicides from availability in the soil aqueous system, to determine if there is a superior method. We seek to accomplish this by measuring levels of select herbicide residues in the soil over time, compare levels, and assess their effectiveness. Herbicide mobility could also be studied to see whether subsurface biochar applications could potentially draw contaminants away from the soil surface. Finding a successful method for the transition from herbicide usage to more organic farming will enable farmers to enact healthier farming practices which in turn will greatly improve the environment.
With the rising rate of unpredictable climate change, maintaining a sustainable agriculture depends on the availability of genetically diverse cultivars. The traditional European grapes (e.g. Pinot Noir) are cultivars of a single species. In contrast, emerging grape cultivars (European-American hybrids) take advantage of the tremendous genetic diversity of the native American grape species (about 30 species). The traditional European grape varieties have little cold hardiness. In contrast, little is known regarding the effect of large fluctuations of temperatures on emerging hybrids but the hybrids appear to show potential. Hybrids might lose hardiness (de-acclimate) earlier than other varieties with the increased mean temperatures in the winter due to climate change. The response of these hybrids to new warm weather patterns are complex and need to be understood. It is critical to identify varieties that are predisposed to early de-acclimation and therefore more susceptible to early spring frost.

We will sample various cold hardy grape varieties from various vineyards across New England in the late winter at regular times. We will analyze the percentage survival of the buds at these different times and expose them to regularly decreasing temperatures below zero in order to quantify the temperature at which half the buds are able to survive and quantify deacclimation.
Agricultural high schools in Massachusetts do not provide as much sustainability studies in their curriculum that is needed to tackle issues in our changing world. None of them have programs that teach how to grow food, despite this being the basis of agriculture and a basic human need. Currently, the curriculum in the agricultural high schools is primarily based on conventional practices. These methods have often been found to be environmentally detrimental. Industrial agriculture is the leading driver of climate change, even more so than energy and fuel consumption. Incorporating Permaculture classes into these high schools will pose as an alternative because it goes beyond sustainability and is a regenerative approach to producing food. Permaculture is the conscious design and maintenance of agriculturally productive systems which have the diversity, stability, and resilience of natural ecosystems. Permaculture is the integration of growing food and building community. The curriculum is hands on with a discussion based component, and accommodates a variety of learning styles. Permaculture will provide students with useful skills that can be applied to their everyday life, as well as a potential career path. This curriculum will provide as a resource to the schools to create a new class to expand the already existing plant science programs. Students will learn the basic principles and ethics as well as how to design landscapes using permaculture. Adding this curriculum to the programs will help the schools be pioneers in an ever-progressing field.
The dairy industry in Massachusetts is critical to the Commonwealth’s agricultural economy, yet it faces many challenges; the most important of which being the high cost of production and the low Federal Milk Marketing Order (FMMO) price that farm businesses receive. As a result, farmers are forced to rethink financial sustainability, and make changes to the way that they approach environmental health for a better future. Sustainability is a controversial subject for many conventional farmers who see eco-regulations as a threat to economic viability. Through producer interviews, articles, and anecdotal evidence, it becomes clear that Massachusetts dairy farms are moving towards the shared goals of economic and environmental sustainability. To cope with low milk prices, many farms lease land, sell “cash crops” like squash and tobacco, and produce compost. Many develop custom harvest or custom application businesses to monetize already existing infrastructure and equipment. From an environmental perspective, practices such as the use of methane digesters, solar panels, and no-till fields are becoming increasingly popular. Farms follow state and federal nutrient management regulations help sequester carbon and allow the nitrogen cycle to properly function. These steps are only some of the many ways that dairy farmers in Massachusetts are making steps to increase long-term financial and environmental sustainability. Overall, farmers are making the most of a challenging situation and striving to make their farms, communities, and planet as healthy as possible.
In a time when women and more explicitly women’s bodies are being put on the forefront of debate, it is beneficial to turn back to age old herbalist remedies and solutions for everyday health issues and the prevention and treatment of disease. The field of herbalism is often overlooked by modern western medicine despite centuries old traditions and modern practices built upon the foundation of this knowledge of plant medicine. Using herbs not only provides a holistic lens through which to view the body and the connection between symptoms and illnesses, but there are also little if any side effects, especially when compared to western pharmaceuticals. This project will examine the mysticism and misconceptions surrounding herbalism and women’s health. Using data from interviews with local herbalists and doulas about their experiences treating women, this project will explore and offer suggestions for herbs and remedies every woman should know to allow them to make informed decisions regarding personal health.
The Pioneer Valley is a hub for agroecology and innovative projects in sustainability. The Stockbridge School of Agriculture provides students with innovative, cutting-edge resources to succeed in agricultural fields through a breadth of courses and experiences offered. However, many of the students in Stockbridge are disconnected from the greater Pioneer Valley community. Fostering stronger connections between Stockbridge students and the community through service learning projects serves two mutually beneficial purposes. The first is to offer services to those who need access to information, lacking the resources or time to obtain it themselves. The second is an experiential learning opportunity, mostly absent in classroom settings. This project will examine benefits of education through service by using a student studying permaculture and assisting the start-up of a large-scale permaculture garden as a case study. This project will further research through conversations around volunteering, motivations in engaging in community service, and education using a framework of emergence. Nick Obolensky said in *Complex Adaptive Leadership*, “Emergence is the way complex systems and patterns arise out of a multiplicity of relatively simple interactions.” Using a strategy of emergence in conversation will allow for authentic and relevant suggestions to arise from potential participants in this work. The information that surfaces in these conversations will be synthesized to create an organizational relationship between The Stockbridge School of Agriculture and the Civic Engagement & Service Learning program. This will work to further connect students and community members to engage in meaningful work together.
Food security is being challenged on a local, national, and global level as agricultural systems struggle to feed a growing population. Reliance on a largely unsustainable global food system creates vulnerabilities within communities everywhere. Localized food systems can have a profound impact on community health, as well as build resilience and a strong sense of food sovereignty. Urban gardens, backyard homesteads, and social enterprise farms are gaining attention in the U.S., and may serve as part of the solution to instilling more food system control in communities. The purpose of this study is to survey solutions that foster food sovereignty on a community level, and those that work to dismantle oppressive, unsustainable systems that govern the collective need to eat. Through interviews with existing operations, this project develops accessible action steps that individuals can utilize in local communities to establish food sovereignty. This study hypothesizes that there are numerous benefits to homesteading and community-oriented food systems, and that significant improvements can be made to increase food accessibility in the U.S. through these techniques. Additionally, this study aims to provide viable examples of individuals and organizations positively intervening in the food system to create systems change.
Value-added production for blueberries helps to reduce product lost, extend the season and increase revenue. However, the necessary product development to produce commercial scaled food, such as blueberry jam require careful considerations for food safety, food quality and regulatory compliance. This project aimed at converting a household blueberry jam recipe (from Ball Book canning) into a small-scale commercial product formula to help provide technical support for value-added production for blueberries. The development measured a variety of physicochemical characteristics including water activity (Aw), pH, degree brix, color and viscosity. Significant product development challenges were discovered during the scale up conversion process when industrial pectin sources were introduced into the formula. Additional experimentation were conducted to compare product quality and gelling functionality of high methoxyl pectin (household pectin) against an amidated low ester pectin (industrial pectin).

Results showed that industrial pectin requires a significantly less usage level and reduced sugar to maintain the same product quality of the original household recipe. Further research will conduct experiments to optimize the sugar and amidated low ester pectin in blueberry jam to deliver a high quality blueberry jam. This work will help to provide a product formula, scheduled processes, product costs and standard operating costs in order to help enable value-added production for blueberries.
Horticultural activities, like gardening, have provided therapeutic benefits to humans throughout history. In particular, children with various cognitive and physical disabilities have been shown to positively respond to horticultural therapy: the implementation of plant-based activities, guided by a therapist, to reach certain mental and physiological health goals. Since becoming popularized in the United States in the mid-twentieth century, studies have proven the various benefits of horticultural therapy for a variety of people, such as war veterans experiencing PTSD, senior citizens suffering from Alzheimer's disease, and children with autism spectrum disorder. Simply being exposed to plants on a regular basis has been shown to improve memory, cognitive abilities, socialization, language skills, muscular strength, coordination, balance, and endurance. For children in special education programs, these skills are highly crucial for development. School systems in the United States provide varying amounts of support for these students, and the implementation of garden-based curricula can be invaluable. Gardens in schools act as inclusive learning environments that allow students to grow emotionally as well as academically. Sources from the Five College Library Database, anecdotal evidence, and the Journal of Therapeutic Horticulture provide data regarding the benefits of horticultural activities to children with special needs. This material is used to suggest methods and ideas for the application of therapeutic horticultural activities in special education programs.
One out of three college students in the U.S. has reported an overwhelming feeling of anxiety or depression due to stress in 2017. Not only is depression a major problem caused by stress but also people living in northern latitudes showed a 30% increase in Seasonal Affective Disorder (SAD) due to shortened daylight hours. College students who are allowed regular access to greenhouses are given the opportunity to develop healthy coping mechanisms. Investigating previous case studies and conducting a new study with a group of students from the University of Massachusetts will find a direct correlation between decreased depression and anxiety and students having regular access to greenhouses. Students will work in a greenhouse on campus for one hour a week and report their stress levels and qualitative self-observations. This study of the direct correlation between greenhouse exposure and increased mental health among college students aims to popularize greenhouse spaces and give students another resource to improve mental health and happiness.
Food is irrefutably essential for human survival. Nevertheless, 41.2 million people in the United States live in food-insecure households. In order to overcome this alarming problem, the USDA has been fostering projects to evaluate how to create greater access to fresh fruits, vegetables, and other nutritious foods. The Healthy Incentives Pilot (HIP) was designed to promote healthy eating by matching purchases, dollar for dollar, on fruits and vegetables made through SNAP (Supplemental Nutrition Program). Just Roots, a non-profit organization in Greenfield, Massachusetts whose mission is to “increase access to healthy local food by connecting people, resources, land, and know-how” has been taking HIP even further. They have designed a research study using their well-established CSA (Community Supported Agriculture) program to track the health benefits of low-income community members when given access to farm fresh-food weekly. With the anticipation of results showing improved health outcomes, this data could be used to encourage insurance companies to fund participation in CSA programs. This research will highlight the connections between making food more accessible within USDA programs and creating practical relationships with food for community wellness and resilience. Through interviews and surveys, data will provide optimal ways to intervene in the food system in order to combat food injustice and address the significance of fresh healthy food for all.
From Waste to Soil: Bringing Composting Worms into the Household

Food waste and other compostable materials often have nowhere to go in the urban and peri-urban environment. As they are tossed in with the other garbage, they enter the waste stream and landfills. Traditionally seen as an unavoidable and necessary evil, what if this and other carbon and nitrogen-based organic matter could be diverted from this common and tragic ending and could instead become abundantly rich soil? With household worm composting systems we can divert waste and create soil in a simple, savvy, and satisfying fashion. Using both research and working examples, this study aims to explore how composting worms can be integrated into an average household. This research will include basic care of composting worms and what can be expected from having a small system in one’s home. The results of this investigation are expected to find worm composting as a viable and promising solution to the problems of household organic matter waste. With this simple adaptation, families and individuals will be able to turn waste into soil.
A Brewer’s Guide to Recycling Spent Grain

Spent grain is what remains of malt after the fermentation process turns the sugars into alcohol. It is the largest byproduct of brewing beer and contributes to nearly 80% of waste produced. This waste product cannot be recycled back into the brewing process but can be reused in a multitude of other ways. One of the most common ways breweries reduce this waste is by donating their spent grain to local farms for agricultural uses. Farmers are often unable to accept small, inconsistent donations of spent grain from small craft breweries so the option of recycling it into human food products has become attractive. Bakers are able use the recycled grain for a wide array of products from pizza dough to dog treats. Research has shown some nutritional advantages to consuming products made with spent grain rather than unfermented grains that are traditionally used. This research project will examine what ways breweries can responsibly handle waste and serve as a guide to brewers seeking to make beer sustainably.
Food insecurity is characterized by the inability to access a sufficient amount of nutritious and affordable food (feedingamerica.org). As shocking as it may be, the United States Department of Agriculture estimates that, as of 2016, 12.3 percent of households in the United States experience food insecurity. When it comes to the question of who exactly experiences food insecurity, recent research has discovered that African Americans are disproportionately affected; roughly one in four African American households are currently classified as food insecure, as opposed to one in ten Caucasian households. This project examines the deep social rift in the food system through the lens of racial injustice. Through collaboration with a local community organization and extensive research examining food deserts, the history of relationships between African Americans and agriculture, and the intersectionality of oppressive forces, this project draws connections between food justice and larger themes of social justice. This research will raise awareness about the pervasiveness of food insecurity and provide an educational platform on which to build conversations surrounding issues of racial equity within the food system.
American Agricultural Policy: Who Is It Serving?

Agriculture is America’s oldest, and arguably, most important industry. Being the sole force that feeds, clothes and produces manufacturing materials, farmers give a great service to their country. This project draws attention to policies like Massachusetts’ Question 3, corporate tax cuts, government subsidies and the Farm Bill, most of which prioritize economic-based policy over constituent-based policy. Research of historical policy, starting with the policies that emerged as a result of the Dust Bowl, to modern policies like the Food Bill, will be used to investigate the intended and actual beneficiaries of such policies. In focusing on both the transparency of the present policies, and also the intentions of the officials creating these policies, this project will explore the true interests of our governing officials, with the end goal of encouraging, reforming, and create policies that more adequately represent and benefit farmers.
In the United States, there are over twenty million people who do not have easy access to fresh fruits and vegetables. The areas these people live in are referred to as “Food Deserts”. Food Deserts are defined as an area where at least 33 percent of the population of that community lives more than 1 mile from a supermarket or large grocery store. These communities are commonly low-income, many of the members have no access to a vehicle, and public transportation is unreliable. Without access to these fresh ingredients, compounded by the low-income level, people often turn to cheap, sugary, and heavily processed foods. These alternatives can result in poor health and a shorter than average life-expectancy. Citizens of the same country should not have a harder time accessing fresh, real ingredients than any other citizen. This project will examine current methods for solving the problems of food deserts with an emphasis placed on using urban agriculture. The main method examined will involve finding abandoned or condemned lots in the communities, purchasing them from the city and teaching the community to farm the lot and grow fresh fruits and vegetables. This method will be compared to other implemented methods to determine the most feasible and effective method. This study will show that every American, regardless of income-level or place of residence, can have access to fresh fruits and vegetables with ease.
It is important for individuals of color to see themselves represented in entertainment, whether it be theater, film, or television. Research has found expressions of unequal power in media can be very damaging to viewers. George Gerbner coined the term “symbolic annihilation”, which points to the ways in which poor treatment can contribute to social dis-empowerment and in which symbolic absence can erase groups and individuals from public consciousness. Mainstream theater organizations have continuously struggled with including people of color in their narratives. In the 19th century, minstrelsy was a form of popular entertainment that did not allow black individuals to perform in visible mainstream channels. Black artists felt the need to combat the problematic images of black identity presented by white minstrel performers as primitive, unintelligent, and overly sensual. Through the use of black acting methods, my production of Ntozake Shange’s choreopoem, titled *spell # 7: geechee jibara quik magic trance manual for technologically stressed third world people*, will critique the practice of minstrelsy. Shange’s characters all struggle to examine and reconcile their identities, as an eclectic company of performers, who are all people of color. A choreopoem resists the rationality and empiricism of the well-made play, and the colonizer’s aesthetic. The characters reject the notion of symbolic annihilation, forcing the audience to recognize them. Developing multicultural theater methods can allow those who feel marginalized or unheard to create narratives of their own through movement and voice, and tackle the archaic stereotypes about black artists that still pervade society today.
This presentation, “The Dark Art of Marvel Netflix Series,” compares the title sequences of Luke Cage, Jessica Jones, and Daredevil, from the Netflix Marvel series. It examines the importance of these title sequences through theatrical elements of lighting and sound. These three shows possess fast-paced opening sequences that deviate from methods employed by other modern shows and films. I come to the conclusion that the title sequences present a gritty reality that separates the underlying dirty realism of the Netflix Marvel Universe series from the light-hearted, mass-produced commercial Marvel Universe films.
My project focuses on analysis and research into the role of Irina Nikolayevna Arkadina in Worcester State University's Fall 2017 production of Anton Chekhov's classic play, *The Seagull*. I explore ways in which my apprenticeship with Commonwealth Shakespeare Company in the summer of 2017 informed my interpretation of the character and established the connection between Hamlet's Queen Gertrude and Chekhov's development of Arkadina.

My research draws largely from the systems developed by Konstantin Stanislavski and his followers such as Stella Adler, Sanford Meisner, and Lee Strasberg. The grandiosity of Chekhov's primary leading woman led me to the insights of actress and theatre practitioner Uta Hagen and biographical investigations into luminary actresses such as Olga Knipper and Sarah Bernhardt. My capstone was enriched by participating in the creative development of Arkadina's costumes and aesthetic, drawing upon my previous work as a costume designer.

The challenge of an actor who works with Stanislavski's system is to understand the identity and perception of the life of the stage, and the details within the script serve as vital clues for us on our journey to learning who that character is. My work looks at the dramaturgical research and creative decisions I made while shaping Arkadina's character, and how those elements impacted her emotional world.
The play is geared towards children and how their imagination works. This Capstone examines a relationship between a post on a street corner that during the play speaks and interacts with a lost little girl. The premise of this play is that children shouldn’t be discouraged about how they perceive the world around them. Perception is key when it comes to looking at the world through a child’s eyes. The world is a scary place, but we can encourage children to use their imagination to allay some of their worst fears. They become less afraid of the world because they feel as if they have control over what they see. Children have active imaginations that seem to get lost in the hustle and bustle of the world of adults. The play also teaches a lesson on what to do when you misplace the grown up you are with. For instance, children and caregivers should have an agreed-upon safe place to meet should they become separated. The message of this play is that everyone needs a companion, even if it is a post on a street corner in a busy city. Engaging young people in the arts has a positive impact on their cognitive, emotional and social development, and furthers a lifelong appreciation of the arts. Theater can not only teach empathy but it can also teach how to handle conflict.
The sciences are often thought of as cold and precise. Something similar can be said about how scientists themselves are perceived. This script delves into the more human aspects of science. It takes place in a series of monologues following the work of three biologists who have changed the way we see the world: Charles Darwin, Gregor Mendel, and Alexander Fleming. The script is broken down into three acts. Each act, titled Observation, Discovery, and Conclusions, is a generalized step in the scientific method. In each act, the observations, discoveries, and conclusions of the three scientists are explored. The monologues of the scientists create a moment, or a series of moments in the scientists' personal journeys. These moments will be fictional with episodes of real research integrated into the story. The pains and joys of research are no longer a mystery to the non-scientists of the world. Long-passed scientists will come alive again in Bio Reminiscence.
This project examines biography and autobiography as it relates to contemporary dance, as well as how a collegiate audience responds to it. It asks what the elements of an autobiographical dance are, especially when choreographing with a contemporary technique vernacular, and then proceeds to question which of these elements resonates the strongest with a college-age audience. The research was initially conducted with a literature review of artists of all mediums in order to pinpoint common elements in art that have been identified by scholars as either biographical or autobiographical. This information was brought into the creative lab, where a 20-minute dance for five performers was constructed over the course of five months that highlighted recent life events of the choreographer/researcher. This dance was presented in two formal performances on February 22nd and 23rd and audience members completed digital post-show surveys that utilized the Liz Lerman Critical Response Process to gauge what elements of the dance connected with them. By gaining firsthand feedback from a younger audience, this research gives choreographers who are interested in making work about the young human experience insight into what methods provide the intended effect for the audience to whom they are presenting. Having this understanding will be particularly beneficial to the choreographer/researcher, who is pursuing further creative endeavors of this genre. The results of this research will expand the dance community’s understanding of a previously under-investigated audience group.
Exploring Protein Kinase C Theta V3 Domain Functions in Jurkat Leukemia T Cells

T cell Acute Lymphoblastic Leukemia (T-ALL) is a hematological malignancy that arises from the malignant transformation and clonal expansion of T cell precursors. T cells are important mediators of the adaptive immune response. T cells are activated by antigens and further differentiate into various effector subsets. Protein Kinase C theta (PKC\texttheta) is the predominant isoform of the Protein Kinase C family of kinases expressed in T cells. PKC\texttheta has been shown by our lab and others to have a crucial role in T cell activation. The V3 domain of PKC\texttheta has been shown to be important for its recruitment to the plasma membrane during T cell activation. The objective of this project was to examine how the V3 Domain of PKC\texttheta affects its localization in leukemic T cells. Preliminary data from our lab shows that Jurkat leukemic T cells redirect PKC\texttheta from the nucleus to the cytosol within 4 hours of stimulation, and begin to undergo cellular death. Using a small molecule inhibitor to block V3 domain-protein interactions of PKC\texttheta in Jurkat T cells, we observed high levels of nuclear PKC\texttheta and decreased cell death. Based on these results, we hypothesized that the V3 domain of PKC\texttheta may also function as a nuclear export signal in T cells, to mediate nuclear-cytosolic shuttling. We utilized flow cytometry and imaging flow cytometry to characterize V3 domain functional requirements in PKC\texttheta cellular localization. Our data suggest that the V3 domain of PKC\texttheta may be important for its nuclear residence in leukemic T cells.
On γδ T lymphocytes (T cells), WC1 molecules act as co-receptors that bind to infectious pathogens and function as pattern recognition receptors. These cells are important in mediating an immune response against bacterial pathogens such as *Leptospira* and *Mycobacterium bovis* in cattle. The goal of this study was to extend our understanding of this gene family to small ruminant species by collecting supporting cDNA evidence to confirm the current and recent caprine genome annotation obtained using PacBio sequencing methods. A series of steps were performed to isolate and sequence mRNA transcripts specific for WC1 SRCR domains, their linkers, and intracytoplasmic tails. From Boer goat blood, peripheral blood mononuclear cells (PBMCs) were isolated and subjected to RNA isolation and reverse transcriptase reactions to obtain pure cDNA material from the lymphocytes. The cDNA was amplified with goat-specific WC1 primers in a standard polymerase chain reaction (PCR) and excised from an agarose gel after running a gel electrophoresis. This band was then ligated using a TOPO cloning kit and transformed into E. coli bacterial cells. The resulting plasmids were grown on LB Kanamycin agar plates, further inoculated, and 88 total plasmids containing WC1 cDNA were sent out for sequencing. From the 88 plasmids, only five were further sequenced to obtain full-length sequences, since the others did not contain cDNA corresponding to full-length transcripts. Analyzing the data, it was discovered that within the PacBio San Clemente caprine genome sequencing, there were errors in its assembly based off the cDNA evidence acquired. The PacBio genes were either missing SRCR domains or had a different type of intracytoplasmic tail. Based on these results, further research must be conducted to challenge the structural accuracy of PacBio caprine genome assembly of WC1 molecules. The Baldwin Lab is in the process of sending cDNA produced in-lab for outsourced PacBio sequencing. These results will help us analyze and confirm the accurate goat genome structure of the WC1 co-receptor.
Cells known as gamma delta T lymphocytes or T cells are a type of white blood cell that are important for protecting against infectious diseases including bacteria and viruses as well as parasites. Sheep and other ruminants such as goats and cattle as well as pigs have a large proportion of specialized receptors known as WC1 molecules on their γδ T cells. While we have defined these molecules and the gene family that codes for them in cattle, we know much less about them in sheep and do not have the full length sequences of their expressed genes nor do we know the number of genes in this multigenic array. We must rely on cDNA evidence to sequence these genes because there is currently no reference genome available for sheep that has this portion assembled. To do this, a PCR reaction is done with cDNA for the full length transcript and then subsequent observation on an agarose gel. The excised whole amplicon of adequate size of ~4400 nucleotides will be sent in for PacBio sequencing that has a high throughput and can sequence up to 60,000 bp from one DNA or cDNA molecule. Thus far, a single full length ovine WC1 expressed gene with a Type II intracytoplasmic tail and fourth partial full length WC1 genes have been sequenced from cDNA using high fidelity Sanger sequencing. Sequencing and assembling the repertoire of WC1 molecules will be useful for developing next generation vaccines that engage γδ T cells and reduce common diseases in livestock.
Placental mammals have a developed anterior/posterior (AP) axis prior to the early post-implantation stages. However, the precise timing and mechanism of axis formation and determination remains unknown. In the mouse, the anterior visceral endoderm (AVE), the first morphologically visible embryonic structure marking the anterior side, is present by embryonic 6.0 dpc (days post coitum). The AVE is significant in the eventual development of bilateral symmetry in the embryo. Embryos are collected within decidual tissue, and the orientation of the AP axis within the embryo is observed after fixation, sectioning, staining, and imaging to allow for visualization of each embryo. By this use of histological analysis of embryos in decidua during early stages of gastrulation, we will determine if all embryos have a particular orientation relative to the ovary-uterine axis of the mother. If embryos are observed to possess an alignment within the uterine tissue, this information can be used to work backwards towards identification of the mechanisms that determine axis formation. Here, I will present preliminary results and future directions of this project.
The research focuses on the collaboration, application and validation of prevention and intervention programs on Gender Based Violence (GBV) in Buenaventura, Colombia. The objectives of this study were to: a) Learn what grassroots organizations are doing to address GBV prevention, in “semi post-conflict areas”; b) Explore and understand the ongoing collaboration between grassroots organizations and possible outside resources, without interference, or hierarchical power dynamics; c) Explore the role of women’s empowerment and feminism for GBV prevention. This research will help organizations highlight their work to prevent and break the circles of GBV, as well as ways in which activists break the culture of silences. The analysis will provide indicators that can be used in other investigations interested in collaborating with grassroots organizations, for example, by understanding the deconstruction of masculinities in Colombia. We used a participatory observation approach as well as interviews with the organization "Red Mariposa", and observed their work with women in workshops. We presented the model of "Strong Women Strong Girls" program, in Boston at three different workshops, in two different locations. The research will present findings from two Non Governmental Organizations (NGOs) in Colombia and we will present an overview of each GBV intervention program. We will examine the dynamics of gender relations and the women activists desire to promote social change and achieve gender equality.

Critical consciousness, deconstruction of masculinity, empowerment and poly-victimizations are key terms.
Fashion is the primary framework in which individuals can read and understand one another at first glance. Over time, as women became more comfortable in their role in society, their fashion followed suit. Using academic research accessed through database articles, this presentation explores how women and their fashion have evolved from the 1920s to present day. World War I started the evolution of the modern day woman. Starting in the 1920s, women started to gain a voice in society and the suffrage movement was building rapidly. During this period known as the "Age of Prohibition," a new type of woman emerged known as the "flapper," sporting more skin, makeup, and short hair. After the World Wars, society was tired of restrictions on clothing and people wanted to wear more expressive things. Fashion magazines began to promote the latest trends and department stores supplied them. In the 1940s, French designer Christian Dior created the "new look" for women, emphasizing natural female curves. Domesticity and feminity were key to a successful woman in the 1950s. Women wore wasp waists, voluminous skirts during the day, and by night, women wore clingy sequined dresses and pearls. Unlike the rest of the decades following the 1950s, the 2000s had a mixed bag of redefined fashion trends from past decades. Today, fashion is highly influenced by influencers online and on the red carpet, leading to hundreds of different styles and trends.
In our current culture, the term feminist has become controversial and divisive. Less than 15% of women currently identify themselves as a feminist. Since the term feminist has been used to further the rights for women, how then has it become so controversial?

Feminism has failed to be inclusive of all women. If a woman believes in equality for women but disagrees in any area of today’s feminist ideology, she is told that she cannot consider herself to be a feminist. If we are continually dividing ourselves, our strength is reduced. We have also seen this divisiveness result in less respect, tolerance and kindness among women.

To solve the problem of division, we must look beyond the divisive issues, both large and small, and identify and focus on common areas in order to make progress. This can be accomplished, in part, through field study and analytical models.

Expectations are to demonstrate areas where women can feel included based upon discovered areas of similarity instead of continually focusing on differences.
Surfactant Incorporated Polyelectrolyte-Micelle Systems: A Fundamental Investigation

Coacervates are a dense, polyelectrolyte-rich liquid resulting from the electrostatic complexation of oppositely-charged macro-ions. The phase behavior and interactions of polymer-polymer and polymer-mixed micelle systems have been studied extensively. In contrast, however, there is limited understanding with regards to polymer-micelle systems and the presence of a single type surfactant. Hence, we describe turbidimetry, coupled with optical microscopy, to characterize the phase behavior of complexes between the cationic polymer poly-(diallyldimethylammonium chloride) (PDADMAC) with the anionic surfactant Texapon as a function of the polymer-surfactant ratio and salt concentration. Preliminary data suggest that the high charge density of Texapon micelles prevents the formation of charge-neutral complexes with PDADMAC. Indeed, fundamental study of the PDADMAC-Texapon system can lead to extrapolations of novel potentiations in coacervate-surfactant applications in food science and biomedicine.

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28.0% of Americans, or 80.2 million people, aged six and older are physically inactive. Physical inactivity is a risk factor correlated with cardiovascular disease, diabetes mellitus, cancer, obesity, joint disease, and depression. Increasing evidence has shown an opportunity to control this modifiable risk factor through urban design. Parks within one kilometer of participants homes also resulted in increased physical activity. An increase in trees and cities has also shown a correlation with improved health outcomes, including lower obesity rates and better social cohesion. Although residents in urban areas benefit from easier access to health care and education compared to rural counterparts, the sedentary lifestyle and lack of green space act as constant threats to physical health. This research seeks to examine the connection between accessibility to parks and green spaces and physical activity outcomes in adult urban populations. Scientific articles from EBSCO Host, PubMed, and ScienceDirect will be used to gather data. We hypothesize a positive correlation between green space availability and overall physical activity. Further research should examine the effectiveness of organized intervention programs in green spaces that promote physical activity. This research provides a compelling argument for policy makers to fund initiatives that preserve and implement cost-effective parks in cities as a means of promoting physical activity.