

***Welcome to our 4<sup>th</sup> Annual 2019 Spring CURCA Celebration!***

It is an honor to host an event that highlights the great work and dedication of so many students and their mentors. Over 300 undergraduate students representing disciplines from three Colleges will be sharing their diverse and engaging work. All students have explored the process, research, outcomes, and application of their knowledge and creativity to real-world issues. Their accomplishments are remarkable and worthy of celebration.

This Spring, we proudly showcase over 210 posters, oral presentations, the art exhibit in the Arno Maris Art Gallery, wall of words, poetry readings, and spotlight Westfield-focused projects. Our ceremony is enriched with the theatrical talents of our students performing songs from “Next To Normal”. Our Music Majors Elizabeth Gelinis will perform “The Valley” for five percussionists and digital looper Movement III: Morning Song and Robert Rodrigues will perform “Silenced Cries (No One is Listening)” for percussion ensemble. As the Director, I am amazed and humbled by the talents of our students, faculty, and staff. I am honored to support and showcase their research and creative works.

***Acknowledgements***

There are so many people to thank in helping to make this event a success. First and foremost, thank you to all of the students and their mentors who’ve worked tirelessly on their projects and presentations. Thank you to the invaluable efforts, dedication, and support of the CURCA committee advisory board! Thank you to Diane Savino, our CURCA Assistant, for her artistic ideas and designs, our undergraduate interns, Melissa Deroo (Art) for graphic art designs, Thomas Howard (History) for social media, and Kendall MacLeod (English) for editorial content and event planning. Special thanks to Professor Catherine Savini for offering abstract writing workshops and Ryan Cramton and his Copy Center staff for their amazing ability to produce excellent work on short notice. Thank you also to Facilities and Operations staff for setting up the Celebration space, the Catering staff, Chris Hirtle and his staff in Media Services, Mark Villani for preparing the Black Box Theater, Informational Technology, and Janet Garcia, David Friedman, and Greg Sanocki of the marketing department for all of their help. Lastly, thank you faculty, staff, and student volunteers for helping to make today’s Celebration run as smoothly as possible.

Thank you all!



Lamis Jarvinen, Ph.D.  
Director, Center for Undergraduate Research and Creative Activity

## ***Spring 2019 CURCA Celebration Program***

<b>12:00 – 1:00 pm</b>	<b>Registrations &amp; Poster Setup</b>	<b>Ely 1<sup>st</sup> Floor Lobby</b>
<b>1:00 – 1:45 pm</b>	<b>Welcome &amp; Opening Ceremony</b>  <b>Provost, Dr. Diane Prusank</b> <b>Professor, Dr. Robin White</b> <b>CURCA Director, Dr. Lamis Jarvinen</b>  <b>Elizabeth Gelinis – Musical Performance</b> <b>Robert Rodrigues – Musical Performance</b> <b>Theater Work – <i>Next To Normal</i></b>	<b>Black Box Theater</b> <b>(Ely 2<sup>nd</sup> Floor)</b>
<b>1:45 – 2:45 pm</b>	<b>Poster Presentations (Odd #s Present)</b> <b>Oral Presentations</b> <b>Wall of Words Group I</b> <b>Poetry Readings Group I</b>	<b>Ely 1<sup>st</sup> &amp; CURCA</b> <b>Arno Maris Gallery</b> <b>Ely 2<sup>nd</sup> Floor Lobby</b> <b>Black Box Theater</b>
<b>2:45 – 3:00 pm</b>	<b>Intermission &amp; Change in Posters</b>	
<b>3:00 – 4:00 pm</b>	<b>Poster Presentations (Even #s Present)</b> <b>Wall of Words Group II</b> <b>Poetry Readings Group II</b> <b>Student Art Exhibit</b>	<b>Ely 1<sup>st</sup> &amp; CURCA</b> <b>Ely 2<sup>nd</sup> Floor Lobby</b> <b>Black Box Theater</b> <b>Arno Maris Gallery</b>
<b>4:00 pm</b>	<b>Raffle Prize Drawing</b>	

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***\* Following Poster #, Denotes Westfield-focused projects***

## ***Schedule of Oral Presentations***

### **Session I (1:45-2:45 p.m.) Arno Maris Gallery**

- 1:45 – 2:00 p.m.**      **Emmet Kevaney (English – Dr. Catherine Savini):** The College Drinking Culture: What, Why, and How
- 2:00 – 2:15 p.m.**      **Marcus Payne (Biology – Dr. Robin White):** A Ketogenic Diet Leads to a Decline in Bran Cancer Cell Death
- 2:15 – 2:30 p.m.**      **Elijuan Diaz (TRIO – Marjorie Rodriguez):** Spanish, Estados Unidos or United States of America: Bilingual Education for Our Future Society
- 2:30 – 2:45 p.m.**      **Carolyn Adams (Movement Science – Dr. Lynn Pantusco-Hensch):** Effects TBI's Have on Developing Brains

## ***Student Summer Research Fellowship (SSuRF)***

### **2018 Inaugural Award Recipients:**

**David Kennedy (English)** *Campbells post colonialism “nation-ness” in the Hero with a Thousand Faces*, Research Advisor – English, Prof. Michael Filas

**Jarrood Petersen (Biology)** *Walking on chains: Anatomy & morphology of waling appendages of striped searobin*, Research Advisor - Prof. Dr. Jason Ramsay

### **2019 Award Recipients:**

**Austin Buckner (Biology)** *Development of a Chemotaxis Macrophage assay and Phagocytosis assay optimization*, Research Advisor - Prof. Kristen Porter

**Katherine Chapman (Psychology)** *The effects of anxiety on attention: An eye tracking task*, Research Advisor - Prof. T. Alex Daniel

**Frederick Collins (Physical & Chemical Sciences)** *Production and Enzymatic Analysis of Dihydrofolate Reductase (DHFR)* Research Advisor – Prof. Roderico Acevedo

**Glendaliz Gomez Gonzalez (Biology)** *Assembly of the chloroplast genome of a Pelargonium plant*, Research Advisor - Prof. Mao-Lung Weng

**Cameron Hamilton (Biology)** *Spontaneous Mutation in Chloroplast Genome*, Research Advisor - Prof. Mao-Lung Weng

**Thomas Howard (History)** *A dangerous road to success: Thomas Sheldon’s quest to research and finance the Westfield Canal*, Research Advisor – Prof. Erica Morin

**Avia Stanton (Biology)** *Tissue pathology differences between wildtype and NLRP12-deficient mice fed a high-fat diet*, Research Advisor – Prof. Kimberly Berman

**Rachel Tynan (Sociology)** *Creating an age-friendly initiative: Making restaurants age-inclusive*, Research Advisor – Prof. Tamara Smith

***Communication*****Legsdin, Shauna '19****117**

Faculty Sponsor, Prof. Max Saito

***The Influence of U.S. Stereotypes in Spain and Mexico on International Relations***

The goal of this research project is to identify a relationship between what type of media Spaniards and Mexicans are consuming about the United States and how they feel about, and their opinions about the United States. The current U.S. government serves as the focal point, making this research fairly relevant to current world affairs. The initial question that influenced this research has been that Spain and Mexico would think negatively of both the current U.S. president and U.S. citizens, and that the international relationships between these three countries, presented through media outlets, would be tense or weak due to the opinions held by Spaniards and Mexicans. A few communication and sociological theories or models of thinking are applied, including the theory of Encoding and Decoding, Cultural Dimensions Theory, and Hegemony. The purpose of these theories are to provide a lens, or way of looking at the information, in an attempt to answer how stereotypes are formed and influenced by the media outlets and culture's present in Spain and Mexico. A survey, distributed to Spaniards and Mexicans currently living in their respective countries, provides quantitative data to accurately identify current opinions and stereotypes of the United States. The literature review includes political and cultural history and analysis of the United States, Spain, and Mexico. Conclusions provide an insight into the international relations between the three countries. Key Words: Communication, Culture, Hegemony, International Relations, Mass Media, Society, Societal norms, and Stereotype.

**Shimizu, Ayaka '20****176**

Faculty Sponsor, Prof. Max Saito

***Cultural Discourse Analysis within the Relationship among the Government, Media and People in Belize.***

This study explores the relationship among people, media and the government in Belize and examines (1) how Belizean people talk about the government and social issues in Belize, and (2) how the government/media inform the public about national situations. Cultural discourse analysis (CuDA) is adopted to examine how the government and people communicate with each other through analyzing my personal observations, survey responses and news coverages in Belize. Questionnaires were distributed to approximately 20 Belizean people for delineating and explicating personhood prominent in Belize. Results suggest that Belizean people pay less attention to current situations in the country. Also, at the same time, it seems the government and media intentionally share less information. They indicate the government's negative attitude about information disclosure and lack of transparency. This could be problematic for promoting a healthy democracy.

## ***English***

**Almafrachi, Massara '20, Hannah Bennett '20, Sabrina Gillis '21**

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Faculty Sponsor, Prof. Brian Chen

### ***Motherhood in 3 American Poems***

Our group project examines how three American poets represent different faces of motherhood. Based on our discussion of motherhood as a major theme in ENGL215: Introduction to American Literature Honors section, we seek to argue that motherhood does not have one and only definition. Instead, the roles of a woman or a mother can reflect many different aspects that people tend to overlook. In this project, we explore the different experiences of motherhood to support this thesis. We contest any stereotypical or conventional ways of viewing motherhood/womanhood in a narrow sense. Our goal is to inform our audience that motherhood comes in different conditions and contexts, including a woman's determination to fight against injustice and domestic violence, her stamina to stand up for her rights as a woman, her unyielding willpower to battle against diseases or psychological disorders, her optimism to cope with loneliness and inferiority, and her defiance against patriarchal social norms.

**Bass, Danielle '19, Anna Szczebak '20, Katelyn Thibault '20**

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Faculty Sponsor, Prof. Vanessa Diana

### ***Beyond the Borders of WSU: Internships***

Our research will offer an in depth look into Criminal Justice, English, and Business internships in the City of Westfield. The purpose is to highlight the importance of the connection between Westfield State University and the city through internships. The two groups are very intertwined. Students receive practical and hands-on experience in the field they hope be employed in after graduation. The small businesses in town receive the assistance they need without having to spend unnecessary funds hiring other employees. By extension, these small businesses enhance the community of the City as a whole. We hope to encourage more students to participate in internships, as well as inspire more businesses to take on interns. Our research has involved interviewing various groups of people, including professors who coordinate internships, students who have completed internships, and professionals who have hired WSU interns. The perspectives of students, faculty, business professionals will all be incorporated. We created a list of questions to ask these groups and communicated with them via email, phone calls, and in-person interviews. In this presentation we will include an overview of our findings, statistics, photos of interns in action, and quotes from students who have completed internships.

**Biseinere, Gabrielle '21, Tanner Deegan '20**

**17\***

Faculty Sponsor, Prof. Vanessa Diana

### ***Gaining Perspective: Engagement in the Westfield Community Through STEM***

S.T.E.M. students, students involved in science, technology, engineering, and/or mathematics, are involved in the Westfield community through clubs, honors societies, internships, and other organizations. More specifically, biology students play an active role in community engagement and service that may not be immediately apparent. We addressed this topic through personal interactions with faculty, community members, and campus groups that helped us to gauge this involvement. For example, the Biology Club is involved in educational events with the Amelia Park Children's Museum as well as the Boys and Girls Club in town, and they sponsor many events that take place within the campus community, such as plant sales and the Biolympics. Additionally, biology students are engaged through

the Westfield River Watershed Association with their bi-annual river cleanups and internship opportunities. It became evident that both students and the community partners/organizations alike directly benefit from their relationship with each other. Students gain the opportunity to contribute to the community and directly apply S.T.E.M. knowledge while local organizations are able to expand their reach to include a larger demographic - college age individuals. Our goal in this poster is to highlight and create awareness of this involvement in order to promote continued collaborations between biology students and residents of Westfield and organizations. In doing so, the university gains positive exposure by which students are able to reflect the values of the university.

**Brice, Luvron '21, Jessica Torres '21, Simone LaPlant '21**

**25**

Faculty Sponsor, Prof. Brian Chen

***Motherhood in Brian Fies' Mom's Cancer***

Our group project examines how Brian Fies represents different faces of motherhood in Mom's Cancer. Based on our discussion of motherhood as a major theme in ENGL215: Introduction to American Literature Honors section, we seek to argue that motherhood does not have only one definition. Instead, the roles of a woman or a mother can reflect many different aspects that people tend to overlook. In this project, we explore the intersection between motherhood and board games to support this thesis. We contest any stereotypical or conventional ways of viewing motherhood/womanhood in a narrow sense. Our goal is to inform our audience that motherhood comes in different conditions and contexts, including a woman's determination to fight for her life, her stamina to stand up for her rights as a woman, her unyielding willpower to battle against diseases or psychological disorders, her optimism to cope with loneliness and inferiority.

**Carroll, Julie '20, Sarah Remy '21, Cayce Williams '20**

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Faculty Sponsor, Prof. Vanessa Diana

***Taking It Back to High School: Westfield State's Future Educators Inspiring Community Learners***

Within the education program at Westfield State University, teacher candidates are required to engage in numerous hands-on teaching and learning experiences in local classrooms and the surrounding community prior to their graduation and completion of the Massachusetts teacher licensure program. In this poster, we will demonstrate the benefits of these hands-on experiences for both the city of Westfield public school students and Westfield State University education students. Westfield public school students benefit from these experiences by having the opportunity to interact and engage with passionate future educators receiving the most up-to-date training and beliefs rooted in a progressive, transformative approach to education. These frequent interactions can help to spark the student's enthusiasm for attending school and expand their love of learning. These experiences allow Westfield State University students to foster their own excitement for educating today's youth and inspiring future generations. In addition, these experiences prepare future teachers for their life-long careers in the field of education and ensure that they enter the profession with sufficient background knowledge and practice in planning, designing, and revising lesson plans. The information provided on this poster will draw upon interviews conducted with Westfield public school students and teachers, Westfield State faculty and staff, and current Westfield State students, as well as alumni employed in the field of education. This presentation will highlight the education programs involvement within the community of Westfield through Westfield Promise, the ICE program, Kappa Delta Pi, field placements, and other valuable connections between the University and Westfield public schools.

**Cornwell, Kaylea '22**

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Faculty Sponsor, Prof. Catherine Savini

***Mandated Reporter Training***

Many teenagers are put in the position of authority of young children, whether it be a camp counselor, a youth coach, or a job that works with them. Often, these teenagers are expected to be mandated reporters in the event that a child reports abuse, but are these teenagers given the proper training to know what it really means to be a mandated reporter? This problem needs attention because there could be many instances where children who are reporting abuse are not getting the proper help they need because they are confiding in untrained teenagers who are blind to the red flags being presented to them. Through research of other organizations who perform mandated reporter training, I will see which programs/training sites are most effective. I will also research the difference between whether or not in person or online training is most effective for this particular issue. With this information, I will write a proposal to the summer camp I work at, proposing that they add mandated reporter training into their camp counselor training. This project is significant because it could have the potential to bring help to children who are in need of it, who otherwise before wouldn't have been provided the help if it wasn't for the training and emphasis on the red flags of child abuse.

**Davis, Meaghan '21, Rebecca Rokne '21**

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***A Push for Accountability: Changes in How Sexual Misconduct is Handled at WSU***

Currently, when a student is expelled from WSU for sexual misconduct the expulsion does not appear on the student's record. This means that the student can transfer to another institution without that institution knowing that they were even expelled. Our project acknowledges the need for repercussions for offenders of sexual assault at the college level because college campuses are vulnerable to this type of misconduct. Furthermore, the lack of consequences in place enables expelled students to reoffend at other institutions without any prior documentation on their transcript of previous disciplinary action taken as a result of offense of sexual assault. We aim to share potential policy changes that can be made at the university level, in order to protect students by holding offenders accountable for their actions and providing more comprehensible and accessible resources for survivors of sexual assault. Over time, we estimate that the implementation of these policies will decrease the number of offenses on the Westfield State University campus, as it forces offenders to take responsibility for their misconduct. Our presentation will include data on sexual assault on college campuses, as well as a petition regarding WSU students wanting to make a change.

**Dawicki, Sabrina '22**

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Faculty Sponsor, Prof. Catherine Savini

***Eating Disorders on College Campuses***

Eating Disorders are a mental health issue that often go ignored or unacknowledged. This is a problem as so many college students are struggling with their eating habits and their body image. According to the National Eating Disorders Association, 32% of female college students and 25% of male college students struggle with an eating disorder. These disorders include but are not limited to Anorexia Nervosa, Bulimia Nervosa, Binge Eating and excessive exercising. The majority of those on campus have little knowledge on what eating disorders actually are and how to help somebody dealing with one. The main goal of my project is to try and reduce the stigmas around eating disorders and shine a light on how much

it can affect an individual's mind and body. My CURCA presentation will provide data on eating disorders, common myths and information on how to avoid using language that can be triggering to those who are struggling with a disorder. This work is important due to the fact that it is an issue that is not spoken about as much as other mental health topics even though it is such a common and harmful health issue.

**De Jesus, Valerie '22**

**55**

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***Teaching Self-Care to Incoming Students as a Way to Prevent Suicide on Campus***

Suicide prevention and mental health-related activities on campus have not proven to be sufficient in educating students about the mental health services available on campus during their first semester in college, and most students are coming in without the appropriate coping skills and motivation to seek help. This lack of understanding and resources on campus affects incoming students because they are transitioning into their adulthood and learning how to live and study independently, which can be stress-factors that, without the appropriate coping skills, can lead to suicide. Recognizing the need for the students to practice self-care and become knowledgeable of the services available on campus, my project focuses on the implementation of a first-year-only course that focuses on mental health and self-care. In addition to presenting my research on the effectiveness of self-care in suicide prevention among college students and the feasibility of a required mental health awareness course, my CURCA project will describe my process for sharing this research to the Curriculum Committee of Westfield State University. This project is significant as it will help incoming students transition into their college life, teach them self-care skills that will help them throughout their careers, and effectively prevent suicide on campus. When students are knowledgeable that they have a support system within their community they will be most likely to succeed and remain in such an institution.

**George, Shannon '22**

**70**

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***ADHD Misconceptions***

Attention Deficit Hyperactivity Disorder, more commonly referred to as ADHD, is a brain disorder that is defined as a combination of ongoing difficulties with maintaining attention, hyperactivity and impulsive behavior. ADHD has been considered a controversial mental illness from the very start. The controversial aspects of the disorder include whether or not it is a real mental illness, if medication is an appropriate treatment, and the negative portrayal in media and classroom settings. There is also an overwhelming amount of misconceptions in regards to ADHD, and these misconceptions are very damaging to society because of the stigma they create. My project is a poster that first brings to light the misconceptions regarding ADHD and then educates the readers on what this disorder truly effects. This project is important because educating people on mental illnesses is what helps to end the stigma surrounding them, which allows people living with these illnesses to receive the help they deserve without the fear and shame that stigmatization has created.



**Giebel, Matthew '21, Haley Bernier '20, Taylor Rivers '20**

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***Keeping Westfield Healthy***

Healthcare is a rapidly expanding field within our country. Westfield State is able to produce highly skilled graduates ready to tackle the ever-demanding field of healthcare. Our poster focuses on three health-related organizations on campus including the EMS club, the nursing department, and the athletic training department. The intent of our poster is to highlight the contributions that students within these groups make to benefit both the city of Westfield and the campus community. Some of these contributions include: collaborating with the Westfield Fire Department, holding various clinics, and volunteering at health fairs within the community. Students are sent on clinical rotations, provide first aid, as well as injury evaluations which promotes growth of both health and health education to the community and the students themselves. We want to highlight these valuable experiences Westfield State allows their students to be involved in. These experiences better prepare students for sectors of the healthcare field while also benefiting the people of the community. Through interviews with respective department leaders, faculty members, and personal experiences, we were able to gain valuable resources to include within our presentation. We will include testimonials and visual aids in order to effectively convey our message. Showcasing the worth of each sub-group of healthcare, demonstrates to the campus community as well as the Westfield community that Westfield State students are actively involved in bettering society.

**Howard, Thomas '20**

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***From Perspective Student to Professional Scholar: A Westfield State Experience***

For my presentation, I will illustrate to my audience how Westfield State University both as a campus, and as a community with the City of Westfield, presents its students opportunities to capitalize on. With this topic, I will be pointing out the unique resources, characteristics, and creative experiences that the University offers for students, utilizing examples from my history as a student at Westfield as evidence for my case. My intention is to clearly state how being active in academics and extracurriculars had a direct correlation to my accomplishments during my later years at Westfield State University, incorporating examples of my most recent work, and pictures of any time I represented the University. I will cite my summer internships at the Westfield Athenaeum Archives and as an intern to Representative Angelo J. Puppulo Jr. relating them to my majors, while paralleling it with my participation in on campus extracurriculars. I will present how my work with Student Government, WSKB Radio Station, and the Honors Program led to engagement in the Westfield community in the forms of my position for the Westfield Whip Museum and a canvasser for DA Gulluni. My hope is to reinforce that Westfield State offers an affordable education which creates skillful post-Bachelor students ready to take on careers or graduate school and that I can provide underclassmen students with ideas on how they can succeed academically, while reinforcing to others the need to fund Public Higher Education due to the amazing results at WSU.

**Kelleher, Cameron '22****108**

Faculty Sponsor, Prof. Catherine Savini

***Trauma Among College Students & The Benefits of Bullet Journaling***

College students who have suffered from a traumatic event in their life have been found to be more likely to have a negative adjustment to a college environment. According to research, traumatized individuals are more likely to seek help through mental health services than the general public. However, research further suggests that, although traumatized individuals are utilizing services more than anyone else, they are being heavily underutilized on college campuses. Through this problem, I constructed a purpose to provide these traumatized students who are not utilizing mental health services on campus with a healthy coping strategy that does not involve utilizing a mental health service. I reviewed various articles, books, and studies regarding information on the healing of trauma, and was able to narrow down my solution to bullet journaling. Bullet journaling is a form of journaling that includes creative and grounding techniques that have been found to significantly help with things like anxiety, depression, and PTSD. My findings suggest that this could be a highly effective way to provide students who aren't utilizing services on campus with a healthy way to cope with their stress. This work is important as it is imperative that we acknowledge how this demographic is underutilizing their services on campus, and how necessary it is for them to get help.

**Kevaney, Emmet '22****Oral Pres**

Faculty Sponsor, Prof. Catherine Savini

***An Analysis of the College Drinking Culture and the Issues Brought About by It***

All colleges and universities seemingly tolerate a detrimental drinking culture that creates all sorts of problems for students, regardless if they participate in unhealthy drinking behaviors or not. Excessive drinking and the culture around it severely harms the mental, academic, and social well being of students. Drinking to many students seems to be the only way to have fun at school, so how can we as a community stop the terrible cycle of binge drinking and peer pressure that comes with the college drinking culture. My research will involve looking at all the factors that lead to college students drinking alcohol and how it affects not only their physical health, but their mental and social welfare. Additionally, I will look into sober alternative events that colleges already provide. I hope to share my findings with students organizations such as CAB or SAIL. I will research specifics on the problems brought about by the college drinking culture by reading studies, what sober events already exist and how they do it, and possibly interviewing students about their experience with drinking at WSU. My findings will convince student organizations that there is a need for sober activities and events on campus. This work is very important because students need a safe outlet to express themselves and have fun.

**Le, Anhna '21, Katelyn Thibault '20, Sidilene Pereira '21****115**

Faculty Sponsor, Prof. Brian Chen

***Motherhood in Crimes of the Heart***

Our group project examines how Beth Henley represents different faces of motherhood in *Crimes of the Heart*. Based on our discussion of motherhood as a major theme in ENGL215: Introduction to American Literature Honors section, we seek to argue that motherhood does not have just one definition. Instead, the roles of a woman or a mother can reflect many different aspects that people tend to overlook. In this project, we explore the intersection between motherhood and violence to support this thesis. We contest any stereotypical or conventional ways of viewing motherhood/womanhood in a narrow sense. Our goal

is to inform our audience that motherhood comes in different conditions and contexts, including a woman's determination to fight against injustice and domestic violence, her stamina to stand up for her rights as a woman, her unyielding willpower to battle against diseases or psychological disorders, her optimism to cope with loneliness and inferiority, and her defiance against patriarchal social norms.

**McDonald, Mia '22, Lyssa Richard '21, Roman Yusenko '21**

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Faculty Sponsor, Prof. Brian Chen

***Motherhood in American Poetry***

Our group project examines the representation of the different faces of motherhood in poetry. Based on our discussion of motherhood as a major theme in ENGL215: Introduction to American Literature Honors section, we seek to argue that motherhood does not have one and only definition. Instead, the roles of a woman or a mother can reflect many different aspects that people tend to overlook. In this project, we explore the intersection between motherhood and loss to support this thesis. We contest any stereotypical or conventional ways of viewing motherhood/womanhood in a narrow sense. Our goal is to inform our audience that motherhood comes in different conditions and contexts, including a woman's determination to fight against injustice and domestic violence, her stamina to stand up for her rights as a woman, her unyielding willpower to battle against diseases or psychological disorders, her optimism to cope with loneliness and inferiority, and her defiance against patriarchal social norms.

**McKim, Alyssa '21, Sarah Balestro '21, Morgan Link '21**

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Faculty Sponsor, Prof. Brian Chen

***How Motherhood is portrayed in Crimes of the Heart***

Our group project examines how Beth Henley represents different faces of motherhood in Crimes of the Heart. Based on our discussion of motherhood as a major theme in ENGL215: Introduction to American Literature Honors section, we seek to argue that motherhood does not have one and only definition. Instead, the roles of a woman or a mother can reflect many different aspects that people tend to overlook. In this project, we explore the intersection between motherhood and survival to support this thesis. We contest any stereotypical or conventional ways of viewing motherhood/womanhood in a narrow sense. Our goal is to inform our audience that motherhood comes in different conditions and contexts, including a woman's determination to fight against injustice and domestic violence, her stamina to stand up for her rights as a woman, her unyielding willpower to battle against diseases or psychological disorders, her optimism to cope with loneliness and inferiority, and her defiance against patriarchal social norms.

**Michalik, Matthew '21, Rachel Tynan '21, Rebecca Rokne '21**

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Faculty Sponsor, Prof. Vanessa Diana

***Bringing the Westfield Community to WSU Campus***

Westfield State University has been located within the City of Westfield for 175 years and it is an important aspect of the city. Over these many years, the city's relationship with the university has grown stronger, and with it so has the community's involvement on campus. Westfield State University is a host to many events, for students and community members alike. We aim to highlight this community engagement between the City of Westfield and Westfield State University that is already offered, as well as to propose new ideas. These programs, as well as others, are not well known among many community members and students. We would like to inform people of these opportunities and how they are imperative to both the city and the university. We discuss specific ways that Westfield State hosts

community events: through a high school mentorship, athletic events such as RunStanley and the Special Olympics, WSKB Community Radio, educational guest lectures that community members of all ages may attend, and training programs such as Safe Zone training or EMT programs. We found this information through interviews with staff and other campus members involved in these activities. For the students these activities are important due to the volunteer opportunities, individual growth, and payment opportunities that can come from them. Within the community, benefits include another location to hold events and growth opportunities for community members, young and old. We will finalize the discussion with our new ideas to further the bond between both parties.

**Neves, Thalita '21**

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Faculty Sponsor, Prof. Professor Vanessa Diana

***Making the "W" in WSU a Forever Home***

The purpose of this CURCA poster is to show the impact Westfield, as a city, has on its students and the benefits that come with having alumni stay within the city. Westfield State University has attracted thousands of people to this area to get an education and to have a college experience. However, many students decide to stay here after graduation because they have formed connections with people in this area, there are jobs available, and a sense of community in the city. Through my research for this project, I have spoken to multiple alumni who made the decision to stay in this area and about the reasons why they stayed. This presentation will focus on the impact these alumni have made in the area, mostly through their work after college. I will also be emphasizing the towns these alumni originally came from and showcasing that although they could have gone anywhere in the state, or anywhere in the world, they chose to live in Westfield and make their mark here. The impact of an undergraduate or graduate experience can make or break a student and Westfield State has shown time and time again that they make a large impact on the lives of their students. Although the experience starts at Westfield State University, many decide to make it their forever home and continue to live in and make an impact on the city of Westfield.

**Pike, Victoria '21**

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Faculty Sponsor, Prof. Professor Diana

***Helping Out Our Town: Circle K Service Club***

Circle K is an international collegiate service organization that is a service leadership program of Kiwanis International. It promotes service, leadership and fellowship. At Westfield State University, this active club goes both into the community and invites the community on campus for various events and service projects. This town and gown relationship benefit both the students of the university and the community as a whole. While volunteering, the students are able to establish a sense of place with their new home, while helping them make connections, gain confidence, and be able to make a difference. Community members get a chance to have their town cleaned up, small business owners can receive help to accomplish tasks they might otherwise be able to do, and the children are able to have more organized activities and positive interactions within the community and on a campus university. The relationship between this club and the city is invaluable, and by highlighting the positive impacts of events such as H.O.O.T. Day and Breakfast with Santa this presentation can serve as a way to celebrate the connection and to intentionally help this connection grow. Information for this presentation was gathered through interviews and newspaper articles.

**Tully, Jillian '22**

195

Faculty Sponsor, Prof. Vanessa Diana

***Deepfakes: Mask of Technology***

Deepfake is an AI-based technology used to produce or alter video content so that it presents something that didn't, in fact, occur. As technology progresses, deepfakes can put many people from celebrities to world leaders in danger. What is behind this technology and how will it affect future generations?

**Walden, Emily '22**

201\*

Faculty Sponsor, Prof. Jen DiGrazia

***Considered "'Atypical'": Parent Guidance and College Education***

As seen on a recent episode of the Netflix show, "Atypical," parents of children who are considered "atypical" often assume that college is beyond the scope of their child's abilities. Using parental guidebooks by advocates like Jane Thierfeld Brown and scholarly articles (Vidali 2007), I argue that parents of children considered atypical should not dismiss college as an option. The benefits of having atypical students attend college are two-way: Students benefit from increased independence, increased exposure to social-emotional experiences that could enhance their future work and civic prospects. Colleges benefit from the presence of atypical students because it provides "typical" students and faculty with exposure to a growing and increasingly visible segment of our population that isn't fully represented in college. While parents of students with disabilities often have the best intentions and understandably seek to protect their atypical children, our ability to change a culture and a student's prospects depends upon exposure, interactions, and a willingness to take a risk.

***Wall of Words Authors***

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Faculty Sponsors, Prof. Michael Filas, Prof. George Layng, Prof. Leah Nielson, Prof. Lisa Renfro, & Prof. Beverly Army Williams

***Geography, Planning, and Sustainability***

**Balbino, Justin '19**

9

Faculty Sponsor, Prof. Alina Gross

***Desertification: How are Planners Tackling this Problem?***

Desertification (the spread of desert-like conditions) is an ongoing threat to land, primarily in presently arid locations. This project's objectives are not only to inform others about the basic definition, causes, effects and possible solutions to the process of desertification, but also to discover how informed planners in the threatened areas are on the subject. There are 2 methods that were used to accomplish its set goals: an analysis of town policies, as well as an analysis of said data. The research area in question was within

the area of the Navajo Reserve in Arizona, and the study sample came from a total of 15 towns near the site. Each town's public website was reviewed regarding their regulations-policies involving desertification, common traits and its importance to planners. Results show the towns and their policies share the following similarities: they do not currently have training for combating desertification, water and air quality are more pressing issues for these communities, and that the plans don't have much information on the topic. The results verified that desertification was not prioritized as highly as other issues in these settlements.

**Brett, Cameron '19**

**23**

Faculty Sponsor, Prof. Alina Gross

***All Aboard the Public-Private Gravy Train for Boston's Crumbling Commuter Rail: Measuring the development potential of Massachusetts' underutilized transit oriented real estate resources for funding commuter rail modernization***

Facing a perfect storm of funding shortfalls to address both crumbling transportation infrastructure and the growing demands for transformative transit investments, Boston's struggle to fund critical transit projects has put a stranglehold on the region's otherwise explosive economic development. Given Boston's historic lack of land resources and the explosive economic growth of the region, it comes as no surprise that Massachusetts faces skyrocketing housing prices and the nation's most time-consuming and congested commutes. Recent public-private partnerships at Assembly Square and Boston Landing have successfully addressed both issues, as private developers rapidly turned blighted industrial wastes alongside existing MBTA lines into dense new transit-oriented developments, where privately funded public transit nodes are surrounded by thousands of new residential, retail, and office spaces. Building off their success, this study seeks to explore other opportunities by developing a model to identify and evaluate development potential along the MBTA commuter rail network. By modeling and evaluating this potential for TOD based on individual stations and commuter-rail corridors, it will illustrate the potential revenue available not just for the various transit proposals that are forced to compete for limited public funding, but also to breakdown improvements into subsections made up of these corridors and stations to promote incremental expansion. Through this winning combination of public transit and private development, Boston can finally breakthrough the chokeholds of congestion and limited construction, ultimately enabling the city to not just sustain its current economic growth, but establish a sustainable foundation for future development alongside incremental transit expansion.

**Griffin, Nolan '19**

**81**

Faculty Sponsor, Prof. Alina Gross

***Food Deserts: A Problem for Everyone***

Food deserts are a major health concern all across the country. A food desert is an area within a community in which residents lack access to healthy food options. Historically these issues are located in poorer areas, and specifically, in the case of the United States, these areas have a significant population of people of color. This is due to the rise of suburbanization, racial discrimination and segregation, and other issues. The project was to look at what was happening in Massachusetts as a whole, and narrow down the area of observation to both the City of Boston as well as the city of Newton. The reason for these cities being chosen was that Boston is the capital of Massachusetts and Newton, along with being the general Boston Area, is also a relatively affluent area. The project also looked into the planning department's involvement in the problem. Interviews were conducted in two scopes. One was to look at what the

officials were doing regarding the issue, and at the same time, people in the city were asked about what their opinion on food deserts. There was also a content analysis of what was being done in Boston. Results will reveal information about the status of the issues in these communities, and how officials are looking into alleviating the issue and what are some viable solutions.

**Griffin, Daniel '19**

**82**

Faculty Sponsor, Prof. Alina Gross

***The Inundation Study of Houston***

Flooding is a problem which yearly seem to captivate news channels for months, and it's always the carnage and sadness that accompanies the disturbing clips. However, what if as planners we work to help those issues and mitigate the damage with simple analysis through work of Geographic Information Systems (GIS). Focusing on Houston for this study, using data layers mainly taken from Texas local GIS systems and United States Geological Survey, we sought to examine for areas of low elevations via Elevation data that lead to storm surges that increase mass flooding in an area. The city of Houston was used due to the recent storm of Hurricane Harvey, as well as the thousands that were affected by this storm due to poor planning of the city. As a result, many fields of grass and dirt that would normally soak up the water, were paved with various strip malls and parking lots, which held much of the water that came down. After maps and analysis were completed, results showed many of areas that were covered in concrete were additionally in flood zones and plains created by FEMA. Furthermore, even some city municipalities were flooded by smaller category three and four hurricanes. These results can be looked at as a starting point not only for the town of Houston, but for other cities like that of New Orleans or even Boston.

**Griffiths, Julianne '20, Alexis Sangleer '20, Dominic Ottolini '20,  
Joseph Barmashi '20**

**83\***

Faculty Sponsor, Prof. Robert Bristow

***Proposed Graduate and Faculty Housing in South Lot***

Like many colleges and universities around the world, we are seeing a growing student population and greater investments in higher education. This enables universities to expand in order to meet their future goals. This can include building new academic buildings, investing in research opportunities, collaborating with other schools, and building more residential hall buildings. Following this trend, Westfield State is expanding since they have built two new residential buildings and the Science and Innovation center within the last decade. For our study, we created a site plan for graduate and faculty housing in the South Lot property owned by Westfield. We went into the field to evaluate the different sites, looked at case studies of other universities, and utilized GIS to determine environmental hazard prone areas. After concluding our research, we created a large model of the area, and the proposed layout for the buildings. The ultimate goal is to provide modern apartment style housing, in an area away from the main campus. Our proposed design includes a playground for families interested in the apartments. We also accounted for ample parking for the residents, in order to not take away from the student parking area in South Lot. In conclusion, these apartments would be seen as a big incentive for graduate and faculty members. By planning effectively we can design the site with as little environmental impact as possible.

**Hadley, Emily '19****88**

Faculty Sponsor, Prof. Carsten Braun

***Recession of Glaciers in the Sierra Nevada de Mèrida (Venezuela) over the Last Five Decades***

One of the many consequences of human-caused climate change is the recession and disappearance of glaciers across the globe. This recession has been occurring at increasingly fast rates over the past few decades. The Humboldt Glacier in the Sierra Nevada de Mèrida mountains of the Venezuelan Andes provides a unique opportunity to observe how a remote glacier in the Tropics has fluctuated over time. In this study I used Landsat satellite images and in-situ GPS data collected in 2009, 2011, and 2015 to determine the spatial extent of the Humboldt Glacier and other nearby glaciers in the Sierra Nevada de Mèrida. Glacier area was calculated using two complementary GIS-based approaches: (1) supervised image classification and (2) Normalized Difference Snow Index (NDSI). I also compiled all other glacier area measurements and estimates from available scientific literature. Glacier-cover in the Sierra Nevada de Mèrida decreased from 1.19 km<sup>2</sup> in 1981 to 0.056 km<sup>2</sup> in 2018 and matches the overall warming and drying of the atmosphere in the region. This study quantified the rate of glacier recession and disappearance for one particular mountain chain in the Andes of South America. Tropical glaciers are particularly important for freshwater stores during the annual dry season and glacier recession has negatively impacted freshwater availability throughout the entire Andes and indeed the world.

**Huynh, Billy '19****97**

Faculty Sponsor, Prof. Alina Gross

***The Future of Visualization Tools in Planning***

With the exponential growth and expansion of technology throughout the last few decades, a wealth of new tools and breadth of information have both become increasingly powerful and accessible. As such, nearly all fields and industries employ some tool to aid in daily operations. For urban planners that comes in the form of a 2D spatial analysis tool known as GIS; however, since the turn of the century 3D visualization tools have also been experimented with, but never fully utilized. However, with improvements in both hardware and software technology and the development of artificial intelligence and integration of big data into various systems allowing for more complex analysis and processes to occur, 3D visualization tools have begun to re-emerge and find use within urban planning departments and planning firms. To determine current visualization tool usage by both planning students and professionals and garner insight on 3D tools, an online survey was conducted for current students enrolled in planning programs and professional planners were interviewed. The research area was limited in the Western Massachusetts region. Findings indicated that while GIS is still the primary tool for both students and professionals, there is strong interest from students in learning 3D visualization tools. Professionals agreed that students should learn 3D tools; however, while they believe 3D tools will become much more prominent, in the broad context of planning, it may have limited use.

**Mantha, Felicia '19****130**

Faculty Sponsor, Prof. Alina Gross &amp; Prof. Timothy LeDoux

***Assessing Sea Level Rise Impacts on Coastal Communities of Massachusetts***

Climate change and sea level rise present a serious hazard to coastal communities on a global level. In the coming decades, densely populated coastal urban areas are at higher-risk of storm surges, tidal flooding and infrastructure damage. Scientist estimate that global sea levels will rise between 0.28m and 0.98m in the next century. In Northeastern states such as Massachusetts, an estimated seven-thousand homes risk



chronic inundation by 2045 due to global sea level rise, a potential loss worth four billion dollars. The research utilizes Geographic Information Systems (GIS), census data, and structural assessments to measure the potential socioeconomic impacts on sea level rise on the coastal North and South shore communities of Massachusetts by 2100. It also examines how a hybrid approach of man-made and natural infrastructures might be able to offset potential impacts from global sea level rise for these coastal communities. By developing a geospatial framework, the research can then assess the potential flooded coastal areas and quantify the socioeconomic impacts of vulnerable communities. Findings indicate that these coastal communities will experience significant coastal flooding placing thousands of homes and businesses at risk. The research developed a strategic coastal resilience plan to reduce the environmental and socioeconomic risks of coastal hazards in a sustainable manner. The planning solution will use a hybrid approach of man-made and natural infrastructure. Possible improve by installing new material for oyster reefs and installation of artificial armored barrier islands to dissipate wave energy before it reaches the shore will be analyzed.

**McCarthy, Sean '19**

**134**

Faculty Sponsor, Prof. Alina T. Gross

***The perception of solar energy in small town Massachusetts***

Solar energy in particular is growing as one of the largest forms of new electricity generation in the state. More people are becoming aware of the dangers of fossil fuels, and as a result, people are looking to invest in the green energy resources. The point of this project was to investigate the perception of solar energy in small town Massachusetts environments, through a case of Holliston, MA. There were two approaches used. One was an interview with the town planner and the second was a survey concerning how townspeople view solar energy. The findings from the interview brought interesting results in that the town has constructed its own solar energy system but, it has caused some complaints from townspeople over the years. The survey also showed that most believe solar energy benefits the town and that some even have their own solar panel system. In conclusion, initial results show that solar energy is generally perceived as favorable and further analysis may offer more insights into understanding solar energy on a broader scale. Most perceive that it is important for Holliston to use solar energy and that it should continue to be utilize more.

**Moran Jr., Sean '20**

**141**

Faculty Sponsor, Prof. Alina Gross

***How Do Worcester Planners/Officials Communicate with Homeless Shelters to End Homelessness***

Homelessness in the city of Worcester, Massachusetts is a continuous problem. Many are unable to afford housing and are therefore left to either live in shelters, live on the streets or are forced to couch-surf. City planners and various homeless shelters around Worcester are working to put an end to homelessness, whether this may be identifying high-level risks associated with homelessness or trying to find stable housing for those in need. Interviews were completed with Worcester's City Manager, Edward Augustus, Evis Terporalli, homeless projects manager, Joanne Alley, director of Interfaith Network of Greater Worcester and Parlee Jones of Abby's House. All agree that there is an excessive need for affordable housing in the city and was identified as funding from the federal, state, and local sources are essential. The Hub Core of Worcester is a great program that identifies elevated risks such as mental health, alcohol, crime victimization, and unemployment. It was concluded that city planners, and other city managers and the people running these homeless shelters in Worcester, Massachusetts are coming

together to put an end to this crisis, as difficult as it may be. They are doing this by working as a group that meets regularly in order to keep the issue of homelessness on the forefront of conversations to keep a handle on the situation so it doesn't get worse, and hopefully working together will put an end to this problem.

**Rex, Henry '19**

165

Faculty Sponsor, Prof. Alina Gross

***How Municipal Planners Can Play a Role In Structure Fire Prevention and Improving Fire Department Response: A Case Study Of Barnstable, MA***

Structure fires can occur in all communities, they can result in loss of property and life. A community can be made safer by actively minimizing its risk for structure fires to occur and by having an effective fire department to put out fires when they do occur. Municipal planners have the ability to play a key role in reducing the risk of structure fires and facilitating effective response by local fire departments. By having strong collaboration between the planning and fire departments a community's risk of structure fire can be minimized. This study identifies what the best practices are for planners to lower fire risk and promote effective firefighting response. It then examines how these best practices apply to the Town of Barnstable. The study also examines the relationship and collaboration between planning staff and fire officials. To determine the best practices, a content analysis was performed on a range of literature on the topic of how planners play a role in firefighting. Interviews were then conducted with planning and fire officials in the Town of Barnstable. The best practices were then compared to the interview results to determine how they are being implemented in the Town of Barnstable or how their implementation could be improved. The study concluded that the Town of Barnstable promotes a safe, low fire risk community by having strong collaboration between the planning and fire departments through utilization of many of the best practices. The best practices found in this study have the potential to be applied to other communities to help lower their fire risk.

**Santiago-Ramirez, Luis Antonio '19**

173

Faculty Sponsor, Prof. Alina Gross

***Mitigating Stormwater Runoff in Chicopee Through Vegetation***

Chicopee has a combined sewer service system and lack of vegetation that are causing storm runoff to be an issue for the city. The purpose of this project is to gain a further understanding of this stormwater issue, learn of the remediations taking place, and obtain knowledge on their progression to fix this issue. The approach for this project consisted of interviews and spatial analysis. Interviews were done with Chicopee's Urban and Community Forestry Department, Water Pollution Control Department and Planning Department. Interviews showed that the City is working on separating the combined sewer pipes by keeping the old combined pipe for stormwater and the new pipe for sanitary only. This will prevent the old pipe from backing up during storm weather into resident's homes and lessening the raw sewage going into the rivers. Vegetation such as rain gardens, canopy systems, and various tree species help absorb the storm water before it's able to start the runoff process which collects debris and pollutants, and is dumped into the river due to the amount of impervious surface throughout the city. The main takeaways for tree planting are balance of different trees, tree selection and the location. The spatial analysis involved examining maps where trees needed to be planted. DCR has planted 1,543 trees with a goal of 2400. The results suggest more vegetation is needed and pipes throughout different sections of the city still have to be separated.

**Savoie, Kyle '19**

174

Faculty Sponsor, Prof. Alina Gross

***Parklets: Small Parks Making Big change***

This study was done to investigate whether or not a pocket park would be fit for implementation in Westfield. A pocket park is a small park, typically the size of a few parking spaces that offers green space, relaxation and recreational opportunities for pedestrian traffic. The study selected two sites in high-traffic areas of the city and analyzed their suitability based on guidelines from a University of California, Los Angeles created Toolkit for Creating and Implementing Parklets. Surveys were also used in the areas to gather public opinion on whether or not parklets were an idea the people want to see developed. Results gathered from this research identified significant public approval for potential pocket parks, with site analyses identifying favorable conditions for parklet development in both locations. Based on public opinion and site analysis, land close to the Westfield town center shows ideal conditions for development, both in regards to citizen interest and surrounding conditions. Based on this research, the establishment of a pocket park on streets nearby the Westfield Park Square would be highly beneficial to the community.

**Smith, Shanice '19**

180

Faculty Sponsor, Prof. Alina Gross

***The Municipal's planning impact on the community's mental health***

There is little research concerning the effect community planning has had on mental health in comparison to its effect physical health. The goal of this study was to determine how people's mental health has been affected by the role of community plans, if incoming community planners have learned about the influence of mental health on planning, and if experienced community planners have utilized knowledge of mental health in their work. Two surveys were administered electronically. One survey for the general public sought to assess their experience of the built environment in relation to their mental health. The second survey was distributed to planning students and experienced planners to assess their knowledge and experience with all different types of planning in relation to mental health. Both surveys asked for demographics as well. In the general survey, a majority of the participants suggested that access to green spaces and public libraries lead to relaxation, social inclusion, physical activity, a sense of safety, and social inclusiveness. None of the planning students surveyed had come across mental health and planning during their studies. Only one of the experienced planners surveyed, came across some mental health issues, during a health impact analysis workshop. Findings revealed that people are aware that their mental health is affected by the built environment, pollutants, and weather. Findings also imply that both aspiring and working planners should gain knowledge with respect to mental health, to come up with strategies to design and regulate their communities.

**Taylor, Justin '19**

187

Faculty Sponsor, Prof. Robert Bristow

***Recreating the Sheffield Lime Kilns***

Our industrial archeological (IA) history has abundant examples for educational awareness. Still, hundreds, if not thousands, of sites have yet to achieve this notoriety, often given the lack of funding to restore the site to previous conditions. Many of these small archeological sites are located on public land and are often managed by agencies that have to prioritize expenditures amongst the many other challenges facing the preservation and management of these resources. However, these properties can

become an outdoor classroom showcasing the abundant history of human activities, while also opening a gateway for future generations to experience their past at local sites. It is this challenge that we attempt to illustrate a process for education at a nearby IA site in Sheffield, MA, known as the Sheffield Lime Kilns. With this project, we attempt to reconstruct images of what these kilns may have looked like while in use in the early 1900s. Using a 3D modeling tool called SketchUp Pro, we can recreate these historic treasures using imagery and physical descriptions to add to our collection of industrial archaeology for history and public awareness, while also reconstructing the past.

**Taylor, Justin '19**

**188**

Faculty Sponsor, Prof. Alina Gross

***The Importance in Planning for Local Archeological Sites; developing a management plan for the Sheffield, MA Lime Kilns***

Small-scale archeological preservation is vital for protecting our local artifacts, while also adding a sense of uniqueness to a place, and opens a gateway to studying our past. Recently studied by the Geography, Planning, and Sustainability Department, lime kilns found in Sheffield, MA, that date back to the 18th century, offer a prime example of the importance to preserving our small-scale relics. However, developing a management plan for this site has brought up some issues, dilemmas, and poses many possible opportunities and outcomes. For our methodology, we conducted various site visits and interviews with local historians and residents, to which can help reconstruct the importance these kilns were to the regional economy in Massachusetts. Using examples from other management plans at small-scale archeological sites, we pieced together a plan for conserving this site. There have been previous attempts at preserving these kilns, but due to problematic environmental and physical factors and limitations, no recent progress has been made. This project goes through the possibilities for management of the site and provides examples and recommendations for next steps for preservation of these historical artifacts.

**Therien, Anna '19**

**191**

Faculty Sponsor, Prof. Robert S. Bristow

***Discovering Archeological Landscapes in Parks and Protected Areas through LiDAR***

Monitoring cultural resources in parks and protected areas is greatly enhanced using remote sensing imagery. Since much of these lands may be in the backcountry, away from much human access, the use of Light Detection and Ranging (LiDAR) adds another tool for interpretation of our lands. For this example, a comprehensive survey and inventory of cultural resources is illustrated for the United States National Park Service lands that protect the Appalachian Trail (AT) in Massachusetts. This methodology is confirmed with historic records and maps to identify the archaeology resources in the corridor. This data is going to be added to existing management plans to help protect the national park. A case study conducted in Tyringham Massachusetts shows the success of LiDAR in archeological projects. This was displayed through the findings of the locations of a 19th century road and farm.

**Tumblin, Jonathan '19**

**196\***

Faculty Sponsor, Prof. Alina Gross

***Bus stops, Bus shelters, and Public Feedback on Bus Stops in Westfield.***

This project was done to gain community feedback for improving the Westfield's bus shelters and understand the public's perspective on how they could be improved. To do these two surveys were

conducted. The first was an online survey posted on the local Westfield community Facebook forums, and the other was an in-person survey conducted at three locations including Westfield State University stop, Stop and Shop stop, and the Westfield Shops stop. There was also an observation of the bus stops that have evolved in the area with more stops popping up within the last year than in previous years before. In addition, the measurements of the shelters at two of the three stops were taken to understand the feasibility of potential improvements. What was found was that out of the sixty-seven people surveyed online and in person, 38 people out of the 67 would be willing to increase their usage of the bus system if the bus stops were improved. Most people that took the survey put that the 3 items that would be most helpful to improve the stops the most were LED light strips, windscreens, and an electronic sign that would notify people of incoming buses estimated time of arrival. Many had comments ranging from helpful feedback to blatant annoyance with the city. Overall people do want to see some kind of update to the bus stops/shelters, which will help people who use the bus system as a whole.

**Wadness, Toma '19**

**200**

Faculty Sponsor, Prof. Alina Gross

***How can Planners help make Senior Living Easier?***

This project focused on senior living and how we can improve quality of life for seniors living in these communities. One issue that seniors face is making their voice heard by the director of their communities. Palm Chase is a community in Florida, that was used for this study, and through interviews and surveys information was gathered to improve ways we can make living for seniors easier. Input from people that live in a community is useful so we can help them be happy and make changes they want. The results show we need to improve security, social life, exercise and have easier access to food. Another result was that many of the seniors that were interviewed wanted to fill out either a yearly or a quarterly survey on potential improvements for their community. Results will help us understand problems seniors face in this community and develop potential solutions, which may also be relevant for other similar senior communities.

***History***

**Brown, Cassidy '20**

**27\***

Faculty Sponsor, Prof. Erica Morin

***Food, Shelter and Sickness: A Comparison of Military Camp Life Between the Civil War and World War I***

American soldiers have been forced to live in difficult conditions over the course of our nation's military history. Some of the hardships and dangers include lack of food, discomfort, diseases, homesickness, trauma, and boredom. At the same time, soldiers also formed intensely close bonds during these experiences and fondly remembered aspects of their time in camps. During the Civil War, Westfield soldiers described the conditions of military camps in great detail in their letters home to loved ones. They discussed meals, weather, sleeping arrangements, drilling, marching, injuries, and illnesses. Approximately 50 years later, soldiers during World War I shared similar stories with their loved ones. Despite military and medical advancements, many of the soldiers' circumstances were the same in both wars. This paper compares the camp experiences of soldiers in these two wars. Although WWI was thousands of miles away from home and soldiers faced brutal conditions in Europeans trenches, personal letters indicate that life in Union Army Civil War camps was worse than World War I.

**Johnson, Austin '21**

102\*

Faculty Sponsor, Prof. Erica Morin

***The Hidden Enemy of Smallpox: The Effect of Smallpox and Inoculation on the Continental Army during the Revolutionary War***

Smallpox outbreaks were devastating during the Revolutionary War. According to reports taken before and after the initial start of the revolution, there was an estimated 30-35 percent of Washington's overall army that was infected by smallpox. Many Revolution participants, including Westfield soldier Russell Dewey, military doctor James Thacher, Abigail Adams, and George Washington, described the pestilence in camps and surrounding areas. They left behind copious information regarding the widespread epidemic of smallpox sweeping through the regiments and campsites of the Continental Army. The disease rendered a significant portion of the Continental Army unable to fight, thereby affecting the colonists' progress against the British. Due to the horrible effects of smallpox, military leaders promoted the use of then-controversial inoculations to protect soldiers. This paper argues that while the American Revolution was primarily fought on the battlefield, smallpox was a formidable enemy that had a significant impact on soldiers physical and mental health as well as in military strategy and procedure of the army. The use of inoculation throughout the Continental Army provided a strategic, military advantage which if not deployed would have had countless effects on the outcome of the revolution itself. In addition, the military use of inoculation normalized the practice and led to wider implementation of vaccine among the civilian populations.

**Lundgren, Rachel '19**

125\*

Faculty Sponsor, Prof. Erica Morin

***Woman Mayor Doesn't Like Housework: The Media's Use of Sexist Language Toward Westfield Mayor Alice Burke***

Although both men and women endure challenges upon entering the United States political landscape, female politicians are faced with an onslaught of sexism from the media, including the first female mayor in New England, Alice Burke. Throughout Burke's career, the media chose to cover unimportant aspects of her life that had nothing to do with her policies as mayor. Reporters, journalists, and newspaper editors continuously exhibited sexist behaviors and utilized gendered language that Mayor Burke's male counterparts did not face. Newspaper headlines focused on her appearance, marriage, and family life, and regularly used sexist vocabulary to describe her. Newspapers stressed her appearance in great detail and in some cases, even wrote entire articles with the sole purpose of discussing her clothing choices and age. The media also honed in on Burke's family life, creating headlines about her husband, her lack of enthusiasm for housework, and her lack of children. This paper describes some of the sexist treatment and gender language that was directed at Alice Burke and compares her experience to other well-known female politicians including Margaret Chase Smith, Bella Azbug, and Hillary Clinton. Although 80 years separates the careers of these women, they were all subjected to the same sexist media coverage.

**MacLeod, Kendall '20**

127\*

Faculty Sponsor, Prof. Erica Morin

***The Sound of Silence: Why Westfield Soldiers Refrained from Talking About Civil War in Personal Letters***

During the Civil War, letter writing was the only reliable way in which soldiers could communicate with their loved ones. Thankfully many of these letters have been preserved and they offer valuable scholarly

insights into how these soldiers lived during the war. During the Civil War, Westfield soldiers in the Union Army wrote home often, but almost never mentioned events of the war, the cause of the war, the actual fighting, or the difficult experiences of war. Soldiers during the Civil War struggled to reconcile cultural beliefs about death, homesickness, and masculinity, along with deep loneliness and yearning for their homes and families, especially their mothers. They suffered from a range of hardships, injuries, and trauma, but they tried to stay positive and cope during the war. This paper argues that these Westfield soldiers refrained from talking about the war due a combination of military orders, a desire to protect their loved ones from the hardships, and an effort to remain strong and masculine in the face of dangers and troubles.

**Morse, Jack '20**

144\*

Faculty Sponsor, Prof. Erica Morin

***The Mundane Elements of War: Camp Life and Downtime of Westfield Soldiers in the Civil War***

Regardless of the time period of the war, soldiers have shared similar experiences and concerns in their daily life, such as weather, sickness, food, drilling, living conditions and morale. Most of their time was spent in camp life writing letters, drilling, and trying to pass the time. Especially during the winter seasons, there was hardly any fighting at all so the soldiers had an abundance of time on their hands. In personal letters, soldiers focus on these aspects to help them get through the difficulties of war and as a distraction to the horrors they face. This paper will analyze letters from soldiers, journals, and books about camp life. This research showcases the letters from Westfield soldiers in the Union Army. These sources will explain how the soldiers coped and illustrate their individual experiences with camp life during a time of war.

**Rayner, Kevin '20**

163\*

Faculty Sponsor, Prof. Erica Morin

***A Timeless Transition***

The soldiers who fought in the Civil War from the city of Westfield shared many similar characteristics to those soldiers who fought for Rome. Through letters written by Westfield soldiers and by Roman soldiers and by multiple primary and secondary sources detailing the life of these soldiers, similarities begin to arise. These similarities include the meals eaten by the soldiers, the needs and wants of the soldiers, the equipment carried by the soldiers, and the kind of values they held dear. There are even similarities in the way the letter are written and the language that they used. The research that I have gathered shows that the life of a Roman Legionnaire was not very different from that of a Civil War soldier. The importance of this topic lies with the fact that that it has to do with the soldiers themselves. The soldiers who fought the battles and were responsible for the outcome of the war. It is important to understand why soldiers fought for their country and kept them in line. Soldiers are responsible for victory or defeat on the battlefield and thus, by knowing more about them one can better understand the nature of war. The research that I have presented on the soldiers from Westfield comes from a collection of Civil War letters from the Westfield Athenaeum archives. The rest of the research comes from books on the Civil War, and on Rome along with various primary sources found on the library databases.

**Rokosz, Ryan '19**

169\*

Faculty Sponsor, Prof. Erica Morin

***Local Leaders and New Deal Projects: Mayor Alice Burke and the Road to Economic Recovery in Westfield, 1939-1943***

Although the New Deal projects of the 1930s are primarily credited to President Franklin Delano Roosevelt, local politicians played a critical role in identifying areas of need, lobbying for funding, executing the projects, and contributing to the overall economic recovery of the United States during the Great Depression. Certainly, federal funding and guidance was imperative for the New Deal to exist, but the structure of most New Deal programs relied on the implementation of local leaders. In Westfield, Mayor Alice Burke was a strong advocate for public works projects and war preparation efforts in the city. She initiated and facilitated a number of large-scale construction efforts, transportation improvements, and law enforcement upgrades in Westfield, as well as offering Barnes airport to the U.S. military in war time. This paper focuses on the efforts of Major Alice Burke and argues that her advocacy was essential to bring about so many positive projects and economic developments in Westfield during the New Deal. Burke is also compared with other local politicians, including mayors, governors, and city officials, who also helped their communities during the New Deal through successful acquisition and distribution of federal assistance.

**Telega Kendrick, Wyatt '20**

189\*

Faculty Sponsor, Prof. Erica Morin

***Good Roads and Good Government for All: Colonel Albert Pope's Progressive Leanings and Reforms Efforts***

During the Progressive Era of reform, many Americans started to reject the cut-throat business culture of the Gilded Age. Citizens and reformers demanded more good government and government protections for the people. Robber Barons and Captains of Industry preferred the laissez-faire business model, but progressives advocated for more government control of business. Although Albert Pope a wealthy business owner and manufacturer, he espoused the progressive ideals of good government and citizen protections through his support of veterans, food safety, parks, and good roads in the United States. Unlike Carnegie, Morgan, Frick and the like, Pope challenged the typical business model and sought to elevate the lives of his fellow Americans. Within his own company here in Westfield, MA and in Hartford, CT, he worked to ensure job security for his employees in times of duress in America. His time as a veteran led Pope to advocate for veterans' rights, and he instrumental to improving roads, parks, and food quality in the United States. This paper argues that Pope may have had the identity of a wealthy Robber Baron but he had the heart and mind of a Progressive reformer.

**Trainor, Jack '19**

194\*

Faculty Sponsor, Prof. Erica Morin

***Treaty of Broken Promises: A Comparison of Native American Treatment in Local, State, and Federal Treaties, 1684-1867***

During the colonial and early American periods, Native American tribes were often forced into negotiations and agreements with colonists and U.S. officials. Many of these agreements were later broken, leading to a widespread sense of distrust and betrayal among Native Americans and the federal government. An examination of negotiations, agreements, and treaties between Native Americans and European-American colonists, settlers, and government officials from the colonial period to the mid-



1800s reveals a declining level of mutual respect, compensation, and ethics between vested parties. In particular, this paper compares historical land deeds and treaties between tribes in Westfield, Massachusetts with other regions of the country. The treaties and documents analyzed for this research include maps and land deeds with the Woronoco Indians in Westfield (1600s-1700s), Treaty with the Cherokee (1791), Treaty with the Six Nations (1794), Treaty of Big Tree (1812), Treaty with the Cheyenne and Arapaho (1865), and Treaty with the Kiowa, Comanche, and Apache (1867). Across decades and regions, all of these agreements were broken or violated by Europeans-Americans with no penalties and virtually no ability for recourse on the part of Native Americans.

**Weatherwax, Joshua '19**

**203\***

Faculty Sponsor, Prof. Erica Morin

***Driven to Debt and Death: William Pynchon and the Woronoco Indians of Westfield***

The early white settlers of Westfield, Massachusetts coerced the Woronoco Tribe into building exorbitant debts and then used these debts to strip them of their ancestral lands for repayment. Though there is little information regarding the extension of credit to tribe members, the so-called “Indian Deeds” of 1684 demonstrate that the debt was intentionally structured in such a manner that it would preclude the ability to ever fully repay it. These actions were often orchestrated by upper-class merchants, particularly the famed Massachusetts settler William Pynchon and members his family. Using this insurmountable debt, the settlers not only managed to purchase nearly all the lands that comprises modern-day Westfield, but they did so for a fraction of what the land was worth. This paper analyzes the “Indian Deeds” and land “sales” of the late 1600s and concludes that settlers made systematic efforts to impoverish and dispossess Connecticut Valley tribes of land and wealth. In turn, the remaining members of the Woronoco Tribe joined King Philip’s War, along with other Native Americans, in frustration about their treatment, and the tribe was completely wiped out. In this regard, the ultimate fate of the Woronoco Tribe can be laid mainly upon the settlers of Westfield, Springfield, and Agawam due to their unethical actions with the Woronoco homeland and tribal structure.

**White, Catherine '19**

**207\***

Faculty Sponsor, Prof. Erica Morin

***Morals in the Time of Cholera: How Morality Informed Nineteenth Century Cholera Treatment***

In 1832, an outbreak of cholera ravaged North America. The causes, transmission, and treatment of the disease were unknown at the time. The majority of Americans in the nineteenth century believed that behaviors such as intemperance, immoderation, allowing oneself to become fearful, lewdness, or other behavior that was viewed as immoral made a person vulnerable to physical illness. According to this way of thinking, individuals became sick with cholera because their behavior failed to meet the standards of morality held by upper- and middle-class society. In Westfield, Massachusetts, local resident Aurelia Taylor often commented on the illness and connected the disease with intemperance and immorality. This paper argues that the fight against cholera was taken up by the many social reform groups of the day, rather than undergoing serious medical analysis. Medical and political responses were influenced by the spirit of reform and official government responses included fasting and prayer, while the best medical doctors implored people to remain calm, moderate, and avoid over-stimulating foods. Therefore, the response to cholera was largely guided by the moral values of the dominant white, Protestant culture of America. Political, medical, and social responses to the disease were informed by this lens of morality. These values blinded professionals to the real causes of the disease.

**Zak, Leland '19**

**210\***

Faculty Sponsor, Prof. Erica Morin

***From Bicycles to Automobiles: Colonel Albert Pope and the Good Roads Movement, 1890-1907***

The rise of the bicycle in the late 1800s sparked a campaign known as the Good Roads Movement. Cyclists, distraught by mud, dust, bumps, and other obstacles, demanded appropriate road conditions to practice their hobby. Bicycle and motor carriage manufacturer, Colonel Albert Pope of Hartford, Connecticut, became heavily involved in the movement for better roads. Pope spent his time and money to support the movement. He sponsored a massive petition, donated to the League of American Wheelmen (LAW), and published articles stressing the importance of good roads for the betterment of American society. Colonel Pope believed that road administration was best in the hands of the government, and that establishing a federal roads department would most appropriately allocate funds and resources and would distribute road construction to qualified individuals. Pope's efforts earned him the title "father of good roads."

## ***Language & Culture Studies***

**Diaz , Elijuan '19**

**Oral Pres**

Staff Sponsor, Marjorie Rodriguez, TRIO

***Estados Unidos or United States of America: Bilingual Education for Our Future Society***

Bilingualism, Monolingualism, Bilingual education, ESL (English as a second language), Latinos/Hispanics. Native Spanish-speaking Latinos in the United States struggle to complete school due to linguistic barriers. Our education system currently has a negative effect on Spanish-speaking students. For example, these students demonstrate higher drop-out rates compared to students whose first language is English. How can the United States of America be prepared for a predominantly Spanish-speaking population by the year 2050, when we currently implement a monolingual education system in English? I have found that bilingualism is more effective in preparing native Spanish speakers to become fluent in both English and Spanish. This strategy improves the language acquisition skills of both English and Spanish speakers. Thus, my project will demonstrate that bilingual education, as opposed to ESL programs, will be a key factor in constructing a better society in the 21st century. By demonstrating the benefits of bilingualism, I hope that education systems will be more open to the idea of implementing such programs in order to allow Spanish-speaking and English-speaking American citizens to be treated equally.

**Gonzalez, Carolina '21**

**76\***

Faculty Sponsor, Prof. Hugo Viera

***The Academic Future of youth in Foster Care: Transitioning towards the University Life***

This research was carried out with the purpose of raising awareness on the experiences of children and youth who have lived in foster care homes for either short or long periods of time, as well as the consequences of these experiences. Despite the many consequences that these young people may have to overcome due to their emotional instability, in this project the focus is on their education, academic performance, and achievements throughout their university life. The goal is to provide information about this population, in order to gain greater knowledge of how to support these children and youth. With this information, universities can offer better opportunities as well as specialized resources guided to improve

and maximize the educational experience of the children and youth of this population. Therefore, the objective of this research is to answer questions such as the following: Are universities preventing students from foster care to achieve their educational goals at university or college? Why do young people who live with their biological families have more success in universities? Why is it more difficult for young people who have been in foster care to acquire a bachelor's degree? and what resources should universities provide to this population so that they can reach a high educational level? As a result the audience will receive knowledge of how the success supporting program and other programs on the university campus help this population to manage their traumas and acquire skills to obtain their bachelor's degree.

**Legsdin, Shauna '19**

**118**

Faculty Sponsor, Prof. Hugo Viera

***Conformity through social media***

The purpose of this project is to first summarize the history of U.S. modern online culture since the development of the Internet and more specifically, the development of social media. The research will then focus on building a theoretical framework around the concept of modern online culture and how it impacts individual's social behavior. Given the inherent variety of the online world, this project will focus on the social media outlet Twitter, and its effects on individual conformity to social issues. The literature review will consist of scholarly journals and current articles that focus on the social implications of media use, which media are being utilized and why, how it is reconstructing our society. Theories and concepts about cultural hegemony, individualism, conformity, and mediatization, will also be analyzed and applied. Conclusions will then be made to either support or refute whether or not the online culture impact conformity to social issues presented on Twitter, and in turn, whether or not this online culture is destroying individualism in the United States. Key Terms: Conformity, Cultural Hegemony, Individualism, Mediatization, Social Media, and Social Issue.

**Ovelheiro, Kayla '19**

**153**

Faculty Sponsor, Prof. Adel Fauzetdinova

***The Many Faces of Buenos Aires***

Often times when we visit a city, we are not experts. We go to cities with the best of intentions in order to absorb what these cities have to offer us. We want to see all of the sites and experience the culture and life of the city. As foreigners or tourists, we will never get the same experience of a city as those who live in the city, and that can be dangerous.

***Music***

**Bowler, Elbert J., Eastman, Elliot J. '20**

**212**

Faculty Sponsor, Music Department

***Who Rocked Rock 'n Roll***

Part of the basis for modern Rock 'n Roll rhythms and music motifs has roots in Indigenous American music. Details of the story, RUMBLE, was first aired on PBS.

**Gelinas, Elizabeth '19**

**69**

Faculty Sponsor, Prof. Sonya Lawson

### ***The Valley, a Percussive Soundscape of Western Massachusetts***

The goal of this presentation is to showcase the creative process, planning and knowledge required to write a large scale ensemble composition. A video of my percussion ensemble piece, *The Valley*, will be featured at the beginning of the day's events. During the viewing, audience members will see the finished product of my work, then later via my poster a timeline of a year and a half worth of planning. From the beginning sketches to the comments written on the score by the players, spectators will get a clear idea of the compositional process and the musical growth that it encourages.

**Rodriguez, Robert '19**

**168**

Faculty Sponsor, Prof. Sonya Lawson

#### ***Senior Recital***

My project will focus on the development of my senior composition recital. As a music composition concentration I have to put on a recital that features pieces that I have wrote since I began taking composition lessons. My recital has six pieces on it which are two chorale works, a percussion trio, a marimba piece, a woodwind quartet, and a piano piece. In the same order the names of the pieces are as follows Irish Lullaby, Dreams like Snowflakes, Silenced Cries (No One is Listening), A Week From Home, Variations on Simple Gifts, and A Little Atmosphere. I will show some of the sketches of the pieces as well as discuss what came easy with composing the pieces and what was more challenging. There will also be a section that covers how putting together rehearsals was and the way we worked on the pieces. Part of my presentation will be the performance of my marimba piece, A Week From Home. A Week From Home is based on the harmonic ostinato from Pachelbel's Canon. Every time the ostinato repeats there is a different variation on the melodic idea. The piece starts in the major mode switches to the minor mode and then returns to the major mode to finish where it repeats the most dense section of the previous major mode section.

### ***Sociology***

**Bayen, Hayley '19**

**15**

Faculty Sponsor, Prof. Tamara Smith

#### ***Sexual Consent Policies in Dementia Care During the Era of the #MeToo Movement***

The purpose of this research is to identify the prevalence of written policies regarding sexual consent and sexual activity among dementia patients and residents in nursing homes or residential care facilities. The first portion of this project involves preliminary research to gain a general understanding of dementia, stigma surrounding sexuality, and definitions of sexual consent through the lens of the geriatric population. The next aspect of this project includes research conducted through a series of gathering data of local residential care and nursing homes then calling them to ask questions regarding their policies. This project aims to explore the ageist implications embedded within society surrounding sexuality through a lack of policies. The findings revealed few nursing homes or assisted living facilities who house dementia patients have a written policy regarding sexual activity between residents. These results should open the door for important research, conversations, and policy-making in elder care. This research is necessary because people plagued by dementia lose cognitive functions at varying levels, inhibiting their ability to provide informed consent. This leaves them vulnerable and susceptible to sexual assault, which is explored through the #MeToo movement. Overall, this should allow for more knowledge and understanding about a population that is growing exponentially before our eyes in a socially relevant time.

Faculty Sponsor, Prof. Tamara Smith

***Foster Youth Representation in Prime-time Television***

This study examines foster youth representation through prime-time television portrayals. Youth in the foster care system are portrayed negatively if at all. Using content analysis, this research examines the prevalence of foster youth in television shows. This study examines the number of television shows with foster youth as characters, the number of seasons these shows have been running, the length of the shows in minutes, genre of shows, where the show takes place, how many main characters, are any foster youth apart of the main cast, are the foster youth viewed positively or negatively and if negative, what stereotypes are there. On the four prime channels (ABC, CBS, FOX, NBC), there are not many television shows that have main characters who are/were a part of the foster care system. They are portrayed more negatively if they were a part of the foster care system. Overall, television does not focus on foster youth as main cast characters. When foster youth are portrayed, the majority of foster characters are portrayed negatively and very few are portrayed positively.

Faculty Sponsor, Prof. Tamara Smith & Prof. Gabriel Aquino

***Demographic Variance in Healthcare Inequality***

African Americans; particularly African American Males, are at a higher risk for costly illnesses such as heart disease, yet they receive less treatment have fewer out of pocket costs and little protective health benefits even with a higher socioeconomic status (Assari 2018). To understand the role of societal structures and symbolic interactionism on why African Americans don't benefit from having a higher socioeconomic status, I decided to perform an econometric study at the state level to understand the relationship between geography, demographics, and healthcare spending. Using cross-variable matching I created a data table, from previously published figures from The Office of the Actuary (OACT), Centers for Medicare and Medicaid Services (CMS), Centers for Disease Control and Prevention (CDC), and National Health Expenditure Accounts (NHEA). Using SPSS multiple analyses were used such as descriptive statistics, Analysis of Variance (ANOVA), and Bivariate (Pearson) Correlations. The data showed interesting results in States that had a high percentage of African Americans, especially when it came to life expectancy and Personal Health Care spending. future research would benefit from a mixed method approach as using qualitative methods in addition to the quantitative method would provide an interesting insight in exactly how previous experiences with health care providers has impacted African Americans willingness to receive treatment.

<b>Tessitore, Meghan '19</b>	<b>190</b>
Faculty Sponsor, Prof. Tamara Smith	
<b><i>Yes on 3: The Influence of Legislative Jargon and University Involvement on Voter Comprehension Among College Students</i></b>	
The purpose of this study was to look into student voters' comprehension of Question 3 on the 2018 Massachusetts ballot. A survey was distributed among 50 undergraduate students, including ones who were and were not registered to vote. Results suggest that the university plays little to no role in voter comprehension and decisions among students. It is also apparent that students who are registered to vote have a fairly solid comprehension of Question 3 and the outcomes of a YES or a NO vote. Students who are not registered to vote demonstrated very little comprehension of Question 3.	
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## ***College of Education, Health, and Human Services***

### ***Criminal Justice***

**D'Agata, Angela '19**

**50**

Faculty Sponsor, Prof. Kimberly Tobin

#### ***Substance Abuse Disorder & Criminal Justice***

Substance abuse disorder was recently made a diagnosable disorder in a 2014 revision of the *Diagnostic and Statistical Manual of Mental Health Disorders*, 5th edition (DSM-5). With that, there leaves a number of questions as to how treatment modalities for those who struggle with addiction should change. Now that it is known as being part of a mental illness, it is important to understand how the disorder affects people and how treatment may need to be reconsidered in light of the diagnoses. In this presentation, we will look at how drugs and addiction affect the brain, the DSM-V criterion for Substance Abuse Disorder, and how the community & criminal justice approach to addiction may change as a result of greater understanding of this diagnosis. Through the exploration of current policies on substance abuse disorder among incarcerated populations, policy recommendations will be made highlighting the importance of reconsidering treatment versus punishment of this population.

**Murray, Jenna '19**

**145**

Faculty Sponsor, Prof. Kimberly Tobin

#### ***Adverse Childhood Experiences: Prevention and Intervention in the Juvenile System***

Research shows that children who experience adverse trauma often commit crimes and are consequently incarcerated for those crimes. The problem is, that incarceration is actually a significant factor in recidivism rates. These hurt kids get locked up for their delinquent behavior, which is a reaction to their internal struggles, and are then expected to reintegrate themselves into society after experiencing the hardships of incarceration. How can the juvenile justice system implement efficient prevention and intervention methods to children that come from adverse childhood trauma? I seek to address how these children are processed by the law and what rehabilitative methods are put in place of incarceration facilities. Through an interview with an expert in the field, an interview with an individual who has lived these experiences, and extensive research, I intend to recommend rehabilitative methods that improve the lives and experiences of juvenile delinquents. Based on published research, specific types of intervention methods such as therapy, and family-based treatment have proven to help at-risk children. When it comes to these damaged children, rehabilitation should be valued above retribution.

## ***Economics & Business Management***

**Barnes, Jordan '20**

**12**

Faculty Sponsor, Prof. Kimberly Sherman

#### ***Conflict within Sports Teams***

In the development and growth of group environments often times groups are faced with conflict internally and externally influencing outcomes or production. A clear example of correlation between conflict and groups is the effects observed in sports teams. A question designed for clear research provided is 'How does conflict affect sports teams?' Our purpose is to research how conflict can affect sports teams of all ages. The goal is to find what causes the conflict and how teams can prevent it in the long run, the significance of this research is understanding how these organizational conflicts in sports

can translate into the workforce or other organizations and find effects and resolutions. Our research will be collaborated around team conflicts. In the search for conflict a clear definition must be established, using this definition different types of issues teams face will be identified. Discovering these effects, questions pertaining to the conflict will be asked to see the different aspects face. This will be done by surveying and interviewing the teams that we have selected to see what causes the conflict they face and how they go about solving it. Then compare each team and see what the biggest and most common outcome is throughout these sports teams. Methods used in research will also include surveys and interviews. The sample targeted for data are student athletes and coached during the spring sports season.

**Bass, Danielle '19**

**14**

Faculty Sponsor, Prof. Kimberly Sherman

***Managing-Up: Exploring the Boss and Employee Relationship***

Although research has been done on why managing-up is effective, no research prior has been on studying the relationship between employer and employee, and how their relationships differ due to the efforts of managing up. This research is key because most people in their lifetime will be an employee and possibly a manager. It is worth studying because managers and employees can better understand how their actions at work will affect their relationships. Two hundred people of all ages, ranging from 19-60 years old, were surveyed for this research. One hundred employees were surveyed on their perception of their relationship with their manager, while the other one hundred were managers surveyed on their relationship with their employees. Both surveys focused on how managing-up played a role in the relationship. This study hypothesized that the strongest work relationships are relationships where managing up exists and employees are trying their best to please their boss and follow their requests. The results of this study will add to research on job satisfaction and job success.

**Chambers, Elaina, Dylan Farrick, Sara Gebo, Alexis LaVallee**

**38**

Faculty Sponsor, Prof. Kimberly Sherman

***Favoritism; How Does It Affect Overall Job Satisfaction?***

Favoritism is a commonly known issue in a lot of workplace environments. It often creates issues between hard working employees and their management staff, with employees feeling worthless, or inadequate. This is often found when employees who are not being preferred over others. Hard working employees become frustrated, while those being shown favoritism get lazy and lackadaisical with their work ethics. This topic is well-known but often brushed off the table and ignored, and not investigated thoroughly. This is most commonly found when observing the college community. College students are just entering the professional workforce and can be subject to this treatment often and may not know information about the matter or what they can do about it. Many college students are in work-study positions, or finding temporary work to get themselves through school, and they can find themselves ignored or brushed aside no matter how they work. Furthermore, students fresh out of college tend to get the short end of the stick when it comes to an entry-level position. They are often overlooked for their hard work due to their management having established relationships with rooted employees in their company. For the previous explained reason, we plan to focus on college students for this study. Conducting this research will allow us to see further into the minds of lower level employees and how they react to being treated the way they are.



**Colbert, Adam '19**

41

Faculty Sponsor, Prof. Hillary Sackett-Taylor

***The Process to Detection and Intervention for Children with Impaired Hearing***

Although research has been done on the success of certain diagnosis and treatment strategies to help children with hearing loss, no research has been done that has analyzed the process as a whole and has come up with solutions for creating a faster and more efficient process. Researchers had found valuable diagnosis strategies and treatment strategies and have even found what has prevented children with hearing loss to getting timely detection and intervention. Timely detection and intervention will help close the gap of disadvantages children with hearing loss face compared to normal students. Disadvantages such as performance in school, social skills as well as speech and language skills are caused from their hearing loss and can be condensed with faster and more efficient detection and intervention. Using expert sampling and secondary research, this study will analyze the data and fit together a process that will become more accessible and timely. This semester's work culminates in a research design proposal for addressing detecting and intervening treatment for children with impaired hearing pending available resources.

**Czerniawski, Madison '21**

49

Faculty Sponsor, Prof. Hillary Sackett-Taylor

***What is Your Willingness to Pay for Health Insurance?***

Consumers in the United States pay too much for health care compared to other countries around the world. Statistical data from the last 40 years has shown that countries with universal health care, like Australia and Canada, pay much less for health care/insurance, compared to countries with private health insurance, like the United States. There has been plenty of data showing what a producer is willing to sell their insurance for, it has continuously increased for the years as a result of inflation, few studies exist on what the consumer is willing to pay for their insurance. Therefore, I propose a study that looks specifically at what a consumer is willing to pay for health insurance. This work is significant because health insurance costs in the United States are extremely expensive, and people often must go without their medication to pay their bills. Many studies have been done showing how expensive health care in the United States is compared to other countries, and the costs differences are quite exponential. Pending available resources, I propose a study to expand on the factors that influence what a consumer is willing to pay for health insurance. I would use a combination of surveys and experiments within different geographic regions/socio-economic factors to collect this data.

**Eliza, Jonathan '19**

61

Faculty Sponsor, Prof. Hillary Sackett-Taylor

***Social Proof Heuristics and Unhealthy Eating: How they are Connected***

Jonathan Eliza, Social Proof Heuristics and Unhealthy Eating: How they are connected. The outcome of Healthy Eating Education campaigns of the past have ended in failure. In the research article Social Proof Heuristics and Unhealthy Eating: How they are connected, a systematic review was conducted of research articles exploring the outcomes of prior Healthy Eating Education Campaigns. An academic search yielded 21 results with 5 article being fit for inclusion, all articles used for research concludes that Explicit Healthy Eating Education Campaigns were ineffective however implicit decision making could be influenced. This Research article conducted a second academic literature review of implicit decision making. 128 results were yielded with 4 being fit for inclusion. Upon examination of yielded research

articles Social Proof Heuristics have been shown to influence implicit healthier eating decisions. This research article is connected to unhealthy eating decisions with an emphasis placed on how Social Proof Heuristics can be used to influence healthier eating. The research uses systematic sampling with respondents aged 18 to 34, in the state of Massachusetts, falling into the Lower and Middle Income Brackets. The proposal for this article is to enhance marketing efforts by understanding which social proof heuristic works best with the respondents in this article.

**Gilbert, Patrick '21**

**74**

Faculty Sponsor, Prof. Hillary Sackett-Taylor

***Will occupation therapy, going from master's degree to a doctorate, be cost effective?***

Although there are studies the effects of what happened to occupational therapy's sister study, physical therapy, there has been very minimal research on what the future of occupational therapy will be once the minimum education limit will be raised in 2027. The future of the field is being left somewhat in the dark and this research aims to answer two questions: 1. Will it be worth it to pursue a career in this field after the change is made? And 2. Is it beneficial to all those that are affected by it? 100 people that either are students in occupational therapy and physical therapy schooling and in the workplace, will be surveyed and given questions about what they feel about the change in their respective fields and how it will and has affect them. To gauge what amount of occupational therapy students, say that they feel prepared for their work compared to those in physical therapy. 25 people from each category will be examined The findings that is hoped to be seen is how this change will change the mental health industry and how it can hopefully progress or be able to catch some flaws that may occur because of this. To allow changes that need to happen but to also not cause stagnation and depletion of the work force of occupational therapy so that the field may see a birth of new life later in the 21st century that it is definitely awarded after this time.

**Grady, Michaela '20**

**78**

Faculty Sponsor, Prof. Hillary Sackett-Taylor

***Are State Prison Healthcare Systems Responsible for Poor Health of Prisons and High Post Release Mortality Rates?***

Current research exists on the quality of healthcare in US State Prisons, however questions remain about the role healthcare systems play as the root cause of the poor health of the prison population and the high rates of mortality shortly following release. The prison population in the United States is increasing and not enough is being done to address the poor health of this population. Diseases and sicknesses are spread easily and rapidly throughout prisons. Access to proper healthcare is rare and the level of healthcare in prisons is often compared to a form of "cruel and unusual" punishment. Poor health of the prison population leads to high post-release mortality rates. By bettering the prison healthcare systems, it is hypothesized that the health of the prison population will improve and post-release mortality rates will decrease. Both of these results would not only benefit prisons, but also the general population as a whole. If there are fewer diseases being spread throughout prisons, then fewer diseases will be brought into the public from visitors, staff, and released inmates. My research proposal is to survey inmates about their experiences of healthcare received in prison, and gather data on how many inmates died shortly after release due to health related complications.

**Hoynoski, Carley '19**

95

Faculty Sponsor, Prof. Hillary Sackett-Taylor

***Factors That Motivate Vaccination Decisions***

Although research has been done on the effectiveness of vaccinations, social media influence on decision making regarding vaccination, and religious barriers, there are still questions that remain on what factors motivate vaccination decisions. The research question will be, "What factors motivate vaccination decisions?" The sample frame population will consist of new parents, refugees, and low income individuals with children. My sample technique will utilize stratified sampling which will consist of individuals who are anti-vaccination, individuals who opt for a prolonged timeline of vaccinations, and individuals who opt into only select vaccinations. I will conduct a survey which will ask about socioeconomic status, ethical concerns, vaccination choices for themselves and their children, as well as a section aimed at eliciting reasons for refusal or acceptance of vaccinations. This research design is a proposal for funding to continue this project for motivations regarding vaccination decisions.

**Janisieski, Brandon '20**

99

Faculty Sponsor, Prof. Hillary Sackett

***Healthcare in the U.S: What do people want to see, and are they willing to pay for it?***

The following research proposal will aim to answer the two-following questions regarding the U.S. healthcare system. 1. Do U.S. citizens want to see the current healthcare system changed or altered? 2. Does how much they pay affect their choices? Recent administrations have made changes to the health care system which have been revered or jeered by citizens on both sides of the aisle. In order to determine what people want to see, and whether the potential financial hit is worth it to them, I will conduct a survey of at least 2,000 U.S. citizens across the country online. The survey will consider income level, age, whether the participant has health insurance and roughly how much they pay. A screening process will be used without any context as to what the actual survey is about to weed out undesirable participants such as: people under the age of 18, and those who could stand to directly benefit in health care policy, such as politicians and medical professionals. This should help give the survey credibility and ensure that participants are as unbiased as possible. This project should provide context to what U.S. citizens truly want to see in their health care.

**Joaquin Ortiz, Algenis, Justin Jones, Mike Ceibelli**

101

Faculty Sponsor, Prof. Kimberly Sherman

***What are essential tactics to a negotiation?***

For this research project my group decided to focus on negotiation tactics. To gather our own research, we have decided to create a survey. We are hoping to gather no more than 50 responses, we feel as if any less than 50 will not be enough collection to obtain proper data, and any more than 50 may just be too many responses to read through. The survey consists of five questions ranging from ethical questions, to basic questions about interviews. The end goal is to compile all our findings into a reliable and accurate research paper that displays our study in a professional manner. The idea behind our research topic is to help others and educate ourselves on possible negotiation tactics that may help us and others in their future, when seeking employment as well as several other negotiations throughout our lives.

**Kasaras, Katrina '20**

106

Faculty Sponsor, Prof. Hillary Sackett-Taylor

***Health and Healthcare Cost Benefits from Adopting a Whole Food, Plant-Based Diet***

The purpose of this research proposal is to observe changes in specific health outcomes after participants adopt a whole food plant-based diet. Various studies have been done to show the health benefits of a whole food plant-based diet. These benefits are not limited to just health but also Americans' healthcare costs. As healthcare is becoming a luxury good in the United States, it is crucial to evaluate how much adopting a whole food plant-based diet could potentially make healthcare more affordable for U.S. citizens. However, there is a gap in the research in which there has yet to be a study done revealing the correlation between adopting a whole food plant-based diet and decreasing healthcare costs. This semester's work culminates in a research design proposal for the correlation of a whole food plant-based diet and decreasing healthcare costs pending available resources. I am proposing the use of a stratified sample in an intervention designed study in order to collect the data for this research.

**Luscinski, Benjamin '19**

126

Faculty Sponsor, Prof. Hillary Sackett-Taylor

***Stigma and Its Effects on Treatments***

Existing research on the mental health of college students has found that this population has a higher incidence of suicide. However, the literature is sparse on the causes of these statistics. Although research has been done studying the effect of stigma on outcomes for people diagnosed with mental illness, research is limited in comparing the effect of stigma on a person's ability or willingness to seek treatment for more than one disease. This research proposes to compare the effect stigma has on two populations: 1. People diagnosed with depression or suicidal ideation and 2. People who either have a family history of cancer, have undergone treatment for cancer or are currently in treatment for cancer. This research will utilize surveys, interviews and secondary data to discern the differences between the type and frequency of treatment sought by those with cancer diagnoses versus those with mental health diagnoses, with special consideration for stigma inducing factors.

**MacNeil, Caitlin, Jonah Yeakley**

128

Faculty Sponsor, Prof. Kimberly Sherman

***The Effect Age Has On Money as a Motivator***

Money as the primary motivator in the workplace acts like a barrier for attracting employees, who have to choose what will drive them to succeed in their careers: higher salary or better job satisfaction. Our research question asks if age has an effect on money as a primary motivator. Age is what makes one decide what is more important in a job, and if money will help improve their job performance. We are looking to see patterns where duration of employment and pay grade could factor what pushes people to pick and stay within their chosen workforce. Our hypothesis is that money is a stronger primary motivator for younger generations who value salary more than job satisfaction. However as people age, their motivation to choose or stay in their current job relates to job satisfaction, not a higher salary. A survey will determine if experience and age changes the perception of money overtime.

**Mathews, Jessica '21**

132

Faculty Sponsor, Prof. Hillary Sackett-Taylor

***Cost Effectiveness of Different Cancer Treatments***

Although there has been research about different cancer treatments, there could be a more cost effective option out there. The specific gap that my research is going to address is how a certain treatments cost effectiveness can help you make an educated decision to benefit your health the most. A gap in the literature prevents patients from being able to make educated decisions on their treatment options. This research gap exists because I believe that those who are making a profit off cancer treatments are charging unfair amount for such treatments, thus benefitting more than those receiving the treatments. I will conduct a survey and use secondary data to collect my information within the population of current cancer patients diagnosed after the year of 2008. These patients benefit the most as they will be able to make more informed decisions that will be most beneficial to their health and budget. Most of my findings pertain the the cost effectiveness between different types of therapies and drugs. I hope that with my research I can find something better and cheaper than what existing research has shown so far. This semester's work culminates in a research design proposal for addressing cancer treatments pending available resources.

**Olsson, Francis '19**

150

Faculty Sponsor, Prof. Hillary Sackett-Taylor

***The Availability of Medical Marijuana and Its Effect on the Opioid Overdose Rate***

In the United States over the past two decades there has been a marked and significant rise in the rate of opioid use, abuse, and overdose. According to the National Institute on Drug Abuse (NIDA) more than 130 people die every day from opioids. NIDA and the National Institute of Health (NIH) are currently promoting the research of any options available to stem this crisis. Simultaneously, the use of Medical Marijuana (MMr) to treat pain has been popularized and legalized in many states. Despite the known benefits of MMr in pain treatment, there has been minimal research into how its use can reduce an individual's proclivity to opioid addiction. The literature has pointed to an Opioid Sparing Effect (OSE) of MMr, meaning that the use of the two drugs in conjunction can provide similar pain treatment for patients, with lower opioid usage. The literature surrounding this topic does not adequately address the connection between the legal availability of MMr and the opioid overdose rate. I will survey individuals who are in recovery from opioid addiction on the circumstances that lead them to opioid abuse and whether or not MMr had any affect on their pattern of abuse. Through these surveys, along with city overdose data, I will determine the effect that the availability of MMr has on the opioid overdose rate. My research this semester will build to a completed research proposal that can be submitted to the NIH or a similar government agency to fund this study.

**Oskar, Elli-Ann '20**

152

Faculty Sponsor, Prof. Hillary Sackett-Taylor

***Importance of Perinatal Dental Care***

Although research has been done showing the importance of dental care for pregnant women, little research shows the effect MassHealth has on the accessibility of dental care for low-income pregnant women in Massachusetts. This study will focus on low-income pregnant women, 18-30 years old. This study will also sample dentists in Massachusetts who do/don't accept MassHealth patients. This research will use secondary data and survey data to collect information on these groups. The questions asked to

pregnant women will include their income and insurance provider to ensure they are part of MassHealth, the state of their pregnancy to ensure consistency is kept within all members of this sampling group, and their dental history. For the sampling group of dentists, they will be asked who they accept, whether or not they accept MassHealth patients, their reasoning for accepting or denying MassHealth patients, the cost or benefit of their decision, and the number of patients they see who are pregnant. This research design is a proposal for funds to research perinatal dental care.

**Santiago, Sabrina '19**

172

Faculty Sponsor, Prof. Hillary Sackett-Taylor

***The Effects of High Healthcare Costs on Patient Choice of Care Delivery***

Previous research has examined and explained the high health-care costs in the United States, and some researchers have provided possible solutions to this health crisis. Yet no research prior to this one has proposed why we as individuals abide by this system and how we as future entrepreneurs can fix this problem. This health care crisis continues to worsen as health care costs increase and the number of people insured decrease. The high costs are not providing better care compared to other countries or longer life expectancy rates leading us to conclude the costs are due to other reasons outside of better health care. In order to understand the effects of this problem an experiment should be conducted, with systematic sampling of people insured, uninsured, and people who pay premium plans of insurance who have minimal coverage. In this experiment the subjects who seek medical attention are either not told about costs or are told. This is to see how knowing the costs of health care will affect people from wanting the medical attention or from deciding to seek medication on their own. This proposal hypothesizes that people more affected by prices like the uninsured will desire to seek their own medication and opt out from receiving health care at the hospital. This proposal should help provide evidence of the reasons why individuals choose to follow this system, and how the high health-care costs impact people seeking health care.

**Walker, Shadique '19**

202

Faculty Sponsor, Prof. Hillary Sackett-Taylor

***Brighter Futures For Youth***

This research will examine the role unintended pregnancy has on youth outcomes. Some believe that a reduction in unintended pregnancy in the US would create brighter futures for youth, although some may disagree. Similar research has been recorded in other countries, like China where they have a one-child policy. Mandatory family planning treatment, such as contraception and abortion services, for teenagers 17 and under would give them an opportunity to grow older with less responsibility to a child. It can cause a conflict in society because of the varying attitudes towards the “rights” of the growing organism in the woman’s body. However, there are those that believe that after a couple of generations it will become a norm and we will look at all life as more equal. This semester’s work culminates in a research design proposal for addressing the morally challenging decision of treatment for teenage pregnancy in order to create better opportunities for brighter futures for the youth. Pregnant female participants will be monetarily incentivized and provided with psychiatric and physical health care as part of their inclusion in the study.

**Youngerman, David '20**

**209**

Faculty Sponsor, Prof. Hillary Sackett-Taylor

***The Pharmaceutical Influence***

This project aims to investigate the process by which holistic drugs are assigned into the illegal schedule 1 category by the Federal Drug Administration. Many find the process itself questionable and potentially subjective based on profit-driven interests on behalf of the pharmaceutical industry. The gap in the existing literature that I propose to address is the connection between the pharmaceutical companies and the Food and Drug Administration and how money potentially influences the favorable reports of these institutions. The FDA need funding to carry out drug research trials and create their reports. This research is important because it will create more transparency with the American public. I will utilize secondary data statistics on drug categorization, arrests and seizures, as well as public financial reports on several healthcare variables. Interviews healthcare professionals and government agency employees will complement the existing data for analysis. The purpose of this research is to develop a proposal for grant funding of this project.

***Movement Science, Sports, and Leisure Studies***

**Adams, Carolyn**

**Oral Pres**

Faculty Sponsor, Prof. Lynn Pantuosco-Hensch

***Effects TBI's have on Developing brains***

It is widely known that traumatic brain injuries are extremely serious. Injuries such as these should be evaluated in a timely manner to ensure that the injury does not get worse and manage it as quick as possible. When traumatic brain injuries occur in children, it can impact their cognitive development as they're still developing. This can cause children to have decreased academic performance, behavioral problems, increased depression, and even increased suicide rates. In children with traumatic brain injuries, there are higher risk of bullying as well. It is crucial to share messages about head safety in and out of sport with parents, coaches, and medical professionals in order to reduce the risks of long term problems associated with TBI.

**Breton, Rachel D.**

**22**

Faculty Sponsor, Prof. Lynn Pantuosco-Hensch

***Can Exercise be used as a Natural Treatment for Pain?***

Presently, pain medication such as opioids is dispensed frequently and addiction to this medication is on the rise. It is less known that the body actually has its own way of blocking pain. Pain can be naturally reduced when the body releases natural endogenous opioids and its produced through exercise. This phenomenon is referred to as exercise induced analgesia, or inability to feel pain. By using exercise to block pain, people can reduce dependency on pharmaceutical approaches. A more natural approach allows the body to heal itself, which is often a healthier decision.

**Brett, Patrick '19**

**24**

Faculty Sponsor, Prof. Lynn Pantuosco-Hensch

***Stability Shoes and Their Effect on Reducing Running Related Injuries***

A stability shoe is a running shoe that is designed to help correct and eliminate over-pronation which is when the foot rolls inward during running and walking. The shoes are constructed with a comfortable foam composing most of the midsole while a denser material is placed under the heel and arch. The

review of literature examined different groups of runners and had them run in recommended shoes based on a Foot Posture Index for a set time while they tracked training and injuries. Research suggests that highly-pronated people may benefit more from a more rigid stability shoe compared to those with a neutral foot.

**Brown, Daria '19**

119

Faculty Sponsor, Prof. Lynn Pantuosco-Hensch

***Exercise as an Adjunct for Substance Abuse Disorder***

Substance abuse disorder is a medical condition that occurs when an individual uses substances with repeated use and dependence leading to impairment and distress as well as a variety of chronic health issues. A review of literature shows that mental health disorders such as clinical depression, anxiety, and post traumatic stress disorder may often result in substance abuse disorder. Those with substance abuse disorder have been reported to have a poor quality of life, low self esteem, decreased self efficacy, and decreased functioning. The Literature also suggests that exercise may be helpful aid in the rehabilitative process. Practical implications for those with substance abuse disorder are that exercise and physical activity can provide long term effects such as self efficacy and improved fitness which can help raise confidence, self esteem and most importantly improve quality of life for this population.

**Colcord, Emma Rose '20**

42

Faculty Sponsor, Prof. Holly Noun

***Where should I live: The Effect of Altitude on Functional Status in Cardiovascular Patients***

Cardiovascular disease is one of the leading causes of death in America. Research has shown that living at higher altitudes improves cardiovascular health and overall well-being. We consider altitude when discussing athletic performance; why not do the same when it comes to cardiovascular diseases? By measuring oxygen consumption and cardiac output, we can see the impact of living at altitudes on the functional status of individuals diagnosed with a cardiovascular disease. A search was conducted for current literature related to cardiovascular disease and altitude and the five most relevant studies were considered. Researchers considered the variables of living at altitudes, functional capacity, and cardiovascular disease. Results were mixed with regard to the impact of living at higher altitudes on functional capacity but health status was not standardized. These results identify the need to do further research to clarify if altitude has an impact on functional capacity of a specific health status. A potential direction to look at is at a specific cardiovascular disease and the effects of varying altitudes. The clinical bottom line, is although there is evidence to show that there is an impact of increasing altitude on functional status, more needs to be done. Additional research needs to be conducted to investigate the effect of living at different altitudes on the functional status of someone with a cardiovascular disease specifically. Through gathering this information, an improvement in quality of cardiac rehabilitation, exercise, and lifestyle choice in where they live and what they do may be seen.

**Cronin, Troy '19**

47

Faculty Sponsor, Prof. Lynn Pantuosco-Hensch

***Amputee Satisfaction with Prosthetic Suspension and Overall Care***

Safety, comfort, functionality and ease of use are considered the most important aspects of prosthetic satisfaction. Choosing the proper suspension devices will help patients in all of these categories. A prosthetic suspension device is technology that secures the limb into the prosthetic socket. A review of



literature showed that having the proper prosthetic suspension devices is essential to overall amputee prosthetic satisfaction and can help people to achieve their dreams without limitations.

**Doyle, Erin '20**

**59**

Faculty Sponsor, Prof. Amanda Salacinski

***A community-based water aerobics program improves perception of health in breast cancer survivors and caregivers.***

Given that cancer survivors are faced with a number of treatment and related morbidities, there is a need to help improve their quality of life; as well as their caregivers. The purpose of the study was to examine the breast cancer survivors and their caregivers perceptions of health and quality of life through exercise over two years. A total of 56 survivors and caregivers participated in the first year of the program and 67 in the second year. The intervention was three 15-week water aerobics sessions offered twice a week over the course of two years. All participants self-reported an increase in their range of motion, flexibility, mobility, and quality of life in both the first and the second year. Little to no research has evaluated the effectiveness of a water aerobics exercise intervention on measure of quality of life, fatigue, and health status in this population, especially the caregivers. Therefore, exercise can lead to an increase in quality of life and overall health. The exercise intervention extends the Rays of Hope efforts to expand the developments in cancer research and treatment advancement in important ways. It aims to increase the quality of life and decrease the risk of cancer recurrence in survivors or occurrence in the caregivers. The exercise program is expanding and offering community outreach, as well as supporting patients and caregivers through the continuum of care that acknowledges the needs of the whole person.

**Fitzgerald, Lauren '19**

**64**

Faculty Sponsor, Prof. Lynn Pantuosco-Hensch

***Ergogenic Effects of Caffeine with Athletic Performance***

An ergogenic is defined as an aid intended to enhance physical performance, stamina or recovery. In this research, caffeine use was reviewed to see what ergogenic effects would occur during athletic performance. A review of literature showed different groups of athletes, improvement with athletic performance, response time, increase heart rate and it reduced perception on effort during high intensity exercises were associated with caffeine use. Studies showed the different effects caffeine has on athletic performances. Through education and nutrition information, consumers can be informed about the ergogenic effects of caffeine.

**Fuller, Kyle E. '19**

**66**

Faculty Sponsor, Prof. Paul Cacolice

***Does a 3D printed orthopedic cast provide the same healing effects as traditional casting techniques for upper extremity long bone fractures?***

Focused clinical question: Upper extremity long bone fractures are a common injury in athletics, and are traditionally casted using fiberglass and plaster. A new way of casting being explored is using 3D printing techniques. The 3D printing technique may offer a similar healing time with improved patient comfort and functionality. Data sources: A literature search was performed. Articles were selected based on a search of five electronic databases using a Boolean string and Mesh terms and additionally a hand search. Study selection: A very limited number of articles was found with this strategy. Inclusion criteria was human patients with upper extremity long bone fractures, and excluded if they had patients with lower

extremity fractures, non-human, and fractures with internal fixation. Three articles were chosen based on the criteria. Data extraction: The researchers took a score for patient functionality for both a 3D printed splint and traditional casting methods. The data was then compared and discussed by the researchers. Summary measures: All three studies found that the patient functionality and comfort were increased with the 3D cast in comparison with the traditional casting methods. Conclusions: The overall combined results from the articles was that healing time and effectiveness needs to be further researched but patient comfort and functionality is improved with the 3D cast/splint rather than the traditional casting method.

**Gaglias, Kate '19**

**67**

Faculty Sponsor, Prof. Paul Cacolice

***The Effect of Hyperbaric Oxygen Therapy on Active Individuals with Mild Traumatic Brain Injury Symptoms***

Focused Clinical Question: Can hyperbaric oxygen therapy (HBOT) enhance metabolic healing and decrease prolonged symptoms in active individuals with mild traumatic brain injury (mTBI)? Data Sources: Multiple electronic medical databases and a hand search were utilized. The PICO search was P: (mild traumatic brain injury) OR (concussion) I: HBOT; C: none; O: (symptoms) OR (cognitive) Study Selection: Inclusion criteria included research written in the English language, published within the last 10 years, conducted on a human population, and Centre of Evidence Based Medicine (CEBM) level two evidence or higher. Exclusion criteria were studies conducting research on animals or human subjects over 70 years old. Data Extraction: Group means, standard deviations, significance, and effect size were gathered when provided. Summary Measures: Reported measures included mTBI-related symptoms and cognitive changes. Evidence Appraisal: Based on the CEBM classification, there were four randomized clinical trials and one prospective cohort. Search Results: Six articles were found using the PICO search, and five of them were utilized for this CAT. Data Synthesis: Three articles reported no statistical significance in using HBOT and two articles reported significance. Calculated effect size ranged from  $r = .196-.659$ , classified as moderate to large. Evidence Quality: PEDro scores were calculated ranging 6-8 out of 10. Internal validity was based upon high levels of agreement with PICO parameters. Due to such agreement, generalization of these findings would be limited. Conclusion: Evidence that hyperbaric oxygen therapy is effective in treating active individuals with symptoms from mild traumatic brain injury symptoms remains inconclusive.

**Gerrior, Christopher '19**

**71**

Faculty Sponsor, Prof. Lynn Pantuosco Hensch

***Interventions and Approaches to Reduce Glycosylated Hemoglobin Levels in Type II Diabetics through Various Forms of Exercise***

Glycosylated hemoglobin (HbA1c) is one of the major clinical implications in determining if an individual has diabetes mellitus. Individuals with HbA1c levels greater than 6.5 are considered to be diabetics. Individuals who are diagnosed with Type II diabetes tend to have much higher HbA1c levels. Research has found that decreasing HbA1c levels by 1% can reduce the risk of microvascular complications, such as retinopathy, neuropathy, and diabetic nephropathy, by 25%. Additionally, reducing HbA1c levels by 1% has been shown to reduce the likelihood of diabetic related cardiac defects, such as heart failure, by 43%. There are many different approaches which may be utilized in order to reduce HbA1c levels in Type II diabetics. Different variations of exercise, such as aerobic training and resistance training, have been examined regarding HbA1c levels in Type II diabetics. A review of

literature was conducted to determine if resistance training, aerobic training, or a combination of both resistance training and aerobic training, is the most efficient and effective way of reducing HbA1c levels and preventing diabetic complications in individuals with Type II diabetes.

**Groux, Monique Susanne '19**

**84**

Faculty Sponsor, Prof. Paul Cacolice

***Does physical activity have a similar neurological effect as medication on attention disorders?***

Focused Clinical Question: Can physical activity have a similar neurological effects as medication in people with attention disorders? Data Sources: Multiple electronic databases pulse a hand search was used. Study Selection: A PICO was used along with a search string. (p): People who have been diagnosed with an attention disorder diagnosed by a doctors using the DSM scale. (I): physical activity (C): medication (O): Change Neurofeedback between interventions as measured with EMG. The Inclusion Criteria for article selection was and age requirement (13-25) Adolescents to college, and all elements of PICO must be found in all articles Data Extraction: Sample size, Standard Deviation, Statistics and effect size Summary Measures: No investigations resulted in statistical significance. Evidence Appraisal: Centre of Evidence Based medicine, level of evidence and PEDro scoring. Search Results: 42 articles were found with original search and 5 were identified based off inclusion criteria. Parameters on medicine, exercise with EMG Data Synthesis: Effect size was calculated with Cohen's d values for each investigation. Evidence Quality: PEDro scores were reports ranging on a score of four to seven. Papers were all level 1B according to CEBM. There were challenges to insure internal validity based on our PICO. There is greater external validity based on lack of persist internal validity. Conclusion: The Literature does support that they both have a stimulating neurologic effect. However the literature does not support that medication and exercise, do not have a similar neurological effect on Attention Disorders.

**Kane, Ryan '19**

**105**

Faculty Sponsor, Prof. Lynn Pantuosco-Hensch

***Athlete Burnout: Prevention and Treatment***

Athlete burnout is a complex psychological and physiological phenomenon. Symptoms include depression and sport devaluation. A review of the literature showed that coaches play a critical role in the treatment and prevention of athlete burnout. Unfortunately, many coaches aren't aware of the many ways they can help their athletes combat burnout. More coach and athlete awareness about burnout could assist with tackling a widespread problem in athletics. Practical suggestions for prevention include planned phases of easier training, as well as promoting autonomy among athletes. Practical suggestions for treatment include reducing the volume and specificity of training, or temporarily ceasing training in severe cases.

**Lanoue, Dan '19**

**114**

Faculty Sponsor, Prof. Paul Cacolice

***Does the clinical assessment of acute sports-related concussions correlate with changes in brain white matter tract integrity?***

Focused Clinical Question: Are objective physiological-based neuroimaging techniques able to aid in the diagnosis of acute sports-related concussions (SRC)? Data Sources: The following databases were searched utilizing the PICO search strategy; P: Acute sports-related concussion, I: White matter tract integrity, C: None, O: Clinical assessment. A collection of scholarly sources was utilized. Study

Selection: Published scholarly sources were utilized if all inclusion and exclusion criteria were met as well as being at or above level 3 evidence determined by the Evidence-Based Medicine Levels of Evidence criterion. Data Extraction: Group means, standard deviations, significance, Cohen's d effect size, and Pearson r correlation coefficients were extracted. Summary Measures: The primary reported measure included associates the acute changes in brain white matter integrity (WMI) quantified from Diffusion Tensor Imaging (DTI) with the clinical outcome measures utilized with the clinical assessment of SRC. Evidence Appraisal: The Centre of Evidence-Based Medicine classifies the three sources utilized as prospective cohort studies. Search Results: Four studies were found using the PICO search with only three meeting all inclusion/exclusion criterion. Effect size was extracted and classify as moderate to large with a range from  $r = 0.478-0.862$ . Data Synthesis: All three articles reported statistically significant correlation between WMI and clinical outcome measures utilized with the clinical assessment of SRC. Evidence Quality: PEDro scores for the selected studies ranged from 5-7. Conclusion: The findings provide evidence supporting acute changes in WMI correlate with the clinical outcome measures most commonly used with the clinical assessment of SRC.

**Loughman, Emily '19**

123

Faculty Sponsor, Prof. Lynn Pantuosco Hensch

***Effects of Aerobic Exercise on Mental Health***

Depression and Anxiety are more frequently reported mental health issues that occur within every age group. Many people turn to taking medications to control the symptoms related to these conditions but the medications have possible side effects of their own. Therefore, alternative ways to improve and/or treat symptoms should be explored. In particular, exercise has been thought to improve mood and release endorphins, among other health benefits. A review of literature will be presented on findings related to exercise and its possible benefits to the treatment of both depression and anxiety, along with other forms of mental illness. These findings could be beneficial for both healthcare providers and patients in order to be aware of all of the possible treatment options, especially options that do not include taking medications.

**Lucey, Evan '19**

124

Faculty Sponsor, Prof. Lynn Pantuosco-Hensch

***Aerobic Exercise: A Potential Non-Pharmacological Modality in the Treatment of Dementia***

With the modern population of the United States aging at a significant rate, age-related neurodegenerative dementia is becoming an increasingly more prevalent disease. Dementia is an incurable disease characterized by progressive cognitive decline. Treatment typically involves intensive medication regimens accompanied by occupational and rehabilitation therapy. Although these strategies can help slow the progression of symptoms, there is no definite treatment that can prevent neurodegeneration. The present literature review examines aerobic exercise and its capability as a treatment for patients diagnosed with dementia. Several studies have suggested that aerobic exercise can be utilized to prevent the onset of dementia in healthy adults. Furthermore, the literature also suggests that routine aerobic exercise may help sustain or increase cognitive function in populations diagnosed with dementia.

**Mongeon, Morgan '19**

140

Faculty Sponsor, Prof. Lynn Pantuosco-Hensch

***How increased neuromuscular control can decrease the risk of knee injuries in athletes***

Knee ligament injuries are common problems for athletes across all sports, ages and genders. The most common injury is a torn Anterior Cruciate Ligament. ACL injuries can be both contact and non-contact, resulting in a partial or complete tear. Previous research mainly focused on lower limb strengthening to avoid these types of injuries. However recent literature has explored the benefits of neuromuscular control in order to prevent these types of injuries.

**Payne, Marcus '19**

58

Faculty Sponsor, Prof. Lynn Pantuosco-Hensch

***What Effects Does Aerobic And Progressive Resistance training Programs Have On Myasthenia Gravis?***

This research focuses on how aerobic exercise, and progressive resistance training in both supervised and home-based exercise programs effect respiratory muscle volume, endurance, muscle strength and neuromuscular coordination in Myasthenia Gravis (MG) patients. Myasthenia Gravis is a chronic autoimmune disease of the neuromuscular junction that is characterized by fluctuating weakness of voluntary muscle groups. This weakness results from antibodies binding to acetylcholine receptors, leading to decreased muscle and nerve innervation. In this study 10 research articles were reviewed that utilized the use of aerobic, and progressive resistance training in both supervised and home-based exercise programs to show its effects on respiratory muscle endurance, respiratory volume, respiratory endurance time, muscle strength, and neuromuscular coordination. This Evidence Based Practice (EBP) found that resistance and aerobic exercise improves neuromuscular function and respiratory endurance long-term in patients with MG. Evidence also found that exercise leads to changes in mediators of inflammation, improved quality of life, increases in respiratory endurance time, respiratory volume, and that the benefits of these respiratory training programs are maintained over time due to the improvements in neuromuscular coordination. Resistance training programs found that muscle strength is increased but primarily in the proximal leg muscles.

**Phillips, Jason '19**

159

Faculty Sponsor, Prof. Lynn Pantuosco-Hensch

***How Different Exercise Programs Improve QoL in Geriatrics***

As we age, the Quality of Life (QoL) we experience can negatively impact us as we live. In the review of literature, exercise programs were implemented for the elderly to participate in. Improvements in QoL, were similar and obtained by various exercise programs. With this finding, it is important that exercise programs are implemented to better the lives of the geriatric community

**Sheehan, Rachel '19**

175

Faculty Sponsor, Prof. Paul Cacolice

***Does Adding Elastic Bands to the Barbell Back Squat Increase Power in Athletes?***

Focused Clinical Question: Does adding Elastic Bands to the Barbell Back Squat Increase Power in Athletes? Data Sources: A literature search using multiple electronic databases plus a hand search was performed to answer the research question. Study Selection: The PICO search strategy that was used Population: Athletes, Intervention: Elastic bands added to a barbell, Comparison: No Bands, Outcome:

Does the band improve power in athletes. Inclusion criteria is the addition of elastic bands to a back squat, athletes, limited to English, human subjects. Exclusion criteria is if Non-athletes and does not measure power. Articles were kept if they met all the listed inclusion and exclusion criteria. Data Extraction: Sample means, standard deviations and effect size. Summary Measures: Statistical significance was set at  $p < .05$ . One article showed statistical significance and two did not. Mean power values were used for comparing the significance between the two groups. Evidence Appraisal: Centre of Evidence Based Medicine, level of evidence and PEDro scoring. Search Results: Five articles were found only three met all criteria. Data Synthesis: Power was increased significantly (from 1434.03+- 438.15 to 1499.85+- 471.06) with bands than without bands. Evidence Quality: Research articles were assessed through PEDro to determine the internal validity of the trial. Scores were on a scale from four to seven out of 10. There is greater external validity based on lack of internal validity. Articles are level 1b according to CEBM. Conclusion: The literature supports that the addition of elastic bands to the back squat can increase power when combined with the correct exercise program.

### **Wray, Chevanese**

214

Faculty Sponsor, Prof. Lynn Pantuosco-Hensch

#### ***Effects of Sickle Cell Anemia on Physical Activity***

Sickle cell anemia, is a disease that is known to shorten life genetically. This genetic disorder causes the expression of defective hemoglobin resulting in irregularly shaped red blood cells, known as “sickle cells.” Sickle cells cause health issues in the body such as: blood buildup, painful attacks, and even strokes. In the review of literature, it aimed to evaluate the impairments of physical functioning and exercise, and to develop and educate a safe environment for this population by taking the right precautions while exercising. Patients are advised to start exercise slowly and progressively, to maintain adequate hydration during and after exercise, to avoid cold exposure or sudden change in temperature, and to avoid sports associated with mechanical trauma.

## ***Nursing***

### **Allivato, Jamie '19**

4

Faculty Sponsor, Prof. Susan Scott

#### ***Early Identification of Sepsis in the Acute Care Setting***

Patients who suffer from infections are at risk for developing sepsis, a potentially life-threatening condition. Early sepsis identification is key to high quality patient care, and it is the responsibility of the nurse to recognize these signs and symptoms as soon as possible so that interventions can be instituted. This scholarly project was conducted to analyze current research on the early indicators of sepsis. A review of literature was conducted utilizing peer-reviewed, scholarly articles. Research was collected from 4 research based, up to date, scholarly articles. An educational session utilizing both visual and auditory information was then developed based on the results of the research. This session was presented to nursing staff in an acute care setting. The goal of the presentation was to increase nursing knowledge early identification of sepsis.

**Andersen, Rebecca '19**

6

Faculty Sponsor, Prof. Joan Kuhnly

***Flu Vaccine and Today's Society***

Every year, the medical field encourages the population to receive an influenza vaccine to prevent the flu. However, there is still a portion of society that does not receive the vaccine regularly. This project takes a close look into the amount of clients that declined the vaccine for the 2018-2019 flu season, as well as their reasoning for declining. Although the focused population is United States Veterans that receive primary care services from the Veteran Affairs Medical Program, many of the beliefs are found across all populations. The more individuals that receive a vaccine, the stronger an immunity the population as a whole has. Thus helping to prevent those that are unable to receive the vaccine avoid the flu. The more education people have, the more likely they are to receive the influenza vaccine. With the research, barriers to care and common reasons for not getting the vaccine arose. The research conducted was through a literature search for peer-reviewed articles, reading recent statistics from the Center for Disease Control (CDC), along with asking veterans their opinions on the vaccine through telephone calls. The information found on this poster will include the barriers of care and reasons to get the vaccine.

**Boden, Alexandra '20**

19

Faculty Sponsor, Prof. Joan Kuhnly

***Endometriosis: Exploring Treatment For Fertility***

Endometriosis is a disease that affects a woman's fertility for future pregnancies. Laparoscopic ablation and hormone therapy have been used as both a method for pain management and as a method to improve fertility in endometriosis patients. With the use of laparoscopic ablation, the endometrial tissue that forms in the pelvic and abdominal cavity is destroyed and cauterized leading to less pain related to menstrual fluctuations and improved fertility. While laparoscopic ablation improves fertility and pain, it does not stop the growth of endometrial tissue outside of the respective reproductive organs. Hormone therapy inhibits the growth of endometrial implants by suppressing menstruation, but does not destroy existing endometrial tissue. This scholarly project was conducted to synthesize and analyze current research to identify whether endometriosis patients ages 14 to 44 who underwent laparoscopic ablation or who received hormone therapy had better outcomes in fertility. A review of current literature was conducted on scholarly, peer-reviewed articles. The literature included a systematic review of randomized controlled trials, quantitative research, an observational study, literature reviews and practice recommendations from the Journal of Obstetric, Gynecologic, and Neonatal Nursing. The evidence concluded that endometriosis patients who undergo laparoscopic ablation have better fertility outcomes than patients who solely use hormone therapy. This scholarly project also proposes a planned test of change based on the Plan Do Study Act (PDSA) model to be used as a foundation to implement evidence-based research into clinical care that could potentially increase fertility rates among endometriosis patients and increase patient satisfaction.

**Brochu, Nicole '19**

26

Faculty Sponsor, Prof. Joan Kuhnly

***Chromotherapy and Its Effects on Mental Health***

Chromotherapy is the science of using colors to adjust body vibrations. Each vibration can be related to a psychological symptom. The way we see colors can predict the type of moods we will present. Secondary colors compared to white colors in an inpatient psychiatry unit possess a greater change in mental status

in the patients, during their stay. The purpose of this evidence based practice project is to explore how color affects the way we cope as human beings during a time of crisis. With the research and evidence, a conclusion of different colors on a wall other than white, show a greater, positive impact of patient's emotions. White color walls show sterility, and open space, causing fear and emptiness in those surrounded by white. Warm colors such as red and yellow can energize those who suffer from depression, to get out of bed and be active. Cool colors such as blue, purple and green can calm one who suffers from anxiety, ADHD, or paranoia. This quality improvement findings may aid unit managers, psychiatrist, and therapist in determining the best background color for their office or unit, in order to support their patients and their mental health.

**Burnette, Charity '19**

**33**

Faculty Sponsor, Prof. Sue Scott

***The Prevalence of Delirium in Sedated Patients Who Receive Scheduled Sedation Vacations*** In the critical care setting, many patients are chemically sedated to facilitate critical care interventions including mechanical ventilation. Many of these patients develop delirium later in their hospital stay. "Sedation vacations" in which chemical sedation is discontinued to assess patient responses while off sedation are conducted daily if medically safe to do so. The purpose of this project was review the literature around sedation vacations and determine there was evidence suggesting that sedation vacations in critically ill patients reduced the incidence of delirium during their hospital stay. A review on current literature was conducted and the evidence suggested that sedation vacations do not decrease the rate of delirium though they were found to reduce the amount and duration of sedation in patients in the intensive care unit.

**Collier, Sara '19**

**43**

Faculty Sponsor, Prof. Joan Kuhnly

***Implementation of Intermediate Care Unit into Nursing Protocols***

At Baystate Noble Hospital, a new intermediate care unit has been implemented for patients who aren't critical enough for an intensive care unit and are too unstable for what care on a basic telemetry unit provides. There has not been significant research done on how intermediate care guidelines affect nursing outcomes. However, evidence does exist on the implementation process of such intermediate units. By specifying admission criteria and nursing interventions, relevant information can be obtained related to improvements in nursing orientation and staffing guidelines. A mixed methods analysis evaluates how identifying the guidelines for intermediate care contributes to the interventions that nurses on the unit must complete. Through thorough research of how intermediate care units are run, establishing specific admission criteria for intermediate care patients, and creating a checklist for nursing orientation on the new unit, nurses will have a better understanding of how the unit operates. This scholarly project analyzed existing evidence on implementation process for intermediate units and by educating the nurses on the data collected, nurses will feel more comfortable and supported by the facility through the change process. This research will be applicable to new nurses orienting on the intermediate care unit, as well as creating a better understanding of staffing needs. Future study should focus on evaluation of implementation guidelines and its impact on patient outcomes.



**DaMotta, Margaret '20, Sydney Slattery '20, Taylor Nodwell '20,**

**51**

**Jashley Baez '20, Julia Lacopo '20**

Faculty Sponsor, Prof. Joan Kuhnly

***Pet Therapy and Patient Satisfaction***

Pet therapy, also known as animal assisted therapy, is sometimes used in hospitals as an alternative way to improve patient satisfaction. This practice is seen more in long term care facilities but could potentially be helpful in a variety of inpatient hospital settings as well. This scholarly project was conducted to synthesize and analyze current research to identify whether patient satisfaction increased with the implementation of an animal assisted therapy, specifically a dog assisted therapy, program. A review of current literature was conducted on scholarly, peer-reviewed articles to find information about the potential implementation of pet therapy in settings such as: trauma, palliative care (symptom relief from a serious illness), and two different pediatrics settings. The evidence supports that pet therapy could potentially improve patient satisfaction in hospitalized patients. Based on this evidence, this project will propose implementation of an evidence based practice program of pet therapy for hospitalized patients with planned analysis of outcomes using a Plan-Do-Study-Act (PDSA) cycle of quality improvement.

**Guimond, Johanna '19**

**85**

Faculty Sponsor, Prof. Joan Kuhnly

***Promoting Patient Inclusion in Determining Plans of Care***

Communication among nurses and their patients is the most effective tool in order to create the caregiver-patient relationship that is the base of well-provided, patient-centered care. In clinical settings, nursing care plans provide a direction for the individualized care of each patient. Each care plan is specified to the patient's diagnoses and needs, assuring continuity of care. These care plans stands as a communication tool between nurses and the interprofessional team. Although these tools lay out the foundation of what goals the health care team would like to be accomplished in a certain time frame, one big contributing factor that is lacking is the collaboration with patients in determining their own plan of care goals, and understanding of healthcare knowledge. Nurses often stick to what they believe would work best, while advocating for the patient. This scholarly project reviewed evidence that demonstrates collaborating with patients in creating their care goals and improving their health knowledge ultimately will improve outcomes, reduce healthcare costs, and create safer environments. According to the Joint Commission's, "Speak Up" initiative, giving the opportunity to patients to become an active participant in their care and health knowledge, creates the foundation for patients to be advocates of their care. Provision of this evidence to hospital staff will lay the foundation for implementation of patient collaboration in their plan of care.

**Guzm'n-Escalera, Natalie '19**

**86**

Faculty Sponsor, Prof. Jennifer Pappas

***Nutrition and Foot Care in Older Adults with Diabetes***

Diabetes is a prevalent disease in the United States. Diabetes can lead to complications such as cardiovascular disease, neuropathy, retinopathy, wounds, hearing impairment, and depression. The CDC reported in 2017 that more than 100 million Americans have diabetes or prediabetes. In Massachusetts, diabetes prevalence increases with age with 18.5% of the 65 to 74 age group and 22.8% of the 75 and older age group afflicted. Patients with diabetes are routinely seen by health care professionals to monitor the effectiveness of their treatment plan. Education may be provided upon diagnosis of this disease, but

there is a lack of reevaluating the patient's understanding of proper foot care and nutrition. A handout on which foods to choose or avoid and what steps can be taken every day to prevent any complications would be beneficial for the patient to review in between health visits.

**Hoeg, Hannah '20, Mollie Devoie '20, Lily Howes '20, Emelia McCarron '20** **92**

Faculty Sponsor, Prof. Joan Kuhnly

***Benefits of a Brief Rest Period and Gradual Return to Activity to Improve Post-Concussion, Short and Long-Term Effects***

Currently, the main treatment for concussions is “strict rest” both physical and mental rest. Medical providers recommend that patients rest until they are no longer symptomatic for 24 consecutive hours, which can take as long as two weeks to one month. This project was conducted to question this current practice and analyze more recent research regarding gradual return to activity with minimal rest period post-concussion. This topic is important because within the healthcare field, it is evident that prolonged rest periods negatively affect academic outcomes and physical activity tolerance in sports-related concussions. This new evidence suggests that a brief rest period and a gradual return to activity is more beneficial for both short and long-term effects, compared to strict-activity rest, both physical and mental. Based on this evidence, this project will propose a post-concussion program integrated into college athletic programs in order to help college student athletes who participate in sports that sustain a concussion. In order to educate these student athletes, we will create a poster presentation that they must attend during a class period. We will also hand out brochures for take-home information.

**Lambert , Tara '19** **113**

Faculty Sponsor, Prof. Jen Papas

***Safer Doesn't Mean Safe; closing the knowledge gap about vaping***

Much is still unknown about the long term effects of vaping, mainly among high school students. Vaping and E-cigs only recently began being regulated by the FDA in 2018, and had just become popular in about 2016. However, what I have been able to conclude is that the main main components of vape juice have been proven to be dangerous to inhale. Additionally a majority of these juices contain very high levels of nicotine as well. With the added flavoring these devices are starting younger and younger customers. The flavoring also masks the flavor of the chemical and can taste sweet or sour or chocolatey. One “pod” Has the same amount of nicotine as a of cigarettes. Depending on your delivery device that means our teens are taking in a large amount of nicotine in a short span of time. The teens then become addicted and must continue with this habit, perhaps into adulthood without even realizing the effects their habits started.

**Magni, Mckinley '19** **1**

Faculty Sponsor, Prof. Joan Kuhnly

***Sleep and it's effects of Psychiatric Behavior***

There is some research on the effects of sleep and the effects on daily behavior in psychiatric patients. A scholarly project was conducted to address the question: “In veterans with psychiatric disorders and in active detox, how does a proper night sleep compared to a poor night sleep affect daily behavior while in an inpatient setting, observed over one month.”

**Martin, Stephania '19**

131

Faculty Sponsor, Prof. Joan E. Kuhnly

***CPI Training: How Beneficial Is it for Nurses?***

The Crisis Prevention Institute offers nonviolent crisis intervention training that is designed to teach the appropriate way of managing difficult situations and disruptive behaviors. CPI training is becoming more common for healthcare professionals, as evidenced by the increase in behavioral patients through the years. This training plays a critical role in training healthcare providers how to appropriately defend themselves in crisis situations, while still providing the best outcome for the patients. This scholarly project was conducted to analyze the question: How does CPI training, as compared to no training, prepare nurses to care for behavioral patients, de-escalate violent situations, and improve patient care? An extensive literature search resulted in a mix of medical journals and comprehensive research articles. Results identified various outcomes using different techniques. 1) A six month post-training evaluation of incident ratios from violent events. 2) A pre and post study design on nurses confidence in handling crisis situations. 3) Nurses' perceptions of what is meant by "workplace safety" from different units. This information could be used to potentially change policies regarding CPI training, making it mandatory and not simply an option.

**Pollan, Rachel '19**

161

Faculty Sponsor, Prof. Sue Scott

***Monitoring for Opioid Induced Respiratory Depression With Capnography***

One of the major adverse effects of opioids is respiratory depression. Respiratory depression can be defined as lowered respiratory rate and decreased oxygen saturation. The majority of postoperative joint patients are prescribed opioids following their procedure. More specifically, some patients receive patient-controlled analgesia, a button the patient can press when they have pain. Both patients with high tolerances to opioids and those who have never received them before can experience respiratory depression. Avoiding adverse events in the hospital can increase patient satisfaction and decrease spending on unexpected outcomes. Recognizing the early signs of respiratory depression can prevent the situation from becoming more serious, or even worse fatal. In my research, I have found that capnography is more effective in recognizing early symptoms of respiratory depression than pulse oximetry alone. Pulse oximetry only measures oxygen saturation and heart rate while capnography measures exhaled carbon dioxide, respiratory rate, and oxygen saturation.

**Snell, Casey '19**

182

Faculty Sponsor, Prof. Joan Kuhnly

***Promoting Pressure Ulcer Prevention in the Hospital Setting***

Pressure Ulcers are one of the most prevalent hospital acquired issues in health-care today. Repositioning patients regularly is known to be the standard of care for preventing Pressure Ulcers. Newer evidence supports that an alternating pressure mattress is the better option. To determine whether one prevention strategy is more effective than the other, research on both prevention strategies is carefully examined. A review of current literature was done on scholarly, peer-reviewed articles which included research on 23 bedridden patients at risk for pressure ulcers who received routine repositioning every 2 hours. The evidence concluded, all patients monitored in the study, had skin areas that had no relief from pressure and remained at risk. In comparison, the intervention group used alternating pressure mattresses. 99 patents participated in a 90 day trial using the mattress with an end point to determine if any patients had

worsening of their skin condition. 20 patients out of the 62 with pressure ulcers had healed completely in the 90 days. The evidence supports that implementing an alternating pressure mattress decreases the percentage of developing a pressure ulcer more effectively than repositioning per protocol. This scholarly project is to educate hospital staff on the leading options for pressure ulcer prevention in the hospital setting in hopes of implementing use of alternating pressure mattresses with high risk patients. Additionally the education will include pressure ulcer definitions and staging to assist with the identification of patients at high risk.

**Stroiney, Andrew '20, Olivia Osei-Kuffour '20, Lexis Cruz '20**

**184**

Faculty Sponsor, Prof. Joan Kuhnly

***Family Presence During Resuscitation Attempts***

Background: Cardiac resuscitation is a traumatic event for both patient and family that can have detrimental effects to their mental health. The stress level of the family directly impacts the recovery of the patient, therefore, having family present during and after resuscitation attempts reduces the stress level of both parties allowing for effective coping and recovery. Evidence supports having family present while trying to achieve the recovery of spontaneous circulation (ROSC), but isn't current practice at this agency. Benefits of this practice directly correlate to improved patient and family outcomes. Objective: This project was conducted to analyze and synthesize the literature on whether family presence during resuscitation attempts is beneficial to the family's and patient's perceived outcome of the given events. Results: After review of the literature on family presence during a resuscitation, the evidence supported that it is to the benefit of the patient to have a familiar person present during a resuscitation attempt as it reduced the stress level in successful revivals. The evidence concurrently showed better family coping of familial loss and satisfaction of efforts made in the medical teams attempts at resuscitation. Methods: Implementation of family members being present is a choice made by the family and at any time they wish to leave, they may. If family wishes to be present during a resuscitation attempt, a healthcare professional should be by the family's side while out of the way to explain all medical procedures being performed and how they benefit the patient.

## ***College of Mathematics and Sciences***

### ***Biology***

**Al Jashamey, Mohammad '19, Frederick Boateng Collins '19,**

**3**

**Glendaliz Gomez Gonzalez '20,**

Faculty Sponsor, Prof. Mao-Lun Weng

***The detection of similar human hemoglobin gene sequences in plants species***

Hemoglobin, a very important biomolecule, over the years, has been the interest of biochemical research in the quest to determine protein structure and its relationship to its function. Several studies have shown that many organisms possess proteins that are homologs to globins. However, not all globins are oxygen transport proteins. Although there is a lot of familiarity with the existence of hemoglobin in the animal kingdom, its findings in non-animal sources such as plants, unicellular eukaryotes, and bacteria are perceptibly recent. Here, we compare the Hbs in a model plant, *Arabidopsis thaliana*, to other plants and the Hbs found in animals, specifically, *Homo sapiens*. Proteins and gene sequences for Hbs from *Arabidopsis thaliana*, other plants, and *Homo sapiens* were obtained from the GenBank

([www.ncbi.nlm.nih.gov/genbank](http://www.ncbi.nlm.nih.gov/genbank)) and Phytozome ([www.phytozome.org](http://www.phytozome.org)) databases. Pairwise sequence alignments were performed using the BLAST TOOL ([www.ncbi.nlm.nih.gov/genbank](http://www.ncbi.nlm.nih.gov/genbank)) and Needle program ([www.ebi.ac.uk/Tools/psa/emboss\\_needle/](http://www.ebi.ac.uk/Tools/psa/emboss_needle/)). Differences between the aligned sequences were used to investigate the similarities and differences that confer structural and functional differences as well as evolutionary diversification. In our study, we found that *Manihot esculenta*, commonly known as cassava or Yuca shared 90% identity with the alpha subunit of *Homo sapiens* hemoglobin. Even though there exist great structural, morphological and physiological differences between plants and animals, our findings show evidence that humans share some genetic similarities with plants.

**Balek, Dayna '20, Karla Contin-Mendoza '20**

**10**

Faculty Sponsor, Prof. Kristen A. Porter

***The Impacts of Seeding Densities on Macrophage subtypes M1 and M2.***

Macrophages are regulators and effectors of inflammation and the innate immune response. Monocytes are the precursor cells of macrophages. Monocytes originate from the bone marrow, furthermore, monocytes will differentiate into macrophages upon activation. Macrophages differentiate into subtypes M1 and M2 through classical activation and alternative activation. M1 macrophages are proinflammatory and are classically activated by helper T-cells (Th1). M2 macrophages promote wound healing and matrix remodeling are alternatively activated by helper T-cells (Th2). The seeding density of macrophages varies greatly in scientific research allowing for unrepeatability of results. This experiment is to further the study of the functions by M1 and M2 subtypes of macrophages. In this experiment, we try to find if the seeding density impacts protein and cytokine expression of macrophage subtypes. Differences in morphology and protein expression were observed showing that seeding density impacts these identifiers. This was achieved by testing through culturing of cells in high ( $1 \times 10^6$ ) and low ( $2 \times 10^5$ ) densities, immunofluorescence microscopy, ELISA (enzyme-linked immunosorbent assay), and western blotting.

**Bourque, Zachary '20, Erica Anderson '19**

**21**

Faculty Sponsor, Prof. Mao-Lun Weng

***Phylogenetic distribution of the Venus fly trap's S-like RNase among different species***

We know that carnivorous plants, such as *Dionaea muscipula*, commonly known as the Venus flytrap, use a digestive enzyme called an S-like ribonuclease (RNase) to break down proteins from insects. Secretion of the S-like RNase aids in converting proteins into usable nutrients for the plant, compensating for the lack of nitrogen in its natural environment. This begs the question whether this compound is found in other plants or animals, as well as if it has similar or different functions in those organisms. This research is important because it demonstrates how similar genetic sequences can be found in distinctly different species and may serve diverse functions based on different environmental adaptations. Our research may also shed light on how animals, including humans are able to digest protein to use as a source of energy. We hypothesize that the S-like RNase will be present in other carnivorous plants, as well as other flowering plants, with distinctly different functions than a digestive enzyme. To conduct this research, we used a genome wide analysis to search for other species of plants with similar genetic sequences. By using their nucleotide sequence and the NCBI database we can determine the similarities of sequences as well as any functions of the S-like RNase that are not closely related to the digestion of proteins. Our results show that the S-like RNase is in fact present in other plants, both carnivorous and flowering, with a variety of functions other than an protein-digesting enzyme.

**Capitan, Courtney '19, Melita Gavel '20, Carol Mateo '20**

**35**

Faculty Sponsor, Prof. Kimberly Berman

***The Influence of Cortisol on the Inflammatory Response of Immune Cells in Normal and High Glucose Conditions***

Cortisol is a hormone produced in response to stress and it affects many bodily processes from immune response to blood sugar regulation. Low levels of cortisol can be beneficial, but elevated cortisol levels over time can lead to high blood sugar levels (hyperglycemia). This response to cortisol is what occurs in diabetic patients. Cortisol has also been shown to suppress immune response by decreasing the production of pro-inflammatory cytokines. Cortisol suppresses the immune response because it lowers levels of TNF cytokine production. However, hyperglycemic conditions can cause macrophages to release higher levels of TNF. The purpose of this study was to observe how cortisol affects production of pro-inflammatory cytokine TNF in human derived THP-1 macrophages differentiated in normal glyceimic and hyperglycemic conditions. Using an ELISA assay, we investigated the effect of simultaneous exposure to both cortisol and hyperglycemia on the inflammatory response of THP-1 macrophages. Preliminary data suggests that cortisol has a significant inhibiting effect on TNF, but no significant increase of TNF production occurred in any hyperglycemic group. We found no evidence suggesting that macrophages release more TNF cytokines after being differentiated in hyperglycemic states. These findings are important because they provide a baseline for understanding the strength of each mechanism at play in the diabetic model.

**Capitan, Courtney '19, Sarah Eugenio '19, Alyssa Gilepsie '19, Abbi LaRoche '19**

**36**

Faculty Sponsor, Prof. Jason Ramsay

***Quantification of Sea Star Locomotion at Various Inclines***

Sea stars have cilia-like cylindrical projections underneath their bodies called tube feet. These tube feet provide a grabbing suction that allows them to anchor in harsh environments. It has been proposed that these feet play a bigger role in starfish movement than previously thought, and propulsion isn't provided by major limb movement alone. It remains unknown how many of the feet are activated during successful fluid locomotion, and what changes in percent activation occur when the sea stars are climbing an incline. Currently, starfish-like-robots are being used to combat invasive species in coral reefs. Our research will provide further understandings of detailed sea star locomotion mechanisms, therefore providing a basis for future innovations and technological advancements. We observed Chocolate Chip Sea Star locomotion up numerous inclines and quantified the percent of tube feet used. Data will be presented on the relationship between incline angle and tube feet utilization during locomotion.

**Dermody, Jordan '20, Rebecca Hoynoski '20, Belinda Boateng '19, Karly Stevens '20**

**56**

Faculty Sponsor, Prof. Kimberly Berman

***The Effect of THC on the Response of Differentiated THP-1 Macrophages***

The main psychoactive ingredient of cannabis is trans delta-9 tetrahydrocannabinol (THC). This cannabinoid interacts with the CB2 receptor that is expressed on peripheral cells of the immune system, which could suggest an important function in the immune response. The CB2 receptor is primarily found on white blood cells and aids in the regulation of cytokine release. Recent studies suggest that THC can reduce the inflammatory response to HIV-1 infection in human immune cells in vitro. As THC is now commercially available for recreational use, more studies to understand its mechanism of action on

different cell types would aid in understanding its effect on specific cell types. Macrophages are immune cells that are necessary for the recognition and response to foreign pathogens and their related molecules. The purpose of this study was to evaluate the overall inflammatory response produced by LPS on differentiated THP-1 macrophages after 24 hour treatment with THC. The ELISA results indicate a trend in which a decrease in the concentration of TNF was observed with the treatment of THC. In vitro assays were performed to test the phagocytic ability of live bacteria. THP-1 macrophages pre treated with THC were infected with E. coli and a standard gentamicin protection assay was performed. We observed a trend in which more live, viable bacteria were internalized in THC-treated cells. This trend was dose and time dependent. These preliminary results may indicate that THC can enhance bacterial uptake into phagocytic cells.

**Dunphy, Rachel '19, Jonathan Lafrenaye '19, Chelsea Budd '19,  
Taryn Carr '19**

**60**

Faculty Sponsor, Prof. Kimberly Berman

***The Effects of Cannabidiol on TNF and IL-1 $\beta$  Production in THP-1 Macrophages***

Cannabinoids have been shown to exert anti-inflammatory responses and activities both in vivo and in vitro. Cannabidiol (CBD) is the main biologically active cannabinoid compound derived from the hemp plant, the male form of Cannabis sativa. The effects of CBD on the endocannabinoid system, which is composed of various CB1 and CB2 receptors located throughout the body, is the focus of this research. Although, CBD does not bind directly to CB1 or CB2, but instead acts on the endocannabinoid system indirectly by binding to various ion channels such as TRPV1 which can exhibit anti-inflammatory properties. Previous studies have tested different concentrations of CBD in LPS stimulated microglial cells and observed anti-inflammatory properties. The optimal amount to treat the stimulated cells was 10 $\mu$ M CBD. This concentration of CBD resulted in a decrease of cytokine release (Caroon, 2018). The goal of this study is to measure the potential anti-inflammatory properties of CBD on THP-1 macrophages. CBD is thought to lower the anti-inflammatory responses. THP-1 macrophages will be used to create an inflammatory response and then will be treated with: 5 $\mu$ M, 10 $\mu$ M, 15 $\mu$ M, 25 $\mu$ M, 40 $\mu$ M and 50 $\mu$ M CBD for about 24 hours. Cells will then be stimulated with LPS or mock treated. After exposing the macrophages to the varying concentrations of CBD we will compare the inflammatory responses of macrophages by measuring the levels of TNF and IL-1 $\beta$  produced by the cells. The levels of TNF and IL-1 $\beta$  will be quantified using an ELISA. The only dosage that seemed to have an effect was 10 $\mu$ M CBD in the first TNF ELISA. The highest dose, 50 $\mu$ M was cytotoxic to THP-1 macrophages.

**Eugenio, Sarah '19, Savanna Lamas '19, Tanner Deegan '20,  
Jovan Ortiz '21**

**62**

Faculty Sponsor, Prof. Kimberly Berman

***The Effects of Garlic Extract on THP-1 Macrophages and Cytokine Release***

Allicin is a compound found in garlic that is activated when garlic is crushed or minced. It is considered to be a homeopathic compound that possesses anti-inflammatory properties. Garlic supplements are often taken by individuals to help various health issues ranging from heart disease to cancer. Previous scientific work has shown the biological effects in different types of garlic extract. Clinical studies have shown that taking a daily supplement of garlic can lower cholesterol due to its antioxidant properties. The purpose of our study was to test the effects of garlic extract on immune cells responses. Macrophages are a type of immune cell that is responsible for producing inflammatory cytokines such as TNF in response to

pathogens and their related molecules. In this study, we analyzed the effects of garlic extract on cytokine release from human-derived macrophages. THP-1 macrophages were exposed with increasing concentrations of garlic extract for 24 hours and then stimulated with LPS. Cell supernatants were harvested and cytokine release was tested by an ELISA assay. Our preliminary data indicates that garlic extract that was heat treated inhibited inflammatory cytokine release.

**Gerrmann, Samuel '19**

72

Faculty Sponsor, Prof. Kimberly Berman

***Influence of Cortisol on Inflammatory Cytokine IL-1Beta under Hyperglycemic Conditions***

Cortisol is a stress hormone produced by the adrenal glands and plays an important role in managing blood pressure, blood sugar levels, and inflammation. Its synthetic counterpart, hydrocortisone is used medically, either as an injection or topically, in the treatment of inflammation, allergy collagen diseases, asthma, adrenocortical deficiency, shock, and neoplastic conditions. Elevated cortisol levels are observed in patients with Type 2 diabetes which may contribute to their disease. Type 2 diabetes is associated with chronically elevated blood glucose levels referred to as hyperglycemia, which can significantly impact cellular responses. Previous studies have shown that immune cells exposed to elevated glucose levels are in a hyper-inflammatory state. Macrophages are immune cells necessary for an immune response to pathogens. This study looks to see if increased cortisol concentrations influence the behavior of macrophages by the release of cytokine IL-1Beta under normal and hyperglycemic conditions. THP-1 differentiated macrophages grown under normal glucose and elevated glucose levels, were pretreated with cortisol and were then stimulated with LPS. IL-1Beta levels were then tested by ELISA. Based on the results, concentrations of IL-1Beta did not seem to be affected by hyperglycemic conditions as opposed to normal glucose conditions. It was also seen that the presence of cortisol suppressed the release of IL-1Beta.

**Gleason, Nicole '19, Tyler Gay '19**

75

Faculty Sponsor, Prof. Jason Ramsay

***New jaw Muscle found in Spiny Dogfish***

The purpose of our research is to investigate the structure and function of the spiny dogfish, specifically their jaws, and compare it to past research that has been done to see if what we find matches up and if any information was missed. With the help of Dr. Ramsay, doing background research on the structure and function of spiny dogfish, and examining preserved spiny dogfish it became clear to us that a muscle in the jaw was missed. With these findings it is apparent that more research and experiments need to be done on the spiny dogfish jaw to find out more about this muscle, how it was missed, what its function is, and what it should be called. With this new found information textbooks, pictures and diagrams will need to be changed and credit will be appointed to Dr. Ramsay and students at Westfield State.

**Goyette, Michael '19, Austin Buckner '19**

77

Faculty Sponsor, Prof. Kristen Porter

***Characterization of macrophage growth, maturation and polarization: best-practices for the THP-1 cell line***

Macrophages are a vital piece of the innate immune system, which can be divided into different subtypes with a broad spectrum of functions. M1 (classically activated) macrophages are involved in clearance of infection, while M2 (alternative macrophages) and M2 subtypes (alternatively activated macrophages) are



linked to Th2-like responses, chronic inflammation, and wound healing. While there is copious information on phenotypes and effector functions of these macrophage cell types, the data is conflicting at best, in both cell lines and in vivo systems. We posit that different methods for growth conditions, monocyte maturation, and differentiation between laboratories is responsible for the conflicting literature. Thus, using the laboratory standard THP-1 monocytic cell line, using common aseptic culturing and maturation conditions and subsequent macrophage phenotypes were compared to each condition and primary macrophage data. Differences in morphology, cytokine and protein expression, HIV susceptibility and wound healing capabilities clearly demonstrate the dramatic difference culture and treatment conditions make toward macrophage polarization. These results may provide standardization of protocols for macrophage plasticity studies, in order to reduce conflicts in the literature and provide an in vitro model that reflects what has been observed among in vivo systems.

**Hoeg, Elizabeth '19, Avia Stanton '20, Cameron A. '20, Emran Aleem '20**

**91**

Faculty Sponsor, Prof. Kristen Porter

***Density Affects Macrophage Morphology and Protein Expression: Optimizing Cell Culture Conditions***

Macrophages are innate immune cells, capable of diverse functions. Inflammation and pathogen clearance is promoted by M1 macrophages. While M2 macrophages are instrumental in wound healing and contributing to a non-inflammatory state. Increasing evidence from working with cells in the lab, suggests limiting spatial conditions, affects macrophage shape and protein expression. It is critical to understand pathways which promote either the M1 or M2 subtypes. Optimal seeding densities for THP-1 macrophages was evaluated through seeding macrophages at a high number of cells/ml versus a low number of cells/ml. Using a fluorescent microscope, photographs were obtained and analyzed to determine cellular morphology. Finding, globular cell shape resulted from the group grown at high density. While low density conditions promoted cellular elongation. Indicating the number of cells/ml influenced cell morphology. Since low density cells had greater morphological diversity, immunoblotting for protein expression further characterized M1 and M2 macrophages were grown at low densities. This allowed analyses of effector function for different types of macrophages. Understanding pathways during macrophage activation which promote either healing or clearance of pathogens are pivotal to the development of therapeutics that target diseases involved in chronic inflammation, and acute inflammation, which can drive transplant rejection.

**Hotham, Catherine '20, Lisa Shippee '19, Emily Cappucci '19**

**93**

Faculty Sponsor, Prof. Kristen Porter

***Seeding Density Effects on Polarization of Macrophages***

Macrophages are an integral part of the immune system. These cells go to the site of infections and engulf pathogens; not only acting as a sort of garbage collector but also processing pathogens to present to the adaptive immune system. There are different subtypes of macrophages that have specific jobs within the immune system; they can be inflammatory or They can work on wound healing. they also have characteristic shapes and specific protein production. Macrophages are plastic cells that can change their characteristics based on the space they have available within the tissues. We examined how the number of cells grown in a well would change the shape and protein production of macrophages. We performed fluorescence microscopy, ELISA, and a Western blot assay to observe any differences. As expected we observed differences in cell shape and protein production between the high and low-density macrophages. Macrophages are a significant part of immunity and immune responses. Examining how the cells grow at

different seeding densities could ultimately determine what the optimal seeding density is based upon morphology and cytokine production.

**Jones, Meaghan '19**

**103**

Faculty Sponsor, Prof. Kristen Porter

***The Effects of how Stress Affects Wound Healing in THP-1 Cells Using Cortisol***

Wound healing in cells is widely studied due to the complexity of the process and how these processes affect the rest of the body's immune system. Specifically, if exposed to stress, the effects on wound healing can be hindered. By exposing matured THP-1 cells to cortisol, and running different tests on the cells, we can determine how cortisol affects wound healing in the immune response. Morphology of the wounded cells can be observed under a microscope after performing a wound healing assay; using images to compare the time it takes to heal. It is expected that in this assay that the cells exposed to cortisol would heal slower than those that are not. Performing a phagocytosis assay will tell how stress affects the clean up of debris to help in the wound healing process as well. The cells exposed to cortisol should experience a slowing in phagocytosis compared to the cells not infected with cortisol. Finally, an ELISA can be performed to see what antibodies appear to detect if there are different antibodies in the cortisol and normal cells. This data should help to support evidence on why those under high stress are affected differently in the wound healing process than those not under stress.

**Lamas, Savanna '19, Erica Anderson '19, Jaime Martinez '20**

**112**

Faculty Sponsor, Prof. Jason Ramsay

***Classifying Species of Batoids in Reference to Webb's Pyramid***

Batoids are a group cartilaginous marine fish that have ventral gill slits and lack an anal fin. There are over 600 species grouped into 20 different families, most of which are in the Rajidae family. In 1984, Paul Webb created a pyramid differentiating bony fish by creating 3 different categories: accelerators, maneuvers, cruisers. Webb explained that all bony fish could be organized into one of these three subgroups. The objective of this experiment is to create an organizational system based on Webb's pyramid to group 6 different batoid species based off of their physical traits. These traits include general size, tail size, wing size and how these allow them to defend, maneuver, cruise or accelerate. Their anterior and posterior defense mechanisms will also be analyzed in order to better categorize. We hypothesize that the batoids with longer wingspans will be able to swim faster or accelerate, while those with smaller wingspans will be able to maneuver more easily. Species with barbs and spikes are hypothesized to be better defenders and species with streamline tail structures will most likely be able to maintain a constant fast speed. By using ImageJ to analyze physical measurements, the way these species move will be analyzed to conclude all observations. These techniques will allow us to conclude on our hypothesis find results for our research.

**LeClair, Adam '19, Kyle Sullivan '20**

**116**

Faculty Sponsor, Prof. Jason B. Ramsay

***Jaw Morphology and Feeding Mechanisms of the Esox Niger***

The chain pickerel is a common species of fish that can be found along the eastern coast of the United States and parts of Canada. Chain pickerel are a predatory species that feed on other fish. What makes the pickerel unique is its method of capturing its prey. We hypothesize that the *Esox Niger* have pterygoids with teeth for holding on and a skeleton that can move passively left and right in order to consume their

food. This involves the pickerel latching its mouth on the prey and using its upper jaw to work the prey into its by releasing one side of the jaw and moving it forward while the other side stays latched on to the prey. This allows the fish to feed on larger prey than it normally would. To test this we looked at the structure of the maxilla and if it attaches to the pterygoid bone. Manual manipulation of the specimen showed that the maxilla does form a link to the pterygoid muscle and the movement is passive. Showing that this occurs in fish is important because it helps show how this process may have evolved over time as it is a common way for snakes to ingest their prey.

**Llewellyn, Meagan '19**

119

Faculty Sponsor, Prof. Robin White

***Modeling a Ketogenic Diet Using Cell Culture: The Effects of Ketone Body Beta-hydroxybutyrate on Neuronal Cells***

A ketogenic diet is a diet high in fat and low in carbohydrates. This study analyzed how a ketogenic diet affects neuronal cells. Specifically, we examined how the ketone body most predominantly found in the brain, beta-hydroxybutyrate, affects the survival and differentiation of Neuro-2A cells. Neuro-2a cells are a commonly used neuronal model due to their capacity to differentiate into mature neuronal cells. It is important to examine if these cells are developing differently when on a ketogenic diet because it could be harmful for women to be on it while pregnant. If significant differences are observed at a cellular level than a fetus's neuronal cells could also be developing differently. Previous studies in pregnant mice on a ketogenic diet have shown changes to the fetal brain, but cellular changes have not been examined. Cell culture was used to mimic the ketogenic diet, with regular and no glucose diets being tested as well to examine the differences in cell count and differentiation. There was a control media, no glucose media, and two medias containing different concentrations of beta-hydroxybutyrate (1mM and 5mM). Cell count was measured by counting cells in ImageJ, and differentiation was evaluated by measuring processes length of the cells. Our results showed a statistically significant higher cell count in the control group than with the different diets, but no significant differences in differentiation. Future research could include investigating the cause of the significant differences in cell count, looking at whether it is due to cell death or proliferation.

**Loughman, Emily '19**

122

Faculty Sponsor, Prof. Kimberly Berman

***Effect of Quercetin on Pro-inflammatory Cytokine Release, Cellular Activity, and Cellular Viability in Human-Derived Macrophages***

Quercetin is a flavonoid found in various fruits, vegetables, and herbs. Like many flavonoids and polyphenols, quercetin acts like an antioxidant with anti-inflammatory and anti-allergy properties on multiple immune cell types. In bone marrow-derived macrophages, treatment of quercetin resulted in significantly decreased cytokine release. Quercetin-treated macrophages primed with LPS and then treated with ATP, Nigericin, or Alum released significantly less IL-1  $\beta$  than untreated cells; though TNF levels were not affected. The goal of this study was to quantify the in vitro effects of quercetin treatment of human-derived macrophages on TNF and IL-1 $\beta$  release. Macrophages were stimulated with LPS in the presence or absence quercetin and cytokine release was tested by ELISA. Few studies have evaluated the toxicity of quercetin on cells in vitro. Therefore, this study will also investigate the possible toxicity of quercetin in our cell line, THP-1. Cells were grown in the presence or absence of quercetin at a range of

concentrations. Cell death was assayed by Propidium Iodide (PI)/Hoescht stain and viewed by fluorescent microscopy. Based on past research, quercetin may be used as a treatment for IL-1 mediated inflammatory conditions by altering the signals that stimulate the inflammatory process. IL-1 mediated conditions include Kawasaki disease, Type II diabetes and gout.

**Maytham, Yasmien '20**

**133**

Faculty Sponsor, Prof. Robert E. Thompson

***Which North American States get Hit by the Strongest and the Highest Number of North Atlantic Hurricanes***

Living in North America near the coastline can be somewhat stressful because of the North Atlantic hurricanes. Our research plans on investigating the North Atlantic hurricanes strength and numbers making landfall with categories 3 to 5. Three locations will be examined, the Gulf States, Southeastern States, and selected areas where hurricanes either did not make landfall or made landfall in other locations. This research can be useful to anyone who is planning to live in these locations or any insurance companies doing business in these regions.

**McMeekin, Matthew '20, Millicent Asare '19, Aya Maytham '19,  
Cameron Hamilton '19**

**138**

Faculty Sponsor, Prof. Mao-Lun Weng

***A Comparative Analysis of the Mitochondria Gene COX1 Across 25 Organisms***

Mitochondria are structures in cells that convert food into energy. Though DNA is found in the chromosomes of the nucleus, mitochondria have their own DNA this is called the mitochondrial DNA. In this study, we investigate the genes cytochrome c oxidase subunit 1 (COX1) across 25 organisms across the tree of life. This gene is used to code a protein used in cellular respiration, it was chosen because it can be found in almost all eukaryotes. It was done to determine how gene sequence can tell how closely related species are and how much change is in the sequence. This study is important because it provides the phylogeny of different organisms and sees the relationship between mutations and speciation of those organisms. 25 organisms were collected from NCBI mitochondrial genome database, 5 organisms from animal, fungi, plant, protist and "other" groups. The 5 chosen will be the smallest size genome, the median between the median and smallest genome, the median size genome, the median between the median and largest genome and largest size genome. Their COX1 gene sequence was assembled through FASTA and multiple sequence alignment was done using European Bioinformatics Institute data tools. The alignment obtained was used to create a simple phylogenetic tree to make a comparison among species. We expect to see that closely related species share similar gene sequence with little to no change compared to the distal related species.

**O'Connell, Alissa '19, Drew Pahl '20**

**148**

Faculty Sponsor, Prof. Mao-Lub Weng

***"Comparison of Fungal Mitochondrial Genomes to  $\alpha$ -Proteobacteria"***

Mitochondrial genome sequences are critical in comparing various organism's DNA to show ancestral descendants as well as comparing similarities. Utilizing the mitochondrial genome sequences of a specific species of fungi from each of the five phyla a comparison between them and the twelve  $\alpha$ -Proteobacterium can be observed. The purpose of this study is to determine which of the five phyla is more closely related to  $\alpha$ -proteobacteria using their mitochondrial genome sequences and BLAST

software. This research allows for the more ancestral data to be analyzed and comparisons to be made across different kingdoms. Fungi was chosen for the focus of this research to bring light to a kingdom that does not have nearly the same amount of research done compared to plants and animals. Taking a specific species from each of the five phyla of fungi and the twelve  $\alpha$ -Proteobacterium, the genome sequences of each could be obtain from NCBI Genome Banks. Starting with one fungus mitochondrial genome sequence a nucleotide BLAST could be performed by comparing that with one mitochondrial genome sequence of a  $\alpha$ -Proteobacterium. After BLASTing and obtaining the Perc. Ident and E-value for each of the five fungi compared with  $\alpha$ -Proteobacterium (giving 60 results), a comparison on which of the five phyla of fungi is more closely related to  $\alpha$ -Proteobacterium.

**Olson, Michael '20**

**149**

Faculty Sponsor, Prof. Kimberly Berman, Prof. Tawana Jewell

***Quercetin effects on THP-1 macrophages grown under hyperglycemia***

Hyperglycemia is a defining characteristic of Type 2 diabetes, in which blood glucose levels are too high in response to the cells' inability to respond to insulin. Patients with Type 2 diabetes exhibit a chronic proinflammatory state. In their adipose tissue, macrophages are the main immune cell responsible for pro-inflammatory cytokine release. Macrophages are large, phagocytic cells found in stationary form in tissues, or in mobile form as white blood cells at sites of infection. Quercetin is a flavonoid shown to have antioxidant and anti-inflammatory effects in vitro. In general, antioxidants aid in the reduction of inflammation, controlling blood sugar, killing cancer cells, and preventing heart disease. Its role in inflammation has been demonstrated in vitro. Previous studies have shown that quercetin inhibits pro-inflammatory cytokine release from bone marrow-derived mouse macrophages. THP-1 is a monocytic cell line useful for testing macrophage function in vitro. In this study, we investigated the effects of quercetin treatment on inflammasome activation in THP-1-differentiated macrophages grown under hyperglycemic conditions. After three days of hyperglycemic conditions, differentiated THP-1 cells were pretreated with 10, 25 and 50 ul quercetin and then stimulated microbial molecules. Cytokine release was assayed by ELISA. Results show no significant difference in cell number after Quercetin treatment. As well, under normoglycemic conditions, Quercetin treatment decreased the amount of IL-1B. Under hyperglycemic conditions, IL-1B decreased with 10 ul quercetin treatment.

**Owusu, Cephas '20, Giancarlo Montanez '20, Cassidy Collazo '19**

**155**

Faculty Sponsor, Prof. Kimberly Pouliot

***Effect of vitamin C and thiamine on macrophage***

Macrophages are white blood cells which are important in an immune response. They are essential to the innate immune system because they provide the first line of defense against microorganisms. In vitro, Vitamin C has been shown to enhance the effector function of macrophages by supporting various cellular functions of the innate and adaptive immune response. Thiamine is a vitamin of the B complex that supports the immune system by strengthening the body's ability to withstand stress. It has a crucial role in metabolic reactions as it works in the form of a coenzyme in reactions that produce energy in our bodies. In recent clinical studies, patients with bacterial sepsis were treated with a combination of vitamin c and thiamine and had a significantly improved survival rate. This study tested the effects of vitamin C and thiamine on macrophage function. Macrophages were pretreated for 24 hours with the combination of vitamin C and thiamine and then stimulated with LPS for 6 hours. Cytokines release was quantified by standard capture ELISA. We show that vitamin C and thiamine had no effect on cell viability.

**Payne, Marcus '19**

157

Faculty Sponsor, Prof. Robin Elaine White

***A Ketogenic Diet Leads to a Decline in Brain Cancer Cell Death***

It has been suggested by some neuroscience researchers that a ketogenic diet (low in carbohydrates and high in fats) may be a viable treatment for cancer as the diet may “starve” cancer cells. Due to the uncertainty of how cancer cells metabolize ketone bodies, this research will determine if C6 rat astrocytoma cells can use the ketone body  $\beta$ -hydroxybutyrate (BHB) as an energy source. Specifically, these experiments focus on how replacement of glucose with  $\beta$ -hydroxybutyrate affects the mitochondrial function of the C6 cells. Media containing low glucose (positive control), no glucose or ketone bodies (negative control), 1mM  $\beta$ -hydroxybutyrate, or 5mM  $\beta$ -hydroxybutyrate will be used to mimic different diets. Under these simulated diets, mitochondrial function was measured with a WST-1 assay and cell death was measured with propidium iodide (PI)/Hoechst microscopy assay. Data from the WST-1 assay suggests that BHB cannot be used as an energy source for C6 cells. PI/Hoescht staining showed that 48 hours of glucose deprivation with or without BHB decreased cell number but had no effect on cell death compared to the positive control group of low glucose.

**Reder, Brandon '19, Belinda Boateng '19**

164

Faculty Sponsor, Prof. Jason Ramsay

***Toe with a twist: How the fourth digit contributes to the novel facultative zygodactyl foot posture in Osprey (Pandion haliaetus)***

Osprey (*Pandion haliaetus*) are a piscivorous raptor species commonly seen around rivers, lakes, and shores of North America. Most raptors, including other piscivorous birds, possess an anisodactyl foot posture where the first toe points backwards while the other three toes point forward. Birds such as parrots, owls, and woodpeckers possess a zygodactyl posture where two toes point forward and two toes point backwards. Osprey are known to have a novel “facultative-zygodactyl” foot posture where the first toe points backwards, the second and third toes point forward, and the fourth toe has the ability to rotate into a position pointing forward or backwards. The flexibility of the Osprey’s fourth toe is widely known by ornithology but has yet to be described in detail. In our research we examined and describe the anatomy of the fourth digit and model how the anatomy of the toe allows for enhanced digital flexibility. Future prosthetics could mimic the flexible ability of the osprey’s foot and be used to more optimally grip objects of different sizes and shapes.

**Rodriguez, Juliana '19, Florence Addai '19**

167

Faculty Sponsor, Prof. Kimberly Berman

***The Effects of Quercetin on Cytokine Release after Infection of THP-1 Macrophages by Salmonella***

Macrophages are white blood cells essential to the innate immune response. Macrophages are phagocytic cells and can they serve as antigen-presenting cells that activate lymphocytes. Macrophages also produce cytokines, such as TNF and IL-1 during an immune response to microbes and their associated molecules. Quercetin is a dietary flavonoid, found in many fruits and vegetables, that exhibits anti-inflammatory properties. Quercetin has been observed to inhibit inflammatory responses to microbial molecules in vitro in bone marrow-derived mouse macrophages. Human-derived THP-1 macrophages were pretreated with different concentrations of quercetin for 24 hours. Cells were infected with *Salmonella bongori* following LPS priming. Bacterial infection and cytokines release of the THP-1 macrophages was observed through an ELISA. Results following a WST showed that quercetin at 50mM lowers cell viability to less than

50%, showing slight cytotoxicity as cells treated at 25mM and with media alone maintained high levels of viability. The macrophages were treated again at 100mM and cell viability had lowered significantly, these results may show quercetin's ability to treat successfully, however, cell viability is dose-dependent.

**Rosado, Sonia '19, Leah Moore '20, Hibo Hussein '19**

**170**

Faculty Sponsor, Prof. Mao-Lun

***Sequence comparison of CYP6AE14 gene - How RNAi provided resistance in crops against worms?***

The fight against insect pest on agricultural crops continues. As techniques and technology continues to grow in aid to combat this problem, some solutions are short fixes with limitations as our pest problem still continues. With the use of sequence-specific gene silencing via RNAi technology (RNA interference), plant crops can have a resistance against targeted pest genes engineered into their genomes. RNAi technology has been used to target a cotton bollworm (*Helicoverpa armigera*) P450 gene, CYP6AE14 in transgenic dsCYP6AE14 cotton plant. Bollworms that fed on transgenic plant showed suppressed expression of CYP6AE14 and reduced growth on a gossypol, a substance found in cotton diet. Here we compare 8 plant eating worms species expressing the Cytochrome P450 gene. These worms were retrieved from the *Helicoverpa armigera* blast search. The worms e-value, alignment length and percent identity are compared and presented as a bar graph. Species sequences were retrieved by UniprotKb search. An alignment was done and examined for similar regions. These results demonstrate that the cotton plant can possibly have resistance to all these worm's species expressing the P450 gene, CYP6AE14.

**Rosado, Sonia '19**

**171**

Faculty Sponsor, Prof. David Christensen

***Cancer cell proliferation in how treatment delivery is affected by location and variation of Cancer***

Uncovering a curable treatment for the numerous types of cancer is a constant battle clinical researcher are up against. Cancer research studies have been an ongoing exploration in the discoveries to further understand the characteristics involved in the changes of cellular structure. In recent years, cancer has been examined numerous times to isolate the cellular complexities involved according to various strains of cells. In each form of cancer there have been similar developments on detecting the infected cells in relation to normal cell proliferation. Treatments have a specification according to development and location. In my research, I wanted to develop an understanding of why the procedures varied from one to the other. I reviewed several case studies that have been implemented, to go through the steps needed to analyze the prognosis to determine treatment steps. This is very important because this disease may involve one thing in common (mutated cells) but as far as treatment procedures, it is extremely different. The mutated cell production occurs rapidly producing infected cells subsequently killing healthy normal cells. In analyzing Lung Cancer, the treatments revolved around the reasoning of CD4 and CD25 being able to prevent patient from producing an immunology reaction. Early on-stage lung cancer cells seen to produced regulatory T-cells resulting in normal cellular proliferation. Compared to NSCLC patients' cells expressed a higher production of the inability to replicate its own cells. In Pancreatic Cancer, are focused on targeting the infected cells by creating an antagonistic anti-IGF-IR antibody to prevent further proliferation in those cells. To this end, I set out to identify why more treatments must be just as unique.

**Skoglund, Linnea '19, Shannon Poulin '19**

**178**

Faculty Sponsor, Prof. Jason Ramsay

***Investigating the functional implications of tooth structure in *Squalus acanthias****

Atlantic spiny dogfish (*Squalus acanthias*) are a group of sharks in the family Squalidae that have sharp defensive spines in front of each dorsal fin and are very common off the coast of Massachusetts. Although this species is very well studied, there has not been any research done to evaluate the unique structure of their teeth. The spiny dogfish uses two rows of teeth simultaneously, with the caudal row being higher than the rostral row. We hypothesize that the rostral row acts as a lever to lift the caudal row up to increase bite force when feeding. We will test our hypothesis by dissecting upper and lower jaws from preserved dogfish specimens and, through pictures and videos, document movements while applying force to the jaws under a dissecting microscope. The measurements obtained will then be used to calculate changes in bite force. We will also make a cross-species comparison by performing the same manipulation on preserved Atlantic sharpnose shark jaws to see if this tooth function is unique to spiny dogfish. By gaining an understanding of the function of the second row of teeth, we will gain a further understanding of the feeding habits of these sharks. We can also replicate the function of their teeth to make more advanced cutting blades that require less force to operate. In this presentation, we will provide information on both species, a detailed description of our methods including photos and videos, and our data analysis of the force on the teeth.

**Urawski, Julia Allison '20, Genieva Antis-Aboltin '19, Samantha Laramee '19**

**198**

Faculty Sponsor, Prof. Jason Ramsay

***Stingray Tail and Barb: Structure and Function***

The Atlantic stingray (*Hypanus sabina* syn. *Dasyatis sabina*) is a very common cartilaginous fish that lives in the Gulf of Mexico and in warmer coastal areas of the United States Atlantic coast. This species of stingray has a prominent barb on its tail, which experts have suggested could be used as a defense weapon against the various types of shark that prey on individuals of Atlantic stingray. In this study, our group investigated the structure and possible functions of the barb and tail. We dissected the relevant areas as we searched for any muscles and connective tissue that may assist in tail movement and barb use. Our hypothesis was that the Atlantic stingray uses its tail as a defense weapon and that there is likely to be some sort of muscle and/or connective tissue attached to the base of the barb that assists in instinctive defense behavior. Multiple preserved Atlantic stingrays were dissected and pictures/videos were taken as needed. The barb was observed under a microscope and multiple cross-sections of the tail were taken. There was not as much of any relevant muscle or connective tissue structural attachments to the barb as we initially expected. Also, we found that most of the muscle mass in the Atlantic stingray's tail is concentrated in the upper part (before the barb). Our research into this part of the Atlantic stingray anatomy will hopefully fill in some gaps and allow us to learn more about these surprisingly successful fish.

**Vivilecchia, Demian M. '19, Lindsey Finkel '20**

**199**

Faculty Sponsor, Prof. Jason Ramsay

***Exploration into the lever mechanics and force output within the muscular complex in the jaws of *Scups (Stenotomus chrysops)****

The style of predation where bite force is used to overcome the physical constraints of more durable prey is known as "durophagy." Durophagy as an adaptation is widely utilized in the animal kingdom as those



species that can produce greater force can use less time and energy for predation. This results in overall greater energy intake for the animal. Many fish species are considered durophagous as they prey on the abundant invertebrate organisms that dwell in marine and freshwater ecosystems. Many teleost fishes, such as *Stenotomus chrysops* (Scups), are considered molluscivorous. Scups are considered generalist predators as they have been observed preying upon a variety of benthic organisms. Fish skulls are of a unique interest within the scientific community due to the high level of kinetic movements within the structure. Despite this, however, Scup skulls have not been studied extensively. This is surprising given their common nature, as they are frequently caught by fisherman and trawlers along the east coast. Historical studies have focused on the power output of the pink muscles of this species, but few other studies have been performed. Generalist durophagous species require robust force output to ensure successful predation. Due to their generalist molluscivorous habits and abundance Scups present themselves as an ideal candidate for studies on the force output of their jaws. This presentation will demonstrate the anatomical structure and mechanics of the muscular complex in the jaws of Scups and display a new understanding of the force production capacity of the structure.

## ***Chemical and Physical Sciences***

**Bunce, Rachel '19**

**32**

Faculty Sponsor, Prof. Maria Carranza

### ***Isoflav-3-ene Synthesis: Effect of the Protection of Salicylaldehyde Intermediate***

Compounds with an isoflav-3-ene structure have potential use for breast cancer treatment as their structure and their ability to bind to estrogen receptors is similar to that of estrogen. Eryvarin H is a recently discovered isoflav-3-ene with antibacterial, antioxidant, antiplasmodial properties and has a preliminary estrogenic profile. Phenoxodiol, another isoflav-3-ene, has shown to inhibit proliferation in many types of cancer cells, including breast cancer. The similarity in structure of Eryvarin H to both estrogen and phenoxodiol make this compound an attractive target for chemical synthesis as well as further evaluation. However, isoflav-3-ene structures are hard to synthesize at high yields. Only one group has been able to chemically synthesize Eryvarian H in twelve steps. Prior research in our lab looked to establish a novel, more efficient, two-step synthetic route to obtain the same compound. The result, without protection of the aldehyde, was a 22% yield of the isoflav-3-ene dicarbonyl intermediate. Thus, we propose a new strategy for the synthesis of the isoflav-3-ene dicarbonyl intermediate, which includes the protection of the aldehyde group on 4,6-dimethoxysalicylaldehyde as a dimethyl acetal, followed by O-alkylation. The expectation of a higher yield of this intermediate may be due to a possible reactivation of the nucleophilic properties of the hydroxyl group on the starting material by the protection of the aldehyde. This new strategy may contribute to a novel, more efficient synthetic route toward isoflav-3-enes.

**Cuevas, Albert b. '19**

**48**

Faculty Sponsor, Prof. Maria carranza

### ***Protein Purification: Extracting Myoglobin from Bovine Tissue***

Myoglobin is a red protein containing heme that carries and stores oxygen in muscles cells. It is structurally similar to a subunit of hemoglobin. Meat is one of the richest sources of dietary protein. Meat contains all of the essential amino acids our body requires daily to build proteins; it is also classified as a high quality, complete protein. The color reflects the bound iron and changes with oxidation state and bound ligands. Consumers use the color to assess the freshness of meat and to see whether meat is properly cooked. Myoglobin is commonly prepared at 95% purity levels from a variety of protein sources. In this project, we propose a method to prepare

myoglobin using beef as our protein source. The experiment will proceed using an 'ÜKTA instrument, which is a chromatography system for fast purification of proteins, peptides, and nucleic acids. We will use anion exchange, cation exchange and size exclusion chromatography. To analyze purity, we will use gel electrophoresis and to analyze oxidation state and ligand binding, we will use UV-vis spectroscopy. We hope that we can obtain the desired results, so we can contribute to the biochemistry fields in the development of the purification techniques and this can be used in benefit of future education purposes and biochemistry laboratories. Myoglobin can be used in therapeutics treatments for patients with lack of oxygen in their bodies, so, the successful results of this procedure will play an important role in this project.

**Lafrenaye, Jonathan '19**

111

Faculty Sponsor, Prof. Maria Carranza

***Isoflav-3-ene Synthesis: Optimization of Intramolecular McMurry Coupling***

Isoflav-3-enes are phytochemicals that have been shown to display estrogenic properties in biological systems due to their structural similarities to mammalian estrogen compounds. Isoflav-3-ene compounds are of interest because several have been shown to have antitumorigenic properties, meaning that they could be potential therapies for various forms of cancer. For example, Eryvarin H and Haginins A-E are all isoflav-3-ene compounds shown to have numerous medical benefits. Eryvarin H has been shown to have antitumorigenic properties in breast, ovarian, and prostate cancers. Haginins A-E have been shown to hinder melanogenesis. There is currently very little published research on isoflav-3-ene synthesis, and no current publications use an intramolecular coupling reaction to achieve the isoflav-3-ene core structure. This project seeks to achieve a more facile methodology for the synthesis of isoflav-3-enes than currently published methods using a titanium-induced intramolecular McMurry coupling reaction. This intramolecular McMurry coupling has been achieved in our laboratory using a di-ketone model system: 1,6-diphenyl-1,6-hexanedione, and was confirmed using NMR spectroscopy. This model system of synthesis will be optimized further to attempt to achieve an intramolecular McMurry coupling in 2-(2-oxo-2',5'-dimethoxy-2-phenylethoxy)-4,6-dimethoxybenzaldehyde, a dicarbonyl compound that shows potential as a precursor of the Isoflav-3-ene core structure. The dicarbonyl precursor is synthesized via the O-alkylation of 4,6-dimethoxysalicylaldehyde with 2-bromo-2',5'-dimethoxyacetophenone. This theorized, more efficient, method of isoflav-3-ene synthesis could be applied in further research projects to produce a variety of isoflav-3-ene compounds useful in medical research.

**Mikule, Christian '19**

211

Faculty Sponsor, Prof. Karsten Theis

***Cellulosic biofuels: Purification of the enzyme cellobiase from fungal material***

With fewer and fewer new discoveries of traditional fossil fuels and the exponential increase in cost for extracting these resources, biomass conversion for bioethanol will become a major contributor in transforming our traditional means of energy production into a cleaner and more accessible process. Terrestrial non-food biomass remains one of the largest underutilized resources that remains to address our growing energy crisis. Utilizing non-starch biomass components including agricultural byproducts, construction waste, urban development and landscape waste material, and disaster cleanup are just a few sources of future biofuel potential that go into landfills. Currently, enzymes derived from fungi are the major method for converting lignocellulosic biomass into sugars to make bioethanol. Efforts are being made on many industrial and scientific fronts to increase the effectiveness and efficiency of this process. By searching for new sources of promising enzymes as well as new methods for efficiently obtaining these enzymes from source material, production of bioethanol from terrestrial biomass can become a featured alternative to fossil fuel for our energy needs. The aim of this research is to help find more efficient procedures to concentrate cellobiase for

greater experimental applications. Using variations of experimental parameters for isolating and thus concentrating target enzymes on a High-Performance Liquid Chromatography system (HPLC) and verifying results with SDS-PAGE, it is feasible that a more efficient means of purifying cellobiase may be uncovered.

**Thompson, Tia '19**

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Faculty Sponsor, Prof. Richard Rees

***Stellar Evolution and Star Clusters***

I will be determining membership, proper motion, and age of a star cluster. I will be acquiring proper motion from the Gaia Data Release 2 catalog. I will be acquiring the photometry in the form of the apparent magnitudes from Gaia DR 2; with the proper motions of the stars in the cluster I can use this to determine the membership of the stars of the cluster. The star cluster age will be determined by comparison of the data to stellar evolutionary models. These models will come from the Dartmouth Stellar Evolution Database.

## ***Environmental Science***

**Arkoette, Joanna '20, Gabrielle Dame '20**

7

Faculty Sponsor, Prof. Michael Vorwerk

***Effect of Human Population on Greenhouse Gas Emissions***

The growth of human population plays a crucial role in the emissions of greenhouse gases. At first glance it's widely assumed that the larger the population the higher the Greenhouse Gas (GHG) emissions, however, studies have shown that's not always the case. Through development and growth of population size areas can keep a standardized level of sustainability. With the new advancements of technology and deployments of energy from different countries and states, smaller populations with high consumption can produce larger amounts of GHG emissions than larger populations with lower standards of living. This report will be an analysis of first and third world progress, through per capita income, to better understand their status and how it corresponds to their emission production. In this paper GHG emissions, their connection with population size, and advancements of society will be closely analyzed. We address the question if GHG emissions are less dependent on size of population and more dependent on the demands of production.

**Balbino, Justin '19**

8

Faculty Sponsor, Prof. Emily Cole

***Native Vs. Invasive Plant-life: A Comparison of Food Sources from Winter to Spring***

With the spread of non-native species in local environments, native species are being out-competed for resources and growth. By observing the plant life of the Experimental Forest located behind Westfield State University, it will be evaluated whether native or invasive food-producing plants have effects on the feeding habits of native wildlife. Four locations within the study area (two with high invasive plant communities and two with high native plant communities) were observed in 20-minute intervals, to catalogue both the plants and wildlife that are present. The bird species residing in the area were the primary focused. Based on initial observations invasive food plants were a significant food source during winter, but the native plants were more prevalent during spring. With invasive food sources readily available, bird species populations may be affected over time.

**Baptiste - Johnson, Daizha '21**

11

Faculty Sponsor, Prof. Michael Vorwerk

***The Effect of Political Affiliation on Environmental Consciousness***

As our nation becomes more politically charged, the general divide on environmental issues has broadened. In this research I examine the influence political affiliation has on one's general view of climate change and environmental consciousness. Research was gathered through a survey of individuals from different political backgrounds. The survey serves to analyze an overall trend between parties and their members' views on the environment. My hypothesis is that views on the environment are correlated to political affiliation. This research will determine if environmental issues have become more politicized than they should be and if political bias will dictate the future of environmental progress.

**Bonemery, Adam '20**

20

Faculty Sponsor, Prof. Emily Cole

***Potential Acid Snow Impacts on the Westfield River's Water Chemistry***

High acidity, or acidification, in rivers and bodies of water can negatively impact riparian ecosystems. It can be caused by acidic precipitation and lead to adverse effects on water chemistry, river geology, stream flow, and marine organisms. To test the connection between acidic snow and the river water chemistry of the Westfield River, samples were taken of fresh snowfall and river water every week for roughly two months. These samples were then tested for pH, conductivity, and dissolved solids. The results will potentially show a correlation between acidic snow and lower river water pH; plus an increase in dissolved solids. This change in water chemistry can kill marine organisms, degrade abiotic features, and change stream flow. Acidic precipitation has been aggravated by the burning of fossil fuels. Westfield River's change in water chemistry could end up being another negative symptom of human impact on the environment.

**Buck, Adam '19**

29

Faculty Sponsor, Prof. Emily Cole

***Elongate Hemlock Scale's presence and co-infestation with the Hemlock Woolly Adelgid; A Pilot Survey on Westfield State University's campus.***

The objective of this study was to investigate Westfield State University's campus for the presence of the Elongate Hemlock Scale. Some key attributes to the study include the Elongate Hemlock Scales population density, frequency, cohabitation with the Hemlock Woolly Adelgid and the potential damage to the Eastern Hemlock Species. The University's campus will be broken up into tree stands, and each Eastern Hemlock will be indexed. It is expected that there will be a significant infestation of Eastern Hemlocks with the Elongate Hemlock Scale as well cohabitation with the Hemlock Woolly Adelgid. The data being collected in this study is important for the future treatment of Eastern Hemlock stands in Western Massachusetts, as the invasive Elongate Hemlock Scale has greater impacts upon the tree species the longer the infestation goes unaddressed.

**Davis, Joseph '20**

53

Faculty Sponsor, Prof. Michael Vorwerk

***The Impact of Computers on the World's Deforestation***

Computers, cell phones, and other technology have changed the way of everyday life. Instead of receiving information needed at school or work on packets of paper, email and other online sharing services are

used to make everyone's life easier, and save paper. With internet access available to about half of people in the world, it should be possible to cut down on the total amount of paper used each year. Although the growth of the computer industry was supposed to cut down the amount of paper used, the access to wireless printers has made printing easier than ever. My goal is to determine if the evolution of technology has influenced the amount of paper used, with a focus on Westfield State University. To examine this, I will survey professors who have been teaching for over ten years to determine if they feel the use of paper has changed as technology has become more prominent. By using web sources, I will examine the world paper usage over time in comparison to the growing production and usage of computers. I will determine if the production of computers has helped with the environmental problem of deforestation, or just made the worlds paper problem worse.

**Fairlie, William '19**

**63**

Faculty Sponsor, Prof. Michael Vorwerk, Prof. Robin White

***A Study of the Mammalian Brain and Social Interactions***

In this study, I examine the correlation between brain mass and social complexity. The Comparative Mammalian Brain Collection as well as a program called ImageJ were used to generate data which correlates the mass/size of the amygdalae to the mass/size of the total brain, as well as brain mass/size to the mass/size of the complex vertebrates' bodies. The amygdalae are one of two almond-shaped clusters of nuclei located deep and medially within the temporal lobes of the brain in complex vertebrates. The amygdalae have been shown in research to perform a primary role in the processing of memory, social awareness, decision-making and several emotional responses, including fear, anxiety, and aggression. In complex vertebrates, including humans, the amygdalae perform primary roles in the formation and storage of memories associated with emotional events. Discussions with Dr. White revealed that the capacity for social interactions in complex vertebrates is closely tied to the amygdalae. The amygdalae are also thought to be a determinant of the level of a person's emotional intelligence. It is particularly hypothesized that larger amygdalae allow for greater emotional intelligence, enabling greater societal integration and cooperation with others. Upon further investigation, amygdalae volume correlates positively with both the size (the number of contacts an individual has) and the complexity (the number of different groups to which an individual belongs) of social networks. In other words, individuals with larger amygdalae had larger and more complex social networks, confirming the hypothesis.

**Flanders, Kody '19**

**65**

Faculty Sponsor, Prof. Emily Cole

***Fish Distribution of Cheshire Reservoir and the Implications of Winter Thaw and Water Depth***

The health of fish populations are historically a good indicator of the quality of the water that the fish inhabit. If a pollutant or toxin is present fish populations will be impacted as fish are exposed to those chemicals or toxins. To assess fish distribution in Cheshire Reservoir a total fish survey was completed involving sonar and catch and release methods. The Deeper Pro+ Fish Finder was used for the sonar readings, water depth and water temperature. Catch and release method was also used to help identify fish species present. The results of the survey have thus far supported the hypothesis that as the water temperature increases the fish will become more evenly dispersed compared to winter months where the fish tend to populate deeper central water. The importance of research of this nature is to anglers across the state that to increase successful fishing trips. Spatial distributions are an important aspect to evaluate when choosing a location to fish.

**Grafton, Kelli '19, Alyssa Delude '19**

79

Faculty Sponsor, Prof. Michael Vorwerk

***An Analysis of the Environmental and Economic Impacts of Lithium Ion Batteries in Plug-in Electric Hybrid Vehicles***

Plug-In Hybrid Electric Vehicles (PHEVs) are run by both battery power and gas, typically having a system that allows gas to power the car after battery power runs out. PHEVs have become a poster child for environmental consciousness over the past fifteen years they have been on the market. However, as some of the cars and their batteries come to the end of their life cycle and warranty, people have begun addressing concerns about the lithium ion batteries. One of the most prominent concerns is how safe and environmentally friendly the batteries are to make and dispose of. In this analysis of PHEV battery efficiency and environmental impact, we will compare several different makes and models of PHEVs and analyze sales of cars against how many of each make and model are taken off the road per year. We will also take into consideration the contents of the batteries and cost of production and replacement, and the environmental and economic impacts of these factors. Additionally, we will assess the life cycle of different types of hybrid car batteries- primarily lithium ion and nickel-metal-hydride batteries, which are the two most common types, and the environmental impacts of each of these batteries. This research will be conducted using annual sales reports, consumer reports, and other scientific sources about the life cycle assessment and contents of lithium ion batteries. Our goal is to determine whether or not PHEVs are an environmentally responsible investment based on our findings.

**Gregoire, Connor '20, Jack Powers '19**

80

Faculty Sponsor, Prof. Michael Vorwerk

***An Analysis of the amount of Green Energy needed to offset Greenhouse gasses emitted in Massachusetts***

In this project we quantify and analyse greenhouse gases emissions (GHG) in the state of Massachusetts. We determine how much green renewable energy is needed to offset the greenhouse gases in the state. We compare the power production of current wind and solar projects across the state to current ghg levels and then calculate how much more production is needed to completely offset the GHG emissions. We use OpenEI.com to determine the potential the state has to harness through planned and proposed projects. With Cape Cod being part of Massachusetts and the Atlantic ocean being known for stable winds, it is an ideal place for a wind farm, but in recent years the projects face strong opposition and never get constructed. Also in this project we map ideal prospective locations suitable for wind and or solar projects. This study is important because the need for clean renewable energy is vital as population and greenhouse gasses increase. Without the elimination of GHG, global warming will continue at a rapid rate.

**Hardy, Veronica '19**

89

Faculty Sponsor, Prof. Michael Vorwerk

***Release of Microplastic Fiber from Synthetic Textiles During Domestic Washing***

Microplastics have been observed in every marine ecosystem on the planet. Organisms, particularly zooplankton, who confuse these microplastics for food can cause damage to their gastrointestinal tracts leading to malnutrition. The chemicals contained in these plastics can react with both sea water and other pollutants, creating toxic resins which are consumed initially by base trophic level organisms. Bioaccumulation occurs up the food chain as these small organisms are consumed by subsequently larger

ones. Microplastics <5mm are typically products of the plastics found in cosmetics and synthetic textiles. Most microplastics that end up in the ocean are from washing machines, which have the potential to release 15-30 gallons of wastewater containing microplastics per wash. Wastewater treatment plants are inefficient at filtering such small particles on a large scale. The top textile pollutants found in the ocean are less than 1 cm in diameter, fibers lost from most commonly polyester and acrylic garments. In 2016 synthetic fibers composed 60% of all fiber produced worldwide, with 91% of all synthetic fibers produced being polyester alone. This study aims to calculate the long-term release of microfibers from fleece, by measuring fabric mass pre and post washing and drying cycles, as compared to a 100% cotton control. Fabric samples will be washed in a Maytag Direct Drive washing machine with Kirkland Environmentally Friendly Detergent and dried in a ThermoScientific oven. They will then be massed, and this process will be repeated multiple times to observe changes in mass from textile deterioration.

**Hatfield, Jeremy '19**

**90**

Faculty Sponsor, Prof. Lauren DiCarlo

***Effects of Wildfire on Beneficial Grassland Invertebrates***

Over the past three decades, wildfires in North America have grown in size, occurrence, and severity highly impacting ecological habitats, wildlife, and human health. Invertebrates, while very beneficial in providing services such as nutrient cycling, pollination, pest control, and food for higher trophic levels are rarely studied after wildfire. Whether vagile, or winged, invertebrates may have different rates of success in accordance with wildfire events. Ground-dwelling invertebrates were collected the year before (2014) and the year after (2016) a large grassland wildfire in the Pacific Northwest. This collection provides an excellent opportunity to assess the overall change in abundance and diversity of invertebrates before and after a wildfire. By assessing the collected invertebrates, our findings will conclude whether there is a significant difference in species abundance before and after a fire is present.

**Hurlbut, William '19, Garine Roubinian '19, Dana Bonollo '19**

**96**

Faculty Sponsor, Prof. Michael Vorwerk

***A Mathematical Model of White Nose Syndrome Rate of Spread***

White-nose syndrome (WNS) is a fatal disease affecting North American bat populations. The fungus grows in cold, dark and damp places affecting bats during hibernation. There is no cure for WNS and the spread of the fungus is rapid and lethal. Through the use of maps and other records that indicate WNS occurrences by county from 2006-2018, we determine the rate of spread of WNS across North America, as well as whether that rate has been increasing or decreasing over time. This quantitative analysis will be based on the total number of affected counties that have been reported over time. We will also develop a mathematical model to estimate the future rate of spread of WNS. Using information on the ranges of various bat species, we can also determine the potential levels of future impact on individual bat species. This analysis and mathematical model could be utilized as a management tool by cities/towns, states, federal agencies, and other groups working to control and prevent the spread of WNS and to develop intervention strategies to protect threatened bat species.

**Jack, Esteafan '19**

**98**

Faculty Sponsor, Prof. Emily Cole

***Bird Predation Effect On Insect Abundance***

For this project I have decided to study the effect of bird abundance on insect populations in 4 different habitats. My hypothesis is that more insects will be found in areas with a lot of cover such as bushy areas, and invasive thickets. In order to get data I have done additional bird watching in 4 different habitats around campus during morning, and evening to see which population has the most birds. Four habitats that were observed for bird watching include old forest, young forest, invasive thicket, and cleared land. Then I am analyzing past data collected from the fall semester about bird watching, and invertebrate collecting to make graphs, descriptives, and frequencies to compare insect count to bird count. When bird watching I am counting how many individual birds that I see while I stand in each habitat. Once I get to each sight I usually waited about 10 minutes before allowing everything to settle down, and then I would only count the birds that I could actually see. I would write down some descriptions of the birds such as the color, and size. Size was measured by if the bird small, medium, or large. Small being the size of a finch, medium being the size of a crow, and large being at least the size of a falcon. Adding bird, and insect data to last data collected from last fall semester I am able to have a much broader amount of data to analyze.

**Juteau, Jennifer '19**

**104**

Faculty Sponsor, Prof. Emily Cole

***Environmental Justice: An Analysis of the Influence Superfund Sites Have on Local Municipalities in Massachusetts***

This study will examine the potential consequences of living near toxic contaminated sites in Massachusetts. Using data collected in the 34 towns with Superfund Sites; income, race, education, and cancer incidents will be compiled and compared to the rest of the state of Massachusetts. Many prior studies have been conducted in other states that provide strong evidence that marginalized people are forced to suffer the ramifications of these sites. The goal of this study is to identify if there is a correlation between superfund sites and the income, race, health, and education of the citizens of Massachusetts who are exposed and take necessary actions to remediate.

**Manion, Sean '19, Coltin Omasta '19**

**129**

Faculty Sponsor, Prof. Emily Cole

***Browse Survey: A comparative assessment of white-tailed deer density and habitat impact in Eastern and Western Massachusetts.***

The purpose of the field study was to determine if the habitat within two different regions are able to sustain the current browse level of the white-tailed deer population. Like all plant-herbivore systems, the interaction between *Odocoileus virginianus* and browse in its habitat results in changes to the populations of both trophic levels (Tremblay et al, 1087). Our study called for the assessment of public lands in the town of West Newbury (Ordway Reservation, Eastern Site) and the city of Westfield (Westfield Wildlife Management Area, Western Site). To gather data, student walked transects within their respective study area, stopping to assess the amount of browsing that was taking place within a four-foot radius through the use of a late-winter deer browse survey. Methods for the survey were modeled after the methods outlined by the Michigan United Conservation Clubs (Mitterling,1). Other data, to support browse observations, like pellet droppings and physical presence of deer, were also noted. The data collected



between the two study areas will be used to both assess and compare the deer populations. Carrying capacity and population density of white-tailed deer within these two regions have implications for other species within the habitat, and should be a factor in the data-driven management plans of deer populations in Massachusetts.

**McColl, Daniel '20, Gregory D'Agostino '19, Scott Carcanague '20, Keith Ruby '20** **135**

Faculty Sponsor, Prof. Michael Vorwerk

***Assessment of Oriental Bittersweet in Western Mass State Parks***

Oriental Bittersweet is a woody vine that was introduced to the U.S around the 1860s, and it has since been spreading uncontrollably across the northeast region. This vine inhibits trees and shrubs ability to absorb nutrients, as well as photosynthesis by constricting their roots up through the canopy. In our research, we quantify its spread and map it by using GPS and geographical information system (GIS). We sampled areas in various state parks in Western MA and assessed the presence or absence of invasive oriental bittersweet during the spring 2019 semester. This data allows us to calculate the colonization and distribution of this detrimental species.

**Moreta, Eileen '19, Melanie Perry '19** **143**

Faculty Sponsor, Prof. Emily Cole

***Potential Management Plan for the Invasive Emerald Ash Borer in Western MA***

We have created a management plan for a private land owner to manage their ash trees because of the encroaching threat of the emerald ash borer. The land owners' property is located right off of Johnson Hill and Ingell road, Chester, MA 01011. The emerald ash borer kills ash trees and has been working its way around the eastern half of North America. The emerald ash borer has been discovered in Dalton, MA, which is within 20 miles of Westfield, MA. We plan to determine basal area of ash trees on the land owners' property and then compare basal area of all other trees within the property. By measuring the size of the ash trees, we will gather an idea whether the forest should be managed for Timber sales or if the forest should be managed for firewood.

**Perez, Destiny '19** **158**

Faculty Sponsor, Prof. Emily Cole

***A Closer Look at Native bee Populations***

In the past couple years, I have been very interested in bee populations and why they are declining. Many factors are involved in this decline such as habitat fragmentation increased use in pesticides, and climate change. Another reason why I chose to do my senior project on bees is because they are one of the most important pollinators for global food production. Crops pollinated by bees include apples, melons, and broccoli which are found in most households nowadays. I will be monitoring bee activity in the pollinator garden located at the Horace Mann building at Westfield State. I will be tracking the bee populations as they are now and then I am going to add bee box habitats for them and see if the population of bees in the garden increases due to the new homes they will have. Potential results could show no significant difference in the population size which would mean the boxes were not adequate enough for the bees. Results could also show a significant difference in the number of bees seen in the area meaning that the bees have taken home in the boxes that will be made. I hope results will show an increase because that means that my bee boxes came out correct.

- Poremba, Zack '19** **162**  
 Faculty Sponsor, Prof. Emily Cole  
***The Knightville Dam: The Effect It Has On Water Quality Indicators Below***  
 This study explored how the Knightville Dam, on the East Branch of the Westfield River in Massachusetts, impacts water quality indicators. Indicators such as PH level, water temperature, flow rate, and diversity in macroinvertebrates were sampled from four locations, two being below and above the dam. The overall objective of the study is to determine if the Knightville Dam has an impact on the water quality of the watershed below. The results from this study can provide insight on optimal dam engineering and information to sport fisherman.
- Skoglund, Linnea '19** **179**  
 Faculty Sponsor, Prof. Robert E Thompson  
***Exploring the Presence of Microcontaminants in the Westfield River Using Gas Chromatography***  
 Medication use and the use of additives in items such as food, cleaning products and cosmetics has increased in America and is at an all-time high. As a result, these emerging microcontaminants are passing through waste water treatment plants and into waterways in the contaminated effluent. Biological testing of these microcontaminants shows that they can disrupt biological processes in organisms. Some of these emerging microcontaminants may be difficult to detect with limited resources, however other small organic compounds that are only produced by anthropogenic use, such as caffeic acid, may be easier to detect. The presence of indicator molecules such as caffeic acid in waste water effluent may indicate the presence of other microcontaminants in the water with more dangerous implications. In the proposed research, I will use gas chromatography to detect and compare the levels of caffeic acid present in water collected from above and below the Westfield Waste Water Treatment Plant in Westfield, Massachusetts as an indication of the presence of anthropogenic micropollutants.
- White, Megan '19, Marissa Eisnor '19, Lisa Bonome '19, Vanessa Parmeggiani '20** **206**  
 Faculty Sponsor, Prof. Michael Vorwerk  
***Water Sustainability on Westfield State University Campus***  
 Westfield State University has 75 drinking water fountains and 16 refillable water bottle stations located all over campus. During the spring semester, we are recording 5 weeks of usage data from the refillable water bottle stations to determine how much these sources are being utilized by the students on campus. In addition, we also distributed 120 surveys to students to determine their usage of water fountains, water stations, student owned Brita filters and purchased water bottles. We hope to determine how significant the water refill stations are in comparison to other drinking water resources. If the refillable water bottle stations are proven to be more significant, Westfield State would benefit from implementing more stations throughout campus.
- Whittier, Rebekah '19** **208**  
 Faculty Sponsor, Prof. Emily Cole  
***An Analysis of Politically-Biased Framing within Climate Change News Coverage***  
 The purpose of this project is to explore the writing methods used by American news sources to portray climate change within their articles. The majority of the general public receives climate change news via popular news media, and how these stories are framed can have influence on the perception of the topic. I

will be evaluating ten news outlets, and choose two articles published in 2019 from each outlet, all pertaining to climate change. I will categorize the articles using Semetko and Valkenburg's five key frames from their 2006 study, "Framing European Politics: A Content Analysis of Press and Television News." These five frames are as follows: Conflict based; Economic based; Human Interest focused; Morality focused; and Attribution of Responsibility. The results of this analysis will potentially show a correlation between how climate change is framed in news articles and the political leaning of the news source. The implications of this would be that political bias can have an influence on how climate change news is covered, and by the public being made aware of this bias, they can more effectively discern facts from political agendas in climate change news articles.

## ***Mathematics***

**Devlin, Jillian '19**

**57**

Faculty Sponsor, Prof. James Wright

### ***Random Walks in the Finance Universe***

Through an independent study this semester I analyzed random walks in the mathematics and finance fields. A random walk is a process whereby an object (stock price) moves randomly in two directions. This one-dimensional walk is structurally quite simple and provides the starting point for understanding how to price options. A call option is a financial contract that gives the buyer the option to purchase stock at a fixed price at some time in the future independent of the stock's future price. Using the structure of random walks one creates binomial pricing trees related to stock prices and option prices. These pricing trees are the basis for understanding the Black-Scholes pricing model for options.

**Tormey, Sarah '22, Mary Philpott '22**

**193**

Faculty Sponsor, Prof. James Wright

### ***Recycling at Westfield State University***

Classrooms on Westfield State University's campus have trash bins and some have recycling bins, but it has come to our attention that these aren't being used properly. This project asks if signage can lead WSU students to recycle properly. We created a sign to remind students to use the recycling/trash bins properly. Trash and recyclable data was collected over three different weeks and analyzed. First week, to identify a base level, we pulled out recyclable items discarded in trash bins and weighed them. Next week, we placed signs above the trash to remind students to recycle their recyclable materials instead of placing them in the trash. Final week, we measured the recyclable items that ended up in the trash, and then compared this to the week when we did not put signs up. Results will help us formulate ideas for improving and developing programs such as a recycling club to increase awareness.

## ***Psychology***

**Chapman, Katherine '20**

**39**

Faculty Sponsor, Prof. Alex T. Daniel

### ***The Effects of Negative/Neutral Imagery on Eye Gaze***

Anxiety and attentional biases have been studied in the past while using imagery and eye tracking (Quigley et al. 2012), but it hasn't been paired with alongside skin conductance response. So far, no one has used only negative imagery alongside neutral imagery in this context. Anxiety is a feeling of

nervousness, of an imminent threat or an event occurring, or a perpetual feeling of fear. This can manifest in the body in physiological ways; increased heart rate, increase blood pressure, migraines, trouble eating, nausea, and trouble concentrating. An attention bias is whether someone has a tendency to pay more attention to one thing over another; whether a participant will pay more attention to negative or neutral imagery. I am testing how general anxiety affects the body's response to negative and neutral imagery. Does anxiety impact our tendency to avoid negative imagery? Are there any correlations? We expect people who tend to be anxious to avoid the negative image by looking at the neutral images more often. We also expect that the participants' whose skin conductance response (SCR) increases over the span of the experiment would be looking at the negative images more and have a higher state anxiety than at the beginning. SCR measures electrodermal activity through two electrodes that are placed on two fingers. The higher the electrodermal activity is, the more stressed, aroused, or anxious a person is. The lower the electrodermal activity, the calmer a person is.

**Chapman, Katherine '20**

**40**

Faculty Sponsor, Prof. Eric Bressler

***Encryption Theory: Westfield State University Jokes and Statements***

Humans would be very inefficient if we didn't have an effective way to get reliable information from one another. Humor might be an adaptive way to find like-minded people, without the threat of deception. This research project looks at jokes (humor), which have encrypted or hidden information, and statements (no hidden information), in the context of Westfield State University, as well as affiliative desire, or the desire to be a person's friend. Westfield State students and non-Westfield State people participated in the survey. We hypothesize that Westfield State students will rate everything as more humorous than the non-Westfield state students and both groups will find the jokes more humorous than the statements. We also predict Westfield State students will find the jokes funnier than the non-Westfield state students and will show higher ratings of wanting to be the proposed speaker's friend. Humans would be very inefficient if we didn't have an effective way to get reliable information from one another. Humor might be an adaptive way to find like-minded people, without the threat of deception. This research project looks at jokes (humor), which have encrypted or hidden information, and statements (no hidden information), in the context of Westfield State University, as well as affiliative desire, or the desire to be a person's friend. Westfield State students and non-Westfield State people participated in the survey. We hypothesize that Westfield State students will rate everything as more humorous than the non-Westfield state students and both groups will find the jokes more humorous than the statements. We also predict Westfield State students will find the jokes funnier than the non-Westfield state students and will show higher ratings of wanting to be the proposed speaker's friend.

**Courtney, Elizabeth '19**

**45**

Faculty Sponsor, Prof. Lynn Shelley

***Depression and Suicide in Guatemala and the United States***

This poster will explore the topic of depression and suicide in both Guatemala and the United States. In both locations the documented rates are increasing. There are many factors that contribute, and difficult to identify a single cause. This poster will explore causes and explore similarities and differences across the two cultures.

**Cox, Nicholas '19**

46

Faculty Sponsor, Prof. Claudia Ciano-Boyce

***The Relationship Between Social Media Use and Suicidal Ideation***

Within the young adult population, defined by the U.S. Census Bureau as people ages eighteen to thirty-four, consistent social media use can increase one's depression. According to research on Facebook envy and Facebook depression from a large Midwestern University, Tandoc, Ferrucci, and Duffy (2015) found that heavy Facebook users reported feeling higher levels of Facebook envy than light Facebook users. Since past studies looked at the relationship between social media use and envy, depression and anxiety, all of which can increase the likelihood of suicidal ideation, this study examined the relationship between social media use and suicidal ideation. Students from Westfield State's Psychology Department took an electronic survey to help answer the question: Is there a relationship between social media use and one's level of suicidal ideation? It was hypothesized that there would be a positive correlation between one's chronic social media use and one's suicidal ideation. In this sample of psychology students, who did not have high suicidal ideation, the hypothesis was generally not supported. However, based on a one-sample t-test, the sample of psychology students ( $N = 74$ ) spent significantly more time on social media ( $X = 6.44$ ,  $S = 4.11$ ) than the population ( $\mu = 2.79$ ,  $\sigma = 4.02$ ) [ $t(73) = 7.54$ ,  $p = 0.000$ ]. In future studies, the survey questions about social media use could be expanded. This study could also be developed as an experiment to examine a "cause and effect" relationship between these two variables.

**Gwynn, Olivia '20**

87

Faculty Sponsor, Prof. Thomas Alex Daniel

***Spoilers Effect on Audiences' Enjoyment***

Contrary to popular belief, previous research has shown that story spoilers do not significantly affect how much audiences enjoy media. In this project, participants selected an episode of television to watch and were given a brief summary about the story: one with spoilers and one without. These results show spoilers affect enjoyment when participants are able to choose what media they consume.

**Jasiel, Michelle '19**

100

Faculty Sponsor, Prof. Rebecca Burwell

***Sexual Trauma: Outcomes and Processes***

Previous research has shown that a prominent minority of individuals, commonly females, endure some sort of eating disorder. Many of these people are victims of sexual assault. Nevertheless, there has been minimal amount of research conducted that looked further into the process by which these events are connected. The current study will assess the hypothesis that both low self-worth and internalized misogyny partially facilitate the relationship between sexual victimization, disordered eating, and anxiety. Approximately 100 undergraduate students will take part in the self-report surveys.

**Ovelheiro, Kayla '19**

154

Faculty Sponsor, Prof. Thomas A. Daniel

***Test Taking Performance Under Pressure***

Working memory is the ability to temporarily store and manipulate information in memory. It is used during activities such as mental math, reading comprehension, and active listening. Beilock and Carr (2005) found that participants who had higher working memory scores experienced a larger effect of pressure than those who scored lower on working memory tasks. This research project will examine how

pressure affects individuals with high and low working memories in regards to their ability to perform on an intelligence test (Raven Progressive Matrices). We will be using Reading Span and Operation Span to measure working memory. We will apply pressure to individuals by informing them that they are being filmed and asking them to perform the test 20% faster. We hypothesize that this increased pressure will have a significant detrimental effect on test scores.

**Stornelli, Lauren '19**

**183**

Faculty Sponsor, Prof. Joseph Camilleri

***Errors and biases in bystander identification of perpetrators***

Although eyewitness testimony is used to determine guilt or innocence, much research has shown that people are prone to making errors in their eyewitness accounts. We currently do not know if people are more prone to making false positives (i.e., saying the person committed a the crime when they did not) or if they are more prone to making false negatives (i.e., saying the person did not commit the crime when they did). Error Management Theory (Haselton & Buss, 2000) suggests we can predict and explain which type of error people are more prone to making by considering the potential costs or benefits of either error. Because there is a greater risk of potential future harm by letting someone go who might be dangerous, we hypothesized that eyewitnesses of crimes are more prone to making false positives. Also, since physical asymmetry correlates with criminality, it is possible that people are more likely to make false positives when judging asymmetrical faces. Our results indicate that eyewitnesses are more likely to make a false positive. Additionally, we found a trend towards a bias against asymmetrical faces. The implications span over the field of Criminal Justice and Psychology, providing a new perspective into the reliability of eyewitness testimonies.

**Webster, Allison '21**

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Faculty Sponsor, Prof. Alex Daniel

***A Proposal to Examine the Therapeutic Effects of a Canine***

This research proposal will test the effects of canines on human anxiety. Participants' anxiety will be measured before and after being in a room with an unfamiliar dog. In one condition, the dog will be leashed and under its owner's supervision, and in another condition, the dog will be unleashed in an adjacent area. I hypothesize that participants' anxiety will lessen more so when the dog is unleashed nearby.