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Showcase of Undergraduate Scholars

Wednesday, April 24, 2019
Gatton Student Center Ballroom
3:00 – 6:00 PM

Opening Remarks and Moderators
Evie Russell, Associate Director of the Office of Undergraduate Research

Welcome
Dr. Jane Jensen, Director of the Office of Undergraduate Research

Presentation of the Faculty Mentor of the Year Awards
Student Research Ambassador

Closing Remarks

Reception to follow outside the Ballroom

Student Presentations begin at 4PM
Poster Presentations (Ballroom)
Oral Presentations begin at 4:00 PM (Third Floor - Room 330, SEC Room)
Table Presentations (Ballroom)
The University of Kentucky, as the state’s flagship and land grant research institution, is truly the University for Kentucky. A fundamental component of our commitment to the state and the people we serve lies in research — the creation of knowledge. World-class researchers at UK conduct this important work across an array of disciplines and in collaboration with communities.

As such, this place has been – and continues to be – home to pioneers and providers, bold dreamers and strategic thinkers, and passionate undergraduate researchers who make our vision and work possible.

Undergraduate research — the interplay between research in the lab and academic preparation in the classroom — provides a rich educational experience for our students. It prepares them to change our Commonwealth, and the world, for the better. Through undergraduate research, students experience the intellectual inquiry that is the foundation of scholarship at the University of Kentucky. They have the precious opportunity to work alongside experts in their fields of study — receiving mentorship and guidance as they enhance what they learn in the classroom with practical applications in the field. This is what the Showcase of Undergraduate Scholars represents.

For faculty, this also represents one of the greatest rewards in higher education — watching an eager young mind passionately pursue new knowledge. Igniting curiosity in the next generation of leaders enriches our faculty’s experience and is at the core of what we do and why we do it.

Undergraduate research at the University of Kentucky embodies a vital component of our role as Kentucky’s indispensable institution. By engaging in innovative research activities and inspiring a generation of thinkers, pioneers, and inventors, we position ourselves to address our state’s most stubborn challenges.

We are creating a better future for all those we touch and teach. We are embracing the profound idea that Kentucky can equip new leaders who will show us the way.

Through undergraduate research, we are showing the world what Kentucky can do.

Sincerely,

Eli Capilouto
President
Welcome to the 2019 Showcase of Undergraduate Scholars!

“Tell me, and I’ll forget
Show me, and I’ll remember
Involve me, and I’ll understand”
- Chinese proverb

The Office of Undergraduate Research and all supporting partners welcome you to the 13th Annual Showcase of Undergraduate Scholars (2019). This UK academic tradition serves to honor the remarkable achievements of our undergraduate researchers and provides an opportunity to thank the dedicated faculty mentors and staff who work on behalf of these students.

As one of the nation’s leading research institutions, UK offers a breadth of experiences and opportunities that actively engage students in their education. Through undergraduate research and creative activities, students work closely with leading scholars to gain in-depth knowledge about their fields of study and have opportunities to apply classroom learning to real life situations. The Showcase of Undergraduate Scholars highlights the invaluable educational impact that undergraduate research can have on promoting student success.

Throughout the event, undergraduate students from diverse academic disciplines will present their faculty-mentored scholarly research and creative endeavors in poster, table, and oral formats. Attendees will also hear from administrators associated with undergraduate research campus-wide, enjoy a presentation from UK Faculty and Students currently engaged in research, and learn about the benefits of engaging in undergraduate research. The 2019 Excellent Undergraduate Research Mentor Award winners will also be announced.

The Showcase demonstrates that true academic enrichment is best achieved by collaborations and partnerships among faculty, academic departments, colleges, units, and programs dedicated to academic excellence. We thank the many dedicated mentors who guided the research projects and creative activities presented today.

Please join us in welcoming and congratulating all the undergraduate student presenters at this year’s Showcase of Undergraduate Scholars. This event is truly an occasion for us to be proud members of the University of Kentucky.

Sincerely,

The Office of Undergraduate Research

Jane Jensen
Director

Bessie M. Guerrant
Associate Director

Evie Russell
Assistant Director

Jesi Bowman
Student Program Specialist

Philipp J. Kraemer
Chellgren Chair for Undergraduate Excellence
Professor of Psychology
The Excellent Undergraduate Research Mentor Award recognizes UK faculty members who have demonstrated an outstanding commitment to mentoring undergraduate researchers, provided exceptional undergraduate research experiences, as well as supporting and promoting the undergraduate research initiatives on campus.
The Office of Undergraduate Research officially launched the Faculty Mentor of the Week recognition program in August 2017. Each week one of UK's outstanding and very much appreciated undergraduate research faculty mentors was highlighted for their leadership and support of undergraduate student researchers.
# SCHEDULE OF ORAL PRESENTATIONS

## ORAL PRESENTATIONS – Room 330 (3rd Floor)

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<td>Mechanical Engineering</td>
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<td>Mollette, Katie</td>
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<td>5:30 PM</td>
<td>Nguyen, Mai</td>
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## ORAL PRESENTATIONS – SEC Room (3rd Floor)

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<tr>
<td>5:30 PM</td>
<td>Somasundaram, Eashwar</td>
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EXAMINING THE MATERIAL PROPERTIES OF BIOFILMS THROUGH LASER-INDUCED SPALLATION
Kearns, Kaitlyn
Time: 4:00 PM – 4:20 PM; Room 330
Faculty Mentor(s): Dr. Martha Grady
Discipline: Mechanical Engineering

Biofilms are thin films of cells, such as bacteria, that are encased in a gel-like substance called the extracellular polymeric substance (EPS). Planktonic bacteria alone can easily be removed from most surfaces, but the EPS makes biofilms antibiotic-resistant, and therefore more difficult to remove. The adhesion strength of biofilms is affected by the surface properties and the environment. *Streptococcus mutans* is an oral biofilm which commonly adheres to the titanium surface of dental implants. *S. mutans* is known as an early initiator, meaning it promotes growth of other biofilms, and sucrose in the environment is a nutrient known to increase adhesion. The presence of biofilms on dental implants causes many problems, such as damage to the gums or even prevention of osseointegration. To model adhesion properties of *S. mutans* on the implant-mimicking surface, biofilms are cultured in a substrate assembly designed for laser spallation procedures. Different sucrose concentrations are used to observe the effects of nutrients on biofilm adhesion. Laser spallation techniques have been used previously to study mechanical properties of many inorganic thin films and have shown promising results with biofilms. In this process, a laser pulse is adjusted by a variable attenuator and focusing lens to achieve the desired fluence (energy density). A mirror reflects the pulse upward toward the substrate, and the pulse is converted into a compressive stress wave, ejecting the loaded region of the biofilm at the top surface of the substrate. We have used this method to compare loading fluence to spallation area and loading location to spallation area. From those studies, we have observed trends in adhesion strength among different sucrose concentrations as well as the role of membrane tension in spallation area measurements. In the future, we plan to investigate the adhesion of osteoblast-like cells.

ARCHIVAL AND HISTORICAL PERSPECTIVES ON THE MENTAL HEALTH OF DISPLACED CHILDREN
Khenner, Elizaveta
Time: 4:30 PM – 4:50 PM; Room 330
Faculty Mentor(s): Carol Street
Discipline: UK Libraries Special Collections Research Center

The two most significant periods of mass displacement in modern history have been the period following World War II and today’s refugee crisis, which encompasses 68.5 million people worldwide. Of these, approximately 12.7 million are child refugees under the age of 18. Comparison of these two mass displacements can allow us to see what was learned from 1945-1955 and evaluate whether these lessons have influenced what is currently being done to assist refugee children affected by this new crisis. Specifically, this research focuses on mental health care of displaced and refugee children living in Germany in the post-WWII period and today. This research will examine the intersection between the mental health issues refugee children experience and their integration into their new communities, including the role of factors such as living conditions in displaced person camps and education in a school environment. This research will use archival collections at the United Nations Relief and Rehabilitation Administration (UNRRA), International Relief Organization (IRO), United Nations High Commissioner for Refugees (UNHCR), and the University of Kentucky for the historical research. Current data will be sourced from government agencies, news sources, scientific literature, and humanitarian aid and health agencies such as the World Health Organization, the United Nations International Children’s Emergency Fund (UNICEF) and Doctors Without Borders. Findings will evaluate whether significant improvements in care for traumatized displaced children have been made in the last 70 years and provide insight into ways to better help millions of facing children facing displacement and trauma.
HUMANIZING THE PALESTINIAN-ISRAELI CONFLICT: WHAT WE CAN LEARN FROM GAZANS
Mollette, Katie
Time: 5:00 PM – 5:20 PM; Room 330
Faculty Mentor(s): Dr. Aiyub Palmer
Discipline: Modern and Classical Literatures, Languages, and Cultures

The power of constructing one’s own personal narrative is critical to psychological development. Growing up in an environment where outside forces craft an individual’s identity takes away from personal agency and identity. This is seen in the Palestinian-Israeli conflict where individuals from Gaza have had personal narratives written for them while ignoring the trauma and violence that are commonplace in Gazan society. In this study ten individuals from Gaza are interviewed about their experiences growing up in what has been labeled as the world’s largest open-air prison. In the interviews each respondent is asked about their unique experiences, how growing up in Gaza has impacted their lives today, what they want the world to know about the conflict, and how restrictions imposed upon Gaza restrict daily life in the area. Along with these interviews the experiences described by the respondents are related to similar experiences found in other interviews with people from Gaza. The interviews are also discussed by linking them to the history of the Palestinian-Israeli conflict in order for the respondents to tell their own narrative within the conflict.

FACTORS ASSOCIATED WITH LIFE’S SIMPLE 7 DIET SCORE: RESULTS FROM A STUDY OF CARDIOVASCULAR HEALTH IN U.S. HISPANICS
Nguyen, Mai
Time: 5:30 PM – 5:50 PM; Room 330
Faculty Mentor(s): Gia Mudd-Martin PhD, MPH, RN, FAHA
Discipline: Nursing

Higher education level has been associated with healthier lifestyle in large population studies but has not been well studied in U.S. Hispanics. The purpose of this study was to examine whether educational level predicted healthy diet as defined by the American Heart Association’s Life’s Simple Seven (LS7). Hispanic adults participating in the Corazon de la Familia study completed baseline Viocare food frequency questionnaires. A logistic regression was conducted to examine the association between diet and educational level, adjusting for sex. LS7 recommends adults consume per day at least 4.5 servings of fruit, 3 or more servings of whole grain, and less than 2300 mg of sodium and per week 7 or more ounces of fish and less than 4.5 sugary sodas. For this analysis, unhealthy diet was defined as following zero to one of the LS7 dietary recommendations; healthy diet was defined as following two or more recommendations. Educational level was categorized as high school education or less and greater than high school education. Baseline data from 97 Hispanics were analyzed. The majority of participants were female (79.4%) and had a high school education or less (69.1%); 39.2% had an unhealthy diet. Regression indicated that the adjusted model was predictive of diet ($\chi^2(2) = 7.16, p = .03$) Education was not predictive of unhealthy diet ($OR=1.3, 95\% CI=.49-3.2, p = .62$). Only sex was significantly associated with diet with females 3.8 times more likely than males to have a healthy diet ($95\% CI = 1.3-10.6, p = .01$). Although education has been associated with diet in some populations, our findings suggest that sex may be a more important predictor with U.S. Hispanics. Although research with larger samples is needed to validate these findings, public health specialists should strategize to promote healthy diet among Hispanic males.
EVIDENCE OF PEROXIDASE CATALYSED FORMATION OF CYSTEINE-TYROSINE AND DITYROSINE CROSS-LINKING IN MAMMALIAN SPERM PROTAMINES
Powell, Christian
Time: 4:00 PM – 4:20 PM; SEC Room
Faculty Mentor(s): Dr. Jason DeRouchey
Discipline: Molecular & Cellular Biochemistry

Spermatogenesis is the process in which germ cells develop into spermatozoa in the testis. Sperm protamines are small peptides (<50 amino acids) which mediate DNA condensation during the spermatogenesis process. The protamines of eutherian mammals have an arginine-rich region which binds to DNA and multiple cysteine residues which facilitate intramolecular folding and intermolecular bonding between protamines. Protamines replace DNA histones during spermatogenesis allowing DNA to achieve a more condensed state. This further condensed DNA state allows for a smaller nucleus and facilitates the formation of the sperm head. Most metatherian sperm protamine lack cysteine but perform the same function. This lack of dicysteine cross-linking sites has made the mechanism behind metatherian protamines folding unclear. In order to investigate this phenomenon, protamine sequences from UniProt’s TrEMBL and SwissProt databases were pulled down and sorted into eutherian and metatherian groups. Multiple sequence alignments (MSAs) for these groups were then generated with MUSCLE 3.8.31. The MSAs were then iterated through position by position and a gap weighted relative entropy score calculated for each position. This analysis showed that the cysteine containing positions were the most highly conserved within the eutherian alignment. For the metatherian alignment, the tyrosine containing positions were determined to be the most highly conserved and corresponded to the cysteine positions in the eutherian alignment. The high conservation implies that these positions are likely functionally/structurally important residues in the metatherian protamines and the correspondence with cysteine positions within the eutherian alignment implies a similarity in function. One explanation is that the metatherian protamine structure relies upon dityrosine cross-linking between these highly conserved tyrosines. Also, the human protamine P1 sequence has a substitution of tyrosines in a position eutherian mammals are expected to have a cysteine. The position is also thought to be involved in intramolecular dicysteine cross-linking. One explanation is the formation of a rare cysteine-tyrosine cross-linking to facilitate folding.

EXAMINATION OF RACIAL DISPARITIES IN JURY COMPOSITION AND TRIAL OUTCOMES
Price, Kathryn
Time: 4:30 PM – 4:50 PM; SEC Room
Faculty Mentor(s): Dr. Michael Zilis
Discipline: Political Science

The Sixth Amendment of the U.S. Constitution guarantees “the right to a speedy and public trial by an impartial jury” and Congress has included in the definition of a fair trial, the right to a trial by jury “selected at random from a fair cross section of the community.” However, the characteristics which determine a fair cross-section of the community has long been debated. The Supreme Court has addressed this topic in various rulings. Notably, Batson v. Kentucky made it unconstitutional to strike venire members solely based on race, but despite this, studies have shown juries to be unrepresentative of the racial composition of their communities from which they are formed — calling into question the fairness of the judicial system. Although, at present, more analysis is needed to assess whether the racial composition of juries significantly affects trial verdicts. In order to add clarity to this issue, jury racial composition was examined in 306 trials in Mississippi’s Fifth Circuit Court District, which took place between 1992 and 2017. A statistically significant relationship between the percentage of white jurors and conviction rates for minority defendants was found (p < 0.05), but there was no such relationship found concerning trials with white defendants. Additional influences on trial verdict, including crime type, will also be investigated.
ALLEGIANCES AND TREACHERY: A LOOK AT THE CULTURAL CRITICISMS OF PAUL MORAND
Shelton, Zach
Time: 5:00 PM – 5:20 PM; SEC Room
Faculty Mentor(s): Carol Street
Discipline: UK Libraries Special Collections Research Center

French modernist poet Paul Morand, known for his descriptive narrative style, wrote observations and criticisms of American life during his visit to the United States in 1927. A newly-discovered collection of Morand’s letters and poetry at the University of Kentucky Special Collections Research Center enables scholars to better interpret his observations during that time period. The poems, or “lyrical photographs” as they were known, provide context to how America in the 1920s was viewed by outsiders. Due to the evocative quality of his poems, a subtle disapproval of iniquity within the cultural righteousness in America before the Great Depression is represented. Within this period of Morand’s career, the height of his French literary acclaim and celebrity, his oeuvre was prospering; yet, eventually, his elitism and allegiances during World War II shunned him from French mainstream culture after the war. Research for this collection will compare Morand’s perception of French society in the 1920s and his Morand’s perspective of American life. Specifically, with the historical context of these poems being written in a period between the two world wars, an investigation will be made into why he fled France after WWI and during WWII. From this, insight concerning the adverse effects of war on France’s stability and imagination, including Morand and his literary contemporaries, will emerge. This research will be useful in not only providing a cultural understanding of the excesses of American life during the 1920s from his perspective, but also helpful in understanding Morand’s subdued and covert right-wing nationalist views (anti-Semitism, misogyny, and racism) that is revealed in his poetry and also his desire to commit future treasonous acts as a Vichy government diplomat and a Nazi sympathizer.

Pharmacological and Genetic Identification of Cholinergic Receptor Subtypes: Modulation of Locomotion and Neural Circuit Excitability in Drosophila Larvae
Somasundaram, Eashwar
Time: 5:30 PM – 5:50PM; SEC Room
Faculty Mentor(s): Dr. Robin Cooper
Discipline: Biology

Acetylcholine (ACh) is an abundant neurotransmitter and neuromodulator in many species. In Drosophila melanogaster, ACh is used in peripheral sensory neurons and is the primary excitatory neurotransmitter and neuromodulator within the central nervous system (CNS). The receptors that facilitate cholinergic transmission are divided into two broad subtypes: the ionotropic nicotinic acetylcholine receptors (nAChRs) and the metabotropic muscarinic acetylcholine receptors (mAChRs). This receptor classification is shared in both mammals and insects; however, both the pharmacological and functional characterization of these receptors within the Drosophila nervous system has lagged behind its mammalian model counterparts. In order to identify the impact of ACh receptor subtypes in regulating the performance of neural circuits within the larval CNS, we used a behavioral and electrophysiological approach to assess cholinergic modulation of locomotion sensory-CNS-motor circuit excitability. We exposed intact and semi-intact 3rd instar larvae to ACh receptor agonists and antagonists to observe their roles in behavior and regulation of neural circuit excitability and to investigate AChR pharmacological properties in vivo. We combined this with targeted AChR RNAi-mediated knockdown to identify specific receptor subtypes facilitating ACh modulation of circuit efficacy. We identify a contribution by both mAChRs and nAChRs in regulation of locomotive speed and reveal that they play a role in modulation of the excitability of a sensory-CNS-motor circuit. We further reveal a conspicuous role for mAChR-A and mAChR-C in motor neurons, directly, in modulation of their input-output efficacy in response to evoked sensory-CNS input, which is also manifested in alterations in locomotive speed.
HOW DID COALITIONS FORM IN MISSISSIPPI DURING CIVIL RIGHTS?

**Poster: 1**
**Mitchell, Kenyatta**
**Faculty Mentor(s):** Dr. Anastasia Curwood

Over the past century, African Americans took part in building organizations to bring about equal rights and social change. Many organizations formed before Jim Crow but reached prominence during the civil rights movement. The Civil Rights movement of the 1950s and 1960s built on long-term strategies for gaining the right to vote, education, housing, and freedom from discrimination. Through organized nonviolent protests, the civil rights movement broke the pattern of segregation and began to help bring social change at the national level through the Civil Rights Act of 1964 and the Voting Rights Act of 1965. Throughout the time period, African American groups came together to combat racism and inequalities. Prior to the Civil Rights Era, the National Association for the Advancement of Colored People was founded in 1909 to advance justice for African Americans. One of the organizations, founded in 1957, was the Southern Christian Leadership conference (SCLC), established by Martin Luther King Jr. The Congress of Racial Equality (CORE), founded in 1942, got excited about the student activism and invited students to form their own organization called the Student Nonviolent Coordinating Committee (SNCC) founded in 1960. These organizations came together in a Council of Federated Organizations (COFO) by 1962 in Mississippi. Coalitions formed with the help of people from all walks of life wanting to challenge segregation and merge together for activism during the Civil Rights movement. Political organizing was the strategic approach that many African Americans in Mississippi resorted. They established precinct meeting, encouraging people from across the state and nation to rid racial segregation of discrimination. Many African Americans were typical citizens in the community yet took over their destiny and demonstrated the true meaning of democracy. Students left their college campuses to commit to full-time movement work.

THE RELATIONSHIP BETWEEN HEIFER TEMPERAMENT AND TIME IN CONTACT WITH HUMANS DURING A STRESSFUL EVENT

**Poster: 2**
**Authors:** Emma Olmstead, Beymi Garcia, Alaa Jaloudi, Maria Piva,
**Faculty Mentor(s):** Dr. Joao Costa

Dairy cattle often undergo stressful events on farm. Tailored handling for different animals will help avoid negative experiences during handling. The objective of this study was to determine if heifers rely on a familiar human for social support when they are exposed to a fear-eliciting situation. The study was conducted on March 23th, 2019 using 16 Holstein heifers (95-180 days), born on the UKy Coldstream Dairy Farm. To assess heifers’ sociability and fear level, a novel arena (10x5m; solid walls) equipped with cameras and a grain bucket covered by a tarp was used. First, heifers were moved to the arena for 5 mins. Next, a novel human and familiar human walked into the pen in opposite corners for 5 mins. Heifers were classified as Social (touched familiar human (n=7)) or Not-Social (did not touch (n=9)). Finally, heifers were startled by suddenly removing the tarp using a pulley, and heifers remained in the arena for a final 5 min. The frequency of looking at and touching the novel objects, and novel humans, before and after the startle were recorded. Grain intake after the tarp removal was also recorded. We found Social heifers looked at and touched both familiar and unfamiliar human for longer ($P<0.05$), all but one (8/9) heifer touched the familiar human after startle occurred, and none of the Not-social heifers touched either humans. Also social heifers grooms for longer ($3.3±0.6$ vs $1.7±0.5$, $P=0.5$) and were less likely to eat grain (1/7 Social and 3/9 Non-Social). No other behavioral differences were found. Furthermore, a negative correlation ($r=-0.24$) between latency to touch the object and latency to look at the familiar person was found. In conclusion, heifers differed in how they responded to standardized tests, sociable heifers were more fearful during the tests but utilized more of social support.
CAN WE MEASURE CALVES’ TEMPERATURES WITH AN IMPLANTABLE RFID MICROCHIP?
Poster: 3
Woodrum, Megan
Faculty Mentor(s): Dr. João Costa

Four consecutive studies aimed to test the precision and accuracy of an implantable radio frequency identification microchip (RFID, Bio-thermo, Allflex, USA). Microchips were implanted in various sites in calves as an alternative to rectal temperature (RT) measurements. Pre-injection, microchips were validated in a water bath against a rectal thermometer, and found to be highly correlated to the rectal thermometer with no measurement bias found. Three microchips were implanted/calf: subcutaneously behind the ear (EAR), subcutaneously at upper scapula (SCAP), and intramuscularly in the neck (NECK). Implantation tests were performed for repeatability; each calf (n=11) had an average of 24 observations/site all taken within 2min. Average coefficient of variance for microchips was very low (0.12±0.03 %CV) and the difference between measurements for a microchip was small (0.1±0.04°C, range 0.0±0.4°C). Following, Holstein bull-calves (n=12) were enrolled in a 24-h study, where each calf had their RT, microchips, and tympanic temperature measured hourly. Correlations were high between SCAP vs NECK (individual animal correlation; median [Q1,Q3] r=0.75 [0.60,0.84]; P,â§0.02) and EAR vs NECK (r=0.78 [0.73,0.84]; P,â§0.01). From the 24-h, RT had negligible correlations with the 3 microchips sites and tympanic temperature, RT’s highest correlation was with tympanic (r=0.19 [0.07,0.22]; P,â§0.81). Finally, calves (n=10) were enrolled in a long-term study where RT and the microchips were measured daily for 30d. Rectal temperature had negligible correlations with EAR and NECK, and a low correlation with SCAP (r=0.33; P<0.0001). Correlations were high for EAR vs NECK (r=0.79 [0.73,0.89]; P,â§0.025); the weakest correlation was between EAR vs RT (median r=0.06 [0.03,0.14]; P,â§0.996). Our results suggest that microchip readings are consistent among microchips, but readings vary by site and have a weak linear relationship with RT. Microchips use is promising, but further testing is necessary to support the use to determine body temperature and its deviations in dairy calves.

ANTHROPOLOGY

PERCEIVED EFFECTS OF UNCERTAINTY SURROUNDING THE PENSION DEBATE ON RURAL SCHOOLS AND COMMUNITIES
Poster: 4
Mayo, Anna
Faculty Mentor(s): Dr. Ann Kingsolver

Several state governments across the U.S. are facing potential financial crises in the next few decades around their public pensions systems. For years, these funds have been diverted for other purposes and have been hit hard by recent financial recessions. This, together with risky investment strategies and an ever-growing retirement population, has led to increased political tension in Kentucky as the government has tried to decrease the unfunded liabilities attached to public pensions. Since 2017 there has been renewed debate and uncertainty about the question of pensions, particularly for the largest group of state employees, public school teachers. As one of the consistently larger employers in Kentucky counties, public schools systems and rural communities in the state are understandably concerned about the results of this debate. This research focuses on how different stakeholders discuss the potential effects on rural schools and communities of this uncertainty related to the pension debate. Teacher retention and recruitment is being affected by this uncertainty, for example, leading to potential generational differences in school staffing, which could have ripple effects in rural communities. Methods used in this project have included discourse analysis of legislation and legal decisions concerning public pensions; archival research of the pension debate in Kentucky newspapers; participant observation at rallies and protests by public school teachers at the capitol in Frankfort, KY; and interviews with different stakeholders on this issue. Preliminary conclusions will be shared.

** Denotes STEMcats project
MINDFULNESS MEDITATION: THE CULTURAL SIGNIFICANCE OF BUDDHIST PHILOSOPHY ON AMERICAN CULTURE
Poster: 5
Reynolds, Adam
Faculty Mentor(s): Dr. Kristin Monroe

The practice of mindfulness meditation has steadily been leaving its mark on American culture since its inception in the early 1960’s. As a result, mindfulness meditation practices have slowly emerged within multiple academic, mental health and social institutions. My research uses an anthropological perspective to explore how mindfulness meditation has become an important part of American culture. Based on participant observation conducted through the Lexington Shambhala Center and The University of Kentucky’s Mindfulness and Meditation Club, and semi structured interviews conducted with personal family members, my research examines how the practice of mindfulness meditation has operated within different sociocultural atmospheres. Through careful analysis, this research endeavors to address the cultural influences that have contributed to the popularization of mindfulness meditation, explain how mindfulness meditation has become secularized from Buddhism, and contextualize the practicality of mindfulness meditation in terms of social interaction and group therapy. For the purposes of collecting data, this research makes use of social, religious and mental health resources located on and off of the University of Kentucky’s campus. Using an anthropological framework, this research also endeavors to explore the cross-cultural differences and similarities between the Lexington Shambhala Center and the mental health and social outlets located on The University of Kentucky’s campus.

OSTEOMETRIC SEX DETERMINATION IN WHITETAIL DEER (ODOCOILEUS VIRGINIANUS) FROM FOX FARM A MIDDLE TO LATE FORT ANCIENT (1300-1650 A.D.) SITE IN NORTHERN KENTUCKY
Poster: 6
Chisholm, Veronica
Faculty Mentor(s): Dr. Heather Worne, Dr. David Pollack, Bruce Manzano

The main goal of this research project was to determine sex of Whitetail Deer (Odocoileus virginianus) based on the examination of pelvic remains from Fox Farm (15MS1). Located in Northern Kentucky, this site was occupied from the middle to late Fort Ancient (1300-1650 A.D.) period. Traditionally, sexing of deer remains depends on the presence and thickness of the ilio-pubic eminence, however, this characteristic rarely remains intact in the archaeological record. Thus, more non-traditional methods of sexing need to be explored for determining the sex of Whitetail Deer remains recovered from archaeological sites. Of the 200 pelvises examined as part of this study, only about 20 percent could be confidently sexed based on the presence of the ilio-pubic eminence. Preliminary sex determinations were obtained from an additional 13 percent based on the height of the acetabulum and the length of the acetabulum. The remaining elements were too fragmentary to determine sex. Of the 62 elements that could be sexed, 53 percent were male and 47 percent female. In addition, equal numbers of right and left pelvic bones were recovered. At this time it is not clear the extent to which these results can be used to characterize the hunting patterns of the residents of Fox Farm.
APPALACHIAN STUDIES

THE ARCHETYPE OF THE "APPALACHIAN STRONG WOMAN": THE RELATIVE EXISTENCE OF MATRIARCHY IN APPALACHIA
Poster: 7
Keaton, Emily
Faculty Mentor(s): Dr. Edward Morris

Because of the portrayal of the "Appalachian strong woman" in folktales and in films, such as The Dollmaker, this work examines whether this figure exists, where she exists, and what factors contribute to this archetypal female figure. After studying the percentage of the Appalachian workforce made up of women and the number of women serving in head-of-household roles, despite the regional perceptions of gender roles and accepted spheres of influence, this work combines bare numbers with extensive interviews to gain a more specific insight on the roles Appalachian women often serve within their family, both as financial providers and as spouses. With the current amount of research, it is suggested that unique rural and post-coal conditions have led to a high percentage of male unemployment and a high percentage of female breadwinners in the region of Central Appalachia in particular, leading to a greater shift of gender representation in the workforce and in families, as well as greater flexibility in gender performance for Appalachian women than for Appalachian men. These conditions, beliefs, and female household roles are fairly unique to the Appalachian region and are certainly distinct from urban conditions, opening a discussion of gender trends in Appalachia.

ARCHEOLOGY

THE PROGRESSION OF PALEOLITHIC STONE TOOLS IN NORTH AFRICA
Poster: 8
Lee, Jordan
Faculty Mentor(s): Dr. George Crothers

From the beginning of human evolution, our human ancestors proved themselves to be experts at manipulating their environments. Stone tool production distinguishes modern humans from our previous hominid relatives. The first manufactured stone tools were simple chopping tools that were flaked from river cobbles to obtain a cutting edge. Over millennia, tool technology evolved to obtain a uniform product suited to specific needs. From simple cobble choppers, tools progressed to hand axes, scraping tools, blades, and ultimately spear points and arrowheads. These developments are divided into periods of time, referred to herein as stone tool traditions. In 2018, the University of Kentucky received a donation of an extensive collection of stone tools from North Africa. The artifacts include styles that span approximately two million years. The artifacts were cataloged and analyzed to identify missing details about the tool’s age, provenance, rock type, and mode of production. The periods that are represented include Oldowan (2.4 - 1.8 million years ago), Acheulean (1.7 million - 100,000 years ago), and Mousterian (160,000 - 40,000 years ago). This type of research is imperative to understanding the development of human tool use through time, and this collection provides a physical timeline for the development of stone tools in North Africa across two million years. The goal of analyzing these artifacts is to begin to document this profound collection of tools from the past, which has been missing from research thus far, and to use this knowledge to provide a better understanding of human stone tool technological development overall.

** Denotes STEMcats project
ART

THE SUBURBAN GOTHIC: GENDER EXPRESSION AND THE GROTESQUE IN THE WORK OF RALPH MEATYARD
Poster: 9
Reynolds, Aaron
Faculty Mentor(s): Miriam Kienle

Ralph Eugene Meatyard was an American photographer who spent most of his career living and working in Lexington, Kentucky. Active from the mid 1950s to his premature death in 1971, Meatyard created a body of work that is both personal and surreal. Using his family and friends as models, his carefully staged photographs explore gender roles and family dynamics within the postwar nuclear family. His work employed unconventional techniques for his time, such as out-of-focus shots, multiple exposures, and high contrast between light and shadow. These methods give Meatyard’s work an enigmatic and grotesque quality, highlighting and estranging normative gender and social dynamics within the postwar suburban environment. Removed from the major centers of the American art establishment, his work draws directly from the middle American culture in which he lived. This project examines how Meatyard’s work employs grotesque motifs in order to deconstruct popular depictions of gender and family in 1950s and 60s America. Similar to southern gothic literature, which uses the grotesque to highlight racial and civil inequalities in American culture, Meatyard used disorientation, absurd incongruity, and fantastic decay to highlight inequality within the American domestic space. Postwar America was a land of contradictions: post-war economic prosperity with racial segregation and discrimination as well as a new emphasis on conservative values and traditional gender roles met with a growing counterculture movement. This project analyzes how Meatyard’s work explored the anxieties of this period within middle-class American culture.

YET ANOTHER FIGHT FOR REMEMBRANCE: TITUS KAPHAR'S REPRESENTATION OF RACE IN THE PAST AND THE PRESENT
Poster: 10
Hedges, Emily
Faculty Mentor(s): Miriam Kienle

With compelling portraits that challenge the representation of minorities within the art historical canon, American artist Titus Kaphar has emerged as an important voice in contemporary art. His paintings are best-known for engaging the history of art and visual culture founded on the construction of whiteness and restoring narratives of people of color through modern-day representations of once hidden historical actors. Kaphar questions how repressed histories have shaped preconceived notions of famous historic figures, such as Thomas Jefferson, and more importantly, of United States history. Throughout his career, his innovative practice has aimed to disrupt the visual field and reveal silenced truths. However, when Kaphar was commissioned to create a cover of the Ferguson protesters for Time magazine in 2014, he drastically altered his initial approach to concepts of visibility and identity. While critiquing the hypervisibility of news media and social media platforms, the piece became a product of media culture itself. As I explore in this paper, Kaphar’s Yet Another Fight for Remembrance redirects his signature whitewashing technique to provide anonymity to the protesters, to comment on contemporary media’s representation of minorities, and capture the collectivity of a movement fighting for justice. By analyzing the visual and contextual components of Kaphar’s practice, in both historical and contemporary subject matter, I argue that Kaphar provides a unique lens with which to examine the complexities of black representation in American history.
BEHAVIORAL SCIENCE

** BRAIN ACTIVITIES DURING RESTING MAY NOT BE CREATED EQUAL
Poster: 11
Authors: Kyra Collins, Meghan Greer, Wilson Harris, Lauryn Willis
Faculty Mentor(s): Dr. Yang Jiang

Research on brain activity during resting-state in older adults before and after a cognitive task, such as studying, has not been well understood. These resting brain activities may reflect healthy or disease mental state. This experiment aims to compare electrical signals during resting state before and after a mental exercise in older adults. Subjects were adults aged 65 or older. We hypothesized that the less brain activity at rest before a memory task, and more resting brain activity at rest after the memory test. To begin the data gathering process subjects were told to close their eyes and relax for approximately two minutes while EEG was recorded their brain waves. Subjects were then asked to complete a memory activity, where in they were tasked with remembering a target picture in a succession of pictures. The subject sat in the same room and sat with eyes closed for another two minutes while their brain activity was measured again. After completing the task, the subject was asked to repeat the resting state analysis. We expect that the EEG will show less activity before the memory task than after the task. To test our hypothesis, the brainwave frequencies under eyes closed and eyes open will be analyzed before and after the task. The results of the comparisons will have direct implications to clinical research.

** THE BEATS OF THE BRAIN: HOW MUSIC INFLUENCES YOUR STUDY HABITS
Poster: 12
Authors: Lindsay Borger, Lindsay Holeman, Julia Johnston
Faculty Mentor(s): Dr. Yang Jiang

The overarching purpose of the proposed experiment is to observe and correctly identify the correlation between music genres and one’s attention and memory skills. Previous research that has been conducted suggests that music makes an impact on one’s brain functions. In today’s technologically advanced world, music becomes almost inescapable, especially on college campuses. Our study aims to uncover how the constant exposure to music affects study habits for college students. We hypothesize that among the three conditions of no music, classical music, and pop music that the classical music condition will yield the quickest reaction times while also maintaining accuracy. Subjects will include six college students: three males and three females. Each subject will perform three trials, randomizing the order of the conditions given. For the intended results, we expect an increasing order of both reaction times and accuracy starting with pop producing the slowest, followed by our baseline of no music, with classical ultimately resulting in the fastest reaction time and highest accuracy. Data from this experiment will allow us to conclude which genres of music either distract from or elevate college students’ studying.
** THE EFFECT OF SOUND FREQUENCY ON RESTING BRAIN ACTIVITY**

**Poster: 13**

**Authors:** Carson Florkowski, Alexandria Mattingly

**Faculty Mentor(s):** Dr. Yang Jiang

Effects of sounds above and below human hearing threshold on brain activity is an understudied area. The purpose of this experiment is to identify relationships between different levels of sound frequency and resting brain activity. Low and high sound frequencies will be used to determine which produced the most stimulated response to one above level of condition. We hypothesize that high frequency sound will cause larger brain response during resting state. To test this hypothesis, three men and three women will be placed in a distraction-free environment where each participant will complete three separate electroencephalogram (EEG) recordings eyes-closed resting state and eyes-open in presence high frequency sound, and low frequency sound. The sound frequencies will be played directly behind participants. An order effect will be controlled by counter balancing between participants. Expected results include increased brain activity due to high frequency sound and an unchanged or less stimulated response to low frequency sound, this being due to younger populations’ heightened sensitivity to high frequency. Results may show sex differences what frequency level shows a standard higher response among participants. Results may also show individual differences of sound sensitivity, known as hearing threshold, of the same age. This pilot study will aid future research in better understanding the effects the developing brain have on sound detection and the deterioration of hearing as one ages.

**MUSIC TRAINING AS A NEURO-COGNITIVE PROTECTOR FOR BRAIN AGING: COGNITIVE AND NEUROPSYCHOLOGICAL PROFILES IN PROFESSIONAL MUSICIANS**

**Poster: 14**

**Authors:** Jillian Carr, Andie Hoskins, Sydney Hoffmann

**Faculty Mentor(s):** Dr. Catherine Schneider, Dr. Yang Jiang

This study focuses on cognitive challenge using music as an outlet. Playing instruments has shown to activate cognitive functions, motor functions, and sensory systems. Literature suggests strong correlations between cognition and music ability. However, studies in the past have not concretely operationalized music training. Here we test the general hypothesis that music training improves neural mechanisms associated with core cognitive functions (e.g. working-memory and attention). This study aims to measure music as a protective mechanism against cognitive impairment. A multi-source study was designed to control level of music involvement and genre by examining professional, classically trained orchestral musicians, establishing cognitive and neuropsychological profiles in an effort to better understand the potential for music training to protect older adults from cognitive decline. The scalp electrophysiological signals from 14 channels were recorded wirelessly while each musician performed a modified delayed match-to-sample task, imagination of music playing, and resting states. Musicians completed neuropsychological screening (MoCA) a music and life span questionnaire as well. Twenty-nine older adult professional orchestral musicians were surveyed and examined. Musician’s scores were compared with those of like-aged non-musicians. Current musicians scored both significantly faster and more accurate on exams administered. Regression and ANCOVA analysis was done between theta EEG signatures in the frontal, parietal, and occipital lobes during the Bluegrass Working Memory Task. The number of years of private music lessons and the number of hours spent practicing music weekly exhibited strong positive correlations.

** Denotes STEMcats project
THE POWER OF MUSICAL EXPOSURE ON ALPHA EEG SIGNALS ON AN AGING POPULATION
Poster: 15
Authors: Andie Hoskins
Faculty Mentor(s): Dr. Catherine Schneider, Dr. Yang Jiang

The aging population is growing, encompassing a large proportion of older adults living with cognitive impairment. Increasingly, more people will live with cognitive deficits in the future. There is little evidence indicating highly effective interventions that prevent or slow onset of cognitive impairment. Music playing influences brain and cognitive function by activating multiple brain areas; playing requires cognitive and motor function and the use of multiple sensory systems, simultaneously. Twenty-nine professional orchestral musicians, both active and retired, were recruited to participate. Information regarding musical experience was collected, totaling to eight predictor variables. Neuropsychological tests were given to participants to examine their cognitive abilities. EEG scalp recordings were taken to identify neuro-cognitive signatures of musicians. The relationship between EEG signatures and predictor variables based on music experience was examined. There is a strong correlation between EEG Alpha signal power and Average Hours of Practice Weekly, Age of Lesson Acquisition, Number of Years Played and Number of Years Retired. This indicates an increase in EEG signature strength related to musical exposure.

LEVERAGING THE MAMMOGRAPHY SETTING TO RAISE AWARENESS OF LUNG CANCER SCREENING: VIEWPOINTS OF MAMMOGRAPHY SCREENING PROGRAM DIRECTORS
Poster: 16
Terry, Leah
Faculty Mentor(s): Dr. Jamie Studts

With recent emergence of evidence and policies supporting Low-Dose Computed Tomography (LDCT) for lung cancer early detection, thousands of new screening programs have been developed. Despite growing support, awareness and uptake of lung cancer screening by physicians and patients remains suboptimal. Applying the Teachable Moment Framework (TMF) may facilitate LDCT education and support consideration of screening among women seeking mammography. This study examined perspectives regarding the use of the mammography setting as a platform to identify and educate LDCT-eligible patients regarding lung cancer screening. This study elicited viewpoints from American College of Radiology (ACR) Certified Mammography Screening Program Directors regarding the use of the TMF to expand awareness of lung cancer screening within the mammography process. A sequential mixed methods approach combined data from online surveys and subsequent key informant interviews to elicit participant viewpoints. Participants (N=1277) included 1060 physicians, 71 radiology techs, and 108 office managers. Respondents indicated that LDCT screening was at least moderately important for eligible women (81%), and respondents indicated that their mammography program would be receptive to informing eligible women about LDCT (65%). The preferred strategy involved posting flyers (67%) with relatively few programs willing to talk directly about LDCT (21%) or make a referral (18%). Reported barriers to assessing LDCT eligibility included time (76%), staffing (77%), and anticipated patient hesitance (63%); while barriers to referring for LDCT included staffing limits (56%) and perceived patient disinterest (47%). Although program directors supported the need to educate LDCT eligible patients, many believed it would be hard to implement. In conclusion, this study revealed modest potential for leveraging mammography to expand LDCT-awareness, but a number of notable barriers were reported regarding the assessment of eligibility and making an LDCT program referral.
SPLICE-SITE CHANGING OLIGONUCLEOTIDES TARGETING THE SEROTONIN RECEPTOR MAY REDUCE SPASTICITY AFTER SPINAL CORD INJURY
Poster: 17
Danyi, Samantha
Faculty Mentor(s): Dr. Stefan Stamm

Spinal Cord Injury (SCI) affects approximately 300,000 Americans resulting in devastating neurological and physical limitations. SCI in the chronic phase is complicated by muscle spasms, which are to a large degree caused by hyperactivation of the serotonin receptor 2C (5HT2C) caudal to the injury site. Currently, there is no rational treatment available for these spasms. Through a combination of alternative splicing and editing of exon Vb, the 5HT2c pre-mRNA generates at least 25 isoforms with different regulatory properties: one intracellular truncated receptor 5HT2C_tr, one non-edited full-length receptor 5HT2C_FL_INI, and 23 full-length edited receptors 5HT2C_FL_ed. The full-length receptors are active in signaling, while the truncated receptor has a dominant negative inactivating function. To intervene with the 5HT2c isoform ratios, we developed a series of oligonucleotides that either increase or decrease the 5HT2c_tr/5HT2c_FL_INI ratio, as well as an antiserum that is specific for the 5HT2C_tr protein. One of these oligos (oligo #21, 2-O-methyl-phosphothioate, 18-mer) is localized in an intron downstream of the regulated splice site. Using minigenes derived from rat DNA, we found in transfection assays that Oligo#21 promotes skipping of all edited exon Vb, with an apparent efficacy of 10 nM in vitro. To test its efficacy in vivo, we delivered oligo #21 into the spinal cords of injured rats through intrathecal injection. Oligo #21 accumulates in motoneurons after intrathecal delivery. We observe exon Vb skipping after delivering 20 µg of oligo #21 to each rat that is more pronounced when using 50 µg. Analysis of the EMG (electromyograph) after oligo treatment showed a change in duration, but not amplitude of the spasms. Our data confirm that a deregulation of the 5HT2C pre-mRNA contributes to spasms occurring after spinal cord injury and show the principle that splicing-changing oligonucleotides could be used to treat spasticity, which is a major comorbidity of SCI.

A POTENTIAL THERAPEUTIC APPROACH FOR A CONGENITAL MOTOR DISORDER
Poster: 18
Houston, Imani
Faculty Mentor(s): Dr. David Rodgers

Choline Acetyltransferase (ChAT) catalyzes the reaction between choline and acetyl coenzyme A producing acetyl choline and coenzyme A which mediates transmission at the neuromuscular junction. The poor core packing in ChAT and multiple mutations leads to the development of congenital myasthenic syndrome, a disease that causes general motor function deficiency and weakness. Given this information a hypothesis was proposed that the structural changes caused by the mutations in ChAT affect the active site more readily due to the numerous cavities. To combat this, we sought after possible therapeutic ligands that would bind in the cavities and dehydrated the protein to improve core packing and reduce the effect of the mutations. By monitoring ChAT’s stability and activity, seven ligands were found that filled targeted cavities reducing the affects.
EFFECT OF CMET ACTIVATION ON COLORECTAL CANCER LUNG METASTASIS

Poster: 19
Thomas, Luke
Faculty Mentor(s): Dr. Mark Evers

The cMET protein is very overexpressed in cases of colorectal cancer (CRC), the second leading cause of cancer deaths in the United States today. In addition, the system of cMET and its ligand HGF has been found to play a vital role in distant metastases of colorectal cancer. In order to examine the role that the cMET plays in colorectal cancer lung metastasis, the inhibitor drugs ARQ197 and XL184 were obtained to restrain the action of the cMET protein. The procedure utilized began with cultivating groups of cells in culture by using McCoy 5A medium and incubating overnight, followed by treatments with both drugs at different dilutions. After the treated cells had been properly treated, the western blot procedure was utilized to place the cells on a membrane producing imaging for protein expression. The images collected were analyzed for four key proteins: pMET, β-Actin, PARP, and Cyclin D1. Based on the pMET imaging blots, HT29 metastatic cell line was highly sensitive to cMET inhibition, and treatment with inhibitors induced apoptosis as well, demonstrated by an increase in cleaved PARP. Also, cMET drug treatment had no effect on the cell cycle or proliferation, which is shown through very little noticeable change in Cyclin D1 expression throughout the imaging. The results imply that cMET treatment in CRC cell lines induced apoptosis and have considerable promise in treatment, especially by preventing progression through elimination of resilient cells in apoptosis.

PERSONALIZED DIAGNOSIS FOR LAFORA DISEASE, A FATAL EPILEPSY

Poster: 20
Wayne, Jeremiah
Faculty Mentor(s): Dr. Matthew Gentry, Mary K. Brewer

Lafora disease (LD) is a fatal, genetic disorder characterized by progressive neurodegeneration, myoclonus (i.e. uncontrolled muscle spasms), and epilepsy. LD patients present with seizures in adolescence that become increasingly severe and frequent, suffer rapid cognitive decline, and typically die within ten years of onset. Abnormal carbohydrate deposits known as Lafora bodies are found in the brains of LD patients and have been shown to drive disease progression. Approximately 50% of LD cases are caused by mutations in the Epilepsy progressive myoclonus 2A (EPM2A) gene that encodes a protein called laforin. Laforin is the only protein in humans that can release phosphate from carbohydrates. In LD patients, mutations in laforin lead to excess phosphate and abnormal branching in cellular carbohydrate stores, causing carbohydrate accumulation and toxicity. There are >50 different laforin mutations that have been described in LD patients, and some patients have milder forms of the disease. We hypothesized that not all laforin mutations are the same and that many mutations may have milder effects on protein function. Our biochemical analysis of disease mutations would allow us to predict disease outcome based on a patient's individual genetics. Recently an unusual case of late-onset LD was described in a patient who lived to the age of 59. This patient contained a novel laforin mutation, where a specific amino acid at position 321 was changed from a phenylalanine to a cysteine (F321C). Using the 3-dimensional structure of laforin and a series of biochemical tools, we found that this mutation and a previously described LD patient mutation, F321S, uniquely alter the function of laforin, providing a biochemical explanation for the very mild clinical phenotype. Our studies also establish a biochemical avenue for rapid, personalized diagnoses of LD patients, enabling doctors to predict patient progression and design treatment schemes that are specific to patients.

** Denotes STEMcats project
** PHYLOSYMBIOSIS IN THE GUT MICROBIOMES OF WILD LEMURS**

**Poster: 21**

**Authors:** Kindness Akwari, Dakota O'bannon, Carly Karrick, Sean Courtney

**Faculty Mentor(s):** Dr. David Weisrock

Our research tests for a phylosymbiotic signal in the gut microbiomes of wild lemurs occupying dynamic ecological matrices throughout southern Madagascar. Phylosymbiosis is a pattern in which evolutionary relationships between host species drive similarities in gut microbiome composition and diversity across host taxa. 65 million years ago lemurs rafted to Madagascar, where they underwent an adaptive radiation resulting in > 110 species that occupy diverse niches and habitats. To assess the presence of phylosymbiosis in this system, we collected fecal samples from 10 species of wild lemur inhabiting dry forest and rainforest ecosystems. After extracting DNA from fecal samples, we amplified the v4 region of the 16S rRNA gene through polymerase chain reaction (PCR). We used gel electrophoresis to analyze the success of the PCR and then sequenced the DNA on an Illumina MiSeq platform. To test for phylosymbiosis, we will analyze microbial diversity using QIIME, and measure statistical significance based on host phylogeny in the R package picante. This study is significant because it investigates the relative contributions of ecology and evolution in gut microbiome patterning. Our research can help build a better understanding of the interactions between host species and microbes, with results that can be extrapolated across various taxa.

** HOW FERTILITY INFLUENCES SEXUAL MOTIVATION AND EMOTIONS IN WOMEN**

**Poster: 22**

**Authors:** Madeline Allen, William Blankenship, Alexandra Claggett, Eve Elmore, Christina Jackson, Chris Lucero, Shin Ya Mu

**Faculty Mentor(s):** Dr. Kaylynne Glover

Fertility generally goes unnoticed by many women, yet some evidence suggests that sexual motivation and emotions are influenced by fertility. In this study, we sought to determine if there was an association between peaks in sexual behavior and fluctuations in emotions with fertility. Participants collected urine samples for ovulation testing for up to two menstrual cycles while also completing daily journaling entries regarding their behavior and mood. Results indicated that a woman’s sexual behavior and mood is not strongly influenced by her fertility. However, some women did show significant peaks in behavior and mood that corresponded with their fertility; specifically, these women indicated a likeliness to respond positively to sexual propositions as well as a general increase in happiness when they were fertile. While the results suggest that some women experience peaks in sexual behavior and emotions with fertility, most women do not.
** THE BROMODOMAIN INHIBITOR JQ1 BLOCKS AXOLOTL TAIL REGENERATION**

Poster: 23

Authors: Irena Antic, Luke Coleman, April Collins, Rachel Cravens, Molly Finnegan, Walker Hancock, Sydney Haring, Maggie Magill, Michael Omali, Emily Parker, Ashley Rauch, Vivian Seeger, Trevor Smith, Nathalie Wane, David Wang, Elizabeth Watkins

Faculty Mentor(s): Dr. S. Randal Voss

The Mexican axolotl (*Ambystoma mexicanum*) provides a unique animal model for studies of tissue regeneration. The axolotl, like all salamanders, can regenerate whole organs including their tails, but we know very little about the underlying mechanisms. In this study, we used a well-characterized axolotl tail regeneration model and a potent anticancer drug called JQ1, that is known to inhibit BET family bromodomain proteins. We hypothesized that if we amputated the distal tail tip of axolotl embryos, and then chronically treated them in 10 uM JQ1 for 7 days, tail regeneration would be inhibited. Indeed, we found that chronic JQ1 treatment inhibited tail regeneration at 7-days post amputation (dpa), prompting us to investigate shorter treatment regimes. We treated embryos from 0-24 hours post amputation (hpa), 24-48 hpa, and 0-48 hpa, and evaluated tail regeneration at 7 dpa. All three treatments inhibited tail regeneration, suggesting that bromodomain protein activity is required early (0-24 hpa and 24-48 hpa) after amputation injury for successful axolotl tail regeneration. Given the importance of bromodomain proteins in regulating transcription, our results suggest that JQ1 altered the transcription of genes that are required for axolotl tail regeneration. We are currently testing this hypothesis by comparing gene expression between JQ1-treated and control axolotl embryos.

** THE EFFECT OF SOCIAL SETTING AND PHOTOPERIOD ON HOUSE SPARROW VOCALIZATIONS**

Poster: 24

Authors: Zachary Athos, Benjamin Bowling, Kathryn Hansen, Noah Jones, Braden Kirkpatrick, Cessna Langford, Nathan Vermillion

Faculty Mentor(s): Dr. Vincent Cassone

Birds breed at a certain time each year so that their young are reared during a time when resources are abundant. Photoperiod (day length) is the primary cue that allows birds to recognize the time-of-year. In birds, melatonin is produced only at night. Thus, longer photoperiods cause a decrease in melatonin. Work from our lab shows that this shortened duration of melatonin allows the expansion of vocal behavior and complexity, while having little effect on primary gonadal function. We have previously observed a number of photoperiodic vocal properties, however these measures were only taken from birds housed individually indoors, devoid of any social context. This led us to hypothesize that birds in a natural setting would have more dynamic vocal patterns than those that are isolated. In the short days of January, two groups (two male and two female) of house sparrows were each housed in isolation indoors and outdoors. A third group of birds was housed outdoors in a colonial setting. Indoor birds had their photoperiod matched as best as possible to outdoors, 10 hours of day and 14 hours of dark. The photoperiod increased naturally outdoors and was increased artificially indoors. Sparrow vocalizations were recorded initially in the short day conditions and later in the spring or simulated spring. The data were represented visually by sonograms that were analyzed and categorized into different types of vocalizations. We also quantified when during the day the birds vocalized, and at what rate. Data analysis is still in progress, but early results show that there is an increase in amount and complexity of calls between socializing birds compared to the isolated ones. This study will show the effect that social contact has on behavior and reinforces the vocal measures we have previously used, as well some behaviors that are absent.

** Denotes STEMcats project
HOW LOSS OF SURFACE WATER AFFECTS CRAYFISH DOMINANCE AND BURROWING BEHAVIOR
Poster: 25
Ahmed, Habiba
Faculty Mentor(s): Dr. Melody Danley

*Procambarus clarkii*, or red swamp crayfish, are animals with well-known dominance behaviors. Such behaviors help establish social hierarchies that influence resource access and use; however, it is not clear how social behavior is influenced in the face of life-threatening environmental stimuli (loss of surface water). In the current study, it was predicted that dominant crayfish would select preferred burrow sites and build burrows in clay substrate over less preferred sand substrate, when prompted by the sudden removal of surface waters. Subordinate crayfish would relocate to the less preferred substrate, the sand. Inter-molt, adult crayfish were housed individually in 1.5-L aquaria with oxygenated, carbon-filtered tap water for at least 72 hours. Two crayfish were then randomly selected and placed in pairs in the experimental tanks (28 cm x 25 cm x 30 cm) at the start of the experiment (10 replicate pairs). Each tank contained medium grain sand in half of the tank bottom, and clay in the other half of the tank bottom, to a depth of 4 cm. Another 4 cm of surface water was added. This was a total depth of 8 cm of substrate + water. Experimental crayfish were able to establish dominant-submissive behavior for the first 24 hours. The surface water was drained at 24 hours from half of the tanks (n=5) to prompt burrowing behavior. Crayfish activities were recorded for an additional 24 hours after surface water removal. Our results indicate that crayfish pairs established dominance relationships within the first 12 hours of interaction, but the number of agonistic encounters was not affected by the acute loss of surface water at 24 hours. In contrast, the number of non-agonistic interactions transiently increased at 36-hours, possibly corresponding with a shift away from establishing dominant-subordinate relationships and towards building burrows. The locations, development of burrows, and visibility of crayfish were not significantly different for surface water dominance interactions. Instead, most crayfish tended to burrow in clay environments regardless of social status and burrow construction was more developed in environments where surface water was removed at 24 hours. In conclusion, acute removal of surface water did not disrupt previously established social status of crayfish, but social status of crayfish influenced burrow development after surface water was removed.

** MATING PREFERENCES OF POTENTIALLY COERCIVE MEN
Poster: 26
Authors: Courtney Baharian, Stephanie Bailey, Ava Fugate, Sahara Sajan
Faculty Mentor(s): Dr. Kaylynne Glover

The research conducted within this lab examines the relationship between male coercive tendencies and how those tendencies are influenced by woman at various points in the menstrual cycle. Based on previous research, it is hypothesized that coercive tendencies in males increase when females are at a fertile point in their menstrual cycle. In order to investigate the proposed hypothesis, males were given photographs of women at various points in their menstrual cycle and answered a survey that measured their coercive tendencies. The results revealed significant differences in how men who were more likely to express coercive tendencies responded towards women compared to non-potentially coercive men. The data collected from this study has implications that could affect the way rape culture is viewed. Considering the metrics used in the survey, male responses could be examined and used to predict the tendencies of males and how likely or unlikely they would be to act on certain coercive behaviors.
**POSTER PRESENTATIONS**

**MICROSATELLITE MARKER DEVELOPMENT IN JEFFERSON SALAMANDERS (AMBYSTOMA JEFFERSONIANUM) TO ASSESS GENETIC DIVERSITY**

*Poster: 27
Authors: Morgan Dailey, Karen Sandoval, Trevor Simpkins, Cassandra Talbot, Catherine Tew
Faculty Mentor(s): Dr. Emily Croteau*

Jefferson salamanders (*Ambystoma jeffersonianum*) are a unique species of salamander commonly found in eastern parts of the United States. Jefferson salamanders are unique in that very little is known about their biology, and this is largely because the salamanders exist in small populations that are hard to locate. Jefferson salamander larvae were collected from three ponds in Kentucky and placed into cattle tanks of three different treatments. The first treatment consisted of tanks with salamander larvae from one pond, the second treatment consisted of tanks with salamander larvae from two different ponds, and the third treatment consisted of tanks with salamander larvae from three different ponds. It was hypothesized that if salamanders from three different ponds were placed into one cattle tank, then that cattle tank would exhibit a greater genetic diversity than one containing larvae from only one pond. To begin testing this hypothesis we performed DNA extraction on tail clips collected from larvae from each of the three treatments. Polymerase Chain Reaction (PCR) was used to optimize microsatellite primer pairs that we selected for genetic analyses. In addition, we combined primer sets to set up multiplex PCRs. Agarose gel electrophoresis was used to visualize whether the DNA extractions, PCR optimizations and multiplex PCRs were successful. DNA was purified from 60 samples, and each contained high-molecular weight DNA. Optimization of eight microsatellite primer pairs showed that successful annealing occurred for all but varied among them from 50-60°C. Multiplex PCRs were difficult to visualize using agarose gel electrophoresis due to difficulty in discriminating between different alleles for each marker. These microsatellites will help us to quantify genetic diversity from the treatment groups in future analyses. More specifically, in the future, capillary gel electrophoresis will be used to create multi-locus genotypes for Jefferson salamanders.

**THE ROLE OF PEPTIDOGLYCANS RECEPTORS IN THE RESPONSE TO BACTERIAL ENDOTOXIN LPS ON BODY WALL MUSCLE AND CARDIAC FUNCTION IN LARVAL DROSOPHILA**

*Poster: 28
Ballinger Boone, Carly
Faculty Mentor(s): Dr. Robin Cooper*

Gram-negative bacteria produce and release endotoxins in the form of lipopolysaccharides (LPS). The different forms of LPS produce varying secondary immune responses. The direct effect of LPS itself, which occurs in seconds, has not been well studied; however, the receptors which bind LPS were first identified in Drosophila which lead to their discovery in mammals. We continue to use Drosophila as a model in these studies. Exposing the heart of larval Drosophila to LPS (500 µg/ml) from *Serratia marcescens* causes the heart rate to initially increase and then slow down. Whereas exposing the body wall muscle, while stimulating the motor nerve, results in hyperpolarization. Evoked as well as spontaneous excitatory junction potentials become depressed with the presence of LPS. The decrease in synaptic transmission is likely due to the postsynaptic glutamate receptors being blocked by LPS. However, the mechanism to explain the hyperpolarization of the body wall muscle and alterations in heart rate has yet to be determined. We set out to determine if there was an alteration in the rapid effects upon exposure to LPS in RNAi expressing lines for the peptidoglycan recognition proteins (PGRPs) PGRP-LC and PGRP-LE in body wall muscle and cardiac muscle. These receptors are known to bind LPS in Drosophila. Knocking down the receptor expression for PGRP-LC and PGRP-LE did not alter the acute effects of LPS exposure to the body wall muscle and effects on synaptic transmission or heart rate in larval Drosophila. Thus, it has yet to be determined the mechanism by which LPS is causing these rapid cellular changes. This is significant to address potential effects in human and other animals exposed to gram-negative bacterial infections.

** Denotes STEMcats project
** SLEEP ALTERATIONS FROM DISRUPTIONS OF HOMOLOGOUS GENES IN DROSOPHILA MELANOGASTER AND MUS MUSCULUS

**Poster:** 29  
**Authors:** Danielle Bauer, Lily Jones, Catherine Short  
**Faculty Mentor(s):** Dr. Douglas Harrison, Dr. Bruce O’Hara

Sleep is a highly conserved behavior across most animal species. However, the fundamental functions and molecular basis of sleep are not well understood. The purpose of this experiment is to determine how specific gene mutants affect the sleep cycle in the fly species *Drosophila melanogaster*. The benefits of using fruit flies for this project include their cost effectiveness, short generation time, multiple well-established genetic tools, and similar sleep cycle to humans. The genes that have been analyzed in this experiment were chosen based on the genes studied in the Knockout Mouse Phenotyping Project (KOMP2). In KOMP2, 343 single gene knockouts in mice were assessed for sleep and wake patterns. To assess evolutionary conservation of genes regulating sleep, homologous proteins were identified in *Drosophila melanogaster*. In this project, 32 flies each of viable mutations of Pdfr, Spn, and Mhc were assessed for their effect on sleep phenotypes. Single 3-5 day old flies were loaded into *Drosophila* Activity Monitors (DAM2) to measure their activity for four days. These monitors used an infrared beam break system; a laser was shone through the tubes and flies that did not move across and break the beam for over five minutes were considered to be asleep. They were maintained on a consistent light cycle that was 12 hours light and 12 hours dark (12:12 LD), with controlled humidity at 25°Celsius. Results of sleep phenotypes including total sleep time and number/length of sleep bouts will be reported. This allows comparison of the roles of specific genes in regulating sleep in flies and mice, with the expectation that this can be connected to understanding human sleep as well.

** CHARACTERIZING THE SPINAL CORD OF AMBLYSTOMA MEXICANUM

**Poster:** 30  
**Authors:** Jason Besse, Robert McGinnis  
**Faculty Mentor(s):** Dr. Elizabeth Debski

The axolotl, *Ambystoma mexicanum*, can repair damage to its spinal cord; an ability not present in mammals. It is therefore increasingly being used in medical studies to examine the conditions under which central nervous system regeneration can occur. However, little is known about the cellular organization of this structure and how it varies at different spinal cord levels. With the eventual goal of creating an atlas of the axolotl spinal cord, we have begun a characterization of the cord with regard to overall morphology and cell placement and identity. We began our studies with the spinal cord of an adult animal that had been fixed and placed in decalcification solution for several weeks. This tissue was divided into identified segments, embedded in paraffin and cut on a microtome at a width of 10 microns. We are presently staining slides containing sections from the different segments with hematoxylin and eosin in order to see the arrangement of different cell bodies within the cord. We hope to compare the structure and organization that we see to that of younger animals to determine to what extent the spinal cord changes as the animal develops and matures.
** COMPARATIVE STUDY OF THE OPTIC TECTUM OF THE AXOLOTL AND LEOPARD FROG**

Poster: 31  
Authors: Kelsey Blackford, Helen Browning, Flor Mucino, Lydia Sanders  
Faculty Mentor(s): Dr. Elizabeth Debski

The axolotl salamander can regenerate a number of brain regions including the optic tectum, the main visual processing area of non-mammalian vertebrates. Unfortunately, little is presently known regarding the organization and cellular composition of this structure. This makes it difficult to follow and assess optic tectum regeneration at the cellular level. We have therefore begun to characterize the optic tectum of the axolotl using the well-defined optic tectum of the leopard frog as our model.

** THE EFFECTS OF MALE COERCIVE BEHAVIOR ON SEXUAL PREFERENCES IN WOMEN**

Poster: 32  
Authors: Emma Boitnott, Dylan Gordon, Lindsey Rousey  
Faculty Mentor(s): Dr. Kaylynne Glover

This project analyzed the relationship between male coercive behavior and female preference. It has been shown that females who are fertile tend to engage in less risky behavior. However, they are more likely to prefer men who are interested in a short-term relationships, which is usually a behavior associated with male coercive behavior. We hypothesized that women who are fertile will be more likely to find males who are potentially coercive more attractive. Women were surveyed with composite photos of men who varied in their sexual coercion potential and rated them based on how attractive they found them and the degree to which they would be interested in a hook-up, short, or long term relationship. We found that females who were fertile did not react differently than the women who were menstrual when they rated the different males. We also found that females preferred men who were less potentially coercive, unless those men were rated low on facial attractiveness. This suggests females can tell to a slight degree when a man is potentially sexually coercive, but do not discriminate on it based on their fertility status.

** ADDITION OF HER9 MRNA TO MUTANT ZEBRAFISH RESCUES VITAL VASCULATURE**

Poster: 33  
Authors: Addison Boore, Emma Gruper, Hannah McCoy, BreAnna Whittinghill  
Faculty Mentor(s): Dr. Ann Morris

*Her9,* or hairy-related 9, is a bHLH-O transcription factor. *Her9* has been implicated in the development of various components of the central nervous system. The *her9* gene found in zebrafish is considered to be homologous to the HES4 gene found in humans. In order to determine the importance of *her9* during retinal development and regeneration in the zebrafish, our lab used CRISPR/Cas9 to create a homozygous *her9* mutant. The mutant phenotype displays characteristics such as craniofacial defects, abnormal swimming patterns, lack of swim bladder, lack of midbrain/hindbrain boundary and mid-cerebral vein (MeCV) and smaller bodies. To provide supporting evidence that *her9* is responsible for the phenotype seen in the homozygous mutant, we used *her9* mRNA injections to rescue the mutant phenotype. We screen the injected mutants for the presence of a midbrain/hindbrain boundary using light and fluorescent microscopy. We saw a significant increase in the number of mutants that possessed a midbrain/hindbrain boundary and MeCV compared to the mutants that were not injected. The data presented, complied with previous data collected in our lab and indicates that *her9* plays a role in the development of the zebrafish central nervous system. It also shows that we are capable of rescuing some of the effects of the *her9* mutation indicating the mutant phenotype is specific to the loss of *her9*.

** Denotes STEMcats project
** DIFFERENCES BETWEEN PERIPHERAL AND CENTRAL RETINA IN AXOLOTLS**

**Poster: 34**  
**Authors:** Ryley Burich, Libby Dolen, Amber Taraska  
**Faculty Mentor(s):** Dr. Elizabeth Debski

The vertebrate retina is a highly organized structure consisting of alternating cellular and plexiform layers of five different cell types. However, it has regional differences that reflect differences in function. In humans, for example, peripheral and central retina differ in the relative thicknesses of several their layers as well as in the ratio of rods to cones. This led us to ask the question of whether the axolotl salamander, an aquatic vertebrate animal, also has regional differences in its retina and whether they are like those seen in humans. We are using paraffin embedded sections and hematoxylin and eosin staining to obtain measurements of the overall width of the retina at defined points along its extent. The widths of the nuclear and plexiform layers at these same points will also be determined. Frozen sections of tissue will also be used with immunocytochemical markers with the aim of uncovering any regional variation of cellular identity.

** IMPACT OF AUTOPHAGY IN THE INDUCTION OF APOPTOSIS OF CANCER CELLS IN A 3D CULTURE SYSTEM**

**Poster: 35**  
**Authors:** Makayla Bush, Benjamin Hancock, Jessica Johansson, Anyla Jones, Karolina Kopyonkina, Lauren Lawson, Olivia Lee, Olivia Makara, Grace Markowski, Kennedy Morgan, Saif Siddiqui, Reagan Smith, Shaelee Tate, Anika Yadav  
**Faculty Mentor(s):** Dr. Edmund Rucker

Autophagy is an essential mechanism in maintaining homeostasis in all eukaryotic cells. Such functions of autophagy include degradation of dysfunctional or waste components inside the cell. The mechanism includes the creation of an autophagosome complex, encompassing the cellular waste, which is then fused with a lysosome where degradation via digestive enzymes occurs. Moreover, autophagy is also known to play a role in numerous diseases, such as cancer, neurodegenerative diseases, and heart disease. In cancer, autophagy is utilized in tumor cells to maintain cellular energy, especially in avascularized regions of the tumor. The cells maintain energy by digesting organelles and waste components with the assistance of autophagosome complexes. This allows the avascularized regions of the tumor to remain alive in the absence of nutrients from the blood stream. However, increased autophagy in avascularized tumor cells can result in programmed cell death. Initially, the effects of two chemotherapeutic drugs, cycloheximide and camptothecin, are being tested for their efficacy at inducing cell death in two cancer cell lines using a three dimensional (3D) culture system: 1) MDA-MB-231, a triple negative breast cancer cell line, and 2) HeLa, a cervical cancer cell line. First line experiments are being conducted in cells with basal (i.e. normal) levels of autophagy within the following treatment groups: 1) negative control, 2) camptothecin, and 3) cycloheximide. Second line experiments are examining the effect of autophagy induction or suppression on the efficacy of the chemotherapeutic drugs with the two cell lines.
** ROLES OF RAPGAP1 AND RBP9 IN REGULATING THE SEX LETHAL EMBRYONIC PROMOTER**
Poster: 36

**Authors:** Kelli Burnett, Kyelle Corcoran, Brody Dixon, Tí’jara Hunt, Clair Lange, Kelly Vaughn, Natia Villegas

**Faculty Mentor(s):** Dr. Rebecca Kellum

The *Sex lethal* gene (*Sxl*) is the master regulator of sex determination in fruit flies. It must be on in females and off in males. If it is inappropriately off in females or on in males, this results in lethality. The activity state of the *Sxl* gene is determined by transcription from its early embryonic promoter (*Sxle*). Transcription from the embryonic promoter ensures that *Sxl* protein is available to regulate splicing of *Sxl* transcripts produced from a later firing promoter that is active in both sexes. Genetic screens were used to identify maternally expressed genes that affect *Sxle* activity. Viability of female progeny is reduced from crosses between mothers carrying these mutations when crossed to fathers carrying a single defective copy of the X-linked *Sxl* gene. Maternal mutations in the highly conserved heterochromatin protein, HP1, severely reduces female viability. A mutation in both HP1 and its heterochromatin partner, HOAP, however restored female viability. A variety of genetic and biochemical data indicate that HP1 first acts as a repressor, then later switches to activator mode at *Sxle*. We used the same genetic assay to identify Rbp9 and Rapgap1 as other maternal activators of *Sxle*. A *Sxle*-GFP promoter fusion transgene was used to assay these genes for activities in *Sxle* regulation. Rapgap1 mutations were found to have significant effects on the GFP+ to GFP- ratio. Rapagp1 is a GTPase Activating Protein regulator of the Rap1 G-protein that could potentially function in a molecular switch for HP1 activity at *Sxle*. An Rbp9 mutation was not found to significantly affect the GFP+:GFP- ratio, but has been shown in previous research to regulate *Sxl* mRNA stability. Thus, the effect of maternal Rbp9 mutations on female viability may be related to a different role for it in regulating *Sxl* expression.

**THE EFFECT OF MYOSIN HEAVY CHAIN (MHC) AND SPINOPHILLIN (SPN) DISRUPTION ON SLEEP IN DROSOPHILA MELANOGASTER**
Poster: 37

**Authors:** Jacob Clay, BaiLeigh Mckenzie

**Faculty Mentor(s):** Dr. Bruce O’Hara, Ren Guerriero, Dr. Doug Harrison

Sleep and its functions are poorly understood, but appear to include memory consolidation, energy restoration, synaptic optimization, clearing of metabolites, immune function, and most aspects of mental and physical health. Genes that regulate or influence sleep should help clarify these roles. Previously, we found several newly-identified genes that influence sleep as part of the Knockout Mouse Phenotyping Program (KOMP2). The KOMP2 aimed to gather phenotype data from Mus musculus single gene knockouts on a C57BL/6 background (approximately 343 different genes). As part of a larger phenotyping pipeline, sleep was measured using a piezoelectric system called PiezoSleep (Signal Solutions, LLC.). Of the genes studied, loss of Myh1 (myosin, heavy polypeptide 1) and Ppp1r9b (protein phosphatase 1, regulatory subunit 9B) had large impacts on sleep phenotypes and were good candidates for future study. For this project, homologous proteins were identified in Drosophila melanogaster: Mhc (Myosin Heavy Chain) and Spn (Spinophilin), respectively. Advantages to using D. melanogaster is that they are cheap to maintain, have a short generation time, and have a large variety of readily available genetic tools. Using genetic mutations and knockdowns, 3-5 day old flies were monitored using DAM2 (Drosophila Activity Monitors, Trikinetics Inc) under a 12hr:12hr light:dark cycle to investigate sleep patterns in the mutants. Preliminary data analysis shows that both Mhc and Spn disruption may reduce sleep amount, suggesting a conserved function in influencing sleep in diverse animal species. Future experiments include sleep deprivation, to assess the impact of these genes on sleep homeostasis, as well as using genetic manipulations to localize effects to specific neuronal populations within the fly brain. After dozens of different manipulations in flies, those with the biggest impact on sleep can be tested back in mice, and perhaps eventually translated to humans, especially if any known drugs impact the relevant pathways.

** Denotes STEMcats project
PARENTAL COORDINATION IN PASSER DOMESTICUS
Poster: 38
Collins, Gabrielle
Faculty Mentor(s): Dr. David Westneat

Parental care is a widely-distributed trait that is often vital to the survival of the offspring. However, caring for offspring is costly, and has been shown to reduce lifespan and decrease future reproductive output. This creates sexual conflict between mates, in which one parent is better off if the other parent does more of the work rearing their offspring. This conflict could be detrimental to offspring, however, if both parents limit their levels of parental care. I have been examining pair coordination, where each parent contributes to raising the offspring by possibly monitoring the behavior of their partner, as a method of mitigating this conflict between mates. An additional complication is that parental coordination may benefit both parents if it also protects the nestlings from the threat of infanticide. This semester I examined factors of parental care across the entire nestling period to gain insight on how metrics of parental care change and to understand factors that influence the level of parental care given. In the field of behavioral ecology, understanding the factors that affect levels of parental care and how those factors contribute to the variance in parental care levels that exists in populations is important in understanding behavior as it influences parental survival and reproduction.

** CHARACTERIZATION OF A SECOND HER9 MUTANT ALLELE
Poster: 39
Authors: Laura Cox, Jovita Devasia, Lauren Frierdich, Sydney Wahl
Faculty Mentor(s): Dr. Ann Morris

Her9 (hairy and enhancer of split-related genes) is a bHLH-O transcription factor that has been shown to affect floor plate development in zebrafish embryos. Floor plate development is crucial in the separation of the neural tubes, and allows the embryo to have an organized notochord. Our lab created her9 CRISPR/Cas9, mutants to unlock the role of her9 during retinal development and regeneration. One mutant was a her9 mutation containing a 1bp insertion; which causes an early start codon leading to a truncated protein. The phenotypes that were seen in the 1bp insertion were: curved body, no swim bladder, smaller body, shorter or undeveloped gut, abnormal swimming patterns and death between 10-13 days post fertilization. To determine if the phenotypes previously observed in the 1bp insertion mutant are specific to her9, a second mutant allele was analyzed (1 bp deletion). Our lab used a combination of light and fluorescent microscopy to characterize the second allele. The 1bp deletion mutant had a curved body, missing swim bladder, missing mid brain/ hind brain boundary and missing vasculature, underdeveloped gut, and short life span post fertilization. As mentioned above, these are similar phenotypes to those observed in the 1bp insertion mutant. Since the second mutant allele produced similar effects on the phenotypes, it can be concluded that the phenotypes are specific to the her9. This research and current investigation will further help to pinpoint the role of her during the development of the retina and its relationship to the zebrafish ability to repair their retinal neurons.

** Denotes STEMcats project
** THE IMPACT OF FOREST FRAGMENTATION ON GUT MICROBIOME COMPOSITION AND DIVERSITY IN WILD

Poster: 40

Authors: Noah Daniel, Addison Lander, Abigayle Parham

Faculty Mentor(s): Dr. David Weisrock

This study focuses on how anthropogenic deforestation can drive variation in gut microbiome composition and diversity in populations of wild lemurs in southern Madagascar. Given that the gut microbiome is largely shaped by ecology, it can provide pertinent information about organismal fitness and overall population health. We hypothesize that forest fragmentation drives differences in gut microbiome characteristics between isolated populations. We sampled from dry forests and rainforests, focusing on populations that were divided due to slash-and-burn agriculture within their respective environment. Fecal samples were collected opportunistically through a combination of trapping and focal animal follows depending on the lemur species. Then, the samples were preserved in 96% ethanol and sent to the University of Kentucky for analysis. In the lab, we extracted DNA and amplified the v4 region of the 16S rRNA gene, and submitted the PCR products for sequencing on an Illumina MiSeq platform. This study is important because it shows how human activity can affect and even harm lemurs, which are considered the most endangered group of mammals by the IUCN. We hope that our results can be used to inform conservation efforts and assess the viability of endangered lemur populations.

** DO BMPS AND SOX4B INTERACT TO CONTROL EYE SIZE DURING ZEBRAFISH EMBRYONIC DEVELOPMENT?

Poster: 41

Authors: Samantha Dolan, Corey Eversole, Taylor Fuson, Sarah Gibbs, Samuel Guizio, Rebekah Hall, Aaron Ho, Abbey Hoffman, Lauren Hudson, Anicah Smith, Mary Troy, Emma Wahlbrink

Faculty Mentor(s): Dr. Peter Mirabito

Zebrafish are useful research organisms due to their rapid development, vertebrate anatomy, human gene correlation, and clear embryonic structures. Bone morphogenetic proteins, abbreviated BMPS, are signaling molecules that are essential to zebrafish embryonic development. Furthermore, Sox4b is a gene that codes for a protein that regulates gene transcription and likely plays a role in zebrafish retinal development. This study is looking for evidence of an interaction between BMPS and Sox4b during embryonic development. The relationship was investigated by analyzing the ratio between eye size and body length of sox4b mutant and wild type zebrafish embryos under different concentrations of a BMP inhibitor known as DMH-1. To achieve this, embryos were collected and analyzed at 48 hours post fertilization. Their eye size and body length ratios were then measured using computer software and compared according to DMH-1 exposure and genotype. Preliminary results with wild type embryos demonstrate that DMH-1 has an effect on zebrafish development. Further work is needed to determine a DMH-1 tolerance threshold, which will be used to treat Sox4b mutants. An effect of DMH-1 on sox4b mutants would be evidence for a relationship between BMPS and Sox4b. Because zebrafish and humans share BMPS and SOX genes, these results could provide insight into human development and contribute to research seeking therapies for human disorders in which BMPS or SOX genes are defective.
**POSTER PRESENTATIONS**

**QUANTIFICATION OF ANTIBIOTIC-RESISTANT BACTERIA IN AGRICULTURAL AND NON-AGRICULTURAL SOILS**

Poster: 42  
Duerr, Morgan  
Faculty Mentor(s): Dr. Karla Lightfield

The use of antibiotics in agriculture accounts for much of the antibiotics produced in the United States. This substantial use is believed to contribute to an increase in the proliferation of antibiotic-resistant bacteria. The goal of this study was twofold. First, we sought to quantify and compare the number of antibiotic-resistant bacteria in both agricultural and non-agricultural soils. Second, the study served as a proof of concept experiment in the development of an inquiry-based microbiology lab on antimicrobial drug resistance. For the first aim, soil samples were collected from an area with no antibiotic use in addition to two farms that use antibiotics at subtherapeutic levels. Each soil sample was plated onto an agar medium that had been treated with either tetracycline, carbadox, or a phosphate buffer solution. Tetracycline and carbadox were chosen because they are both common animal feed additives used in veterinary medicine. Tetracycline-resistant bacteria and carbadox-resistant bacteria were cultivated, counted and characterized from soils exposed to the manure of dairy and swine farm animals treated with subtherapeutic antibiotics and compared to tetracycline-resistant and carbadox-resistant bacteria from soils not treated with antibiotics. Higher numbers of carbadox-resistant bacteria were detected compared to bacteria with resistance to tetracycline. We believe that this study serves as an excellent model for an inquiry-based microbiology lab. Microbiology students will be able to design their own hypothesis-driven experiments using basic microbiology techniques and equipment to examine the prevalence of antibiotic-resistant bacteria. Students will learn to perform serial dilutions and understand why they are necessary, calculate the number of colony forming units per gram of soil, carry out extraction and purification of DNA from the antibiotic-resistant bacteria and consider the potential health implications that correspond to increases in antibiotic resistance.

**GENDER DIFFERENCES AND THE EFFECTS OF OFFSPRING SEX RATIO ON PARENTAL CARE**

Poster: 43  
Farmer, Ben  
Faculty Mentor(s): Dr. David Westneat

Parental behavior in animals varies based on factors both long- and short-term. The driving force behind this variation is the way ecology affects trade-offs: a particular life history tends to emerge that accommodates the survival of the current brood, survival of the parent, and survival of future broods. We studied the variation in parental behavior within a population of house sparrows (*Passer domesticus*), a biparental species. We investigated the impact of parent gender and offspring sex ratio on provisioning behavior during periods when nestlings are dependent on parents. Videos of nest sites were scored for metrics of care occurring for broods during nesting seasons from 2011 to 2014. Visit frequency, time at the nest, and time away from the nest were of focus in analysis and were compared across broods and between the parental sexes. We found that male feeding trips per hour increased, peaked, and then declines through the nesting period, while female feeding trips increased throughout nestling growth. Data on the brood size and sex ratio of the offspring may provide further clues as to how the parents partition their care. We will also test if the patterns of care and the sex of an offspring affect nestling growth. Our results refine a general understanding of the ecology of trade-offs involving parental care.
IMPACT OF BACTERIAL GROWTH MEDIA ON THE CIRCADIAN CLOCK OF KLEBSIELLA AEROGENES
Poster: 44
Fields, Katelyn
Faculty Mentor(s): Dr. Vincent Cassone

While it is well-known that humans experience circadian rhythms with a period of 24 hours, recent research has shown that the human gastrointestinal system also operates under its own circadian clock. Studies suggest that gastrointestinal microflora is controlled by the host’s circadian clock; nevertheless, it is not completely understood how this interaction is regulated. Additionally, one specific bacterium found in the human gastrointestinal (GI) tract, *Klebsiella* (nee Enterobacter) *aerogenes*, has exhibited increased swarming motility in the presence of melatonin. Melatonin is an important neurohormone, but it can also be found in the (GI) lumen. The purpose of this experiment is to determine how three different growth media affect the swarming area, circadian period, and circadian phase of the bioluminescence signal of *K. aerogenes*. The types of media utilized are an in-house made eosin methylene blue (EMB) agar with tryptone (control), commercial EMB agar, and commercial EMB agar with tryptone. Semisolid EMB plates with 1nM melatonin were inoculated with the bacteria, expressing a luciferase cassette driven by the CoaE (Dephospho-Coa Kinase) promoter. The bacteria were allowed to proliferate in a Lumicycle photon counter for six days. The plates were then photographed, allowing for swarming area quantification. Furthermore, the bioluminescence signals were used to obtain data for the circadian period and phase. Statistical analysis revealed no significant difference in circadian period or phase of the bacteria grown on the different media. However, there was a statistically significant difference (p=0.0067, ÔÂ*< 0.05) in the swarming areas between control group and the bacteria grown on the commercial EMB, which had average swarming areas of 312.388 mm² and 149.538 mm², respectively. These results suggest that future experiments of this nature should employ an in-house EMB agar with tryptone in order to optimize bacterial growth. However, further experimentation should be conducted to verify this conclusion.

DIURNAL LOCALIZATION OF A HUMAN GUT BACTERIUM, KLEBSIELLA AEROGENES, WITHIN A HETEROLOGOUS HOST TISSUE
Poster: 45
Authors: Haley Fluharty, Jesse McDonald
Faculty Mentor(s): Dr. Jiffin Paulose, Dr. Vincent Cassone

Our study explores the motility of the human gut commensal bacterium, *Klebsiella aerogenes*, within the colon of the laboratory mouse, *Mus musculus*. Previous research shows that *K. aerogenes* expresses circadian rhythms of motility outside of the host (in vitro) and increases swarming behavior in the presence of the brain/gut hormone melatonin. The purpose of this study is to analyze the concentration and localization of *Klebsiella aerogenes* within colonic mouse tissue over a 24-hour period. C57Bl/6 mice were infected via oral gavage with *K. aerogenes* expressing a constitutive mCherry fluorescent marker under a lac-z promoter. Proximal, medial, and distal colon samples from the six infected mice were taken at six time points (every four hours) over twenty four hours, with three points in the dark period and three in the light. The colon tissues were cryosectioned and stained for an antibody against a mucin protein family member to label the mucosal section and to determine the location of the gut bacteria across the tissue section. Confocal images were analyzed to determine the percent area of the tissue that contains positive, constitutive mCherry bacteria signals. Preliminary data show that the bacteria are expressing positive signals from lumen and peripheral locations in the tissue at certain times of day. These data will show whether circadian patterns of swarming in *K. aerogenes* persist within a heterologous host as well as how circadian rhythms in the microbiome are affected, if at all, by location across the colon.

** Denotes STEMcats project
TRADE-OFFS SHAPE CAROTENOID-BASED COLOR VARIATION IN REDHEADED PINE SAWFLY (NEODIPRION LECONTEI) LARVAE

Poster: 46

Gaines, Maranda

Faculty Mentor(s): Dr. Catherine Linnen

Carotenoids serve various ecological roles in animals including coloration, immune responses, and vision. Carotenoid-derived coloration is greatly emphasized in the literature, particularly relating to mate choice and aposematic warning. However, the trade-offs between the color and non-color functions of carotenoids are not thoroughly explored. In the redheaded pine sawfly (Neodiprion lecontei), some larval populations have yellow pigmentation, using carotenoids derived from their diets for aposematic warning coloration. Other larval populations are white in color, having genetically lost the ability to produce the yellow pigment. Because carotenoids are essential to life functions in both the yellow and white populations, explore the selective pressures favoring a loss of yellow coloration in white populations is explored. It is hypothesized that trade-offs between color and non-color functions have driven the white populations to stop producing yellow pigment, thereby retaining carotenoids for other life functions. Through analyses of field trip notes, white larvae are found more commonly on pitch pine (Pinus rigida) than on other pine hosts. After extracting and quantifying the carotenoids in multiple N. lecontei hosts, P. rigida is found having lower carotenoid content than other hosts. These findings support the hypothesis that selection favors white populations who use limited carotenoid sources for non-color functions despite an increased predation risk.

** FERTILITY AWARENESS IN WOMEN

Poster: 47

Authors: Emma Galdau, Jillian Garrett, Alexandra Gililland, Karina Martinez, Gabrielle McKarns, Emma Skipworth, Savannah Trent

Faculty Mentor(s): Dr. Kaylynne Glover

Fertility perception is a topic that is largely unexplored and, in humans, fertility is masked. The purpose of this study is to evaluate fertility awareness in women. We hypothesized that women are generally unaware of their own fertility. Before the study began, participants were given a pre-survey to determine their preexisting knowledge of fertility. Participants completed daily journal entries answering questions about their mood, fertile belief, and sexual desires. Participants also collected urine samples which were used to test for fertility. We found that women were, in fact, unable to accurately detect their own fertility. The evidence collected shows that the accuracy of a woman to detect her fertility is relatively low which could be due to both biological or environmental influencers, such as incomprehensive sexual education.
** EFFECT OF ECOSYSTEM-TYPE AND TOURISM LEVEL ON THE DIVERSITY OF THE LEMUR GUT MICROBIOME**

**Poster: 48**

**Authors:** Maria Hajj, Zoe Hert, Eric Kowalewski, Lydia Pack, Chris Toussaint

**Faculty Mentor(s):** Dr. David Weisrock

The purpose of our research is to determine which factor, ecosystem-type or level of tourism, has a greater effect on variation in the gut microbiome of *Eulemur rufifrons*. *E. rufifrons* is an ideal study system because in Madagascar populations vary in their habitat-type and level of tourist exposure. In this study, we focused on populations that live in a dry forest with constant high levels of tourism and those that live in a rainforest where tourism exposure is variable. We hypothesize that ecosystem-type will be a greater driving factor in lemur gut microbial variation than level of tourism. As such, we expect greater differences in microbial patterning between rain and dry forest populations than between high and low tourism exposure populations. To conduct this research, fecal samples were obtained from wild specimens of *E. rufifrons* in Isalo National Park, a dry forest with high tourism, and Ranomafana National Park, a rainforest with varying levels of tourism. In the lab, DNA was extracted from fecal samples using the QIAGEN PowerFecal Kit, the V4 region of the 16S rRNA gene was amplified with PCR, and PCR products were sequenced on an Illumina MiSeq platform. This research is significant to lemur conservation efforts. If the data show that tourism exposure affects the microbial signal greater than the ecosystem-type, this indicates a significant, drastic anthropogenic impact. Ecotourism is a growing industry in Madagascar that promotes conservation efforts; however, its impact on the health and viability of endangered biodiversity is relatively unknown. This study furthers our understanding of how anthropogenic forces shape microbial communities, aiding conservation research. Determining how factors, like ecosystem-type or tourism regime, impact the microbiome is vital to understanding how to effectively conserve these primates.

**KLEBSIELLA AEROGENES: STUDYING A BACTERIA’S CIRCADIAN RHYTHM**

**Poster: 49**

**Authors:** Carmen Harper, Addison Hubler, Andrew Rader

**Faculty Mentor(s):** Dr. Vincent Cassone

Within this lab, we are studying the human gut bacterium, *Klebsiella aerogenes*, the second bacteria reported to have a circadian rhythm. The goal of our lab is to determine the specific genes within *K. aerogenes* that govern the circadian rhythm. We began this experiment by mutating a strain of *K. aerogenes* expressing CoaE::lux, a metabolic gene, with pBAMD1-2, which has the ability to mutate genes by randomly inserting kanamycin resistance. When metabolism occurs, the strain will glow due to the CoaE::lux genes, which enables us to track the circadian rhythm as the bacterium’s metabolism will rise and fall over a 24-hour period. To do so, the *K. aerogenes* strain was placed on nutrient media and put into a LumiCycle. The LumiCycle tracked bioluminescence over a 72-hour period. These data were then compared to a wild-type control to see if the circadian rhythm was changed. Mutated DNA was then isolated using polymerase chain reaction (PCR). The products from PCR were sent out for sequencing, and the results were compared to wild-type sequences to see if the mutations influenced the *K. aerogenes* strain’s circadian rhythm. The results we gathered showed that mutants CAHAR-3D, 4D, and 6A had an irregular swarming pattern when compared to the bullseye pattern of wild type *K. aerogenes*. The mutants had a jagged irregular shape compared to the neat circles the wild type colonies produce. Certain mutants also had a biofilm, which shows pathogenic properties. Our DNA sequencing results showed that multiple *K. aerogenes* mutants had similar mutations.
INVESTIGATING THE EFFECTS OF DEHYDRATION ON SPATIAL MEMORY
Poster: 50
Authors: Sahana Holla, Daniel Khoudoud, Ivanka Rainer, Alexandra Schneider
Faculty Mentor(s): Dr. Jessica Santollo

Research in humans has repeatedly demonstrated impaired cognitive ability in response to dehydration. Similar effects have been observed in animal models. For example, a previous study conducted in this lab demonstrated that dehydration impairs Novel Object Recognition performance in female rats in low ovarian hormone states but not in male rats, regardless of gonadal hormone status. An additional study in male mice reported that 24-hour water deprivation impaired spatial memory in the Y maze task. This project, therefore, is interested in determining whether sex influences dehydration-induced impairments in spatial memory. To begin investigating the effect of dehydration on spatial memory, males were tested (n = 18) by a spatial object location test. This test was composed of 1 day of habituation to the open field and two training days where rats were allowed to explore the area for three 5-minute trials with a 2-minute intertrial interval. During the training trials two identical objects were placed in the top quadrant of the open field. On test day (day 4), rats were either water-deprived 24 hours in advance or kept euhydrated. During the test, one of the objects was moved from its training day location to a novel location, the rats were allowed to explore for 5 min, and the time spent investigating each object and activity levels were measured. Preliminary results suggest that euhydrated males spent more time with the object in the novel location, but dehydrated males spent similar amounts of time with both objects. These results suggest that dehydration may impair spatial memory using this paradigm. After replicating these preliminary results, future studies plan to probe for sex differences after dehydration.

INDIRECT GENETIC EFFECTS ON SOCIAL BEHAVIOR IN LIVING ORGANISMS
Poster: 51
Holtmann, Haley
Faculty Mentor(s): Dr. Jeremy Van Cleve

A literary analysis citing multiple studies performed on the topic of indirect genetic effects. Indirect genetic effects refers to the concept of pairs, or groups of social organisms. These organisms express genes that influence their growth patterns and behaviors. The indirect effect would be how the pair or group reacts to their counterparts. While it is not their genes that influence them to grow to a certain size or increase aggression, their partner’s genes do affect them. In the studies reviewed for this analysis, a majority of phenotypes investigated involved aggression. The animals being studied expressed higher aggression when in contact with animals possessing genes that made them prone to aggression. Several studies have been performed on these genes themselves, but few on their influence on outside individuals. In the studies involving plants, studies have shown that growth patterns can be the result of outside sources using the nutrients necessary to thrive. This can also be contributed to indirect genetic effects. The significant values and regression coefficients from each study were compiled into one coherent data log. Using this compilation of data, it can be deduced whether there is a significant scientific base behind indirect genetic effects, and if the samples and studies done are enough to support this conclusion.
** THE TICKING TIME CLOCK: CIRCADIAN RHYTHMS WITHIN HUMAN GUT BACTERIA  
** Denotes STEMCats project

** Poster: 52  
** Authors: Anna Howard, Frances Miller, Callihan Moraska  
** Faculty Mentor(s): Dr. Vincent Cassone, Dr. Jiffin Paulose

The human gut microbiome is a diverse community of organisms, all of which have an array of purposes and functions that keep things running smoothly. Recently discovered circadian rhythms within the gut microbiome have been shown to influence the body’s main clock. *Klebsiella aerogenes* is one of only two bacterial species found to reveal circadian rhythms. We hypothesized that the circadian rhythm of *K. aerogenes* is driven by a set of genes. To research this, the circadian clock of *K. aerogenes* was mutated and the morphology and clock function were analyzed in comparison to a wild-type strain. To begin this study, a transposon (Tn5) within a pBAMd1-2 plasmid containing the kanamycin resistance gene was randomly introduced into the genome of tetracycline-resistant pCoaE::lux bacteria via electroporation. The promoter of the CoaE gene within *K. aerogenes* had previously been placed in front of a luciferase reporter gene cassette, which results in metabolically-driven light expression. This newly mutated bacteria was placed into a Lumicycle for 72 hours after the addition of melatonin to the colonies; bioluminescence and colony growth were analyzed in comparison to wild-type controls of the bacteria. The bioluminescence data show that the six mutants expressed varying circadian rhythms when compared to the wild-type. By examining the morphology of the *K. aerogenes* mutants, it was discovered that they showed irregular growth patterns compared to the wild-type. Each mutant’s DNA underwent PCR, was sequenced to identify mutated regions, and was later analyzed by BLAST search. Utilizing these results, we can suggest that circadian rhythms of *K. aerogenes* were altered by the mutations within their genome. This study brings us closer to better understanding the genetic basis of circadian expression within this human gut commensal bacterium.

** THE EFFECTS OF A BACTERIAL ENDOTOXIN (LPS) ON BEHAVIOR AND SENSORY-CNS-MOTOR CIRCUITS  
** Poster: 53  
** Istas, Oscar  
** Faculty Mentor(s): Dr. Nicholas McLetchie, Zachary Stanley

The effect of bacterial sepsis on animal behavior and physiology is complex due to direct and indirect actions. The most common form of bacterial sepsis in humans is from gram-negative bacterial strains. The endotoxin (lipopolysaccharide, LPS) and/or associated peptidoglycans from the bacteria are the key agents to induce an immune response, which then produces a cascade of immunological consequences. However, there are direct actions of LPS and associated peptidoglycans on cells which are commonly overlooked. This study showed behavioral and neural changes in larval Drosophila fed commercially obtained LPS from Serratia marcescens. Locomotor behavior was not altered, but feeding behavior increased and responses to sensory tactile stimuli were decreased. In driving a sensory-CNS-motor neural circuit in in-situ preparations, direct application of commercially obtained LPS initially increased evoked activity and then decreased and even stopped evoked responses in a dose-dependent manner. With acute LPS and associated peptidoglycans exposure (10 minutes) the depressed neural responses recovered within a few minutes after removal of LPS. Commercially obtained LPS induces a transitory hyperpolarization of the body wall muscles within seconds of exposure and alters activity within the CNS circuit. Thus, LPS and/or associated peptidoglycans have direct effects on tissues without a secondary immune response.

** Denotes STEMCats project
SEX RELATED EFFECTS ON GEMMAE GROWTH
Poster: 54
Jiang, Yichen
Faculty Mentor(s): Dr. Robin Cooper

A male would act differently with a female than with other males and vice versa, which we all can relate as humans. Studies have shown similar behaviors in plants, but very few has been focusing on the gemmae (asexual offspring). We are using offspring of Marchantia inflexa to find out whether they will respond differently among opposite sex, by looking at the germination rate and the length of their rhizoids (hair like structure that affix to their substratum). We hypothesize that they will respond to the opposite sex with a higher germination rate and have longer rhizoids. None of the results of this experiment are significant, the hypothesis was not supported, and however, the pattern is opposite to what we hypothesized.

DIGITAL TECHNOLOGY AND OCULAR HEALTH: A REVIEW
Poster: 55
Langford, Amy
Faculty Mentor(s): Dr. Karla Lightfield

Digital technology is becoming an increasingly large part of our daily lives, infiltrating many aspects of life including work, entertainment, social life, and learning. Digital device usage has been shown to have detrimental effects on the health of its users. Many of the short-term effects of screen time on visual health and comfort have been experimentally and clinically proven. Those effects are commonly called Computer Vision Syndrome (CVS) and include dry eye, eye strain, headaches, and blurred vision. The long-term effects of screen time on visual health are predominantly unknown. This paper is a literature review of the causes, symptoms, diagnosis, and treatment of CVS. Additionally, seventy-five University students were surveyed in regards to their vision, quantity of digital device usage, and frequency of CVS symptoms. The findings confirm our increasingly digital society, with as much as 94% of the US workforce being internet users and American teens spending nine hours using digital technology daily. In the primary survey of University students 60% of respondents reported spending greater than four hours using a computer daily and another 81.33% of respondents reported spending greater than two hours using a smartphone per day. The increased digital technology use has brought along an increase in CVS symptoms. These symptoms result from decreased blink frequencies, blue-light emissions, and unhealthy screen viewing angles. Treatments include frequent breaks, Meibomian gland treatment, blue-light blocking lenses, and, ideally, decreased screen viewing time. In summary, people are becoming more reliant on digital technology. Prevention and treatment of CVS demands attention. Short-term effects are widespread and experimentally established but long-term effects are probable as well, specifically damage to the retina due to blue light exposure. Continued research is needed to correctly diagnose and treat CVS and related visual issues caused by digital technology usage.
DAILY RHYTHMS ARE ALTERED BY HIGH-FAT FEEDING IN FEMALE OFFSPRING BORN TO OBESE MOTHERS
Poster: 56
Llanora, Josie
Faculty Mentor(s): Dr. Julie Prendergast

About 26% of U.S. women are obese prior to pregnancy. Children born to obese mothers are at increased risk of obesity and metabolic syndrome. Disruption of circadian rhythms is also associated with obesity and metabolic dysfunction. Circadian, or daily, rhythms are 24-hour fluctuations in physiology and behavior. Environmental factors, such as the light-dark cycle and diet, can alter these rhythms. For example, in male mice, high-fat diet (HFD) feeding alters daily rhythms and increases body weight. In contrast, female mice fed HFD do not become obese, and their daily rhythms are not altered. However, previous studies have shown that female mice will develop diet-induced obesity if they are born to an obese mother. In this study, we sought to determine if female offspring weaned from obese mothers had disrupted daily rhythms. Female C57BL/6J mice were fed HFD (60% kcal fat) for 12 weeks (6 weeks prior to pregnancy and throughout pregnancy and nursing) to generate obese mothers. Then daily rhythms were analyzed in female offspring fed HFD. Female offspring born to lean or obese mothers had high-amplitude rhythms of eating behavior during LFD feeding. Consistent with our previous studies, HFD consumption did not alter the eating behavior rhythms of females born to lean mothers. In contrast, HFD consumption advanced the phases, or timing, of the eating behavior rhythms in females born to obese mothers. We also investigated locomotor activity rhythms in female offspring born to lean and obese mothers. The daily rhythms of activity were not affected by HFD feeding in females born to lean mothers. However, the amplitudes, or robustness, of the activity rhythms were increased by HFD feeding in females born to obese mothers. Our results show that maternal obesity causes daily rhythms in female offspring to be susceptible to the effects of HFD feeding.

THE EFFECTS OF BACTERIAL ENDOTOXIN LPS ON SYNAPTIC TRANSMISSION AT THE NEUROMUSCULAR JUNCTION
Poster: 57
McNabb, Micaiah
Faculty Mentor(s): Dr. Robin Cooper

Gram-negative bacterial septicemia is a common cause of death in many animals, including humans. Serratia marcescens and Pseudomonas aeruginosa are two gram-negative bacterial strains commonly found in human cases of septicemia. Gram-negative bacteria contain high levels of lipopolysaccharide (LPS) endotoxin in their outer membrane, which induces an immune response in animals. The direct effects induced by LPS, independent of an immune response, have often been overlooked in endotoxin studies. The mechanisms in glutamatergic synapses at Drosophila neuromuscular junctions (NMJs) have been well-documented and serve as an effective model for the direct action of LPS on presynaptic motor neurons. Studies with LPS exposure was shown to enhance synaptic transmission and hyperpolarize the membrane potential at low doses but block glutamatergic receptors and decrease observable spontaneous events at a high dosage. The dosage effects are LPS type specific. The hyperpolarization is not due to voltage-gated potassium channels or to activation of nitric oxide synthase (NOS).
**POSTER PRESENTATIONS**

**EFFECT OF MATERNAL SEPARATION ON CAPSAICIN-INDUCED CGRP RELEASE IN ADIPOSE TISSUE**

**Poster: 58**  
**Mounce, Sophia**  
**Faculty Mentor(s):** Dr. Analia Loria

Early life stress (ELS) has been shown to increase risk for a variety of health issues including obesity, which can lead to an increase risk of hypertension due to the overstimulation of sympathetic activity. Stimulation of sensory nerves in adipose tissue increase the sympathetic activity and blood pressure, this response is called the adipose afferent reflex (AAR). Our lab has previously demonstrated that mice exposed to maternal separation and early weening (MSEW), an ELS model, showed an increase in sympathetic activity and mean arterial pressure (MAP) when fed a high fat diet chronically. Calcitonin gene-related peptide (CGRP) is a marker of sensory activation and it is released from afferent nerves in response to different stimuli such as pain. The purpose of the study was to determine how MSEW affects capsaicin induced CGRP release from subcutaneous white adipose tissue (scWAT) and gonadal white adipose tissue (gWAT) in order to better understand the effect of MSEW on adipose tissue sensory neurons. Six-month-old C57BL/6 mice fed a low-fat or a high-fat diet were used. The scWAT and gWAT samples were removed and incubated in DMEM with capsaicin (1 µM) for 1 hour. After incubation, fat explant were separated and capsaicin-induced CGRP release in the media was analyzed via ELISA. CGRP release in scWAT was similar between control and MSEW mice (0.71 ± 0.12 vs. 1.0 ± 0.40 ng/mg tissue, respectively); however, it was reduced in HF-fed mice (0.20 ± 0.12 vs. 0.35 ± 0.14 ng/mg tissue). Contrary, capsaicin-stimulated gWAT released more CGRP tissue from MSEW mice (LF: 0.10 ± 0.05 vs. 0.34± 0.10, 1 ng/mg tissue; HF: 0.08 ± 0.05 vs. 0.24 ± 0.09 ng/mg tissue, main effect MSEW p<0.05). Our data suggest that MSEW increase the capacity to respond to a sensory stimulus in gWAT, but not the scWAT.

**THE IMPACT OF GONADAL HORMONES ON MEMORY IMPAIRMENTS FOLLOWING DEHYDRATION**

**Poster: 59**  
**Myers, Katherine**  
**Faculty Mentor(s):** Dr. Jessica Santollo

Previous studies in rats indicate a correlation between gonadal hormone condition and memory performance after hypovolemic dehydration; dehydrated female rats in diestrus II (low-estrogen) were unable to complete an object recognition task, compared to hydrated DII females, dehydrated and hydrated males, and dehydrated and hydrated females in estrus (high-estrogen). These results suggest that gonadal hormones may have a protective role against dehydration-induced memory impairments. This is not surprising, as estrogens have been implicated in fluid balance and memory pathways. The current study sought to explore whether gonadal hormones directly provide protection against dehydration-induced memory impairments using a novel object recognition (NOR) paradigm. Male and female rats were subjected to either castration/ovariectomy or sham surgery and tested following a saline injection (euhydrated state) or a 20 CE³g/kg furosemide injection (dehydrated state). Animals underwent testing after training with two identical objects; on test day, one of the original objects was replaced with a novel object. More time spent exploring the novel object indicated memory of the old object, and thus intact cognition. Regardless of experimental group, all male animals spent more time exploring the novel object (p<0.05). In females, rats treated with furosemide spent less time with the novel object (p<0.05). Post hoc analysis showed that both euhydrated and dehydrated intact females, as well as euhydrated ovariecromized (OVX) females, spent more time with the novel object (p<0.05). However, OVX females treated with furosemide spent the same amount of time with the two objects. Our results suggest a protective effect of ovarian hormones against hypovolemic dehydration in female rats, but no such protective effect by testosterone in male rats. Follow up studies measuring brain activity levels in areas associated with learning and memory are in progress, to begin identifying mechanisms by which ovarian hormones provide protection.

**** Denotes STEMcats project
** DIGESTING A CIRCADIAN RHYTHM PHENOMENON**

Poster: 60 

Authors: Mitchell Nelson, Obadah Tolaymat 

Faculty Mentor(s): Dr. Vincent Cassone, Dr. Jiffin Paulose 

Circadian rhythms have been widely observed as a central process to the day-to-day regulation of animals, plants, and cyanobacteria. Recent studies have shown *Klebsiella aerogenes*, a bacteria residing in the human gut, to possess an identical process. Our goal is to identify the genes responsible for this phenomenon. To do so, we conjugated a pCoae::Lux strain of *K. aerogenes* with pBAMD 1-2, a plasmid functioning to mutate the chromosomal DNA of its host. pCoaE::lux is able to produce light at the activation of CoaE, a metabolic gene. In the wild type *Klebsiella aerogenes*, the activation of the metabolic gene, and therefore the bioluminescent production, occurs in accordance with its circadian rhythm. After conjugation, the changes in the bioluminescent patterns of the mutants were analyzed. The mutant’s genomic DNA was then isolated, targeted using PCR, and sent out for sequencing. Several mutants differed from the wild type in colony area, shape, and bioluminescence. Wild-type *K. aerogenes* colonies exhibited a 22.75 hour swarming period in the presence of melatonin. Mutants 1, 3, 4 and 5 showed statistically significant differences in colony area compared to the wild type. Wild type colonies were circular but mutants 1, 2, and 5 had irregular shapes. The metabolic rhythms of the mutants were also different from the wild type colonies in varying ways. With sequencing and further investigation we can identify which genes may be responsible for *K. aerogenes*’ circadian rhythm.

** SAND VS. CLAY: HOW BURROWING SUBSTRATE AFFECTS CRAYFISH HEART RATE AND BEHAVIOR**

Poster: 61 

Pappas, Stephanie 

Faculty Mentor(s): Dr. Melody Danley 

Burrowing substrate affects the construction of *Procambarus clarkii*, red swamp crayfish, burrows and their behavior. To date, the energetic costs associated with burrowing under these different conditions has been elusive, because direct and indirect calorimetry measurements may be skewed by the presence of the burrowing substrate and the amount of time needed to assess such energetic costs. The current experiment was designed to determine the energetic costs associated with burrowing in two different types of substrates (clay = preferred, sand = not preferred) using heart rate as the physiological index for energetic costs. It was predicted that the crayfish would have a higher level of burrowing activity and an increased heart rate when provided with clay burrowing substrate due to increased burrowing activity, compared to those crayfish placed in the sand environment. In this experiment, each adult, inter-molt crayfish was placed in a tank with either sand or a mud substrate (4 cm) and surface water (4 cm), and then allowed to acclimate for 24 hours. After the 24 hour acclimation period, the surface water was removed to stimulate burrowing behaviors. Behavior data was collected using time-lapse video recordings, and heart rate data was collected using a data acquisition system, AD Instruments, with 3-lead electrodes. Our results indicate crayfish in the sand substrate spent a greater amount of time exploring or burrowing, compared to those in the sand environment. Likely related, crayfish in the clay environment had higher overall heart rates compared to those in the sand environment. Our results suggest crayfish in the sand environment conserve energy by spending less time exploring and burrowing in the less preferred environment, whereas crayfish in the clay environment spent more energy engaged in burrowing and exploratory behavior after surface water was removed. This experiment can be used to better understand how the different substrates and behaviors affect the energetic cost of crayfish burrowing.
CHARACTERIZING EXPRESSION OF CLAUDIN 12 AND GRAINYHEAD-LIKE TRANSCRIPTION FACTOR 2A DURING CHOROID FISSURE FUSION
Poster: 62
Pelphrey, Cassie
Faculty Mentor(s): Dr. Jakub Famulski

During formation of the eye, an epithelial fusion event occurs. A fissure forms at the ventral region of the eye, known as the choroid fissure. Coloboma is the congenital blinding disorder associated with the inability of the choroid fissure to fuse during the epithelial fusion event in the eye. Mutations in a transcription factor, pax2, have been shown to disrupt eye morphogenesis resulting in failure for the choroid fissure to fuse in both humans and zebrafish. Through RNA sequencing, it was determined that many genes had differential regulation between Pax2 mutants and wild-type organisms. Two genes of interest with reduced expression were Claudin 12 (cldn12) and Grainyhead-like Transcription Factor 2a (grlh2a). Claudins are important components of tight junctions, expressed in epithelial cells. (cldn12) is a non-classic claudin and its expression has been reported to be restricted to discrete boundaries in the surface ectoderm which later form the cornea of the eye. (grlh2a) is known to play a role in epithelial morphogenesis during neural tube closure and palatal fusion. In order to validate our RNA sequencing results, whole-mount in situ hybridization (WISH) for cldn12 and grlh2a was completed. Grhl2a and cldn12 expression was detected throughout the cranial regions of the embryo from 24-48hpf. When examined in embryos from a pax2+/− incross, cldn12 expression appeared reduced in the cranial region in 19% of the embryos, while grlh2a expression appeared to actually increase in ~10%. Mandelian genetics predicts 25% of the embryos should be homozygous mutant. Taken together our preliminary data suggests that cldn12 expression is downregulated in pax2 mutant embryos and warrants further investigation into possible connections to coloboma. Examining grlh2a expression will require further analysis to validate the RNA sequencing results.

THE ROLE OF SOX10 EXPRESSING NEURAL CREST CELLS IN THE ORGANIZATION OF POM SUBPOPULATIONS
Poster: 63
Poffenberger, Paige
Faculty Mentor(s): Dr. Jakub Famulski

The Anterior Segment (AS) of the eye maintains eye environment and is vital for normal vision. When development of the AS of the eye does not occur properly, anterior segment dysgenesis (ASD) can occur. This disorder can increase the risk of congenital glaucoma, corneal opacity, Axenfeld-Rieger Syndrome, and more. The AS develops through migration of neural crest cells, which differentiate into periocular mesenchyme cells. These POM cells migrate to areas around the retina, but differentiation and migration patterns are unknown. It is known, however, that the Sox10 gene plays a critical role in this differentiation. Our overall hypothesis is that in the absence of Sox10, neural crest cells will fail to migrate and specify into the POM subpopulations, ultimately producing an ASD-like phenotype. To study this, we utilize a mutant line of zebrafish, Sox10 CLS. The 2 main aims of this project to reach our goal include identifying the CLS heterozygous individuals and examining the consequences of Sox10 loss of function on POM cell specification. To identify the Sox10 CLS heterozygotes, standard protocol for fin clipping and PCR of the gDNA is utilized. Primers targeting the transposon insertion in the mutants allows for heterozygote identification. Incrossing of those identified heterozygotes will then double-confirm them. To study Sox10 knockout in the context of POM cell specification, we will incross confirmed heterozygotes followed by fixation of embryos at 24hpf, 32hpf, and 48hpf. Standard protocol of whole mount in situ hybridization for POM associated genes will then be performed utilizing digoxigenin and fluorescein riboprobes to characterize gene expression. These neural crest cell markers will be imaged and studied for Sox10 knockdown interference. The final step in this project will be to outcross the Sox10 CLS heterozygotes to GFP reporter lines to monitor the migration behavior of POM cells and POM cell distribution.

** Denotes STEMcats project
**EXERCISE DOES NOT ALTER SLEEP IN YOUNG SEDENTARY ADULTS**

*Poster: 64*

**Reynolds, Rachel**

**Faculty Mentor(s):** Dr. Julie Prendergast

Circadian rhythms are 24-hour cycles of physiology and behavior, such as the sleep-wake cycle. Misalignment between internal rhythms and environmental cycles leads to poor health outcomes such as cardiovascular risk factors and metabolic disorders. Behaviors such as exercise can shift the timing of the internal circadian rhythm. If activity can shift the circadian rhythm to become more aligned with environmental cycles, such as the light-dark cycle, and social obligations, such as early work schedules, then sleep quality and health might improve. The goal of this research was to determine whether exercise improves sleep in young adults. Forty-seven (n=28 females), young, (mean age: 24.1 ± 4.7 yrs), sedentary (≤ 2h of exercise/week) subjects participated in this experiment. Subjects completed sleep logs and wore actigraphy watches to measure sleep. During the last five days of the experiment, subjects participated in treadmill exercise 30 min/day. At baseline (before exercise), only 48% of subjects had sleep efficiency greater than 85% (mean baseline sleep efficiency: 82.7 ± 7.4%), which is the threshold for normal sleep. Sleep efficiency was similar during exercise (mean exercise sleep efficiency: 84.1 ± 6.9%). At baseline, 90% of subjects slept less than the recommended 8 hours of sleep per night (mean baseline sleep duration: 6.3 ± 1.3 h), and exercise did not alter sleep duration (mean exercise sleep duration: 6.1 ± 1.3 h). The young, sedentary adults in this study slept less than the recommended amount and sleep quality was below normal in most subjects. Five days of exercise did not alter sleep in our study. Future research could investigate the effects of long-term exercise on sleep.

**AFRICAN GREEN MONKEYS BORN TO MOTHERS WITH GESTATIONAL HYPERTENSION EXHIBIT HIGHER PROTEIN EXCRETION RATES AS JUVENILES**

*Poster: 65*

**Rivera, Patrick**

**Faculty Mentor(s):** Dr. Jeff Osborn

Hypertensive pregnancy disorders are the leading cause of maternal and fetal mortality worldwide. Preeclampsia, gestational hypertension (GH) with proteinuria, can have deleterious effects on mother and fetus. Fetal exposure to hypertension (HTN) increases the risk of HTN and cardiovascular disease later in life. The African Green Monkey (AGM; Chlorocebus aethiops sabaeus) spontaneously develops chronic HTN and GH with similar pathologies to preeclampsia. We hypothesize that GH will predispose AGM offspring to HTN as juveniles prior to sexual maturity. Male and female AGMs 1-3 years of age were single housed for acclimation and 3-day urine collection. Blood pressure was recorded using forearm plethysmography and urinary protein excretion was evaluated using a BCA assay. Juveniles were grouped by their mother’s gestational phenotype: normotensive (NT; SBP < 120 mmHg through pregnancy) and gestational hypertensive (SBP < 120 mmHg before and > 140 mmHg during late pregnancy). Protein excretion was higher in offspring to GH pregnancies (GH 166.2 ± 50.8 mg/day vs NT 354.7 ± 48.5 mg/day; p<0.05). Systolic blood pressure (SBP) was similar between GH offspring and those from NT pregnancies (NT 107.2 ± 8.4 mmHg, n = 13 vs GH 109.2 ± 5.1 mmHg, n = 20; p > 0.05). The data suggest that exposure to GH in late pregnancy results in higher protein clearance and a predisposition to altered renal function in juveniles before sexual maturity. This suggests that GH can negatively affect the renal health of offspring postpartum.

** Denotes STEMcats project
POSTER PRESENTATIONS

Effects of Bacterial Endotoxin LPS on the Neuronal Regulation of the Heart, a Sensory-CNS-Motor Nerve Circuit as well as at Neuromuscular Junctions: Crustacean Model
Poster: 66
Saelinger, Christa
Faculty Mentor(s): Dr. Robin Cooper

Eatable crustaceans are susceptible to bacterial septicemia from injury or compromised defense by bacterial strains which can possibly have detrimental effects in mammals. Since many crustaceans (i.e., crabs, lobsters, crayfish) are used for animal food and human consumption, it is of interest to understand the effects potential bacterial infections can have on their health and our health. The Red Swamp crayfish (Procambarus clarkii) was used as a model crustacean to investigate the effect of direct exposure to isolated endotoxin lipopolysaccharide (LPS) from gram-negative bacteria (Serratia marcescens). S. marcescens is a common strain identified to cause septicemia in mammals (500 µg/ml) and is prevalently found in nature. LPS injection into the hemolymph of crayfish revealed acute changes in heart rate and effects on survival. Direct LPS exposure on an in situ sensory-CNS-motor circuit produces a decrease in function at 500 µg/ml but has no significant effect at 100 µg/ml. At the isolated neuromuscular junction, the direct action of the LPS endotoxin (500 µg/ml) enhances evoked synaptic transmission and alters facilitation, while decreasing observable spontaneous vesicle fusion events. These direct actions on tissues appear to be independent of innate immune responses and suggests the LPS receptors on these tissues have a role in excitability of cellular function. In addition, we embarked on examining reproducibility in the data analysis with different participants.

EXACERBATED DIET-INDUCED OBESITY AND DISRUPTION OF DAILY EATING BEHAVIOR RHYTHMS IN PERIOD2 MUTANT MALE MICE
Poster: 67
Salamone, Gabrielle
Faculty Mentor(s): Dr. Julie Prendergast

Circadian rhythms are 24-hour cycles of behavior, physiology, and gene expression that are entrained by cyclic factors in the environment such as light and darkness. Disruption of circadian rhythms is associated with an increased risk for cardiovascular disease and obesity. The Period 2 (Per2) gene is a core circadian gene that participates in the transcription-translation feedback loop that generates the 24-h rhythms of circadian clocks. The goal of my project was to determine if disrupting the circadian clock timekeeping mechanism, by disabling the function of PERIOD2, alters daily eating behavior rhythms and increases diet-induced obesity in male mice. Two different strains of PERIOD2-deficient mice were used for this experiment. The mPer2Idc-/ mice do not express PERIOD2 protein at all while the mPer2Brdm-/ mice express a truncated non-functional protein. At 7 weeks old, the mice were single-housed with a locked wheel in 12L:12D and fed low-fat diet (LFD). At 8 weeks old, the diet was switched to 45% kcal high-fat diet (HFD) for 7 weeks. Each week body weight and food consumption were recorded. I found that mPer2Brdm-/ mice gained more weight than the wild-type and mPer2Idc-/ mice when fed HFD. Additionally, the mPer2Brdm-/ mice had lower amplitude eating behavior rhythms during HFD feeding compared to wild-type and mPer2Idc-/ mice. This study shows that disrupting the molecular timekeeping mechanism of the circadian clock may regulate metabolism and obesity during HFD feeding.

** Denotes STEMcats project
HOW SURFACE WATER AFFECTS CRAYFISH DOMINANCE AND BURROWING BEHAVIOR
Poster: 68
Authors: George Schounce, Evelyn Bahena
Faculty Mentor(s): Dr. Melody Danley

*Procambarus clarkii*, or red swamp crayfish, are animals with well-known dominance behaviors. Such behaviors help establish social hierarchies that influence resource access and use, however, it is not clear how such social behavior is influenced in the face of life-threatening environmental stimuli (loss of surface water). In the current study, it was predicted that dominant crayfish would select preferred burrow sites in clay substrate over less preferred sand substrate, when prompted by the sudden removal of surface waters. The submissive crayfish would relocate to the less preferred substrate, the sand. Individual crayfish were transferred from a common stock tank to individually housed 1.5-L aquaria with oxygenated, carbon-filtered tap water for at least 72 hours. Two crayfish were each placed in the experimental tanks (28 cm x 25 cm x 30 cm) at the start of the experiment (10 replicate pairs). Each tank contained medium grain sand in half of the tank bottom, and clay in the other half of the tank bottom, to a depth of 4 cm. Another 4 cm of surface water was added. This was a total depth of 8 cm of substrate + water. Experimental crayfish were able to establish dominant-submissive behavior for the first 24 hours. Each trial was chosen randomly as to whether the surface water was removed or not. The surface water was drained at 24 hours and this prompted burrowing behavior. Crayfish activities were recorded for an additional 24 hours after surface water removal. Our results indicate that crayfish established dominance relationships within the first 12 hours in the experimental tanks, but the number of agonistic encounters was not affected by the acute loss of surface water at 24 hours. In contrast, the number of non-agonistic interactions transiently increased at 36-hours, possibly corresponding with a shift away from establishing dominant-subordinate relationships and towards building burrows. The locations, development of burrows, and visibility of crayfish were not significantly different for surface water x dominance interactions. Instead, most crayfish tended to burrow in clay environments regardless of social status and burrow construction was more developed in environments where surface water was removed at 24 hours. In conclusion, acute removal of surface water did not disrupt previously established social status of crayfish, but social status of crayfish influenced burrow development after surface water was removed.

INVESTIGATING THE EFFECTS OF SUV39H1 AND SUV420H1/2 ON PROGRAMMED GENOME REARRANGEMENT IN PETROMYZON MARINUS
Poster: 69
Scott, Claire
Faculty Mentor(s): Dr. Jeremiah Smith

A jawless vertebrate, sea lamprey (*Petromyzon marinus*), diverged from the vertebrate lineage roughly 550 million years ago, allowing for an evolutionary model to study the mechanism differences of genome alteration including epigenetics in mammals and programmed genome rearrangement (PGR) in lamprey. Through PGR, lamprey delete approximately 20% of their genome of which is retained in germline cells. The mechanisms of PGR have yet to be fully understood; however, the investigation of effect of SUV420H1/2 and SUV39H1 have given some outlook into prospective genes of involvement. SUV420H1/2 transcribes for a methyltransferase that trimethylates Histone 4 at Lysine 20, a site important for recruitment of factors necessary for DNA damage response and therefore DNA repair, an important step in PGR. SUV39H1 transcribes a methyltransferase responsible for catalyzing di- and tri-methylation of Histone 3 at Lysine 9, a significant marker for heterochromatic DNA. Due to its function, it is suspected that PGR levels will decrease in CRISPR-mediated knockouts because the embryos will be lacking a marker for chromatin packaging and deletion. Preliminary results from microscopy demonstrate that the are only small differences between the number of micronuclei per interphase nucleus in CRISPR-mediated knockouts and control embryos. These results portray that similar genes to SUV420 should be investigated.
EFFECTS OF OPTOGENETICALLY DRIVING A CHLORIDE CHANNEL AND A CHLORIDE PUMP ON CARDIAC FUNCTION IN A FRUIT FLY (DROSOPHILA MELANOGASTER)
Poster: 70
Stanley, Catherine
Faculty Mentor(s): Dr. Robin Cooper

Approaches are sought after to regulate ionotropic and chronotropic properties of the mammalian heart. Electrodes are commonly used for rapidly exciting cardiac tissue and resetting abnormal pacing. With the advent of optogenetics and the use of tissue-specific expression of light activated channels, cardiac cells are not only able to be excited but also inhibited with ion-selective conductance. As a proof of concept for the ability to slow down cardiac pacing, chloride-conducting channelrhodopsins (GtACR1/2) and halorhodopsin (eNpHR, a chloride pump) were expressed in hearts of Drosophila and activated by light. Unlike body wall muscles in most animals, the equilibrium potential for Cl- is more positive as compared to the resting membrane potential in larval Drosophila. As a consequence, activating the two forms of GtACR1/2 with low light intensity, the heart rate increased, likely due to depolarization and opening of voltage-gated Ca2+ channels. However, with very intense light activation the heart rate ceases, which may be due to a larger flux of Cl- counteracting the influx of Ca2+. Activating halorhodopsin hyperpolarizes body wall and cardiac muscle in larval Drosophila and rapidly decreases heart rate. Intense light activation of halorhodopsin stops the heart from beating, whereas lower intensities slowed the heart rate. Even with hormonal upregulation of the heart rate, the pacing of the heart was able to be slowed with light. Thus, regulation of the heart rate in Drosophila can be accomplished by activating chloride-conducting channelrhodopsins using light. These approaches demonstrated in a genetically amenable insect model may now be transferred to mammals with viral expression.

FAR-RED LIGHT IRRADIANCE LEVELS NEEDED TO INDUCE SEXUAL EXPRESSION IN MARCHANTIA INFLEXA
Poster: 71
Topmiller, Maria
Faculty Mentor(s): Dr. Nicholas McLetchie

It is known that in seed plants, the exposure to far-red wavelengths of light triggers sexual expression indicated by new growth of reproductive structures or bending of the thallus towards the light source. However, it is not known if there is a threshold level of far-red irradiance that must be reached to trigger expression. This study sought to answer the question through controlled tests in growth chambers, exposing the organism of study, Marchantia inflexa, to differing levels of far-red irradiance and measuring if sexual expression occurred and the time to expression for the different levels. Six different far-red light level treatments were used and a total of 108 individuals, amounting to 18 individuals per treatment group. Higher light irradiances (3.0-4.0 IRR) caused expression in a larger percentage of individuals in those treatment levels, whereas lower irradiance levels (1.0-2.0 IRR) caused a lower percentage of individuals in those treatment groups to express. Those exposed to the higher levels also sex expressed in a shorter amount of weeks than those exposed to the low levels. The conclusion was that the lowest level of far-red irradiance tested triggered sexual expression in M. inflexa, but higher levels induced expression in a larger number of individuals and induced expression more quickly than lower levels did. So while this study did not find a specific threshold of far-red irradiance that induces sexual expression, it was found that elevated levels caused expression sooner and in a higher percentage of individuals than lower amounts.
BREAKING PHYSICAL DORMANCY IN INDIGO (INDIGOFERA SUFFRUTICOSA) SEEDS: A WAY TO HELP FARMERS INTRODUCE A NEW CROP
Poster: 72
Unuakhalu, Reme
Faculty Mentor(s): Dr. Carol Baskin

Farmers in Kentucky and Tennessee would like to use Indigofera (Leguminosae) as a crop to replace tobacco but are having difficulties with breaking the physical dormancy (water impermeable seed coat) of the seeds. The aim of this research was to develop a safe method for making Indigofera seeds water permeable. The researcher used standard treatments known to make water impermeable legume seeds permeable, including mechanical scarification, wet heat (100°C), dry heat (100°C), and alternating wet heat (100°C) and ice bath (0°C). These experiments were conducted on two I. suffruticosa seed lots from Tennessee. Seeds in lots one and two mechanically scarified with a razor blade germinated to 80% and 86.7%, respectively. After 20 seconds in boiling water, seeds in lots one and two germinated to 38.3% and 74.7%, respectively. The hot water killed the non-germinated seeds in lot one but not those in lot two. Dry heat was ineffective in breaking dormancy. Alternating wet heat (five seconds in boiling water) with two minutes in an ice bath for three cycles promoted germination of seeds in lot one (81.7%) but four cycles killed the seeds (30%). For seeds in lot two, three and four cycles resulted in 89.3% and 94.7% germination, respectively. In conclusion, tests need to be conducted on each seed lot. Wet heat is a faster way to break dormancy than mechanically scarifying each seed individually, but some seed lots may be more likely to be damaged (killed) by high temperatures than others. The researcher recommends using the alternating wet heat and ice bath treatment on seed lots that are sensitive to wet heat.

SONIC HEDGEHOG SIGNALING PROMOTES SIAH E3 UBIQUITIN LIGASE EXPRESSION TO PROMOTE CHOROID FISSURE CLOSURE
Poster: 73
Veith, Sydney
Faculty Mentor(s): Dr. Jakub Famulski

Vertebrate eye formation involves an intricate interplay of neural tissue, which ultimately forms the semi-spherical eye. A critical aspect of this process is fusion of the choroid fissure located in the ventral area of the developing eye. Failure of choroid fissure closure is known to result in congenital blindness. Recent work in our lab identified Siah1 and Siah2 E3 ubiquitin ligases as regulators of Nlz2 protein stability which in turn regulates gene expression of a critical factor in choroid fissure closure, Pax2a. In order to expand on these findings, I sought to explore the upstream regulators of Siah expression. Sonic hedgehog (Shh) signaling is involved in fissure closure and was the focus of our study. We hypothesized that Shh positively regulates the expression of Siah genes during eye formation. To test our hypothesis, I performed whole mount in situ hybridization on Danio rerio embryos treated from 5.5 to 24 hours post-fertilization (hpf) with either Purmorphamine (to increase Shh signaling) or Cyclopamine (to decrease Shh signaling), to assay for expression of Siah1, Siah2, and Pax2a. Expressions of these genes was increased in purmorphamine-treated embryos while decreased in cyclopamine-treated embryos. To confirm my results I also analyzed expression in Smo -/- mutant embryos which lack Shh signaling. The observed changes in gene expression were quantified by qPCR. Taken together, my results support the hypothesis that Shh regulates Siah E3 ubiquitin ligase expression. Future work will concentrate on the molecular mechanism of regulation and relation to eye development.
FEMALE FERTILITY PERCEPTION AND MALE COERCIVE BEHAVIOR IN HUMANS

Poster: 74
Von Deylen, Madison
Faculty Mentor(s): Dr. Kaylynne Glover, Dr. Vincent Cassone

Fertility in humans is difficult to detect without testing, but evidence suggests our behavior may fluctuate with its hormonal changes. In these studies, we explored the influence of fertility on three avenues of human reproductive behavior. First, we investigated the degree to which women are capable of recognizing their fertility as well as the impact of fertility on sexual motivation and response, conducted through daily journaling and urine analysis. We found no effect of fertility on either, nor did we find evidence that women accurately perceived their fertile window. Additionally, we explored the impacts of fertility on sexually coercive behavior. Sexually coercive behavior increases with female fertility in many primates species, and chances of conception from rape are higher than that of a one-night stand, but there is evidence that women increase coercion-avoidance behaviors when fertile. We studied this relationship through two surveys. The first went to women who rated images of potentially sexually coercive men at different points in their menstrual cycles. The second went to men and included metrics to identify potentially sexually coercive participants as well as images of women who varied in their menstrual status which were rated for potential relationship durations. We found that women do not show a fertility-mediated response to sexually coercive males, but that they do generally find sexually coercive males less appealing than other males. We also found that sexually coercive men do not discriminate between women due to fertility, but are less likely to find any woman appealing for a relationship for any length of time.

CHEMISTRY

** THE DANGEROUS CONFLUENCE OF HONEY BEES, PESTICIDES, AND HONEY

Poster: 75
Authors: Blanca Aleman, Gillian Clark, Reilly Cochran, Bailey Harrison, Aaliyah Hughley, Cooper Jordan, Sean Keating, Malia Alma Marium, Austin Woods
Faculty Mentor(s): Dr. David Atwood

Colony collapse disorder (CCD) has been a topic of both conversation and research in recent years, as CCD has been found to be the leading cause of bee population decline. Though a number of factors contribute to this disorder, the impact humans have through habitat destruction and the use of pesticides are some of the most significant. This experiment was created to provide insight on how prevalent pesticides are in bee-related products, such as honey, as a way to assess how great this human impact is on bee health. Before analyzable data could be acquired, the procedure needed to be tested in order to determine if this extraction of pesticides from honey was indeed possible. A surrogate pesticide sample, Triphenyl Phosphate (TPP), and honey were mixed with a ratio of 1:100 before the experiment was conducted. Then, the Quechers process was utilized to recover a portion of the initial sample while isolating the TPP. This process involved multiple extractions of an organic layer (containing Acetonitrile), and an inorganic layer in an attempt to separate this substance from other compounds present in the honey. The experimental process recovered 73% of the initial mixture of TPP and honey, proving that the Quechers process is a reliable procedure to determine if pesticides are present in honey. These results show that this procedure could be used in future experiments to analyze the amount of pesticides in honey.
SPERM NUCLEAR VACUOLES: NATURE’S INDICATOR OF SPERM DNA INTEGRITY
Poster: 76
Berkowitz, Danielle
Faculty Mentor(s): Dr. Jason DeRouchey

Chromatin within somatic cells is packaged by histone proteins. During spermiogenesis chromatin is remodeled with the vast majority of somatic histones being replaced with short arginine rich peptides known as protamines. These protamines condense the DNA into a near crystalline packaging density. This tight packaging is thought to be required not only to condense the DNA into an extremely compact space for transport, but also to protect the paternal genome from damaging agents DNA repair processes are shut down post-spermiogenesis. In vivo, small cytoplasmic inclusions called sperm vacuoles are sometimes observed. The exact etiology of their appearance however remains unclear, but it has been suggested that they result from a failure of chromatin condensation or arise from ROS-induced damage to the spermatozoa. Prior results by the DeRouchey lab, showed that DNA condensation was dependent on the formation of a unique hairpin structure in eutherian mammalian protamines through intra-protamine disulfide bond formation. We hypothesized that the breakage of the disulfide bond linkages in eutherian sperm nuclei would result in the formation of nuclear vacuoles and the resulting defect in DNA packaging would make the sperm DNA more susceptible to ROS attack. In this study, we show results from fluorescence microscopy studies that nuclear vacuoles can be induced in isolated mammalian sperm nuclei through simple reduction of the S-S bonds with DTT. Using small-angle X-ray scattering (SAXS) techniques, as well as DNA damage assays, we show that the vacuoles do result in poor packaging which is subsequently more susceptible to ROS damage.

** DNA STAINING: VISUALIZING STRAWBERRY DNA UNDER THE MICROSCOPE
Poster: 77
Authors: Ethan Bess, Grayson Blount, Anaise Laforest, Kassidy Melton
Faculty Mentor(s): Dr. Stephen Testa

The strawberry DNA experiment is a way for younger students to begin learning about the concept of DNA. Four non-fluorescent stains were tested for interaction with strawberry DNA as an extension of the initial experiment. Small amounts of Coomassie Blue R250 and G250 were added to samples of strawberry DNA and placed on microscope slides. The R250 should become purple or red when it comes in contact with the DNA and the G250 should become green or blue. Observed color changes partially matched the expected: the G250 was a seafoam green color and the R250 was a light brown color. These changes were most visible under a microscope. Stains-All was prepared in two test tubes and a sample of DNA was added to one, while the other served as a negative control. It was expected that the Stains-All would cause the DNA to turn blue. The control was a vibrant purple and the test tube with the DNA was a dark bluish purple. DNA was saturated in the stain for a week for optimal visualization. Under the microscope, the stained DNA was vibrant purple with dark purple speckles. Small amounts of Bromocresol green dye were added to both a DNA-dissolved and non-DNA solution. There was no difference in the color change of these solutions. Small clumps of strawberry DNA were then placed under a microscope and a few drops of bromocresol green solution were added. Through the microscope one small red strand was clearly visible. It cannot be definitively said why this color change occurred, as it did not occur over all of the DNA stained. Based on these results, R250, G250, and Stains-All are recommended as stains to further the strawberry DNA experiment if a microscope is accessible.
** FLUORESCENCE: AN ENLIGHTENING TAKE ON THE VISUALIZATION OF STRAWBERRY DNA**

**Poster: 78**  
**Authors:** Kaitlyn Burchett, Jade Newton, Rachael Twehues  
**Faculty Mentor(s):** Dr. Stephen Testa

The strawberry DNA extraction experiment is used to introduce students to the concept of DNA at a simple level. Experiments involving DNA fluorescence were conducted to develop a follow-up to the initial experiment for a more in-depth look at DNA. In one experiment, the effectiveness of luminol, a chemical used in forensic analysis to detect blood, in identifying the presence of DNA through fluorescence was tested. Two luminol solutions, one with copper sulfate (CuSO4) and the other without, were made to see which one reacts with DNA. The luminol solution combined with CuSO4 produced positive results when mixed with hydrogen peroxide. It was found that when the strawberry DNA was added to the luminol solution, the fluorescence lasted longer than the luminol solution without DNA. This experiment as a demo is useful for capturing the attention of students while also teaching them about how the extra salt from the DNA extraction increases the fluorescence.

The purpose of the other fluorescence experiment was to use SYBR Safe DNA Gel to see if the DNA extracted from the strawberries would fluoresce. The DNA with and without the gel added was observed through the fluorescence viewer, which showed the fluorescence of the substance from LED lights. Although both samples with and without the gel glowed, there was a difference in the one with the gel as it showed the DNA fluorescing brighter than the water alone. This experiment demonstrated that strawberry DNA does fluoresce when exposed to blue light, and that the SYBR Safe Kit can be used as a safe and inexpensive follow-up to the original strawberry DNA experiment.

**PLASTIC POLLUTION IN KAMPALA, UGANDA BASED ON RESIDENTIAL AND COMMERCIAL BUILDING COUNT**

**Poster: 79**  
**Authors:** Caleb Duckworth, Fernando Molina  
**Faculty Mentor(s):** Dr. Jeffrey Seay

Developing countries like Uganda struggle with ways to clean up trash that accumulates all over the country. This results in trash piling up on the streets, at citizens homes, and in the oceans. Overall, many developing countries suffer from major plastic pollution problems, however in response, a plastic to fuel process has been developed to help tackle this growing issue. Before this technology can be implemented though, research must be conducted identifying the best possible locations to put the plastic to fuel contraption. Using high-resolution photography, the goal is to locate areas that suffer more heavily from the plastic pollution problem in Kampala, Uganda. Using the high-resolution images, the hope is to ascertain the residential and commercial building counts in Kampala, then there will be a determination to identify where there are more heavily populated areas that would output more plastic pollution. This will then allow for the determination of the best areas in which a plastic to fuel process would be most effective and beneficial. This is all in the hopes of relieving the problem of plastic pollution that is hindering Kampala’s land.
THEORETICAL ANALYSIS OF AROMATICITY IN MATERIALS UNDERGOING SINGLET FISSION

Poster: 80  
Goodlett, Stephen  
Faculty Mentor(s): Dr. Chad Risko

The development of tunable organic materials that absorb/emit light has led to many new technologies such as Organic Light Emitting Diodes (OLEDs) and organic solar cells. An important consideration in the creation of organic electronics is the quantum efficiency of the material, as materials with higher quantum efficiencies create more excitons per photon absorption, and therefore produce more power from a given light source. One way to increase the quantum efficiency of a material is by singlet fission. This phenomenon occurs when a molecule transitions from a single singlet excited state, to two triplet states, thus effectively doubling the number of excitons produced per photon absorption and consequently doubling the quantum efficiency of the material. In order for a species to undergo this process, the energy of the triplet state must be about half the magnitude of the singlet state’s energy. Indolonyphridine thiophenes (INDT) were selected by Bronstein et al. as potential candidates for this process. These molecules show promise because the triplet state shows aromatic character, and therefore stabilizes the excitation. Therefore, the goal of this project was to study the aromatic properties of a few derivatives of INDT using theoretical methods. The molecules under study were first optimized using the IP-tuned LC-ωPBE/6-311++G(d,p) level of theory for the singlet ground and triplet excited states. Various theoretical methods to determine aromaticity (HOMA, ACID, and NICS-xy scan) were used on the INDT derivatives. The computations showed an overall increase in the aromatic behavior of the molecules in their triplet excited states. This indicates that these molecules make good candidates for singlet fission as they are likely to be stabilized by the greater aromatic character of the excited triplet state.

** COLOR CHANGE OF FRUIT DNA WITH PERMANGANATE: AN EXTENSION OF THE STRAWBERRY DNA EXTRACTION EXPERIMENT

Poster: 81  
Authors: Tori Harris, Bailey Schenk  
Faculty Mentor(s): Dr. Stephen Testa

The purpose of this lab is to design an educational activity that students can do with the strawberry DNA that comes from the strawberry DNA extraction experiment, which is an experiment that helps to introduce students to DNA. An experiment was conducted to determine whether potassium permanganate will react with strawberry DNA from the experiment to cause a color change. DNA was added to a solution containing a buffer, potassium permanganate, and water. This test tube was compared to a solution containing no DNA. It is predicted that the DNA will react with the potassium permanganate solution to cause a color change from purple to clear. It is also predicted that the results will show that more DNA added to the solution leads to a faster color change. The expected results from the experiment would lead to the conclusion that adding DNA with potassium permanganate would be good addition to the strawberry DNA experiment because it helps to show that DNA can be a part of a visible chemical reaction. In a separate set of experiments, the extraction procedure was applied to bananas and kiwis in addition to strawberries to determine which fruit will yield the most DNA per gram of fruit. The quantity of DNA will be estimated using the permanganate reaction, as developed above, exploiting the observation that the sample with the most DNA will presumably change color the fastest. It is anticipated that the strawberry will yield the most DNA per gram because strawberries are octoploids, which means they have 4 copies of 2n chromosomes. Bananas are triploids and kiwis are hexaploids, so they should yield less DNA per gram than strawberries. This experiment can be conducted by students and is a great way to improve their familiarity with the universality of DNA.
POSTER PRESENTATIONS

SIMULATION OF THE ELECTRONIC PROPERTIES OF GROUP 14 PHTHALOCYANINE DERIVATIVES
Poster: 82
Nkansah, Asare
Faculty Mentor(s): Dr. Chad Risko

The focus of this project is to apply computational materials chemistry approaches to understand the ambipolarity of charge transport in crystalline Group 14 phthalocyanines. Such molecular materials, which fall under the broader context of organic semiconductors, are of interest for next generation, flexible electronics applications. More specifically, the project will deploy theoretical simulations run in a high-performance computing environment to provide evidence that the dimensionality of charge transport in these materials can be finely tuned by substituting the phenoxy axial groups with fluorine atoms and by varying their number of positions. In this step of the data collection process the theoretical simulations were used to compute the energy values for different variations of phthalocyanine, internal reorganization energies, Huang-Rhys parameters for hole transport, and the shapes of the molecular orbitals.

THE IMPACT OF POLYMORPHISM ON THE ELECTRONIC AND OPTICAL CHARACTERISTICS OF 6,13-BIS((TRIISOPROPYLSILYL)ETHNYL) PENTACENE
Poster: 83
Telesz, Nicholas
Faculty Mentor(s): Dr. Chad Risko

Technological revolutions in consumer electronics towards highly flexible devices continue to demand advances in the development of organic semiconductors. Polymorphism, variations in packing in molecular crystals, in these materials can greatly impact their electronic and optical properties and hence is a characteristic that needs to be controlled. Here, we build on the traditional use of density functional theory to now include the GW method combined with the Bethe-Salpeter equation (GW-BSE) to investigate the structural and electronic properties of 6,13-Bis((triisopropylsilyl)ethynyl)pentacene (TIPS Pentacene) polymorphs. The properties in question include electronic band structure, density of states, and UV-visible absorption spectroscopy. The results of these calculations provide theoretical insight into why the materials behave the way they do experimentally and can be used to identify the packing configuration of experimental crystals.
COMMUNICATION SCIENCES AND DISORDERS

FRAMING OF SEXUAL ASSAULT STORIES IN THE NEWS MEDIA: EFFECTS ON COLLEGE STUDENTS' ATTITUDES
Poster: 84
Baehner, Emily
Faculty Mentor(s): Dr. Anthony Limperos
This study investigates the relationship between how the news media reports on sexual assault and rape cases and the subsequent impact on the attitudes of college students, particularly regarding their opinions of both rape victims and alleged perpetrators. A literature review of related research will provide an understanding of framing theory, the linguistics of news coverage, and the previously studied impacts of sexual assault news coverage on news consumers' attitudes regarding sexual assault victims and perpetrators. Framing theory anchors the current study. A sample of college students were exposed to one of two video conditions, after which their attitudes regarding sexual assault, the portrayed victim, and the portrayed perpetrator were measured. The study explores the ways in which the news constructs and portrays rape and sexual assault cases, and its subsequent influence on viewer's perceived understanding of blame, responsibility, and accountability related to perception of the news coverage.

UTILIZING INFLUENCER MARKETING TO SUCCESSFULLY PROMOTE BRAND ENGAGEMENT: A STUDY OF ASOS, GLOSSIER AND MVMT SOCIAL MARKETING AND DIRECT RESPONSE
Poster: 85
Fuller, Kalee
Faculty Mentor(s): Dr. Hyun Ju Jeong
In the current digital age, brands must find new ways to reach and connect with their target consumer audience. As Millennials and Generation Z become more and more encompassed with social networking sites such as Instagram and Snapchat, they have simultaneously become more in tune with the public figures, or “influencers”, of social media. This study looks at how three individual brands, ASOS, Glossier and MVMT have uniquely incorporated influencers into their marketing tactics to either establish their brand or further grow their brand’s presence in the digital realm and among their demographic. The research uses case studies, examples and statistics from social media accounts, and other sources to answer the following three questions: why is it important to incorporate digital media platforms in the campaigns, what media strategies are used in these campaigns, and how the sponsored content by the influencers is received by the targeted audience.
USING DISCERN TO ANALYZE WEBSITES REGARDING COCHLEAR IMPLANTATION FOR CHILDREN
Poster: 86
Hudson, Rachel
Faculty Mentor(s): Dr. Anne Olson

The decision to get a cochlear implant is life changing and there are more factors that go into it than the average person is aware of. Many websites that are easily available hold a lot of bias, whether its a Cochlear Implant company website or website created by someone with a bad experience. Few public websites show the true benefits and possible consequences of cochlear implantation. For this reason, using a variety of search engines and search terms, websites were ranked on all factors using the DISCERN tool. These findings hold important value that can be used by parents to analyze the influences cochlear implant websites hold and help determine the best choice for their child.

COMPUTER SCIENCE

NEIGHBORHOOD GRAPHS FOR CITIES IN KENTUCKY: COMPARISON FOR TWO DISTANCE MEASURES
Poster: 87
De Castro, Luke
Faculty Mentor(s): Dr. Jerzy Jaromczyk

Geometric graphs provide convenient frameworks to model problems that involve distance and proximity relations. In this research, we study the question of mutual relation between the economic development of regions in Kentucky and their highway network using relative neighborhood graphs, a sub-family of geometric graphs. Specifically, we are interested in how the efficiency of a region’s road network in Kentucky relate to its economic development. Highway networks, while based mostly off of geometric distances, are also influenced by outside social and environmental factors that could affect the efficiency of the network. The spanning ratio, proposed by Osaragi and Hiraga, defined as a ratio of the road distance to the Euclidean distance between two nodes is used to measure this efficiency. This ratio is calculated for each edge of a relative neighborhood graph created from the 120 county seats in Kentucky as graph vertices, using Google Maps for road distances and the Haversine distance formula for the straight-line distance. Relative neighborhood graphs and their edges are based on the concept of neighborhoods for each pair of input points. Once this ratio is calculated, a regression of the ratios demonstrates how the travel efficiency of the highway network in a region relates to the per capita income of its inhabitants. The analyzed regions are the 15 Area Development Districts as defined by the Kentucky Council of Area Development Districts. This research is sponsored by the Kentucky Young Researchers program.
STATISTICAL ANALYSIS COMPONENTS FOR TRACELAB
Poster: 88
Loredo, Josh
Faculty Mentor(s): Dr. Jane Hayes

Software traceability is the ability to trace software development artifacts and their elements throughout the software development lifecycle and is used to minimize risk. TraceLab is a framework to support the development and replication of traceability and other software engineering experiments by reusing components that can be composed into experiments. Researchers and practitioners can easily package up these experiments ensuring reuse of components and data as well as ensuring repeatability of results. As in any experimental setting, it is important to know if results obtained are statistically significant. Toward that end, we developed several TraceLab components for performing statistical analysis. Specifically, we developed the sign test and t-test components. Our poster will show the algorithm for one of the components as well as a screenshot of the component in use in TraceLab.

THE VIRTUAL UNWRAPPING PIPELINE: THE PROCESS AND ITS CHALLENGES
Poster: 89
Authors: Chad Nelson, Tam Nguyen, Anthony Tamasi
Faculty Mentor(s): Dr. Brent Seales

At the Digital Restoration Initiative, millenia-old documents too badly damaged to be opened or studied physically are digitized without incurring additional damage. To achieve this, the authors demonstrate a custom software pipeline, which consists of specific steps to virtually unwrap documents and reveal text that has been hidden for thousands of years. The pipeline begins with acquisition to scan the physical object into digital form, and moves to segmentation, differentiating the specific layers or pages of the manuscript so that the program clearly understands what is a page and what is not. Then, texturing is run to find ink on the pages and the result is flattened onto a 2D image for readability. Often these datasets are too large and the pipeline too computationally intensive for a single computer, causing performance issues within our software. Cloud computing is a solution to this problem, which will create a server to allow volume data to be accessed anywhere. This will lead to other tools from the pipeline, such as segmentation and texturing, to also be on the cloud and be accessed by everyone. This research enables and empowers collaborative scholarship by simplifying and democratizing the complex technical process of translating an ancient artifact into legible and interactive digital objects.

FINDING RELATED FEATURE REQUESTS: AN EMPIRICAL REPLICATION
Poster: 90
Authors: Jennifer Lee, Matthew Rife
Faculty Mentor(s): Dr. Jane Hayes

Feature requests allow users to communicate their changed needs for the software system. Developers depend on these requests to inform their decisions for software changes. It is useful for the developers to know when multiple feature requests are related in order to tackle all the grouped requests at once. Prior work applied a horizontal traceability method in order to identify related feature requests. In this paper, the prior study was replicated using a TraceLab implementation of their approach. TraceLab is an experimental framework that supports the development and sharing of components that can be packaged into experiments, thus promoting reuse and replication. The Vector Space Model and Latent Semantic Analysis techniques of the prior work were re-implemented with slight performance enhancing changes. This paper focuses on the replication of that particular study but also on the act of replicating any study in the TraceLab environment.
THE VIRTUAL UNWRAPPING PIPELINE: COLLABORATING WITHIN THE DIGITAL HUMANITIES
Poster: 91
Authors: Allison Revers, Kyra Seevers, Raiffa Syamil
Faculty Mentor(s): Dr. Brent Seales

At the Digital Restoration Initiative, we take ancient documents that are too badly damaged to be opened or read physically and digitize them. After applying our custom software pipeline, these digitized documents are then virtually unwrapped, revealing the text that has been hidden inside for thousands of years without incurring additional damage to the document itself. While this pipeline is computationally impressive, it requires improvements in the field of scholarship and digital humanities research. In particular, this research has three areas of focus: creating a digital provenance chain, improving usability through user experience design techniques, and preparing the pipeline for open source release by creating a stable base for our software. The provenance chain allows us to flow back and forth between the final images produced by the pipeline and the original dataset captured from the object. The chain is created by tracking computational metadata and is crucial to verifying that our resulting images are not a fabrication and can be used for scholarship. Secondly, the pipeline previously relied on wordy applications abstracted from the physical object. Through user experience techniques such as digital ethnography, these issues are identified and rectified in the development of a new, visual application. Finally, code support, or the code behind the code, allows future maintenance and development to be performed quickly and with more clarity. This includes a robust testing and logging system. This research moves the digital humanities field towards shared tools and data sets, allowing for increased collaboration between developers and digital humanists across the globe. These innovations have the power to aid in the discovery and analysis of texts once thought to be lost forever.

A USER-CENTERED ACTIVE LEARNING APPROACH FOR APPLIANCE RECOGNITION
Poster: 92
Shin, Eura
Faculty Mentor(s): Dr. Simone Silvestri

Smart homes are becoming an increasing reality due to the diffusion of smart grid technologies and smart appliances. Through these technologies, smart homes offer new possibilities for energy conservation through fine grain energy management. One key enabler of these energy management systems is monitoring energy consumption at the appliance level. Existing approaches mainly rely on aggregated smart meters' readings but lack the sufficient accuracy to recognize individual appliances. Conversely, smart outlets are a suitable alternative since they can provide accurate electrical readings on individual appliances. Previous approaches for appliance recognition based on smart outlets use passive machine learning, which are deficient in the flexibility and scalability to work with highly heterogeneous appliances in smart homes. We propose a stream-based active learning approach, called K-Active-Neighbors (KAN), to address the realistic problem of appliance recognition in smart homes. KAN is an interactive framework in which the system simultaneously learns the home appliances' signatures and also the user behavior in terms of willingness to interact with the system. Specifically, KAN considers a realistic learning scenario in which the user is not always available for labeling. We develop an Arduino-based smart outlet to test our approach. Results show that compared to a common active learning approach, KAN achieves higher accuracy in a shorter training time, which is favorable for real scenarios in smart homes.

** Denotes STEMcats project
COMPARING THE POWER OF ALGORITHMIC TECHNIQUES AND PROGRAMMING LANGUAGES ON CHARLES BABBAGE’S PRIMALITY TEST

**Poster: 93**

**Authors:** Benjamin Stringer, Vincent Liu

**Faculty Mentor(s):** Dr. Jerzy Jaromczyk

In 1819, Charles Babbage, known primarily for his Analytical Engine, presented the following test for prime numbers: A positive integer n≥2 is prime if and only if n divides (n+k)C(n) - 1, for all integer k, 1≤k<n. Although Charles Babbage's theorem for distinguishing primes from non-primes might not be described as efficient, its programming implementation offers many challenges as well as opportunities to be creative, and hence is of great pedagogical value for students learning efficient algorithms and experimental analysis. The tasks are to find the longest consecutive list of primes and to test the largest possible number within prescribed time limits. To add to the challenge, no built-in libraries for computing binomial coefficients should be used. In this presentation, we will describe a number of approaches to efficient—both space and time—implementations of this test, including different approaches to calculating binomial coefficients, overcoming overflow, and implications of using different programming languages, especially C++ and Python 3. In particular, there is automatic support for arbitrary precision in Python3, Matlab supports arbitrary precision via its 'vpa' function, and for C and C++ there exists the GNU Multi-Precision (GMP) library. Various implementations with different algorithmic and programmatic solutions will be shown and discussed, as well as their impressive impact on the performance of the test. Acknowledgements: We would like to thank Nelson Penn and Nathaniel Stromberg for suggestions leading to improvement in the implementations. This project was presented at NCUR 2019.

IMPROVING THE AWARENESS AND DIAGNOSIS OF PARKINSON’S DISEASE USING COMPUTER-AIDED TECHNIQUES

**Poster: 94**

**Authors:** Michelle Imarah, Lily Sutton

**Faculty Mentor(s):** Dr. Corey Baker

Parkinson’s disease is a progressive nervous system disorder that affects movement of the human body. It is marked by the death of neurons in the substantia nigra, causing a decrease in dopamine production. Susceptibility to Parkinson’s disease can vary depending on age, gender and ethnicity. Early diagnosis of Parkinson’s disease has been shown to slow down disease progression, reduce the extent of symptoms, diminish the rate of deterioration of patient quality of life, and reduce the cost of care. However, early diagnosis is very difficult, as most of its symptoms, such as tremors, rigidity, posture control and bradykinesia, are not unique to the disease. Unfortunately, this allows the disease to progress and worsen, resulting in further neuronal loss along with loss of motor functions. Hence, the goal of this research is to create a diagnostic toolkit which would aid in early diagnosis of Parkinson's. This toolkit uses a series of tests to analyze a patient’s posture, speech, handwriting, changes in walking, blinking and tremors. The results from the toolkit will be used to determine a patient’s likelihood of a Parkinson’s diagnosis. The toolkit would also leverage current technology as it will be presented as a self-diagnostic test which will be available for use on tablet devices thereby giving patients another way, other than visiting a doctor, to assess their risk of having Parkinson’s Disease.
A PYTHON LIBRARY FOR CONVERTING LAB MANUALS IN MICROSOFT OFFICE WORD FORMAT TO JUPYTER NOTEBOOKS
Poster: 95
Tapia, Andrew
Faculty Mentor(s): Dr. Jerzy Jaromczyk

This project shows our Python-language library for converting documents from the Microsoft Office Word format to interactive Jupyter notebooks. The development has been motivated by the needs of the Essentials of the Next Generation Sequencing Workshop, a weeklong workshop in bioinformatics, organized by a collaborative group from Computer Science and Plant Pathology. The workshop manual contains instructions for both the workshop's wet labs and computer labs; the notes provide explicit goals, clear instruction, and tasks with a self-evaluation checklist. Until now, the manual has been prepared in Microsoft Office Word, and all lab instructions in the manual are prepared with consistent formatting to ensure the manual is easy to read. However, one characteristic of bioinformatics is the mixture of biology and computational tasks, such as running command line programs to answer a biological question and the layout of the manual reflects that sequence of steps. As drawbacks to using the Word document format for the manual have become more noticeable since the workshop's inception, a transition to a different file format for the manual is among the possible improvements to the manual initiated in the Bucks for Brains Research Group following the 2018 workshop. Of the file formats that have been considered for this transition, the Jupyter format has appeared among the most appealing due to the format's support for execution of code snippets (including Unix Bash commands) and the ease with which the computer labs in the workshop translate to the notebook format. As manually converting many Word documents to the Jupyter format can be tedious and time consuming, it may be desirable to have a tool for converting Word documents from the workshop manual to the Jupyter format automatically. We demonstrate the efficacy of the library developed for converting laboratory notes from the workshop manual to Jupyter format.

TRACELAB COMPONENTS FOR SOFTWARE RESEARCH
Poster: 96
True, Patrick
Faculty Mentor(s): Dr. Jane Hayes

Software traceability is the ability to determine if software meets its requirements throughout the development life cycle and is also used to reduce errors. TraceLab is a program that allows researchers and developers to measure the effectiveness of their program to meet the specific requirements by using the different components to design traceability tests. New components can be created and added to TraceLab to increase its capabilities. We have created a component to run Python scripts. Our poster will show the algorithm for the component and screenshots of the component in TraceLab, the Python code and the output as proof of concept.
THE FUTURE OF USING ANTIBODY TO TREAT ORAL DISEASES, GINGIVITIS, AND PERIODONTITIS
Poster: 97
League, Jessica
Faculty Mentor(s): Dr. Chifu Huang

Gingivitis and periodontitis are associated with dental plaque. The predominant organisms isolated from oral dental plaque are gram-negative rods, including *Fusobacterium nucleatum*, *Porphyromonas*, *Prevotella*, *Fusobacterium*, and *Actinobacillus actinomycetemcomitans*. Antibacterial agents can be rendered ineffective by resistance development in target organisms, can be difficult to maintain at a therapeutic concentration in the oral cavity, and can be toxic to the host. Therefore, there is a need to develop alternative chemical approaches for treatment. Since both gingivitis and periodontitis have an infectious etiology, vaccine therapy has been proposed as a means to control them. Literature survey will seek current studies on vaccine therapy to treat oral diseases. Current vaccines were developed based on the identification of virulence factors that stimulate the induction of salivary immunoglobulin A antibody responses. For periodontal disease vaccines, *Porphyromonas gingivalis*, and *Aggregatibacter Actinobacillus* have been identified as antigenic targets. Recently, integrated proteomics have been used as an effective strategy for discovery and development of vaccines for important human pathogens. Current technology against periodontitis: gingipain plays key roles for survival of bacteria and destruction of connective tissue. What is the sequence used to produce a vaccine that’s homologous against all PGs, regardless if its lysine or arginine? The best antigen is the one that has charge. Techniques were developed to select what amino acid sequence of gingipain is commonly being used, as well as for other bacteria. What kind of FNUK doesn’t have gingipains? How can a vaccine be developed against proteases that can attack all bacteria at once? What do they all have in common? A strategy is needed to immunize like mucosa between the bacteria, and identify which antigens to use against PGs, AAs, and FNUK. The antibody therapy seems to have a great potential to treat future oral diseases.
DIETETICS AND HUMAN NUTRITION

AT-HOME TEETH WHITENING PRODUCTS AND THEIR EFFECTS ON TEETH SENSITIVITY IN A COLLEGE AGE POPULATION
Poster: 98
Adamson, Dalton
Faculty Mentor(s): Jessica Houlihan

Background: It is hypothesized that use of teeth whitening products can cause sensitivity of teeth. Based on past research, the whitening effect is due to the peroxide within the product, but a side effect is erosion of the enamel. Most studies in the past utilized dental office bleaching and little is known about over the counter whitening products and their effects. This study aims to analyze the effects of at-home teeth whitening products on the development of tooth sensitivity in a college age based population.

Methods: Data was collected from 64 college aged students enrolled or not enrolled at various colleges (4 males and 60 females). Self-reporting surveys were developed on Qualtrics and disturbed through social media outlets. The survey asked demographic questions, use of whitening products, type of whitening product, frequency of use, prevalence of sensitivity, and how extreme the sensitivity was on a scale of 1-10. A t-test and Pearson correlation test were conducted.

Results: 42 participants (65.63%) reported use of whitening products. Of the population who used whitening products, 40 were female (95.24%) and 2 were males (4.76%). A t-test indicated a value of (p=0.09) which is approaching statistical significance between students who used whitening products and levels of sensitivity reported. A Pearson correlation showed a moderate inverse correlation (-0.27) between use of whitening products and level of sensitivity. Discussion: The results suggest that at-home whitening products do have an effect on teeth sensitivity. However due to widespread lack of accuracy in self-reporting surveys, limitations of the sample population, and no clinical test to determine teeth sensitivity the responses reported are likely inaccurate. A bigger sample population and established clinical test could suggest a greater significance.

RESEARCH PROPOSAL ON TRAINING LOAD IN ATHLETES AND WELLNESS SCORES
Poster: 99
Atkins, Payton
Faculty Mentor(s): Jessica Houlihan

Background: It is hypothesized that athletes that complete higher training distances will have higher levels of fatigue. Monitoring training loads of collegiate athletes is a relatively new concept and there is still a minimal amount of research that specifically compares these two variables. The aim of this study is to investigate the correlation between training loads of female collegiate soccer players and wellness scores.

Methods: This study analyzed seven female collegiate soccer players from a division 1 program. Of the total participants, 72% were white, 14% were Hispanic, and 14% were of Asian decent. The subjects were monitored using a GPS system for four weeks in both their fall season in 2018 and their spring season in 2019. Participants answered a validated wellness survey every morning. For statistical analysis, Pearson correlations and t-tests were conducted to discover relationships between training distances and wellness variables from the survey.

Results: There was a strong correlation between total distance and soreness in the spring training period (r=0.709). There was also a moderate correlation between total distance and mood (r=0.544) as well as total distance and energy level (r=0.605) in the spring. In addition, a statistically significant difference was found between total distance in the fall and spring (t=0.05), with spring distance being higher. All other statistical tests comparing total distance and wellness variables in the fall versus the spring, as well as differences in data between starters and nonstarters, were insignificant.

Discussion: With these results in mind, it is important to replicate similar studies in the future with a higher subject power in order to confirm or refute these findings. Being able to understand the implications of total distance of soccer players on wellness factors will allow players to better reach their full potential in their sport in regards to their athletic performance.
COLLEGE STUDENTS' KNOWLEDGE OF THE KETOGENIC DIET
Poster: 100
Audrain, Erika
Faculty Mentor(s): Jessica Houlihan

Background: It is hypothesized that the college students will have a low knowledge of the ketogenic diet. Many college students try different fad diets, often without being aware of all the benefits, consequences, or tenants of the diet. There is no known research on this topic and population. This proposed study will aim to determine the amount of knowledge that college students have about the ketogenic diet by using a cross-sectional survey to examine knowledge. Methods: Data was collected from 87 students enrolled in college (74 female, 12 male, 1 transgender female). Surveys were distributed to students via social media. The survey recorded demographics of the participants and asked questions regarding the ketogenic diet. A score was calculated out of six for their answers and they were assigned to low knowledge (0-2), intermediate knowledge (3-4), and high knowledge (5-6). T-tests were then conducted. Results: 32.18% of the participants had low ketogenic diet knowledge, 51.72% had intermediate knowledge, and 16.09% had high knowledge. The average knowledge score of the participants was 3.15 ± 1.39. Among the class standings, freshman had the highest average knowledge score. There was no statistical significance found in the knowledge in participants with normal BMI versus participants with an overweight/obese BMI (p= 0.49) nor in health-related majors versus non-health-related majors (p= 0.729). There was a statistically significant difference in the knowledge of those that had followed the ketogenic diet and those that never had (p=0.0215). Conclusion: The results suggest that college students have an intermediate knowledge of the ketogenic diet. Because of the lack of research in this area, more research is warranted. Also, a validated survey is needed to more accurately access knowledge. Although there is not one yet, it was attempted to correctly determine college students' knowledge of the ketogenic diet in this pilot study.

RELATIONSHIP BETWEEN OBESITY RATES AND CONSUMPTION OF SCHOOL PROVIDED MEALS
Poster: 101
Banks, Riley
Faculty Mentor(s): Jessica Houlihan

Background: It is hypothesized that the consumption of school provided lunch contributes to the rising obesity rates in today's youth. Obesity rates are climbing steadily and this research aims to determine a link between school lunches and obesity. The existing research on this topic is limited which is unfortunate because of the high rates of students receiving free and reduced lunch benefits who have no other choice than to partake in these meals which may be contributing to poor health. Methods: A group of 40 college-aged students were surveyed using the Qualtrics platform via a link provided on various social media outlets. Data was collected over a period of roughly two months, from January 28, 2019 to March 18, 2019. The students were asked a variety of non-identifying questions and the surveys were completely anonymous. Results: The research concluded that the average BMI of the participants was 27.187, giving an overall unhealthy average. It was concluded that there was no statistically significant relationship between overweight participants and their intake of school provided lunch. There was, however, a relationship between overweight individuals who partook in school provided lunch and breakfast regularly during their time in the public school system. This research also proved that females were more likely to become overweight when participating in the school lunch programs. Conclusion: This research proved that there is a relationship between the school provided meals and unhealthy BMI later in life. This study aims to answer the question of if government mandated school lunch and breakfast programs have long lasting effects of student's eating habits, weight, and overall health. It is necessary to conduct more research on this topic, but this study is shedding light on the unhealthy options and habits being formed in the public school system today.

** Denotes STEMcats project
THE EFFECTS OF NUTRITION EDUCATION ON FRUIT AND VEGETABLE INTAKE

Poster: 102
Bertram, Emily
Faculty Mentor(s): Jessica Houlihan

Background: Fruit and vegetable intakes have continually shown to be insufficient among all age groups. Researchers have studied these trends and ways to increase daily intakes, focusing on the short-term effects of nutrition education on these intakes. However, there is a significant lack of research done on the long-term effects of nutrition education strategies, both formal classes and gardening. Methods: To assess the long-term effect of these strategies on fruit and vegetable intake, a cross-sectional survey was used to collect information on what type of nutrition education was received, when it was received, and how that impacts dietary behaviors in adulthood. This survey was electronically distributed through social media, with the target population being Kentucky adults. Results: A t-test was conducted from survey responses analyzing multiple aspects: nutrition education in childhood, nutrition education in adulthood, gardening in childhood, gardening in adulthood, and both nutrition education and gardening in childhood compared to nutrition education only. The results showed significance for those who received nutrition education in childhood (p = 0.044), as well as those who gardened in childhood (p = 0.038). This significance led to the t-test analyzing the difference between those who received both nutrition education and gardening in childhood and those who received nutrition education only, which was also found to be significant (p = 0.044). There was no significance in the p-values of those who received nutrition education or gardening in adulthood. Conclusion: The aim of this study was to determine the long-term effects of nutrition education strategies on fruit and vegetable intake in Kentucky adults. It was concluded that both nutrition education and gardening experience in childhood have long-term effects that increase consumption of fruits and vegetables in adulthood. Because of the lack of supporting research, future studies should look at the long-term effects of both strategies.

PHYSICAL ACTIVITY IMPACT ON VARIABLES DEFINING ACADEMIC SUCCESS

Poster: 103
Cain, Anystan
Faculty Mentor(s): Jessica Houlihan

Background: Presently, most post-grad jobs and programs are becoming more competitive and are no longer based solely upon GPA and test scores. Most professional applications require a complex resume with a plethora of experience. There are many factors that decide a student’s level of academic success. Research has shown that physical activity is significantly important to maintaining health and longevity. It has been discovered that individuals who are more physical active are more successful academically.

Objective: The objective of this study is to correlate different factors defining academic success with physical activity levels. Methods: A survey was produced through Qualtrics and electronically distributed to undergraduate students at the University of Kentucky. 62% of respondents were seniors, 14% were juniors, 16% were sophomores, and 8% were freshman. Results: Physical activity level and GPA were not found to be related (r-value = 0.121533). GPA is also not correlated with participants who do or do not meet the recommended minutes of exercise per week (r-value = 0.228196). Physical activity level was slightly correlated with hours spent volunteering per week (r-value = 0.351069). Participants meeting the recommended minutes of weekly exercise and class-standing was correlated (0.454673). Conclusion: The survey results found there was not a significant correlation between minutes of physical activity per week, intensity of physical activity and academic success. One limitation that might have led to uncorrelated data could be a small sample population. Future research is necessary in order to assess the significance of physical activity and academic achievement.

** Denotes STEMCats project
FAST FOOD INTAKE FREQUENCY AND DEPRESSION SCORE IN COLLEGE STUDENTS

Poster: 104
Collier, Jillian
Faculty Mentor(s): Jessica Houlihan

Background: It was hypothesized that frequent fast food consumption would have a negative impact on mental health. Mental health was defined as depression in this study and quantified using a validated depression screening tool. The physical impacts of fast food consumption are known but a gap in the literature exists on the impact of this food on mental health specifically in college students. Methods: In order to examine the relationship between fast food intake and mental health in college students at the University of Kentucky a cross sectional survey method was used. The survey included demographic questions, questions about fast food intake, and a validated mental health screening tool for depression. The survey was an online link projected to college students on social media. Results: The hypothesis was tested using a Pearson’s correlation between fast food intake and total depression score. The R value was 0.0657 indicating no correlation. Another Pearson test was done on the most reported depression symptom of being lethargic and fast food intake, resulting in a moderately positive correlation of 0.255. The average frequency of fast food consumption per week was reported as 3.21 with a standard deviation of 2.58. The average depression score was 14.1 which correlates to moderately depressed on the PHQ-9 scale. 64.33% of participants said the driving force for why they eat fast food was convenience. Conclusion: Overall this study did not find a correlation between increased fast food intake and poorer mental health outcomes. However, a correlation between being lethargic and more frequent consumption of fast food was found. High depression scores were found in this population. Fast food intake is on the rise and so is the occurrence of depression in college students. Understanding the link between food and mental outcomes is an important topic to further investigate.

A RETROSPECTIVE STUDY OF DENTAL SEALANT PLACEMENT DURING CHILDHOOD AND CAVITY PREVALENCE IN ADULTHOOD

Poster: 105
Coons, Emily
Faculty Mentor(s): Jessica Houlihan

Background: It is hypothesized that the placement of dental sealants as a child can have a positive effect on the number of cavities that someone has in their adulthood. In the 1960’s dental sealants were first introduced to help protect tooth surfaces from cavities. Dental sealants are painted on the chewing surface of teeth to help prevent tooth decay on teeth that may otherwise be tough to reach. Cavities are the result of bacteria in your mouth making acids that can attack the teeth’s enamel. This retrospective study aims to analyze the correlation between placement of dental sealants and cavity prevalence in adulthood. Methods: Data was collected from 63 participants (1 male and 62 females). Self-reporting surveys were developed on Qualtrics and then distributed to Facebook for friends to take. The survey asked about demographics, if a person had dental sealants placed as a child, if they had them restored, how many sweets/sugar-sweetened beverages that a person consumes weekly, how many cavities a person has had as an adult (if any), and if a person practices routine oral care. A Pearson correlation test was conducted. Results: 22 participants (34.9%) reported that they had never had sealants placed as a child. Of the population who did have sealants placed, 24 of the participants (58.54%) that had sealants placed had also gotten them restored. It was also shown that people who consumed more sweets that also had sealants placed had a decreased chance of getting a cavity as an adult. The Pearson correlation had a moderate statistical significance of 0.08139. Discussion: The results show that although the significance is small (0.08139), there is moderate statistical significance between having sealants placed as a child and getting cavities during adulthood. A larger sample size would suggest a greater significance.
CORRELATION BETWEEN INCOME POVERTY LEVELS AND HIGH BODY MASS INDEX IN MEN AND WOMEN IN SOUTHEASTERN KENTUCKY
Poster: 106
Frederick, Sydney
Faculty Mentor(s): Jessica Houlihan

Background: This topic is needed to educate interventionists and others about causes of high body mass index in this underprivileged area. It will help fill in the gaps of which groups have higher BMI's and reasons for this. It was hypothesized that persons who are considered to be at the poverty level will tend to have a higher BMI. The aim of the study was to find if the hypothesis was accepted and reasons for poverty in the area. Methods: A cross-sectional anonymous survey was distributed to participants through email as well as shared on social media. This study had 100 participants who were residents of Kentucky, 85% being from Southeastern Kentucky, with being 75% female and 25% male. Results: Annual household income of $50,000 to under $15,000 was 29% and $50,000 to above $150,000 was 71%. When asked if participants consider their community in poverty, 59% said yes while 41% said no. BMI results showed 43% were normal weight and 51% were either overweight or obese. After the t-test was conducted the p-value equaled 0.67. Discussion: The results were not significant. However, some results were able to fill gaps for interventionists of reasons for high BMI results. Some results were interesting in that most of the participants were well above the poverty level, but most were overweight or obese. Also it was interesting that even though most participants weren't in poverty they considered their community to be. A reason the results are geared toward middle and upper class could be due to the fact more people of those classes would have access to electronics to take the survey. Conclusion: Future researchers should go into communities in Southeastern Kentucky especially the lower income areas of the community.

BINGE EATING VS. BMI IN THOSE WITH A HIGH WORKLOAD
Poster: 107
Garten, Gunnar
Faculty Mentor(s): Jessica Houlihan

Eating disorders have been known to be one of the bigger problems affecting young adults here in the US, with the most prevalent being binge eating disorder (BED). Binge eating disorder is defined as a severe, life-threatening, and treatable eating disorder characterized by recurrent episodes of eating large quantities of food, often very quickly and to the point of discomfort. It is the most common eating disorder in the United States and became an actual formal diagnosis in 2013 with a recorded number of 2.8 million Americans having BED. This study aims to analyze the relationship between having a high workload (work hours/credit hours), whether or not episodes of binging occur and how it affects overall BMI. A pilot study was done in which data was collected from 25 participants enrolled at the University of Kentucky. The data was collected via electronic survey through a distributed link on social media. The survey recorded the information necessary to find the BMI of participants, their total hours of workload in a week, and whether or not they experience episodes of binging. A t-test was then performed to analyze the relationship with all participants having a workload of 25 hours a week or more. With a total of only 25 participants, the sample did not reach power. The average BMI for those who had reported episodes of binging being 27.2 with 11 respondents and those who did not being 24.23 with 14 respondents. With an overall p value of 0.05, the t-test indicated that there was a significant difference in BMI between those who binged and those who did not. Also, based on BMI classifications, those who did experience binging averaged an overweight BMI, while those who didn't averaged a healthy weight BMI.
HEALTH STATUS DIFFERENCE BETWEEN NEONATES DELIVERED VIA VAGINAL VS. C-SECTION

Poster: 108

Guirguis, Farah

Faculty Mentor(s): Jessica Houlihan

It is hypothesized that neonates delivered via C-section are at a higher risk of developing certain diseases, such as obesity, asthma or allergies. The vertical mother-to-baby transmission of microbes through vaginal delivery plays a crucial factor in the baby's gut microbiome and consequently can help with the maturation of the newborn's immune system, and metabolic health. Furthermore, C-section delivery has been shown to produce unfavorable conditions for the baby such as antibiotic exposure early on in life, first exposure to the hygienic hospital setting, gestational weight at birth, and breast feeding irregularities. However, it remains unclear of this association. This study aims to analyze if there are differences in health between vaginally and C-section delivered neonates. A cross-sectional survey was distributed. Data was collected from 240 participants (200 female and 40 male). Self-reported surveys were distributed to participants via social media. It recorded asthma and allergy severity as well as weight during their childhoods. Participants over age of 18, 78.21% were delivered vaginally and 21.79% were delivered via C-section. T-tests and Fischer's tests were used to calculate differences between two groups in asthma & allergy severity. Weight was further stratified to activity level and tests mentioned above were used. The T-test p-values calculated for asthma and allergy severity are 0.8634 and 0.4436 respectively. For Fisher’s Exact Test, the p-values calculated for asthma and allergy severity are 1.000 and 0.2913. The p-values for low, occasional and high exercise level are 0.6535, 0.422, and 0.9695. The results suggest that there is no difference in health status between neonates born vaginally or through C-section. However, due to a large number of confounding variables, more research on this topic needs to be done.

HEALTH INSURANCE TYPE AND HEALTHCARE ACCESS AND AFFORDABILITY IN THE US

Poster: 109

Harp, Rachel

Faculty Mentor(s): Jessica Houlihan

Background: The Affordable Care Act (ACA) and health insurance have often been analyzed in how they relate to individual health outcomes. Most of the current literature focuses on ACA impact or healthcare on a large-scale. This study examined the relationship between health insurance type and individual healthcare access and affordability in the US. It was hypothesized that lack of health insurance or health insurance types other than private insurance among US citizens is linked to a decrease in healthcare access. Methods: A cross-sectional survey was designed and distributed electronically through social media sites and group-messaging systems. All age and gender demographics were included, and the only exclusions were participants living outside of the US. Participants were grouped based on health insurance type (privately insured, Medicare+Medicaid, Military+Other, and uninsured). There were five research questions in the survey. Relative risks were calculated for each group for each of the five questions. Age range in relation to health insurance type was also analyzed. Results: There was a total of 319 participants who completed the survey for data analysis. The uninsured group had the highest relative risks for all five research questions. All relative risks in the uninsured category were over 1.0. The other data trend showed that privately insured patients had the least risk for a decrease in healthcare access or affordability compared to the other insured groups. The Medicare+Medicaid group had less risk compared to the Military+Other group. Conclusions: The null hypothesis can be rejected based on the results. The relative risk assessments showed that lack of health insurance or having health insurance other than private places an individual at greater risk for decreased healthcare access. Future research should focus on the financial burdens of healthcare costs and how different levels of coverage impact healthcare access among individuals.

** Denotes STEMcats project
**POSTER PRESENTATIONS**

PHYSICAL ACTIVITY AND GRADUATING HIGH SCHOOL GPA IN COLLEGE STUDENTS

Poster: 110
Hazelwood, Hannah
Faculty Mentor(s): Jessica Houlihan

Background: Research has shown that physical activity is known to have many benefits for students including improved self-esteem and cognitive development. While some research on this topic exists, few studies have looked specifically at GPA and it's relation to participation in sports or physical activity. The aim of this study is to determine the association between participation in sports or physical activity during high school and graduating GPA in University of Kentucky college students. It was hypothesized that college students who participated in a sport or physical activity would have a higher graduating GPA compared to those who did not participate.

Methods: Participants included University of Kentucky college students and the design was a cross-sectional survey. The survey was given electronically through Qualtrics. The short version of the International Physical Activity Questionnaire is a validated survey that was given to participants and GPA was self-reported. The strength of the relationship between the two variables was measured by using Pearson’s Correlation. The respondents were also separated into two groups, one who met physical activity guidelines of 150 minutes per week and one who did not. The average GPA of these two groups was then compared.

Results: The average GPA of all the participants was 3.731 and the average total activity score was 4712.05 which is relatively high. A correlation of -0.034 was found and a regression analysis was also done. The r squared value was .0012 The p-value was found to be P= .63.

Discussion: My hypothesis was not supported and I found no relationship between GPA and physical activity score. Further research should be conducted focusing on current high school student’s current GPA and current physical activity or current college GPA and current physical activity. Current research should also actively seek low activity and low GPA students.

FOOD SECURITY, BMI, AND MINDFUL EATING PRACTICES OF UK STUDENTS

Poster: 111
Holloway, Shayna
Faculty Mentor(s): Jessica Houlihan

Background: Prevalence of food insecurity on college campuses has increasingly become a subject of awareness over the last several years, but little research has been done to examine the food insecure population’s response to emotional eating cues or how food security may affect physical health. Mindful eating is a tool used to counteract unhealthy eating behaviors, potentially improving health. The aim of this study is to analyze the relationship between food security status, the mindful eating factor of emotional eating, and BMI among University of Kentucky students.

Methods: Data was collected using a cross-sectional survey distributed to University of Kentucky students both on paper and electronically. 110 complete survey responses were collected. The survey included the entirety of the validated USDA 6-item food insecurity screening and questions adapted the Mindful Eating Questionnaire. A t-test was used to analyze significance between variables.

Results: 31% of participants were determined to have low or very low food security, 35% had a BMI in the overweight or obese categories, and 26.4% were considered to exhibit a low level of mindful eating in response to emotional cues. A t-test revealed that there was no statistically significant difference between the food secure and food insecure students' mindful eating scores (p=0.702) and the relationship between food security and BMI was approaching significance (p=0.152).

Conclusion: The results of this study show that there is no significant relationship between food security status and BMI or mindful eating. Future studies should look at other mindful eating factors instead of just emotional eating, and the possible relationship between food insecurity and low BMI warrants further research.
TANNING BEHAVIORS, SELF-IMAGE, AND MENTAL HEALTH IN COLLEGE-AGED WOMEN

Poster: 112  
Hoover, Lily  
Faculty Mentor(s): Jessica Houlihan

Background: It is hypothesized that college-aged women who partake in tanning behaviors will have a more positive association with self-image and mental health when tanned compared to those who do not participate in these activities. While there is a lot of literature already existing on the prevalence of tanning in young, white females, not many studies have looked into self-image and mental health reports of tanners. This study aims to determine whether or not there is a positive relationship between tanning and self-image along with mental health in college-aged women. Methods: Data was collected from 115 female students (18-25 years old) enrolled at The University of Kentucky. The cross-sectional 16-question survey was distributed electronically via various social media outlets. The survey collected data on demographics, tanning behaviors & frequency, as well as self-image and mental health reports, certain data were analyzed using Fisher’s Exact Test. The sample population in this study was similar to the target population in that a majority of the participants identified as white/Caucasian (92.17%). This study found that 72.17% of college-aged women reported using an indoor tanning bed before. The main finding (analyzed by Fisher’s Exact Test) to come out of this study was that there is a significant nonrandom association between tanners (tanning beds) and levels of both attractiveness (P-value: 0.00176) and slimness (P-value: 0.00531) compared to non-tanners. However, the relationship between tanners (tanning beds) and happiness (P-value: 0.177) compared to non-tanners was not significant. Conclusion: The results suggest that attractiveness and slimness are reasons why a majority of participants engaged in tanning bed use, while happiness may not be a reason to engage in tanning bed use. Future research is needed in order to understand the psychological aspects behind why college-aged women view tanned skin as slimmer and more attractive.

THE RELATIONSHIP BETWEEN BREAKFAST CONSUMPTION AND BODY MASS INDEX IN UNIVERSITY OF KENTUCKY STUDENTS

Poster: 113  
Howard, Hannah  
Faculty Mentor(s): Jessica Houlihan

Background: It is hypothesized that consuming breakfast, specifically a balanced breakfast, is associated with a lower body mass index (BMI) in college students. However, data in the literature is conflicting. This study aims to determine if there is a relationship between eating breakfast and BMI in University of Kentucky (UK) students, and if a balanced breakfast shows a difference in BMI compared to a carbohydrate-heavy or protein-heavy breakfast through a digital self-report survey. Methods: Data was obtained from 124 UK students and completed through Qualtrics. The survey recorded age, height and weight, gender, if breakfast was consumed in high school, if breakfast is currently consumed, amount of days of breakfast consumption per week, and categories of breakfast consumption (carbohydrate-heavy, protein-heavy, and balanced). A t-test, Fishers test, and Pearson correlation were executed. Results: Fifty-nine percent of students reported that they currently consume breakfast in college, 45.2% consuming carbohydrate-heavy breakfasts, 11.0% protein-heavy breakfasts, and 43.8% balanced breakfasts. BMI classifications included 2.4% underweight students, 56.5% normal weight students, 25.8% overweight students, and 15.3% obese students. Students reported eating breakfast 3-7 days per week. A t-test indicated no statistically significant difference in BMI between those who eat breakfast in college and those who do not (P= 0.091). A Fishers test indicated no difference in BMI category between balanced breakfast consumption versus carbohydrate-heavy breakfasts (P= 0.159) and protein-heavy breakfasts (P= 0.063). A Pearson correlation suggested an inverse relationship between BMI and days of consumption (R= -0.03035), however this was close to zero. The p-values 0.091 and 0.063 were approaching significance. Conclusion: The results suggest that breakfast consumption does not have an effect on BMI in UK students, nor does the consumption of balanced breakfasts as opposed to carbohydrate-heavy or protein-heavy breakfasts. Yet, the results from this study were approaching significance and need further study.

** Denotes STEMcats project
THE EFFECTS OF SOCIOECONOMIC STATUS ON BMI IN COLLEGE STUDENTS
Poster: 114
Huff, Erica
Faculty Mentor(s): Jessica Houlihan

Introduction: There is research to show that socioeconomic status can be a factor that influences BMI. However, there is not much research that specifically studies the effect of socioeconomic status on BMI in college students. This study aims to determine the relationship between BMI and socioeconomic status in college students.

Methods: The data was collected from 13 college students (12 females and 1 male). Self-reporting surveys were distributed through various social media outlets. The survey recorded employment status, yearly income of the individual, yearly income of their parent/guardian, student status, housing situation, monthly expenses, and food budget. Linear regression/correlation was conducted. Results: The survey showed that 71% of participants were employed and 92% were financially dependent upon a parent/guardian or spouse with only 7.69% of participants reported being financially responsible for someone else. 85% of participants reported having a food budget and 84.6% of respondents reported financial support from another person. Linear regression/correlation between BMI and food budget testing showed a correlation of -0.484 indicating a small to moderate correlation. R squared from linear regression was 0.234 and an adjusted R squared of 0.138 and a P-value of 0.15. Conclusion: The results suggest there may be a negative relationship between socioeconomic status and BMI as seen through food budget in college students. However, due to the small sample size and the use of self-reported height and weight, the relationship cannot be determined with this study and would require further research.

THE PREVALENCE OF UNTREATED DEPRESSION AMONG YOUNG ADULTS
Poster: 115
Kassinger, Brooke
Faculty Mentor(s): Jessica Houlihan

Background: Depression is one of the most common mental illnesses and is rising among young adults. Underlying factors, such as genetics, environment, stresses, and biological makeup play a role in the increasing rates of depression, and can lead to physical, mental, and social issues. With increasing rates of depression, not much is understood about the prevalence of untreated depression, or it’s association with increased use of social media.

Methods: A cross sectional study was conducted using a survey to correlate diagnoses of depression to what rate of people seek treatment. The survey was conducted by providing a link through social media platforms and sites that target young adults. A validated questionnaire was used to screen for depression if a previous diagnoses had not been given. The convenience sample was comprised of 107 volunteering participants who filled out the survey. 80 participants within the age of 18-35 were included. Results: A bootstrap sample was generated to estimate the sampling distributions in a way to avoid bias. A 95% confidence interval was used when calculating the test statistic. 65% were not diagnosed with depression, and 35% were diagnosed with depression. 46.43% reported they do not seek treatment or take medication, and 50% do. The z-test between those who sought treatment and those who didn’t was 0.265 and the p-value was 0.396. The average social media use for depression was 21.3 hours a week.

Conclusion: There was nearly no difference between the mean of those who were diagnosed with depression and sought treatment and those who didn’t. There was a significant difference between social media use and participants with untreated depression versus social media use of the whole population. Further research should include a larger population, can help identify barriers to treatment and if treatment of depression is effective.
MYOSTATIN AND MUSCLE-BONE INTERACTIONS IN DIABETIC BONE DISEASE IN TYPE 1 DIABETES

Poster: 116
Knuckles, Callie
Faculty Mentor(s): Jessica Houlihan

Background: It is hypothesized that myostatin has direct effects on osteoblast differentiation and contributes to Diabetic Bone Disease in individuals with Type 1 Diabetes. However, more studies need to be conducted in order to determine the mechanism of action of myostatin on bone and evaluate the changes in bone phenotype in T1D with varying levels of myostatin inhibition. This study aims to assess the impact of myostatin on cells via stimulation with myostatin and evaluation of differentiation and signaling pathways under both normal and hyperglycemic conditions. Methods: MC3T3 cells, C3H10T1/2 cells, and/or C2C12 were plated in 6-well plates, collected, and processed for with qRT-PCR to evaluate myostatin and AcvR2b transcription. In another study, cells were stimulated with vehicle, myostatin, and/or BMP-2 for various durations and collected and processed via western blot or qRT-PCR. Western blot was used to assess myostatin-related pathways like Smad2/3 expression and phosphorylation. qRT-PCR was used to quantify osteogenic gene expression of Runx2 and Osx. Lastly, osteogenic differentiation and the expression of Runx2 and Osx was assessed under hyperglycemic and hyperosmolar conditions via qRT-PCR. Results: It was demonstrated that the main receptor for myostatin (Acv2b) is present in MC3T3 and C3H10T1/2 cells, but these cells lack myostatin gene expression. However, exogenous myostatin addition stimulated Smad2 phosphorylation showing myostatin can exert intracellular signaling events. Experiments looking at the impact of myostatin on the expression of Runx2 and Osx showed down-regulation of transcription of both genes. Preliminary experiments also indicate that myostatin combined with hyperglycemia/hyperosmolality potentiate the down-regulation of Runx2 and Osx. Conclusion: The results demonstrate that myostatin has direct negative effects on osteoplastic cells which could negatively influence bone health in individuals with elevated myostatin. Higher levels of myostatin as well as hyperglycemia/hyperosmolality seen in patients with Type 1 Diabetes may potentiate poor bone health.

CORRELATION OF STRESS LEVELS AND SOCIAL MEDIA USAGE IN MILLENNIAL AGE COLLEGE STUDENTS

Poster: 117
Nevill, Mackenzie
Faculty Mentor(s): Jessica Houlihan

Background: The 21st century has been an era for the boom in technology and the internet. With the internet comes social media, a form of communication and interaction that has never been experienced before. College students today have grown up in this era of social media becoming what it is today. With the added pressure of always being connected and observed by peers, it would be no surprise that the generation currently in college would face high stress levels from not only school but also peer opinions. This study was to evaluate if there is a correlation between stress levels and social media usage. Methods: A survey was produced through Qualtrics and distributed through social media platforms to full time undergraduate students. 66 student responses were used in the data analysis. There were 22 males and 44 females with an average stress level between low and moderate levels (1.51). Two factors also correlated were stress levels and thinking about what others thought of them. Results: A Pearson correlation was generated for the stress score and amount of social media usage per day (r=0.1963). The Pearson correlation between stress level and worrying about what others thought of the participants was r=0.3416. Conclusion: There is no strong correlation between stress levels and social media usage but there was a moderate correlation between stress levels and worrying about what others think. A limitation for this study is the small sample size and also bias on participant’s estimation on how much time they spend on social media per day. Future studies need to have more controlled groups to get an accurate measure on social media use. Also the study needs to include a better stress assessment to get more accurate representation of what the students actual stress level is.

** Denotes STEMCells project
FOOD CRAVINGS AND BMI IN UNIVERSITY OF KENTUCKY STUDENTS

Poster: 118
Seaton, Hannah
Faculty Mentor(s): Jessica Houlihan

Background: Based on the research, it is hypothesized that college students who have food cravings anytime throughout the day will have a higher BMI, than those without cravings. Food cravings are believed to derive from the association between foods and internal or external stimuli. This means if a person is hungry and consumes a certain food repeatedly, it will be conditioned in their mind that this particular food reduced their hunger.

Methods: During a 7-week period, students attending the University of Kentucky in Lexington, KY were asked to answer the questions on an electronic survey on a volunteer basis. Ninety-three undergraduate students participated and were the focus for this study.

Results: The average BMI of those with cravings each day was 22.7 ± 3, while the BMI of those without cravings was 24.6 ± 4. A p-value of 0.0299 shows the correlation between BMI and cravings is statistically significant. 100% of participants with cravings gave into their cravings at least once a week. 79% of food cravers experience cravings from 5 pm to 12 am, 3% crave from 8 am to 12 pm, and 18% crave from 12 pm to 5 pm.

Discussion: While the results showed a significant correlation between the students’ BMI and cravings, the average BMI for those without cravings was higher than those with cravings. Many studies with large sample sizes showed a high correlation between high BMI and cravings. Therefore, more participants were necessary in order to find a positive relationship. However, it is hypothesized those with higher BMIs do not have cravings because they are already fulfilling those possible cravings in other ways.

Conclusion: Further research should focus on cravings in relation to rest of the daily intake.

ASSOCIATION BETWEEN SPORTS PARTICIPATION DURING HIGH SCHOOL AND BODY MASS INDEX OF FEMALE COLLEGE STUDENTS AT THE UNIVERSITY OF KENTUCKY

Poster: 119
Stiltner, Shelley
Faculty Mentor(s): Jessica Houlihan

Introduction: It is hypothesized that sports participation during high school years encourages the adaptation of healthy behaviors and thus, is related to lower body mass indexes (BMI) and continued physical activity in college. There is currently very limited research regarding this topic, especially in the female population. This research study aims to determine the relationship between high school sports participation and body mass index and participation in physical activity in female college students at the University of Kentucky by distributing a retrospective, cross-sectional survey.

Methods: Data was collected from 116 female college students enrolled at the University of Kentucky. The self-reported Qualtrics survey was distributed to female students via multiple social media platforms. Participants were surveyed retrospectively on high school sports participation, duration, and the number of sports performed, as well as current anthropometric data, physical activity and duration, and type of current sports participation, if applicable. A t-test and Pearson’s correlation test were conducted.

Results: Females who reported that they participated in sports during high school were found to have a lower average BMI (23.35 ± 3.84, n=97) than females who reported that they did not (24.88 ± 3.71, n=19) (p=0.1). Participants who reported that they participated in sports during high school were not more likely to remain active in college (78.35%) than participants who did not (78.95%). Of the participants who reported that they participated in sports during high school, no significant correlation was found between the number of sports played in high school and college-aged BMI (r=0.072). Discussion: As the t-test was approaching significance, the results suggest that sports participation during high school may correlate with a lower BMI in female college students. With a larger sample size, these results may be more pronounced.

** Denotes STEMcats project
COMMON MEAL SKIPPING PATTERNS AMONG COLLEGE STUDENTS AND THE CORRELATION WITH THEIR DAYTIME ENERGY LEVELS, COGNITIVE FUNCTIONS AND ACADEMIC ACHIEVEMENTS

Poster: 120
Wagner, Briana
Faculty Mentor(s): Jessica Houlihan

Introduction: It has always been said that breakfast is the most important meal of the day. Due to busy schedules in college, it is common to skip meals, especially breakfast. The hypothesis of this study is that, students who eat breakfast will have better academic achievement. Methods: A survey was given to students who attend college, with ages ranging from 18 to 24 years old. This survey asked student demographics and information regarding breakfast options and overall GPA. When ranking their daily fatigue after breakfast or caffeine intake, a 0-4 scale was used. With 0 being no energy and attentiveness, and 4 being extreme energy and attentiveness. Results: 53 responses were recorded, however only 48 were taken. 58% of the responses came from seniors, with the rest coming from each other class. On average, every student said they drank at least two caffeinated beverages. However, 55% of students did not respond correctly to their breakfast choices. Students who did consume breakfast, had earlier classes. When constructing a T-test, no breakfast consumption and those who sometimes did eat breakfast was compared to their GPA. This had a p-value of 0.302. This showed no significance, however when using the same test and comparing those who did not eat breakfast with those who sometimes did and their GPA, the p-value was 0.025. This was significant, therefore the alternative hypothesis is supported. Discussion: Students who do not consume breakfast have lower energy and attentiveness than students who do. However, not necessarily lower academic achievement. Having a larger response base may increase findings. Knowledge about breakfast consumption should be provided to help guide students with their meal choices.

A RETROSPECTIVE LOOK AT DENTAL CARIES CORRELATES IN CHILDREN FROM KENTUCKY BASED ON FREE AND REDUCED LUNCH STATUS

Poster: 121
Walters, Andrea
Faculty Mentor(s): Jessica Houlihan

Background/Introduction: It is hypothesized that there is a significant correlation between low socioeconomic status and dental caries in individuals from Kentucky. However, there is minimal research on this population, especially on children from the Southeastern part of the state. This study aims to examine the relationship between socioeconomic status and poor dental health in college students that grew up in Kentucky by retrospectively analyzing their income, free and reduced lunch qualification, and health status. Methods: Data was collected from 136 students (29 males, 102 females) who currently attend college or graduate school, or have completed some college, and are native to the state. Self-reporting surveys were distributed to students via social media. The survey recorded age, gender, home city/county, year in school, whether or not the participant qualified for free or reduced lunch, family’s average income, whether or not soda was provided in their household, type of soda consumed most, cavity presence, cavity onset, and filling presence. A Fischer’s exact test was conducted. Results: 21% of participants qualified for free or reduced lunch, while 79% did not. 71% of participants reported having a cavity at some point in time, and 52% reported an onset during elementary school. One confounding variable, soda consumption, provided information that 83% of participants were provided soda in their childhood home, and 17% said Mountain Dew was what they consumed most. A p-value of 0.5 was obtained using Fisher’s exact test when comparing free and reduced lunch qualification and presence of a cavity. Conclusion: Results suggest that there is not a significant correlation between free and reduced lunch qualification and cavity presence in children from Kentucky. However, more studies should be conducted on larger populations, strictly rural parts of Kentucky, and on individuals that did not attend college to allow for more accurate data.
PERIODONTITIS PREVALENCE BASED ON GEOGRAPHIC’S

Poster: 122

White, Madeline

Faculty Mentor(s): Jessica Houlihan

Background: Oral health is extremely important in ensuring optimal overall health. It is important to bring awareness to the importance of oral health, in order to try and improve it in areas that struggle with this. Studies show that the prevalence of periodontitis in adults is significant, especially in Appalachia regions. Research was needed in other geographic locations in order to see what regions are struggling the most and need the most awareness. Methods: The current study was done on 300 adults 50 to 70 years old. One hundred and fifty of these adults were from Lexington and the other half were from cities eastern of Lexington. The data was obtained from a central orthodontist office which had access to all of their orthodontist locations. This cross-sectional study used panoramic x-rays to observe how many patients in Lexington had periodontitis compared to the patients eastern of Lexington. The goal of this study was to determine if geographic location affected the rate of periodontitis. Results: By performing a difference in proportions test with a 95% confidence interval, no statistical significance was found. The p-value was 0.3. With the information found, periodontitis in Lexington office locations had no difference in prevalence compared to the office locations eastern of this. Conclusion: There is still a need for a larger regional research study to compare geographic locations and its prevalence of periodontitis. Recommendation for future studies include obtaining the information from a general dentist office.

ECONOMICS

AN ECONOMIC ANALYSIS OF VOLUNTEER RETENTION FOR BROKE SPOKE

Poster: 123

Authors: Zachary Brooks, Tyler Jones, Kermory Malone, Alexander Phipps, Samuel Storey

Faculty Mentor(s): Dr. Gail Hoyt

Broke Spoke is a nonprofit whose goal is to provide bicycles at an affordable price to people in the Lexington community who might otherwise have difficulty acquiring a bicycle. This in turn meets the transportation needs of many who they assist. They also provide bike repair knowledge and customers can work toward owning their own bike by helping the volunteers build them. Their mission is to “provide better access to better bikes to everyone. Empower individuals to perform their own maintenance. Be a hub to cycling advocacy in the community.” One issue they face in achieving their mission is volunteer retention. Our research question is as follows: Does Broke Spoke branding on bikes increase the number of volunteers at Broke Spoke? We hypothesize that Broke Spoke would see a positive impact from branding each of their bikes with their own logo; further spreading the word of the shop to more potential volunteers, donors and people who can use the service Broke Spoke provides. We will test this hypothesis by gathering detailed information from a survey. This survey will be administered to 500 students at the University of Kentucky. Using these data, we will conduct regression analysis to determine the factors that influence volunteer behavior. We will also be analyzing other information of interest to our nonprofit partner Broke Spoke.

** Denotes STEMcats project
**POSTER PRESENTATIONS**

**AN ECONOMIC ANALYSIS OF THE RELATIONSHIP BETWEEN REFUGEE DEMOGRAPHICS AND WAGES FOR KENTUCKY REFUGEE MINISTRIES**

Poster: 124  
Authors: Imani Brown, Sarah Linn, Amber Natour, Adrienne Poole, Nicole Wesolowski  
Faculty Mentor(s): Dr. Gail Hoyt

Kentucky Refugee Ministries (KRM) is a non-profit organization that focuses on serving Kentucky's refugee population. KRM's mission is to provide resettlement services to refugees through the partnership of agencies and faith-based communities, in order to promote self-sufficiency and integration in our community. KRM is committed to offering access to opportunities and community resources and promoting awareness of diversity for the benefit of the whole community. Often, a refugee's national origin and English proficiency determine their employment status, earned wages, and available career opportunities. The foundation of our research asks, "Does birthplace and English language skills of Lexington refugees have a statistically significant correlation with earned income?" Our methodology for conducting research was completed through two data sources, KRM's client database and a survey of University of Kentucky students' attitude-based ideology. The data from KRM was extracted from client systems with extensive individual demographic information. We determined the attitudes of University of Kentucky students by administering a comprehensive survey on topics related to KRM. The questions were designed to specifically target the viewpoint of the community concerning the refugee population. We will empirically analyze our hypothesis by conducting regression analysis using STATA. An analysis of these results will determine any potential correlations between individual demographic variables and earned income.

**HOW PERCEPTION OF FOOD INSECURITY AND WASTE EFFECTS VOLUNTEERING AND DONATIONS FOR GLEANKY**

Poster: 125  
Authors: Drew Brown, David Burton, Caroline Jones, Kate Marshall, Jonathan Thomas  
Faculty Mentor(s): Dr. Gail Hoyt

GleanKY is a local non-profit that gathers and redistributes excess fruits and vegetables from grocery stores, farms, orchards, and home gardens to nourish Kentucky's hungry. They are attacking two problems: food waste and hunger. The purpose of our research is to identify factors that make an individual more likely to volunteer and/or donate to GleanKY. The most important anticipated factors are access to transportation, perception of food insecurity and waste, empathy towards hunger and disposable income or time. Data will be gathered through a regression analysis run on survey data gathered from UK students. The survey was designed to gather demographic information on participants as well as to gage overall views on nonprofits and their missions. The regression will analyze survey responses of participants who answered with a high likelihood of volunteering to create a target market of volunteers for GleanKY.
ART AND OPTIMISM: THE IMPACT OF ART EXPOSURE ON POSITIVITY IN YOUTH
Poster: 126
Authors: Noelle Cho, Katlyn Davis, Kendall Myers, Christopher Reed
Faculty Mentor(s): Dr. Gail Hoyt

On the Move Art Studio (OMAS) is a local non-profit organization serving the Lexington, Kentucky area. Reaching out to low-income communities who request an OMAS program, OMAS provides free art classes and activities in their renovated 1969 vintage trailer, named Arthur. OMAS provides access to the arts for underprivileged children who have not previously had this opportunity. Working with OMAS, we are researching the following question: Do art programs, such as On the Move Art Studio, lead to improvements in the self-esteem and optimism of children from the low-income communities serviced? Art-focused non-profit organizations such as On the Move Art Studio (OMAS) seek to provide an outlet for children to express themselves through art, which is a positive release for the emotional and mental strain they experience. Art programs also empower children to pursue more challenging, diverse activities as well as opportunities for increased future achievement. Our empirical approach is to first survey UK students on their degree of exposure to and attitudes towards the arts. The next step is to survey a sample of the children currently participating in OMAS programs, in order to measure the impact of arts programs on their optimism, confidence, and stress levels. Using regression analysis, we plan to evaluate the impact of art exposure on the aforementioned factors.

AFTER-SCHOOL PROGRAMS AND ACADEMIC OUTCOMES: AN ECONOMIC ANALYSIS ON THE IMPACT OF AFTER-SCHOOL PROGRAMS
Poster: 127
Authors: William Click, Cameron Rostron, Hannah Vaughn
Faculty Mentor(s): Dr. Gail Hoyt

E7 Kids Cafe is a nonprofit organization in Lexington, Kentucky that provides free meals and after-school care for elementary and middle school students. Children who come to E7 can get help with their homework, participate in a variety of games and activities, and have the opportunity to go on educational and entertaining field trips. Our research intends to see if there is a connection between a child’s home/community environment while they are in elementary school (factors such as safety, responsibilities, parental involvement, and food security) and their academic performance (GPA). We will be gathering data from a survey we have created that we will administer to approximately 400 UK students. We will perform regression analysis and present descriptive statistics that we draw from our survey in our report. This research may help explain to E7 Kids Cafe how providing a safe, supportive environment could affect the children they serve later in life.
AN ECONOMICS ANALYSIS OF KEY FACTORS FOR SUCCESSFUL JOB PLACEMENT AND RETENTION FOR INDIVIDUALS WITH BARRIERS TO EMPLOYMENT
Poster:  128
Authors: Emily Dunlap, Ezekial Edwards, David Graehler, April Massard, Benjamin Mathis
Faculty Mentor(s): Dr. Gail Hoyt

Opportunity for Work and Learning (OWL) is a nonprofit focused on providing employment opportunities for individuals with disabilities and those who have previously been incarcerated. They offer interview coaching, resume help, vocational skills assessments, and training certifications. In our research, we are going to examine the variables that impact the likelihood of successful job placement for individuals facing barriers to entry. Our preliminary thesis is that job quality, employee qualifications, employers' fears of liability, and pre-employment services all contribute to a higher chance of job placement and retention among individuals with disabilities and the formerly incarcerated. We are conducting a survey that will be given out to University of Kentucky students to better understand the perception of different employment tools that OWL offers. Currently, we are working with OWL to collect data about individuals who have used their services in the past to see which factors best lead to successful job retention. We will examine the relationship between these variables by conducting regression analysis and providing descriptive statistics.

ENGINEERING

SMART HOME ENERGY MANAGEMENT SYSTEM WITH "SMART PLUG"
Poster:  129
Alden, Rosemary
Faculty Mentor(s): Dr. Dan Ionel

Buildings account for 40% of the energy consumed in the US, a fact that places major emphasis on the reduction of the associated electricity usage and on improvements in efficiency. The primary goal of this project is for the “Smart Plug” to function as a testing module for the latest generation of smart devices. The research aligns with the growing interest in energy reduction and monitoring by OEMS like Schneider Electric and GE, and Utilities such as LGE&KU and TVA. Through use of the Raspberry Pi and Linux, this model also acts as a subsidiary IoT device to the larger Home Energy Management Systems (HEMS) based on demand response. This device is dedicated to a smaller design for a residential Smart Home. The work synergistically aligns with the Department of Energy's Building Energy Monitoring Open Source Systems (BEMOSS) for commercial buildings in purpose and design. In this study a NOYITO voltage transformer and YHDC SCT013-000 current transformer will measure the AC voltage and current consumed by an appliance for power calculations. In addition to a relay switch and Arduino Teensy, these calculations will be part of the HEMS to control the power supplied to the “Smart Plug”. Current and voltage waveform distortion can be analyzed using Fourier Analysis and the Total Harmonic Distortion index. The research results will be disseminated at the ICEEIA’19 Conference in August and demonstrated at future outreach events organized by the ECE Department and the UK College of Engineering.
POSTER PRESENTATIONS

LAYERING STRUCTURE FORMATION IN IONIC LIQUIDS AT IONIC LIQUID/VACUUM INTERFACE
Poster: 130
Authors: Tadd Ausenbaugh, Austin Haley
Faculty Mentor(s): Dr. Sergiy Markustsya

When ionic liquids are introduced in vacuum interface, it is observed that ionic liquid follows certain structuring. Understanding this structure is important for determining properties of the ionic liquid. Calculations are performed to determine this structure. However, traditional calculations often neglect friction, which causes error in determining dynamic properties. Applying the molecular modeling simulation approach for coarse grain molecules will predict accurate structure and dynamics, because the simulations constantly model frictions and forcefields. Ideally this structure will accurately match the structure and dynamics found through experimentation. Being able to accurately produce larynx structures and predict dynamics through simulation will aid application of ionic liquids across various projects, such as using ionic liquids to solve current limitations found in lithium ion batteries, and in aerospace applications.

ORIGAMI-INSPIRED ADDITIVE MANUFACTURING: ARCHITECTURAL AERODYNAMICS IN HURRICANE WIND LOADS
Poster: 131
Authors: Morgan Baumann, Christopher Wheatley Jr.
Faculty Mentor(s): Dr. Marian Lontieta Guierrez Soto

Hurricanes and natural disasters are among the largest construction challenges today. Providing an infinite amount of possibilities, origami inspired structures can be applied to many complicated situations. By taking dynamic building envelopes designed using origami and kirigami principles, a more comprehensive structure can be built to sustain impacts by high winds. In this study, the aerodynamics of three different origami inspired structures were analyzed. Although the use of origami itself may make the structure more aerodynamic, there is an unknown optimization for aerodynamic properties. Polymer designs were created using additive manufactured techniques, and models of varying sizes of each structure were printed and were tested in a wind tunnel. Structures were tested at a zero-degree angle and a forty-five-degree angle, allowing for testing of wind hitting directly on a side of each structure and on a corner of each structure. By combining a wind tunnel for small-scale simulation of hurricane conditions and computational analysis for full scale buildings, a comparison can be made to find differences between experimental and computational data. By increasing the number of facets at an angle to wind flow, and decreasing the size of the facets, the size of the body direct to wind flow can be minimized and wind resistance can be decreased.

STABILITY OF AMYLOID STRUCTURES
Poster: 132
Authors: Tamunoemi Braide, Hunter Shearer
Faculty Mentor(s): Dr. Qing Shao

Amyloid structured peptides are responsible for Alzheimer’s Disease, a brain degenerative ailment and type II Diabetes. These proteins form a beta sheet structure that makes the peptide very stable, especially in the human body environment. This research hopes to go a step closer to identifying which terminal or chain interaction is weaker in certain solutions of varying salt concentrations and temperatures using Molecular Dynamic Simulations. Data collected from the Molecular Dynamic Simulations will be used to calculate and compare the residue-residue interaction energy to pinpoint the strength and weak points of the peptide structure. This research will be beneficial to Medicine by replicating the conditions of the amyloid peptide dissociation during further treatment.

** Denotes STEMcats project
OPTIMAL DESIGN AND SIMULATION OF A NET-ZERO ENERGY MICROGRID WITH RENEWABLE RESOURCES IN RURAL KENTUCKY

Poster: 133

Jones, Stewart

Faculty Mentor(s): Dr. Dan Ionel

This ongoing project explores the necessary renewable energy resources and feasibility of a grid-connected, microgrid using Glasgow, KY as an example. The Glasgow load that the microgrid would serve includes over 7,000 homes as well as commercial and industrial buildings. In a Net-Zero Energy (NZE) system the amount of energy consumed is equal to the energy produced on an annual basis. HOMER Pro microgrid software is used to size the microgrid components such that the annual demand is met by energy generation from the renewable resources within the microgrid as an NZE system. The project uses the connection between the utility grid and microgrid to purchase energy from the grid when local renewable generation is too low to meet demand. The renewable energy capacity of the microgrid is made large enough such that it can over generate when renewable generation potential is higher. This over-generation is sold to the grid to ensure that the microgrid remains NZE. The study considers two microgrid architectures that adhere to the grid-connected, NZE constraints discussed and compares them with the traditional grid-only solution. One architecture includes a utility-scale solar photovoltaic (PV) farm while the other consists of a PV farm, seven Vestas V90 wind turbines, and a 1MWh Li-ion battery energy storage system (BESS). In future work, this sizing optimization will be performed again using a custom control scheme in which the microgrid will act as a source or sink to the utility grid. Using this sizing information, a transient system simulation of the optimal architecture will be performed through PSCAD software. A paper will be written, and a poster will be made for the dissemination of results to industry and other students. These results will also be presented at the ICEEIA’19 conference in August.

THE EFFECT OF FIBROUS GEOMETRY ON THERMOMECHANICAL BEHAVIOR OF PHENOLIC IMPREGNATED CARBON ABLATORS FOR USE IN THERMAL PROTECTION SYSTEMS

Poster: 134

Authors: Skylar Mays, Katherine Moody

Faculty Mentor(s): Dr. Matthew Beck

Ablative materials in thermal protection systems (TPS) are used in space applications to protect passengers and payload from critical degradation in high temperature conditions. The standard ablative, phenolic impregnated carbon ablator (PICA), is composed of carbon fibers embedded in a phenolic resin. Because the fibers are oriented and distributed randomly within the phenolic, thermal properties are not isotropic throughout the material and properties are simplified to an imprecise macroscopic average. Here, we present a stochastic modeling approach for PICA that allows for assessment of thermomechanical properties as a function of distinct fibrous geometries. The approach includes a computational toolkit for generating representative volume elements (RVE’s), and a methodology for computing the distribution of thermal conductivity and expansion for each fibrous geometry. We report that fibrous geometry had a significant effect on thermomechanical behavior. Based on these results, the fiber geometry within ablatives must be a major design consideration moving forward.

** Denotes STEMcats project
DNA COMPUTING UNITS BASED ON FRACTIONAL CODING
Poster: 135
Moore, Peyton
Faculty Mentor(s): Dr. Sayed Salehi

Fractional encoding has been recently proposed as a promising convention to represent information in molecular computing systems. This research presents new 2-input molecular computing units based on unipolar fractional representation. The units calculate simple computational equations that can be used for the computation of more complex functions. The design of these molecular computing units is inspired by fan-in 2 logic gates in the field of stochastic computing. Each computing unit consists of four chemical reactions with two reactants and one product. The DNA reactions are designed by implementing the chemical reactions of each unit based on the toehold-mediated DNA strand-displacement mechanism. Every unit is designed by four input strands and eight fuel gate strands of DNA. Since DNA molecules related to the input and output of the units have the same form of domain-toehold-domain-toehold, output molecules of each unit can be used as input for other units and this provides the cascading of the units for designing complex circuits. The whole DNA pathway for each unit is composed of twenty DNA reactions. The simulation results by Visual DSD show that the DNA implementations follow the theoretically expected computations of each unit with the maximum of 9.33% error.

PREDICTING FINAL MATERIAL PROPERTIES BASED ON THE TOOL USED
Poster: 136
Nienaber, Trevor
Faculty Mentor(s): Dr. Julius Schoop

During machining, a part undergoes immense forces that can alter its material properties and grain structure. Having the ability to accurately predict these changes prior to machining can vastly increase the efficiency of any process by eliminating the need for post processing to obtain the desired material properties. This research aims to develop more accurate models to aid in the prediction of material properties. A high-speed camera will be used to observe the behavior of the material at the cutting zone using various tool heads to develop a deeper understanding of how each tool effects the material properties. These models will enable manufacturers to better determine what process and tool to use to get as close as possible to the final desired material properties eliminating the need for extensive post processing.

** Denotes STEMcats project
BIO-INSPIRED IMMOBILIZATION OF CASEIN-COATED SILVER NANOPARTICLES ON CELLULOSE ACETATE ULTRAFILTRATION MEMBRANES

Poster: 137
Shannon, Halle
Faculty Mentor(s): Dr. Isabel Escobar

Casein-coated silver nanoparticles (casein-AgNP) had been previously loaded on cellulose acetate (CA) ultrafiltration membranes for biofouling control. However, when physically added to the membrane casting solution, AgNPs tend to leach off the membranes. Therefore, there is strong interest in developing methods to chemically bind the AgNPs to the membranes without losing their activity, and in making these methods scalable. Inspired by the affinity of silver to the thiol groups of cysteine proteins in bacteria, CA membranes were cast and imbedded with AgNPs via attachment with functionalized thiol groups using polymerized glycidyl methacrylate (GMA) and cysteamine. However, the chemical reactions required three steps after casting the membranes, and each step needs a large amount of solution bath. To minimize the materials and energy needed in the chemical attachment process and maximize the reaction efficiency, this study integrated all the chemical reactions in the stage of preparing dope solutions. The recipe and procedures changed due to the difference of dope solution and membranes. Membranes immobilized with AgNPs were successfully cast for laboratory-scale study. This method successfully prevented leaching of AgNPs during cross-flow and dead-end studies. Pseudomonas fluorescens Migula in brackish water was used for biofouling test and the membranes displayed a significant reduction in the accumulation of bacterial cells. This method provided a promising approach of casting CA membranes immobilized with AgNPs.

CAPACITIVE ISOLATION FOR ACTIVE BATTERY CELL BALANCING

Poster: 138
Wormald, Luke
Faculty Mentor(s): Dr. Dan Ionel

Over time, cells or modules within a series battery stack will become unbalanced from each other which negatively impacts the usable capacity of the battery stack. To mitigate this impact, active charge balancing systems can be used. However, nearly all active balancing solutions are large and heavy due to the size of the isolation transformers used in them, which are optimized for high current and capacity systems. This ongoing research study investigates the use of capacitive isolation to shrink the footprint and cost for applications which do not need as high balancing currents. The poster will report on the simulation for modeling various configurations of capacitive isolation circuits seeking optimum efficiency within a finite current region, while varying the frequency of the input and the capacitance of the isolation circuit. Following the simulations, circuits of the most promising models will be physically assembled and tested to validate the model and its results. A final objective will be to integrate the solution into a function battery management system for use in the University of Kentucky Solar Car. The results of this research will be disseminated at future conferences.
CONTEST VERSUS SCRAMBLE COMPETITION: A COMPARISON OF VIBRATION PATTERNS OF SEED PARASITE LARVAE

Poster: 139
Deeb, Adan
Faculty Mentor(s): Dr. Charles Fox

All organisms require resources (e.g. food) to successfully survive and reproduce, but resources are not infinite. For many parasitic insects, larvae cannot move among hosts and cannot leave to find a new resource if the host is depleted before development is complete. Therefore, two competition strategies have evolved: contest and scramble competition. Contest competition involves direct conflict between individuals, ending in a winner-takes-all scenario, whereas scramble competition involves gathering as many resources as possible before others deplete the resource. Seed beetles, such as Callosobruchus maculatus, are seed parasites that develop inside beans and exhibit both competition strategies. As the larvae develop, they consume the inside of the bean and subsequently create vibrations as a result of their chewing. These vibrations may be used as a mechanism to sense population density. We hypothesize that larval density and the magnitude/frequency of chewing vibrations are positively correlated, and that larvae may use this information as a cue of how to allocate resources to life-history traits. This will likely be different for each competition strategy (contest vs scramble) because of the different costs and benefits of exhibiting each strategy. Because the larvae may be exhibiting different behaviors at different times of the day and females and males may behave differently because they have different reproductive roles, this study measured the effect of time of day, sex, and/or competitor strategy on the chewing vibrations. We reared larvae of two competition strategies on mung beans (Vigna radiata) and recorded the chewing vibrations in 42 individual larvae (single larvae per bean) until pupation and adult emergence. We measured the amount of time it took to first hear vibrations, and after adult emergence we recorded the sex of each beetle. Chewing vibrations were detected from 19-24 days post hatching, on average, and this time did not differ between males and females or populations of different population strategies. The time of day did not affect the detection of chewing vibrations, and it took 66 (+/- 62) seconds to detect chewing after the bean was placed on the sensor. In the scramble strategy population, females were slower to begin chewing than males, and this trend was reversed for the contest strategy populations. Our research aims to understand how conspecifics influence the partitioning of resources during the larval stage of a seed parasite. Future research should evaluate how vibrations of foraging larvae drive the larval detection of regional population density, and how population density changes the allocation decisions of larvae.
**POSTER PRESENTATIONS**

**VIRGIN FEMALE BODY MASS DOES NOT AFFECT THE TOTAL DISTANCE DISPERSED IN THE PRESENCE OF COMPETITION**
Poster: 140
Farmer, Matthew
Faculty Mentor(s): Allyssa Kilanowski

Super-parasitism is the act of an organism parasitizing a host that has already been parasitized by another species. The distance that females disperse may be related to their mass because organisms with increased mass have more energy; this increased energy could fund farther dispersion. Our goal is to understand if female mass predicts the distance that they disperse when there is offspring competition in the form of a parasitized host organism. Our experiment uses the seed beetle (*Callosobruchus maculatus*), a seed parasite that specializes on legumes (*Vigna spp*). We measured pre-copulatory mass and performed dispersal experiments to assess how far each female traveled. We replicated the experiment across genetically distinct populations. To evaluate the relationship between mass and dispersal, we performed a linear regression. Results: We found a weak, positive relationship between the mass and distance dispersed by females. Two populations were shown to have a weak, positive relationship, whereas the other two populations had a weak, negative relationship for mass and distance dispersed. Post-hoc, we hypothesized that there could be a relationship between emerged Julian date of population and mass because those that emerged on a later Julian date took longer to develop than those that emerged on an earlier Julian date, resulting in greater mass and potentially farther dispersion. We performed a second linear regression incorporating Julian date emerged into the model. Accounting for size differences in body mass based on when the females emerged as adults did not alter the trend found in the first model. Our results suggest that there is not a relationship between the mass of a female and the distance she dispersed in the presence of competition, but there is a relationship of the emerged Julian date of a population and the farthest dish dispersed. Future dispersion experiments should include massing and copulating females twice to determine the effects of virginity on distance dispersed.

**INTERACTIONS BETWEEN COLLETOTRICHUM SPP. AND ASIAN CHESTNUT GALL WASP ON CHESTNUT**
Poster: 141
Hollowell, Hannah
Faculty Mentor(s): Dr. Lynn Rieske-Kinney

Because of its importance both economically and ecologically as a nut-producing tree, chestnut (*Castanea spp.*.) has undergone extensive research to investigate the fungal and insect pests that often affect it. This study focuses on the invasive Asian chestnut gall wasp (ACGW), *Dryocosmus kuriphilus*, which oviposits in the buds of chestnut trees in spring and causes galls to form around the developing larvae, greatly inhibiting nut production. Previous research has demonstrated the effectiveness of several control agents, one of which is a fungal pathogen, *Colletotrichum acutatum* which causes necrotic lesions on the gall and extensive mortality of ACGW. The goal of this study aims to determine whether the period of inoculation with *C. acutatum* influences the timing of mortality for ACGW larvae or adults and to evaluate the relative effectiveness of different strains of *C. acutatum* at causing ACGW mortality. By inoculating galls on Chinese chestnut trees with either one of three strains of Colletotrichum or with the control agar, the relative pathogenicity of each strain was evaluated. Additionally inoculations were conducted on two separate dates, one during the period of ACGW larval development and one following pupation of ACGW while the adults were still within the galls. The differences in mortality between the first and second inoculation dates helped identify how the fungus causes mortality, either through ingestion during the larval feeding period or through external penetration of the gall wasp’s cuticle prior to the adult’s emergence. Initial results of this study indicate that the various fungal strains of Colletotrichum that were tested exhibited no statistically significant differences in percentage of galls desiccated and ACGW mortality. However, the differences in inoculation dates had statistical significance for the percentage of galls desiccated, possibly due to wounding during the inoculation, yet the difference in dates demonstrated no significance for ACGW mortality.

**Denotes STEMcats project**

**POSTER PRESENTATIONS**

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Poster: 141
Hollowell, Hannah
Faculty Mentor(s): Dr. Lynn Rieske-Kinney

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**Denotes STEMcats project**
**POSTER PRESENTATIONS**

**USING A SUSTAINABLE, LOW-IMPACT TRAP TO CONTROL CUCUMBER BEETLE POPULATIONS IN HOME GARDENS**
Poster: 142  
Kositzke, Christopher  
Faculty Mentor(s): Dr. Stephen Dobson

The striped cucumber beetle *Acalymma vittatum* and spotted cucumber beetle *Diabrotica undecimpunctata howardi* inflict over $100 million in damages on commercial cucurbit crops annually in the U.S.A. Large-scale organic farms generally use organic insecticides to combat these pests and use yellow sticky traps to monitor the beetle population in the field. However, sticky traps are single-use and prove difficult to place without damaging the highly vascular cucurbit plants. Our initial objective was to create a reusable monitoring trap with a more accurate capture rate. Throughout the 2017 growing season we developed a modified funnel trap and deployed it at regular intervals in organic winter squash and mixed cucurbit plantings. By recording the number of beetles captured over a 24-hour period with different variations of the funnel traps, the commercial sticky traps and the live traps currently used to lure beetles for research purposes, we were able to generate a side-by-side comparison of the effectiveness of the respective trap types. The modified funnel traps outperformed all competitors by a factor of 3 or more, significantly increasing the number of beetles collected. This demonstrated a potential for independent control, so during the 2018 growing season the traps were tested in 24 cucurbit home gardens throughout Lexington, KY, ranging from a few plants to a quarter of an acre. After a week in the field, the trap was cycled out and beetle capture rates were recorded. Crop damage was visually assessed at each visit, and additional pesticide use was self-reported by participants. The data revealed low capture rates overall, although two seasonal spikes corresponding to generational surges did emerge. Overall, we conclude that the trap has potential for use as a control method in fields smaller than mid-size organic commercial farms, but larger than home gardens.

**DISSIMILARITY OF C. MACULATUS HYBRID TO PARENTS IN TRAITS ASSOCIATED WITH SCRAMBLE COMPETITION**
Poster: 143  
Khan, Hiba  
Faculty Mentor(s): Dr. Charles Fox

In high density environments, there are two strategies to compete for limited resources: scramble and contest competition. When the carrying capacity of a resource is met with the increasing number of females in a population, scramble competition between those females occurs. The strategy in which all resources are available yet are being utilized by only a few individuals, limiting the development of others, is referred as contest competition. Hybrids can vary in competition type compared to their parent species. The hybrid's traits can match the parents with the dominant gene or be phenotypically average of the parental population traits due to incomplete dominance. The genetic relationship of dominance of the traits influencing the behavior of scramble or contest competition was examined, then the competition type exhibiting incomplete dominance was identified. To assess this, a hybrid population of seed beetles (*Callosobruchus maculatus*) of two biotype populations from Burkina Faso (BF), a known scramble competitor, and South India (SI), a known contest competitor, were developed. The hybrids were compared to the parents with respect to three traits: female body mass, female fecundity, and female sensitivity to parasitized oviposition sites (a measure of competition strategy). Virgin females were weighed then mated to a male of the same population. After mating, the females were placed in an array of dishes to lay eggs for 24 hours. In arrays, the first four dishes contained parasitized beans and the last 3 dishes contained unparasitized beans. To test the beetles' sensitivity to parasitized oviposition sites, the distribution of eggs throughout the arrays were counted. It was found that the hybrid females are intermediate between the parent populations in mass and total fecundity, suggesting that these traits are partially dominant. The hybrid population's egg distribution in the arrays was like SI, suggesting that the contest competition trait is partially dominant. It is evident, however, that the hybrid traits differ from the parent populations.

** Denotes STEMCats project
Circadian rhythms are controlled by an internal biological clock and are typically synchronized with aspects of an animal's environment. Circadian rhythms are an adaptive characteristic of life-history traits that allow animals to optimize behaviors in order to increase their fitness and possibly the fitness of their offspring. In parasitic-insect systems, the decisions females make, like oviposition placement, have a significant effect on offspring fitness. Using 4 replicate populations of a seed beetle (*Callosobruchus maculatus*), we mated virgin females and males from the same population between approximately 0800 and 1500 hours to measure the variance in number of eggs laid throughout the day. Within 20 minutes after mating, we placed females individually in dispersal arrays for 24 hours to lay eggs. Finally, we counted the number of eggs laid by each female. We found a positive trend between the total number of eggs laid to the time of day females were placed in the dispersal arrays, with females who mated earlier in the day laying fewer eggs than females who mated later in the day; however, the trend was not significant. This relationship did not vary by population; the number of eggs laid of all 4 replicate populations increased as the day progressed. Our results could indicate that there is a circadian rhythm to the number of eggs laid in seed beetles; however, an alternative explanation may be that females are simply older and more sexually mature if mated later in the day. To determine if there is a potential adaptive circadian rhythm that increases fitness and offspring production, there would need to be a future experiment to differentiate between these two hypotheses like mating sexually mature virgin females at different times of the day or mating virgin females at different stages of sexual maturity at the same time of day.

Cold exposure can have significant, negative effects on the fitness ability to survive and reproduce of insect species, driving them to develop means of coping with changing climatic conditions. Insect cold tolerance may improve through gradual acclimatization brought on by seasonal temperature shifts or through more immediate means such as rapid cold hardening. Further, recent studies have shown diet to influence insect longevity and have suggested that diet may also influence insect cold tolerance and reproduction. However, what component(s) of an insect diet (e.g. protein concentration) are most important to cold tolerance and reproduction remains unclear. In this study, we seek to determine whether diet affects cold tolerances and reproduction in the fruit fly, *Drosophila melanogaster*. Specifically, we will examine whether diets rich in protein or carbohydrates: 1) improve insect cold tolerance, 2) improve reproduction, and/or 3) stop the negative effects cold exposure has on reproduction. For this study we are rearing experimental flies on four diets commonly used in labs around the world that vary in their protein and carbohydrate content. Using these experimental flies, we are examining how diet influences a fly’s ability to survive a cold shock (-3°C for 1 hr), their overall fecundity (# of offspring produced), and whether diet protects fecundity from a sub-lethal cold shock (0°C for 1 hr). Initial results show that diet does affect cold tolerance, with flies reared on protein rich diets being better able to survive cold shock compared to flies reared on carbohydrate rich diets. The remaining experiments are either in progress or scheduled for a later date. Ultimately, we seek to understand whether and to what magnitude diet influences fitness-relevant traits like cold tolerance and reproduction, and what importance diet has for the evolution of these fitness-related traits.
SCRAMBLE VS CONTEST COMPETITION: EFFECTS ON OVIPOSITION DECISIONS IN A BRUCHID BEETLE
Poster: 146
Shields, Fabian
Faculty Mentor(s): Dr. Charles Fox, Alyssa Kilanowski

Within an ecological community, competition has strong effects on survival and reproduction. Resource competition is the interaction between individuals that contend for a common resource, such as food, while mate competition is more important for reproduction. Competition strategy can vary among populations: one strategy is scramble competition, which refers to competition in which a resource, such as food or mates, are available for all competitors. This strategy often leads to many individuals having access to resources, whether it be food or mates. A second strategy is contest competition, refers to competition where available resources are consumed or utilized by one to few individuals. We wanted to understand if females from populations that exhibit either scramble or contest competition would alter oviposition patterns in the presence of conspecifics. We examined how competition affects the number and distribution of eggs laid in three populations of seed beetles (Callosobruchus maculatus): two populations are scramble competitors and one is a contest competitor. Using seven petri dishes in the form of an array, we set up two treatments using fresh beans and beans with eggs already laid on them. For the control treatment we filled the arrays with only fresh beans. To test the oviposition we filled the first three dishes of the experimental treatment arrays with beans with eggs present and the other four dishes with fresh beans. After massing and mating the beetles, we placed them in the arrays for 24 hours. We found that all populations show a preference for fresh beans compared to beans that have eggs present as this gives the offspring increased fitness. When there are no competitors present, all populations laid the majority of their eggs in the first dish of the array. However, when competitors were present, a change in distribution of oviposition among the populations was displayed. All populations show a trend for distributing eggs further along the array. While not significant, the proportions of eggs laid by each population differs in the experimental treatment. Our results indicate that females change their oviposition strategy when competitors are present. Future studies may use fine-tuned equipment to research changes in female oviposition strategy with another female present in the array.

FORESTRY

JUST BEAD IT: PRESENCE OF MICROBEADS IN NEW MEXICO RIVER OTTER SCAT
Poster: 147
Kohen, Keely
Faculty Mentor(s): Dr. Matthew Springer, Dr. John Cox, Gabriela Wolf

This is a study documenting the presence of microbeads in the reintroduced river otter population on the upper Rio Grande River. The purpose of this study was to collect qualitative and quantitative data about the different microbeads found in river otter scat from various latrine sites. The measurements of the collected microbeads were recorded, analyzed, and mapped. Of the total number of collected scats, 14.8% of them contained microbeads. Due to the upper Rio Grande River's remote location, the high instances of microbeads in this system is worrisome and could have a potential impact on the large sportfishing industry of the surrounding areas and downstream.
POSTER PRESENTATIONS

GEOLOGY

THE UNDENIABLE ATTRACTION OF LUNAR SWIRLS
Poster: 148
Waller, Cierra
Faculty Mentor(s): Dr. Dhananjay Ravat

Lunar swirls are complex patterns on the Moon with distinct brightness signatures and magnetic characteristics. Current research has suggested that the formation of lunar swirls relies on local magnetic fields to shield impinging solar wind, based on a shift in electromagnetic wavelength peaks related to solar radiation and space weathering. Our research combined recent models and methods to characterize these anomalies at the surface of the Moon, exploring the effects of field strength and position. We have produced a high resolution map of a famous swirl named Reiner Gamma using magnetic dipole modeling. These maps and models are considered when examining lunar landing locations and potential colony locations on the Moon.

GERONTOLOGY

SOCIAL ENGAGEMENT IN FEMALE OLDER ADULTS WHO CHOSE TO LIVE IN A SINGLE-SEX ASSISTED LIVING COMMUNITY
Poster: 149
Samadi, Dealla
Faculty Mentor(s): Dr. John Watkins

The purpose of this research is to propose theorization with greater specificity by considering a controlled population of older adults: females who made a decision to be part of an exclusively female retirement community as opposed to a mixed sex community. Institutional living, more specifically, single-sex institutional living is a unique place of residence. It is a special venue for social engagement, presenting potential opportunities to either expand or reduce social engagement. However, the mechanisms and decisions associated in social engagement within institutional living has not been well examined. Theorization will specifically aim to characterize social engagement and interactions throughout an individual's lifespan and its transition into older age. Qualitative data will be collected through narrative-based interviews with six residents where subjects engage in storytelling. Interviews were transcribed, coded, and then categorized into common themes that can help in the development of a potentially novel theory, or more specific theory regarding aging processes in female older adults. In doing this research, we ask: how does choosing to live in a single-sex assisted living community influence social engagement and eventually gerotranscendence? A secondary purpose that has broader implications is to provide an illustration of the phenomenon that is accessible and useful for current and future health practitioners and the lay public. Educating health practitioners and the lay public will enhance appreciation of the complex social dynamics that influence an older person's decisions and health conditions and improve the care that we provide to older adults.
HEALTH SCIENCES

EXPLORING THE PERCEPTIONS OF ERROR DISCLOSURE IN PHYSICIAN ASSISTANT AND PHYSICAL THERAPY GRADUATES
Poster: 150
Appel, Emily
Faculty Mentor(s): Dr. Karen Skaff

Error disclosure is vital in ensuring patient safety and establishing transparency in the patient-provider relationship. Despite this importance, many providers fail to disclose errors due to fears of litigation, fears of internal shame, fears of external embarrassment, and a lack of experience. The majority of current literature on error disclosure focuses on the behaviors of physicians, however it has important implications for all healthcare providers. This study aims to explore the perceptions of error disclosure in physician assistant and physical therapy graduates. The study population consisted of 2018 graduates from the physician assistant and physical therapy programs at the University of Kentucky. A cross-sectional survey design was used to ask the graduates about their perceptions of error disclosure following their clinical experiences as students within their academic program. Due to fundamental differences between physician assistant and physical therapy roles in patient care, it was hypothesized that a difference may have been seen between the two groups in their survey responses. Despite having a limited number of responses, insight into the graduates’ experiences with error disclosure was still gained. Of the 19 survey responses, 16 reported observing an error during their clinical experiences. Of these observed errors, 68 percent of responses reported that the error was disclosed to the patient while 31 percent reported that the error was not disclosed to anyone. Ten out of the 19 participants reported having prior training in error disclosure, however none felt superiorly prepared to handle the error. These results support the conclusion that errors happen often and disclosure rates remain low. To address this, education programs should be utilized by institutions and academic programs as a way to train current and future providers to effectively recognize, report, and manage errors.

RELATIONSHIP BETWEEN NUTRITIONAL SUPPORT AND MUSCLE HEALTH IN SURVIVORS OF CRITICAL ILLNESS
Poster: 151
Authors: Scott Battista, Sarah Greene
Faculty Mentor(s): Dr. Esther Dupont-Versteegden, Kirby Mayer

Research Question: What is the relationship between nutritional support in the intensive care unit (ICU) and muscle health in patients surviving critical illness? Introduction/Research Hypothesis: In clinical practice, there is heterogeneity in the approach to nutritional support for patients with critical illness. Moreover, recent randomized control trials, fail to demonstrate benefit in providing early nutrition to these patients. Malnutrition has a negative impact on muscle health and physical functioning. We hypothesize that a lack of early nutritional support in critically ill patients will be associated with greater muscle dysfunction. Number of Subjects: 34 adult patients, median age of 53 (range 19-83) admitted to the medicine ICU were previously enrolled in a prospective study to assess muscle health. Proposed Methods: This project is a secondary retrospective analysis of a previously completed prospective muscle observational study. Participants previously performed a series of muscle assessments during admission to the ICU, hospital, and 1-month following hospital discharge. We are currently working with data analyst at CHSR to assess nutritional data such as delivery method, rate, and type as well as critical illness data e.g. ventilator days, ICU length of stay, and SOFA scores. Planned Statistical Analysis: Data will be assessed with descriptive statistics and histograms. To determine the relationship between nutrition and muscle, appropriate correlative test will be performed. A multi-variate logistic regression will be utilized to determine if the lack of nutrition in combination with clinical and demographic variables predicts muscle dysfunction at hospital discharge. Expected Results: We expect to demonstrate that patients who do not receive nutritional support early in the ICU will have a higher likelihood of developing muscle dysfunction. Career Development: As an undergraduate student planning for a career in medicine, the proposed provides many opportunities for learning and growth.
THE RELATIONSHIP BETWEEN SEX, PREMORBID FUNCTION, AND COMORBIDITY ON COGNITIVE AND EMOTIONAL HEALTH IN SURVIVORS OF CRITICAL ILLNESS

Poster: 152
Authors: Heba Boustany, Trent Marshall
Faculty Mentor(s): Dr. Esther Dupont-Versteegden, Kirby Mayer

Introduction: Approximately 50% of patients surviving an admission to the intensive care unit (ICU) for critical illness develop long-term deficits in physical, emotional, and mental health, described as post-intensive care syndrome (PICS). Although older age, higher severity of illness, and longer times requiring mechanical ventilation increases risk of PICS, there is less known about the association between sex and premorbid health with PICS development. Purpose: The primary purpose of this study is to elucidate the relationship between sex, body-mass index, and premorbid function with cognitive and emotional health in patients surviving critical illness. Methods: A prospective observational study was performed on patients pending discharge from the hospital or at one-month follow-up visit in the ICU Recovery Clinic at an academic medical institution. Adult patients with admitting diagnosis of acute respiratory failure, sepsis, heart failure, or lung transplantation with an ICU stay > 4 days were eligible. A series of emotional and cognitive health assessments were performed. Descriptive statistics and linear regression will be performed to assess the association between the entire population with scores on outcome measures. Secondarily, we will perform independent t-tests (Wilcoxon 2-sample test) and chi-square (Fisher’s Exact Test) to test for differences in outcomes scores based on the independent variables and co-variates. Results: 30 patients with a mean age of 52.5 years (15 female, 50%) participated in this study. Data collection of these patients is complete and pending statistical analysis. Final results and analyses on the HADS, MOCA, IES, and EQ-5D will be ready by time of presentation. Conclusion: We initially hypothesize that cognitive function will not differ between females and males. Secondarily, we believe that younger patients with unhealthy BMIs will have lower mental, emotional, and cognitive health scores.

OPIOID AND NON-OPIOID PRESCRIBING RATES FOR ANKLE FRACTURES IN EMERGENCY DEPARTMENTS ACROSS THE UNITED STATES BETWEEN 2006 AND 2015

Poster: 153
Bowers, Lucy
Faculty Mentor(s): Dr. Phillip Gribble

Context: An ankle fracture is a common injury observed in the Emergency Department (ED) and is often treated conservatively or surgically, depending on whether the fracture is stable. Opioids provide value for the management of acute musculoskeletal pain. However, prolong opioid use is associated with well-known consequences in the United States such as dependence, abuse and/or misuse. Considering these concerns and the effectiveness of non-pharmacological interventions for the treatment of acute pain, it is critical to identify the prescribing patterns for patients diagnosed with an ankle fracture in the ED. Objective: Describe the percentage of patients prescribed a scheduled and non-controlled medication in the ED. Methods: This was a secondary analysis of the publicly available data collected through the National Hospital Ambulatory Medical Care Survey from 2006-2015. Data analyzed using the sampled visit weight, yielding an unbiased national estimate of ED percentages. Due to the complex sample design, sampling errors were determined using SAS software. Results: From 2006-2015, 86.9% of patients presenting with an ankle fracture received medication during their ED visit. Among those prescribed a medication, 63.02% were prescribed a controlled substance and 34.29% were prescribed a non-controlled substance. The majority of the controlled substances were given to patients between the ages of 25-64. Conclusion: Approximately 2 out of 3 patients diagnosed with an ankle fracture in the ED received a controlled substance. The majority of these given to young-adults. Other effective non-pharmacological interventions should be explored to prevent the risk of the well-known consequences associated with opioid use.
DEPLETION OF MUSCLE STEM CELLS INHIBITS MUSCLE FIBER HYPERTROPHY IN RESPONSE TO LIFELONG PHYSICAL ACTIVITY AND NEGATIVELY IMPACTS PHYSICAL FUNCTION

Poster: 154

Authors: Hannah Caldwell, Ally Neal
Faculty Mentor(s): Dr. Charlotte Peterson

Background: A reduction in muscle stem cell content with advancing age is thought to directly contribute to the progressive loss of skeletal muscle mass and function with aging. However, we previously found that the depletion of muscle stem cells throughout adulthood did not affect the onset or degree of muscle loss observed in sedentary mice. The current study was designed to determine if muscle stem cell depletion would negatively impact muscle fiber size and function in response to lifelong physical activity. Methods: Adult female Pax7-DTA mice were treated with a placebo injection or tamoxifen for 5 consecutive days to effectively deplete muscle stem cell content. Following a 2-month washout period, mice were singly caged and assigned to physically active (free access to a running wheel) or sedentary (locked running wheel) conditions. Thirteen months later, at a mean age of 20 months physical function testing was performed. After physical function testing the mice were sacrificed for subsequent analysis. Results: Muscle stem cell depletion throughout adulthood negatively impacted physical function and limited muscle fiber hypertrophy in response to lifelong physical activity. In search for a possible mechanism that was driving the reduced level of physical function we examined the muscle spindle-fiber and found that muscle stem cell depletion lead to an aberrant muscle spindle-fiber phenotype. Conclusion: These findings suggest that muscle stem cells are viable therapeutic targets to promote muscle fiber hypertrophy in physically active older adults. Further, determining if restoring satellite cell number rescues aberrant muscle spindle-fibers and improves physical function has important clinical implications.

DETERMINING THE REQUIREMENTS FOR MUSCLE STEM CELLS DURING TESTOSTERONE INDUCED MUSCLE HYPERTROPHY

Poster: 155

Authors: Ally Neal, Hannah Caldwell
Faculty Mentor(s): Dr. Charlotte Peterson

Background: There is a widely accepted notion that testosterone induced muscle hypertrophy is driven by myonuclear accretion via muscle stem cell (satellite cell) fusion. To date, no study has directly tested the requirements for muscle stem cells during testosterone induced muscle growth. Methods: Mature (≥ 6 months of age) female Pax7-DTA mice will be injected with 2mg of vehicle or tamoxifen (n=16/group) for five consecutive days to effectively deplete satellite cells, followed by a 2-week washout period. Following the washout period, mice were further divided (n=8/group) and pellets containing testosterone propionate or sham pellets (2.5 mg, release time 21 days) were implanted subcutaneously by making a 5 mm incision in the skin of the neck. Following 3 weeks of administration, hindlimb muscles (plantaris and soleus) were excised, weighed and prepared for immunohistochemical analysis. Results: Three weeks of testosterone administration led to significant muscle fiber hypertrophy in the plantaris and soleus muscles, independent of muscle stem cell content. There was significant myonuclear and muscle stem cell accretion in the plantaris and soleus of muscle stem cell replete mice. Conclusions: While muscle stem cells are necessary for myonuclear accretion, they are not required for testosterone induced muscle growth. These findings indicate resident myonuclei possess a compensatory mechanism to support muscle growth in the absence of myonuclear addition via muscle stem cell fusion. These results are clinically significant in that testosterone could be used for a therapeutic treatment to increase skeletal muscle mass in a patient population with muscle stem cell dysfunction or loss.

** Denotes STEMcats project
**POSTER PRESENTATIONS**

**TRANSVERSE SCAPULOHUMERAL RHYTHM IN HEALTHY CONTROLS COMPARED TO PATIENTS WITH END-STAGE GLENOHUMERAL OSTEOARTHRITIS**

**Poster: 156**

**Redd, Elizabeth**

**Faculty Mentor(s):** Dr. Timothy Uhl, Nicole Cascia, Oliver Silverson

Background: The rotator cuff (RTC) functions to rotate the arm which is critical for activities of daily living (ADLs) involving the shoulder. Self-care tasks require shoulder external rotation (SH-ER), executed with the help of scapula moving into external rotation. Compensations in scapular kinematics and muscle activity can predispose an individual to a RTC injury. If left untreated, a RTC injury can lead to end-stage glenohumeral osteoarthritis (GH-OA) with rotator cuff arthropathy. Currently, it is unknown how scapular external rotation (SC-ER) during SH-ER differs between healthy subjects and patients with end-stage GH-OA. **Purpose:** To determine if the ratio of SC-ER to SH-ER, defined as Transverse Scapulohumeral Rhythm (TSHR), differs between healthy subjects and patients with end-stage GH-OA to then help tailor prevention and rehabilitation programs. **Methods:** A total of twenty-six subjects were included: thirteen healthy controls (6M, 7F, age 43±17) and thirteen patients (9M, 4F, age 62±14) with end-stage GH-OA. A paired t-test was conducted to compare average TSHR in healthy controls to patients with end-stage GH-OA. **Results:** TSHR was 1:18, 95% CI [9, 27], with an average SC-ER of 6 ±5º and GH-ER of 56 ±10º in healthy controls. TSHR was 1:5, 95% CI [3, 7], with an average SC-ER of 4±3º and GH-ER of 23 ±20º in patients with end-stage GH-OA. A paired t-test showed statistical significance in TSHR between healthy controls (1:18) and patients with end-stage GH-OA (1:5); p=0.01. There was no statistically significant difference found in SC-ER between the two groups, p=0.30. **Conclusions:** Differences exist in TSHR between healthy subjects and those with end-stage GH-OA. On average, healthy subjects demonstrated 2.5x more degrees of SH-ER with only a 2-degree difference in SC-ER. Although differences in SC-ER did not show statistical significance, there is clinical relevance due to the relationship between the scapula and the humerus during ADLs.

**SEX DIFFERENCES IN THE SOCIAL DETERMINANTS OF HEALTH AMONG SENIORS AND PEOPLE WITH DISABILITIES LIVING IN PUBLIC HOUSING**

**Poster: 157**

**Rochell, Jahsleighe**

**Faculty Mentor(s):** Dr. Brandi White

Background: Seniors and individuals with disabilities are a subgroup of public housing residents with significant health challenges. Many social determinants adversely affect public housing residents. Sex differences exist in many of these determinants and are associated with negative health outcomes. We explored sex differences in social determinants in a subset of public housing residents that are largely underserved. **Methods:** This was a cross-sectional study of 130 African-American public housing residents in a mid-sized US city using the BRFSS. **Results:** Males (60 years; n=62) were significantly younger than females (63 years; n=68). There were similar rates (male vs female) for having a mobility disability (32% vs 33%) and mental illness (27% vs 25%). Most participants had health insurance (89% male vs 91% female). Significantly more males smoked (69%) vs females (41%). There were similar rates (male vs female) for high blood pressure (76% vs 81%), chronic obstructive pulmonary disease (COPD) (79% vs 72%), asthma (64% vs 65%), and diabetes (43% vs 40%). There were no differences (male vs female) in experiencing financial insecurity (39% vs 32%), financial stress (18% vs 26%), or food insecurity (72% vs 61%). A significantly higher proportion of females perceived their community as unsafe (89% vs 69%). **Discussion:** This is the first known study to examine sex differences in the social determinants among seniors and individuals with disabilities in public housing. Understanding the challenges these residents face will assist with targeting programs and services to meet this population’s needs.
AUTISM AWARENESS AND ACCESS TO DIAGNOSTIC SERVICES
Poster: 158
Adams, Ashley
Faculty Mentor(s): Dr. Robyn Brown

There is a surplus of information and early intervention methods dedicated to autism which may have increased diagnostic rates in the U.S over the past few decades. Having autism awareness and access to diagnostic services can enhance the ability of society to cope and understand people on the autism spectrum. Being proactive in the early stages of childhood development can lead to a more positive lifestyle for both parties, the child and the family. Although there is a shrinkage in the gap for diagnosing autism among non-Hispanic White Americans and minority groups, it is still apparent that there are underlying factors causing there to still be a significant difference between the cohorts. This research will focus on the disparities of autism rates among ethnicities and address the risk factors that lead to substantial gaps between them. This study was developed by analyzing data collected from each ethnic group. This project was developed by analyzing the diagnostics made for each group. When looking at the statistics, it can be seen that rates are slowly but surely increasing for the minority groups. For white children, the rates have gone from 6.7 to 13.2, for blacks it is 5.9 to 11.1, and 3.9 to 8 for Hispanics. White children have higher diagnosis rates than all other minorities; they are about 19% more likely than black children and 65% more likely than black children to be diagnosed (Furfaro, 2017). By looking at these rates, there is evidence showing that early screening and diagnosis helps with development and prevention of any further damages.

THE NEGLECT OF MENTAL ILLNESS IN THE PRISON SYSTEM
Poster: 159
Brown, Jasmeane
Faculty Mentor(s): Dr. Robyn Brown

Intro: I want to focus my topic on how the mental health of prisoners is neglected, by them not getting the resources or treatment they need. It is an issue that I feel strongly passionate about and is now being talked about more often. It is socially relevant because mental health is a now a huge controversial topic and has a stigma to it that needs to be broken. The stigma of mental health is that most people do not see it as an illness which causes a lot of mentally ill people to feel ashamed for asking for help. It is my hypothesis that most men and women in the prison system who are mentally ill, are not provided the resources that they need when it comes to taking care of their mental state of mind. Methods: The method that I will use to showcase my project is making a poster showcasing an interview that I will have with an inmate in the prison system. To record the statistics of people having some type of mental health, they usually have to willingly give that information out. There are a lot of people who do not report that they have a mental illness, and this is for multiple reasons. I will gather my information from my interview to show insight on what really happens inside of the prison. Results: My anticipated results are that there is a huge percentage of prisoners suffering from a mental illness, and most of them are not getting any type of help or treatment for it. My interview will show my results. Conclusion and implications: In conclusion my project will give awareness and provide an idea of how to help prisoners in the system get the proper treatment that they need and deserve.
HUMAN TRAFFICKING INTERVENTION: A CASE STUDY AND INTERDISCIPLINARY REVIEW
Poster: 160
Eiseman, Mackenzie
Faculty Mentor(s): Dr. Robyn Brown

In recent years, the topic of human trafficking has come up more often, which has led to improvements understanding of the issue and resources to combat the issue. However, there are still many gaps that exist. Human trafficking, which includes sex and labor trafficking, has a pertinent social relevance due to its impact on the most vulnerable in society. Those affected are at an increased risk for physical and mental health conditions as a direct result of human trafficking. The methods used to develop this project include an interdisciplinary literature review and a case study of a Human Trafficking Intervention Court in Nashville, Tennessee. The methods also include a critical analysis of the legislative efforts and resources available to survivors. By reviewing these components, the results are anticipated to highlight areas in which there is room for improvement both in preventing human trafficking and empowering those caught in the midst of human trafficking to help them escape. The results will also display whether systems such as the one in Nashville are effective. The conclusions from this are intended to elucidate gaps in the systems placed to prevent and end human trafficking as well as services for survivors of human trafficking. The goal is that through this knowledge and analysis of systems currently in place, proactive systems to counteract human trafficking could be expanded into new jurisdictions.

STDs IN COLLEGE: HOW TO BE EDUCATED AND PROTECTED
Poster: 161
Gilmore, Emily
Faculty Mentor(s): Dr. Robyn Brown

Introduction: Getting tested for STDs is something that should be done every 6 months. Students in college should be educated on this subject because it is very important. STDs are something that can show no symptoms and you can have it. STDs are also easily transmitted to people if they are not be safe and using protection during sex. College students show to have the highest STDs rate out of other age groups. Methods: Within this project, research will be based upon a survey conducted on campus among students about sex and STDs. In this survey questions like: How often do you get check for STDs? Are you familiar with the three most common STDs? Do you use condoms during sex? Are you on any birth control? This survey will be anonymous and hopefully help to see how well students are educated on this subject. Results: In the end, with the results I hope to be able to see how students at this University view sex and the knowledge they have about STDs. I will be able to put this into rating and rate the students based on the answers from the questions. Conclusion: STDs is something everyone should be educated on and know the importance of practicing safe sex. Throughout this project that it my goal for college students. Implications like not having many people participate in the survey can play a role due to it maybe being uncomfortable answering certain questions. However, hopefully there will be a good turnout for this project.
DAY VERSUS NIGHT SHIFT FOR NURSES: DOES IT AFFECT PATIENT CARE?
Poster: 162
Madden, Sarah
Faculty Mentor(s): Dr. Robyn Brown

Introduction: This capstone project is about the differences between day and night shifts for nurses. I want to examine the difference in the patient care that is given throughout these times. This is scientifically and socially relevant because if the patient care is not correctly given during night shifts, then a change has to be made. Methods: I will be doing research based upon qualitative interview methods with 20 participants. Ten nursing students from the University of Kentucky and 10 nurses from the University of Iowa hospital. I will interview them asking: how do you physically feel when you are working a night shift versus a day shift? Do you feel that you can give accurate care during a night shift? How do you think patient care could improve during night shifts? Then I will examine each results, examine the statistics, and come up with a conclusion. Preliminary Reports / Conclusions / Implications: I believe after the interviews with the nurses, I will see that night shifts do affect patient care. I believe that nurses are more tired during the night, especially when they are on night shifts. Nurses are scheduled night shifts for months at a time, and the stimulation of your brains during the night are less active than during the day. My conclusion of this capstone project would be that night shift nurses are less active to attend to every patient. An implication of this project would be that some nurses would want to be on night shifts because of the extra money given. This could cause a bias because some nurses are not scheduled on day and night shifts. I hope to eliminate this bias during the interviews.

HOW COLORISM AFFECTS BLACK WOMEN IN THE WORKPLACE
Poster: 163
Moore, DeAirra
Faculty Mentor(s): Dr. Robyn Brown

African American women and the color of their skin has always been a topic of discussion for a while now. More recently has been a type of degradation towards African American women with darker skin tones. This is known as Colorism. According to the National Conference for Community and Justice, Colorism is defined as a practice of discrimination by which those with lighter skin are treated more favorably than those with darker skin. Not only is colorism a common issue within the Black community, but it is also creating a separation, or divide between lighter toned women and darker toned women especially in the workplace. This separation causes for there to be discrimination on darker toned women because they have darker skin, even though they might qualify more over the lighter skinned African American woman. The purpose of this study was to find and show how darker toned African American women are more discriminated against than lighter toned African American women in places of business with the use of interviews, research, and studies. The results showed that there is a divide, or discrimination between lighter toned African American women and darker toned African American women. This topic at hand has been an ongoing issue far as these two groups of Black women not getting the fair chance of careers based on their skin color.
**POSTER PRESENTATIONS**

**IS VAPING JUST AS BAD AS SMOKING USED TO BE?**
Poster: 164
Pearson, Kassidy
Faculty Mentor(s): Dr. Robyn Brown

Throughout the years with the help of campaigns, we have been able to get and maintain the percentage of people smoking cigarettes low. Smoking e-cigarettes, also known as vaping, is a recent trend that challenges this. Teenagers and young adults nowadays have made vaping very popular probably not knowing how similar it is to smoking an actual cigarette. They may actually end up addicted and it could be another issue just like how smoking cigarettes used to be, or worse. The purpose of e-cigarettes was for cigarette smokers to stop smoking cigarettes as a mean to eventually get them to stop smoking. They were not intended for non-smokers. For my capstone project, my capstone project compared the amount or percentage of people who used cigarettes 15-20 years ago to how the amount or percentage of people that smoke e-cigarettes now. I have gotten research on census tracts of people smoking from 15-20 years ago and from a recent year. Also, I obtained data from the General Social Survey and ICPSR. The implications that could probably occur would be with the data not being broad enough or showing inconsistencies. After analyzing the results, and if the percentage or amount of people that smoked cigarettes back then are close to the number of people that smoke e-cigarettes now, then the next step could be that this calls for bringing awareness to the problem.

**AN ANALYSIS OF MATERNAL MORTALITY AND MORBIDITY BASED ON LEVEL OF INTERVENTION DURING CHILDBIRTH**
Poster: 165
Wilwerding, Anna
Faculty Mentor(s): Dr. Robyn Brown

The United States has the highest maternal mortality rate of all developed countries. There has been a paradoxical increase in maternal mortality and morbidity that cannot easily be explained without further research. American women are exposed to a variety of factors that put them more at risk for complications and pregnancy-related death, including pre-existing health conditions, lack of paid leave after childbirth, little contact with a physician in the weeks following childbirth, higher maternal age, and the reliance on Cesarean section. Recent medical advancements for childbirth rely on increasing intervention, including the application of epidural analgesia, drugs for induction, and Cesarean section. The question of whether there is a difference in maternal mortality and morbidity with varying levels of medical intervention was examined through the collection of various research studies. Some quantitative and qualitative data was collected and analyzed to interpret apparent patterns and acquire results. The preliminary findings indicate that there is a difference in maternal mortality and morbidity rates based on the level of medical intervention during childbirth. The findings of this study demonstrate that maternal mortality and morbidity rates vary. In order to decrease these rates in the U.S., it may be important to consider the most prevalent level of intervention associated with common birthing practices in this country. Additionally, there are other factors that have a role in the obscurely high maternal mortality rates in the U.S. that will require further research. This project highlights the need for further attention to the ways in which varying birthing practices and processes influence the rate of maternal mortality and morbidity.
THE IMPACT OF IMMIGRATION STATUS ON HEALTHCARE ACCESS
Poster: 166
Kim, Wonjin
Faculty Mentor(s): Dr. Robyn Brown

Immigrants are people who came to live permanently in a foreign country. In the case of the US, there were thousands of immigrants that come every year. Recent years have shown that the access to healthcare and health coverage for immigrants have decreased. These are immigrants who are noncitizens, green card holders, and children of immigrants who are U.S. citizens. They come to the US hoping to get better healthcare but they receive less access compared to U.S. citizens. This is inequality since immigrants came to the US to live there permanently. This problem is one example of racial disparities in access to care that most people do not know about. The main method would be comprehensive review or meta-analysis into scientific journal articles that focus on immigration statuses and limited access to health care. These articles would give the most data for the project. The data would come from online sources such as CDC and Journal of Ethics. The project would be broken down into 2 parts. One part would focus on the scientific journal articles and writing an essay on it. The second part would be doing a presentation on the findings. The implications are that immigrants have received less healthcare than U.S.-born citizens. This research highlights the need for policy development on changing or expanding access to healthcare among immigrant communities.

HISTORY

THE DESIGN FLAW: UNCOVERING PAST AND CURRENT ISSUES IN LEXINGTON'S LOW INCOME HOUSING
Poster: 167
Cofer, Ashleigh
Faculty Mentor(s): Carol Street

Lower income housing is a problem that many communities across the world face. The American city of Lexington, Kentucky, is an excellent example of a mid-sized city that grew exponentially during the 20th century, but inadequately addressed the needs of its more impoverished citizens while enjoying robust growth in economy and prestige. Analyzing the William H. Qualls Urban Planning Papers at the University of Kentucky Special Collections Research Center to investigate how housing divisions were created and designed and compare with current city data to understand how the early plans contributed to current inequities in housing is crucial. The collection contains reports on neighborhood zoning; transportation; water quality and management; housing for low, middle and high-income families; and business development during the 1960s to 1980s when the city experienced a period of significant expansion. The collection mentions several issues that arose when constructing these low-income housing areas for residents. Some of the inequities in lower-income neighborhoods have never been fixed, despite attempts to do so in the past and present. Through research into successes and failures of prior efforts to create thriving lower income housing for residents, this study plans to identify past barriers to success and build a new plan for improving low-income housing for its residents. This research will help other mid-sized communities around the world that are facing similar problems.
THE USE OF SLAVE DEEDS IN THE UNDERSTANDING OF SLAVE EMANCIPATION IN THE BLUEGRASS
Poster: 168
Cotton, Gabrielle
Faculty Mentor(s): Dr. Kathryn Newfont

When one speaks of slavery, what is often discussed is the enslavement of individuals while their ability to gain freedom is often glazed over. This research counters that common idea and highlights an often overlooked part of slavery. This research studies the ways that slaves were able to work their way towards paying for their own emancipation from their enslavers and the ways that they were able to free others. The particular example that has been studied includes brothers Willis and Lewis Mitchell. In 1827, Willis Mitchell purchased his brother, Lewis Mitchell, from George Miller in Culpepper County, Virginia. These individuals have led to specific research into the ways in which slaves were able to obtain money whilst still being enslaved, as well as provided opportunity for further research into the study of these individuals’ lives. This research has included analyzing a collection of newly uncovered slave deeds from the County Clerk’s Office in Lexington, Kentucky, as well as other primary documentation in the form of Lexington City Directories to piece together the story of these two brothers and the way in which they were able to obtain freedom. Through this research actual accounts of Kentucky slaves paying for their own emancipation and also paying for the emancipation of other enslaved family members has been discovered. This research has also pieced together their lives and has provided potential explanations as to how they were able to obtain this money to purchase their freedom.

THE SEXUAL COERCION OF ENSLAVED KENTUCKIANS
Poster: 169
Evans, Sydney
Faculty Mentor(s): Dr. Kathryn Newfont

Coerced human reproduction, called “Slave Breeding,” was a lucrative business in the deep South during the antebellum period. This research focuses on the role that more northern slave states, such as Kentucky, played in coerced human reproduction. My research on Kentucky slavery reveals that it shared grim similarities with the deep south. Kentuckians also engaged in “slave breeding” and made a profit in doing so. This research is important to understand the grasp slaveholders had over biological reproduction. The use of Kentucky slave novels, public records in the Fayette County Clerk’s office, and documents from the Freedom Writers Foundation helped demonstrate the presence of coerced reproduction. Enslaved people suffered numerous coerced sexual encounters with both their masters and other slaves to promote and expand the slave population. In Kentucky, enslaved men were sometimes sent to several other plantations to “breed.” These men were forced to copulate with enslaved women and were referred to as “studs” in official and sale records. Fertile enslaved women were called “breeders” and forced to endure sex with men selected by enslavers. Kentuckian enslaved women could be forced to produce offspring as many as 20 times in their lifetime. Enslaved women considered especially beautiful were labelled “fancy girl,” and sold for sexual purposes to white slaveholding males. The sources show that local slave holding white Kentuckians were just as engaged in coercing human reproduction, which they called “slave breeding,” as the deeper south. In fact, Kentucky emerges as a leading site of selective breeding of enslaved humans, though that history has been erased and covered up.
POSTER PRESENTATIONS

INTERIOR DESIGN

ASSESSING THE NICU: A COMPARISON OF MULTI-BED AND PRIVATE PATIENT ROOM DESIGNS

Poster: 170
Tashjian, Emily
Faculty Mentor(s): Lindsey Fay

The purpose of this study is to compare the old, multi-bed University of Kentucky Hospital neonatal intensive care unit (NICU) to the new, private patient room NICU through a pre-/post-occupancy study through means of behavioral mapping observations and analysis of existing qualitative and quantitative data. In the past, multi-bed designs were the standard in NICUs, but studies have shown that patient outcomes improve in a variety of ways while recovering in private rooms. This model offers less stimuli for the patients and greater levels of privacy for parents, thus increasing the focus on family-centered care. The effect on nurses and healthcare providers, based in their perception and interaction in the space, has not been thoroughly researched and analyzed. This study is conducting that initial research at the University of Kentucky. The primary goal of this study has been to evaluate staff perceptions of the built environment before and after moving from an 8,000 square foot open-bay NICU to a new unit that implemented the single-family design across 36,000 square feet at the University of Kentucky Medical Center. This data has been gathered from a variety of participants including physicians, nurses, technicians, and therapists. It is hypothesized that staff perceptions of the NICU are positively increasing due to the new design layout that includes decentralized nurse stations, private patient rooms, and collaborative huddle spaces. The outcomes of this research will positively impact a variety of groups. First, documenting this research in a visual, graphic document will be useful to the faculty researchers as an important tool for referencing key outcomes from this research that could be used for future publications. Additionally, this document can be shared with UK HealthCare so that they can better understand the impact of the new design on their staff, patients, and visitors.

JEWISH STUDIES

"PA-JEW-CAH": RECLAIMING THE HISTORY OF PADUCAH'S JEWISH COMMUNITY

Poster: 171
Newberry, Hannah
Faculty Mentor(s): Dr. Janice Fernheimer

When imagining Kentucky's religious heritage, most people picture churches, not synagogues. Yet historian Lee Shai Weissbach demonstrates that Kentucky's first synagogue was built in Louisville in 1849, and Jews had been living in the Commonwealth almost as long as it existed. Kentucky's Jewish heritage is rich and varied as illustrated by Arwen Donahue's This is Home Now: Kentucky's Holocaust Survivors Speak, Deborah Weiner's Coalfield Jews: An Appalachian History, and Amy Shevitz's Jewish Communities on the Ohio River: A History. While each of these texts refers to Paducah as an early and important Jewish settlement, none offers exclusive scholarly attention to what is now Kentucky's third largest Jewish population center. Supported by the Jewish Heritage Fund for Excellence and the UK Jewish Studies Summer Undergraduate Research Award, this study seeks to fill this gap in scholarship and provide more visibility to Jewish Kentucky generally, and specifically, Jewish Paducah. The author conducted three original oral history interviews, two with individuals who had lived memory of the Paducah Jewish community and one who is an active participant in that community. By closely analyzing the extant scholarship to contextualize first-hand accounts of Paducah's Jewish community, we call attention to a history that few know about. This study seeks to promote understanding of one of Paducah's most historically important ethnic groups, and thus show how Paducah's, as well as Kentucky's, heritage is far more diverse and inclusive than outsiders often realize.

** Denotes STEMcats project
According to Mary Wagner, the author of Jewish Hospitals Yesterday and Today, Jewish Hospitals emerged in the mid-19th century in the U.S. for several reasons: the Jewish American community’s need to combat anti-Semitism, to provide services for its large and then-growing immigrant population, and to establish a place for Jewish medical professionals to work, since anti-Semitism prevented them from being employed elsewhere. Although, American Jews became increasingly more accepted as part of the broader American social and political milieu throughout the early 20th century, Jewish Hospitals persisted in cities across the U.S. until the 1970s. To date roughly 22 of originally 113 Jewish hospitals remain. Among them, is Jewish hospital in Louisville, KY, first established in 1903 by a group of Jewish physicians and the Jewish community of Louisville. This study considers Louisville Jewish Hospital as an unusual case example of a Jewish hospital that continues to exist and preserve its Jewish heritage by using Jewish concepts to guide its principles of care, despite a shrinking local Jewish population. Although Louisville’s Jewish Hospital faces economic hardships it continues to impact the global medical community through its medical advancements, such as the nation’s first hand transplant. To carefully investigate the way Jewish Hospital Louisville connects its Jewish values to its medical innovations, we conducted three original oral history interviews with leaders of Jewish Hospital to determine how Jewish Hospital had impacted the local community by following the Jewish concept, Tikkun Olam, in their mission for social justice, advocacy, philanthropy, and medical advancement. The primary source interviews with Rabbi Dr. Nadia Siritsky, Dr. Gerald Temes, and Mr. Robert Waterman call attention to the ways Louisville Jewish Hospital adjusted to new pressures, while honoring its Jewish heritage, thus providing a useful case example for other U.S. Jewish hospitals.
KINESIOLOGY AND HEALTH PROMOTION

INCREASED WAIST TO HIP RATIO (WHR) IS ASSOCIATED WITH WEAKER KNEE MUSCULATURE AND ALTERED LOWER EXTREMITY MECHANICS DURING SIT-TO-STAND
Poster: 173
Tuckey, Margaret
Faculty Mentor(s): Dr. Michael Samaan

Obesity leads to numerous health-related diseases, including osteoarthritis (OA). Obese individuals with impaired quadriceps strength perform sit-to-stand (STS) movements using altered kinematic patterns, yet the relationship between quadriceps dysfunction and joint loading in the obese population is unknown. In this retrospective study, 11 obese subjects were divided into the low (<median WHR; 5 subjects) and high WHR (≥median WHR; 6 subjects) groups. The total support moment (TSM), contributions of the hip, knee and ankle joints to the TSM, lower extremity joint kinematics and knee joint muscle strength were assessed for both groups. Group differences were assessed using independent t-tests with bootstrapping (p<0.05). The high WHR group demonstrated weaker knee extensor (low WHR: 1.62±0.2Nm/kg; high WHR: 1.06±0.2Nm/kg; p<0.01) and flexor (low WHR: 0.91±0.2Nm/kg; high WHR: 0.56±0.2Nm/kg; p=0.01) strength. The high WHR group performed the STS task with higher peak hip flexion (low WHR: 74.4±9.8°; high WHR: 87.9±8.5°; p<0.04), hip (low WHR: 63.9±3.8°; high WHR: 78.6±6.0°; p<0.01) and knee range of motion (low WHR: 65.0±5.2°; high WHR: 74.4±8.1°; p=0.05). No differences were found in TSM-related parameters (p>0.05). Increased knee extensor torque observed in the low WHR group is indicative of greater quadriceps function and allows for adequate distribution of the lower extremity load across the knee joint. The high WHR group compensated for their weaker knee extensor musculature by utilizing a larger hip and knee range of motion in order to perform the STS task with similar lower extremity load patterns to the low WHR. The weaker knee musculature observed in the high WHR group can be easily targeted through exercise-based interventions in order to strengthen the knee musculature and reduce abnormal movement patterns during the STS. Future studies should explore how weaker quadriceps in the obese population may contribute to abnormal lower extremity joint mechanics associated with increased risk of OA.

LANDSCAPE ARCHITECTURE

HOMEGROWN | PROVIDING FRESH FOOD AND PEDESTRIAN CONNECTIONS IN JACKSON, KENTUCKY
Poster: 174
Browning, Joseph
Faculty Mentor(s): Dr. Jayoung Koo

Eastern Kentucky communities face numerous challenges, and Jackson is no exception. While lack of job opportunities in Eastern Kentucky is of primary concern, a secondary concern residents face includes limited access to fresh foods. This limited access has led to heavy consumption of processed and fast foods which has contributed to alarming rates of obesity, heart disease and cancers. To directly combat these issues, the HOMEGROWN project aims to implement a community garden network in Jackson. This garden network will provide at least one garden within each of the five neighborhoods of Jackson. This will give all residents access to fresh vegetables within a short walking distance of their homes. HOMEGROWN will also provide plans for a pedestrian network that connects the gardens to one another and to community anchors such as schools, community centers and the County Extension Office. The first phase of the project presented to the Extension Office included a plan for building raised beds in the existing parking lot expansion project. The Extension Office currently provides gardening classes, so the raised beds will be a demonstration area on their property. The second phase of the project identified key locations for the neighborhood gardens. Determining factors included the total available space and the average distance to the nearest five residences. Finally, the pedestrian corridor plan will connect Jackson residents to community spaces, as well as provide aesthetic improvements that will lead to economic investment in Jackson’s tourism industry.
EXPLORATION AND DESIGN OF OUTDOOR LEARNING ENVIRONMENTS AND PLAYSCAPES IN COLLABORATION WITH FAYETTE COUNTY PUBLIC SCHOOLS SUSTAINABILITY AND PLANT OPERATIONS
Poster: 175
Strader, Tyler
Faculty Mentor(s): Dr. Brian Lee, Dr. Adina Cox, Jordan Phemister

The following is a response to the Request for Ideas (RFI) to outline a potential senior project for landscape architecture students in their final studio LA 426. This is intended to be a public service community engagement and design project that will engage and serve the students, staff and surrounding communities of Meadowthorpe Elementary School (MES) and William Wells Brown Elementary School (WWBES), as well as district-level staff. The purpose of this project is to provide a design of outdoor learning environments and playscapes that will engage and educate elementary students, staff, and the local community about the benefits of nature and sustainable landscapes. Summary Phase (Weeks 14-15): Develop final project report summarizing research, the community engagement workshop and design process to communicate the importance and need for sustainable outdoor learning environments and playscapes and create a roadmap for future efforts at other schools. Develop final presentation and materials and documents for UK Showcase of Undergraduate Scholars, and ASLA 2019 and ASLAKY 2020 Student Awards submissions. Gear material toward obtaining funding needed for implementation.

ENHANCING JACKSON
Poster: 176
Warmoth, Tim
Faculty Mentor(s): Dr. Brian Lee, Dr. Jayoung Koo

This project takes place in the City of Jackson found within Breathitt County, Kentucky. It is a multiple phase project with an overall goal to promote a healthy lifestyle and encourage physical activity in open spaces. This was done in multiple phases starting with the design of the 4-H extension offices parking lot. Raised planting beds were incorporated into the parking lot to allow an educational gardening experience for residents. After finalizing this portion of the project, suitability analysis was conducted to find the best locations within the community to provide additional public gardening space. By providing community gardens, the community can produce healthy foods at a low cost. Soil types, land location, land ownership and topography were taken into consideration when selecting alternative gardening sites. The final phase of the project was providing the city with a long-term planning plan. This was achieved by conducting a current site inventory and identifying areas in need of visual enhancement or increased connectivity. The project will offer multiple phases to keep the cost lower for the community. The final site design will include a trail and visual enhancements along streets to promote residents using alternative modes of transportation.
MUSIC

THE IMPACT OF MUSIC-FOCUSED ENVIRONMENTS ON TECHNIQUE AND PERFORMANCE
Poster: 177
Browning, Tyler
Faculty Mentor(s): Daniel Mason

Technique, the motor skills behind playing an instrument, is crucial for a musician to perform and is the basic building block of performance and sound. Musicians spend most of their lives developing and refining their technique through extensive practicing and numerous performances. Summer music festivals act as a catalyst for developing technique in a short amount of time as musicians experience intensive instruction through orchestral training, chamber ensembles, and one-on-one instruction from professionals in the music field. The purpose of this research was to observe the effects of the Sewanee Summer Music Festival on developing a musician's overall technique and performance. The methods involved in this research included learning new solo repertoire, observing the progress of students in orchestral and ensemble settings, and mainly focusing on artistic details in various musical compositions throughout the festival. By the end of the summer music festival, research showed that students saw increased technical and musical awareness on their instruments, increased ensemble performance, and a deeper appreciation and understanding of different genres of music. The overall implication of this research is that the intensive setting of summer music festivals offers a new perspective to practicing and performing and will aid in the development of technique and performance in current music students. The results from this research will provide a basis for further study in developing better practice habits for musical success.

USING LINGUISTIC INQUIRY TO COMPARE COUNTRY AND ROCK SONGS
Poster: 178
Cooper, Emily
Faculty Mentor(s): Dr. Olivia Yinger

Music plays a large role in our culture, and lyrics have the ability to share a lot about their writer's emotions and thoughts. Examining the relationship between song genres could create a better understanding of how humans use words to convey feelings. The purpose of this study was to compare emotional tone and authenticity in different song genres and compare how authenticity relates to popularity and word count to learn more about those relationships. Lyrics for the top 50 most popular country songs and top 50 most popular rock songs were downloaded from the Billboard Top 50 list and edited. Spelling errors were corrected and repetition was only allowed to appear only once. Each song was run through the Linguistic Inquiry and Word Count (LIWC) software, returning the mean for each category tested. 2-tailed independent t-tests returned significant differences (p<0.05) in the word count (p=0.028), authenticity (p=0.012), and negative emotional tone (p=0.05). A Spearman rank order correlation showed that authenticity had a very low negative correlation (-0.142) with popularity and a only a slightly higher correlation with word count (0.231), however, this was significant at the .05 level. A correlation between authenticity and word count shows that the more original words used in a text, the more genuine it seems. This has the ability to not only sell more music, but to help deliver persuasive speeches and land job interviews.
ANTON WEBERN "EINGANG" MUSICAL UNIFICATION IN A POST-TONAL ERA
Poster: 179
Murner, Sarah
Faculty Mentor(s): Dr. Jennifer Campbell

Anton Webern (1883-1945) studied with Austrian composer Arnold Schoenberg from 1904-1908, and it was this encounter that dramatically altered Webern's musical language and syntax from the heavily chromatic music of his student years to the succinct and pointillistic twelve-tone works we associate with him today. Believing that the tonal system had become too decadent and stretched to its limits by Richard Wagner, Schoenberg strayed from traditional tonality, wandering into a realm of exploration and ambiguity and later pioneered the twelve-tone method of composition; Webern closely followed the model his teacher established for him. Webern's Opus 4, 5 Lieder nach Gedichten von Stefan George was composed after his abandonment of tonality and prior to his twelve-tone works of the 1920s. Although it may not sound like it at first, Webern used several techniques to facilitate a cohesiveness throughout all five songs, which are all settings of poems by Stefan George. An in-depth analysis of the first Lied of the group, "Eingang" can be used to illustrate Webern's compositional practices that he developed during his post-tonal, pre-twelve-tone period of artistic work. Within Eingang, there are instances of direct repetition in the piano part. This could suggest a modified type of formal structure, with the repeated phrases signaling a change in sections. The most interwoven means of connection is the use of numerology; in this piece, Webern focuses on the number seven heavily in the phrasing, time signature, and pitches themselves. These compositional techniques are among those that create cohesion in "Eingang," illustrating that atonal music is more than just a predecessor of twelve-tone and serialism.

SERGEI RACHMANINOFF'S MUSICAL LANGUAGE IN TEN PRELUDES, OP. 23
Poster: 180
Temple, Abby
Faculty Mentor(s): Dr. Jennifer Campbell

Although adored by the public for his captivating piano pieces, Russian composer Sergei Rachmaninoff (1873-1943) has received limited critical attention from music theorists. Active at the fin-de-siècle, Rachmaninoff continued writing music that embraced melody, tonality, and functional harmony, unlike his French contemporary Claude Debussy or his Austrian counterpart Arnold Schoenberg, both of whom dramatically broke with Western music tradition. As a pianist, Rachmaninoff studied the music of Romantics such as Frederic Chopin and Franz Liszt, absorbing their compositional proclivities through his fingers, then assimilating their writing into his own composing practice, ultimately resulting in his distinctive musical language. Despite his unwavering connection to Romanticism, Rachmaninoff and his music gained a prominent position in music history textbooks and concert halls across the globe during the twentieth century, and I suggest he deserves the same attention from theorists, too. In my paper, I argue that Rachmaninoff established an idiosyncratic musical language, and that his Ten Preludes, Op. 23 (1903), a diverse set of short piano pieces, offer an ideal case study. I analyze Rachmaninoff's compositional tendencies, examining his use of form, phrase structure, harmonic language (especially his emphasis on the predominant and submediant), linear voice leading, and skillfully crafted musical climaxes. Rachmaninoff consistently employed these compositional tools in Op. 23, yet created a unique identity for each prelude. For instance, he uses stretched phrases and parsimonious voice leading in No. 1; differing A sections with hidden emphasis on the predominant in No. 4; and two layers of texture leading to climax in the well-known No. 5. The collective difference of these preludes exemplifies how Rachmaninoff developed a distinct musical voice, one that was rooted in the compositional language of those before him but substantially different enough that its sound has been associated with him through the twentieth century and beyond.
NEUROSCIENCE

EFFECT OF SLEEP FRAGMENTATION ON NEUROPATHOLOGY IN TRANSGENIC AD MICE
Poster: 181
Authors: Emrakh Askarov, Alex Baker, Lindsay Beechem, Barbara Gillis, Frances Salisbury
Faculty Mentor(s): Dr. Marilyn Duncan, Dr. Bruce O’Hara, Dr. Michael Murphy

Alzheimer’s Disease (AD) is a neurodegenerative disease that is defined by amyloid beta (A) plaques, neurofibrillary tangles, and neuronal death. Decreased clearance of A from reduced sleep may be a contributing factor in the rapid decline of memory in AD patients. Previous studies have indicated that increased A and alterations in the daily sleep-wake cycle are early indicators of AD. However, limited studies have investigated whether sleep fragmentation accelerates the progression of AD pathology. This study investigated whether chronic disruption of daily sleep-wake cycles with sleep fragmentation (SF) increased A 40 and 42 levels and neuroinflammation in the brains of transgenic AD mice (3xTgAD). Female mice (8 months old) were sorted into two groups, an undisturbed sleep (US) group and a SF group, involving stimulation for one-hour periods during the light phase, 4 times/day, 5 days/week for 4 weeks. Sleep was monitored using a piezoelectric system. The results showed that the US mice slept a majority of time during the light period as expected, and were not affected by the sleep fragmentation of SF mice in the same room. SF mice had greatly reduced sleep during the SF intervals as expected, and this sleep loss was only partially made up during the dark period. Protein levels of A 40 and 42 in the hippocampus, qualitatively measured by ELISA analysis, were significantly higher in SF mice. Also, gene expression markers of neuroinflammation, analyzed using a TaqMan low-density gene expression array, were significantly elevated in SF mice. These results may suggest that A clearance is decreased in SF mice resulting in increased neuroinflammation and plaque development. If future rodent studies support these findings that chronic SF advances AD pathology, then improving sleep consolidation would be a potential therapeutic strategy for reducing the progression of AD neuropathology in humans.

** ALCOHOL CAUSES NEUROPLASTICITY OF HIPPOCAMPAL GLUTAMATERIC SYSTEMS TO PROMOTE ADDICTION
Poster: 182
Faculty Mentor(s): Dr. Mark Prendergast

Binge alcohol drinking occurs in approximately one-quarter of those 12 years and older in the United States (SAMSHA 2015). This reflects consumption of five or more alcoholic beverages in one episode. One consequence of repeated binge drinking is the development of alcoholic dependence. Dependence develops, in part, because of neuroplasticity (eg. upregulation) of glutamate receptors in the hippocampus. Organotypic hippocampal slice cultures were exposed to alcohol (50 mM/0.24%) for seven days in vitro and function of Ca2+-permeable glutamate receptors was assessed by exposing tissue to an agonist of N-methyl-D-aspartate (NMDA)-type glutamate receptors during 48 hrs of alcohol withdrawal. Uptake of the non-vital fluorescent dye propidium iodide was assessed subsequently. Alcohol pre-exposure significantly enhanced the sensitivity of hippocampal pyramidal neurons to NMDA, reflected by the increased uptake of propidium iodide, a marker of dying neurons. These findings suggest that neuroplasticity of glutamate systems contributes to alcohol dependence. Thus, glutamate systems may be vital in the production of new pharmaceuticals for therapeutic treatment of alcohol dependence.

** Denotes STEMcats project
DBS PLUS FOR PARKINSON’S DISEASE: 3D SUBCORTICAL BRAIN MAPPING OF NERVE GRAFTS AND TRAJECTORIES IN CORRELATION WITH THE FUNCTIONAL OUTCOME
Poster: 183
Burns, Heather
Faculty Mentor(s): Dr. Greg Gerhardt

Parkinson’s disease (PD) is characterized by the loss of dopaminergic neurons in the midbrain, which causes worsening rigidity, tremors, and bradykinesia. In the United States, the total direct and indirect cost of PD treatment is $25 billion per year. Currently, there is no cure available to stop or slow the progression of this disease. In our two recent clinical trials, NCT01833364 and NCT02369003, autologous peripheral nerve grafts containing “repair” Schwann cells were implanted into the midbrain during Deep Brain Stimulation (DBS) surgery. The hypothesis is that grafts act to supply the damaged cells with a neurotrophic environment, thus promoting their survival and regeneration. The aim of the following research is to reconstruct the grafts’ trajectories, map their final targets, and correlate the functional anatomy with the motor outcomes. Using the Lead-DBS software, the pre-operative and post-operative MRI and CT scans of 64 DBS Plus patients will be co-registered and normalized to a common space. After correcting for brainshift bias, the trajectories will then be manually reconstructed to determine their effect on the subcortical connectomes using an ATAG atlas. The placement of the grafts will also be analyzed in correlation to the clinical outcome, based on the Unified Parkinson Disease Rating Scale III motor scoring. Mapping the graft locations will help optimizing the grafting technique and potentially identifying new functional targets to improve the motor outcome of patients with PD.

CHARACTERIZING CHANGES IN CALMODULIN BINDING SPECIFICITY
Poster: 184
Clowes, Katherine
Faculty Mentor(s): Dr. Luke Bradley

Calmodulin (CaM) is a 148 amino acid, calcium-modulated protein that is known for its many roles in biological processes, such as muscle contraction and neuronal signaling. Calmodulin is particularly notable for its numerous, high affinity binding interactions. These interactions depend on both the amino acid sequence and the overall structure of calmodulin. CaM has a "two handed" structural motif connected by a central linker region, and binds four calcium molecules in its active conformation. Mutations in calmodulin, especially those in and around the central linker region, can lead to changes in binding specificity and disease states. Changes in binding specificity can be determined through use of Isothermal Titration Calorimetry (ITC), a technique used to determine the thermodynamic parameters of protein-target interactions. In this project, I compare the binding affinity of wild type calmodulin to B7, B9, and P7 mutations of calmodulin by performing ITC with three "gold standard" binding partners: CaM kinase 1, CaM kinase II, and myosin light chain kinase.

** Denotes STEMcats project
POSTER PRESENTATIONS

REPOSITIONING FLUBENDAZOLE FOR SPINAL CORD INJURY
Poster: 185
Davis, Kate
Faculty Mentor(s): Dr. James Geddes

We previously reported the serendipitous observation that Fenbendazole, a benzimidazole anthelmintic, improved functional and pathological outcomes following thoracic spinal cord contusion injury in mice when administered pre-injury. Fenbendazole is widely used in veterinary medicine. However, it is not approved for human use and it was uncertain if only post-injury administration would offer similar benefits. In the present study we evaluated post-injury administration of a closely related, human anthelmintic drug, Flubendazole, using a rat spinal cord contusion injury model. Flubendazole, administered IP, 5 or 10 mg/kg day, beginning 3 hrs postinjury and daily thereafter for 2 or 4 weeks, resulted in improved locomotor function after contusion SCI compared to vehicle-treated controls. Histological analysis of spinal cord sections showed that such treatment with Flubendazole also reduced lesion volume, improved total tissue sparing, white matter sparing, and gray matter sparing. Flubendazole inhibited the activation of GFAP, suppressed cyclin B1 expression and Bruton’s tyrosine kinase activation, markers of B cell activation/proliferation and inflammation, and reduced B cell autoimmune response. Together, these results suggest the use of the benzimidazole anthelmintic Flubendazole as a potential therapeutic for spinal cord injury.

CHRONIC INTERMITTENT HYPOXIA INDUCES ROBUST ASTROGLIOSIS IN AN ALZHEIMER'S DISEASE-RELEVANT MOUSE MODEL
Poster: 186
Higgins, Emma
Faculty Mentor(s): Dr. Adam Backstetter

Sleep disturbances are a common early symptom of neurodegenerative diseases, including Alzheimer’s disease (AD) and other age-related dementias, and emerging evidence suggests that poor sleep may be an important contributor to development of amyloid pathology. Of the causes of sleep disturbances, it is estimated that 10-20% of adults in the United States have sleep-disordered breathing (SDB) disorder, with obstructive sleep apnea accounting for the majority of the SBD cases. The clinical and epidemiological data clearly support a link between sleep apnea and AD; yet, almost no experimental research is available exploring the mechanisms associated with this correlative link. Therefore, we exposed an AD-relevant mouse model (APP/PS1 KI) to chronic intermittent hypoxia (IH) (an experimental model of sleep apnea) to begin to describe one of the potential mechanisms by which SDB could increase the risk of dementia. Previous studies have found that astrogliosis is a contributor to neuropathology in models of chronic IH and AD; therefore, we hypothesized that a reactive astrocyte response might be a contributing mechanism in the neuroinflammation associated with sleep apnea. To test this hypothesis, 10-11-month-old wild-type (WT) and APP/PS1 KI mice were exposed to 10 hours of IH, daily for four weeks. At the end of four weeks brains were analyzed from amyloid burden and astrogliosis. No effect was found for chronic IH exposure on amyloid-beta levels or plaque load in the APP/PS1 KI mice. A significant increase in GFAP staining was found in the APP/PS1 KI mice exposed to chronic IH, but not in the WT mice. Profiling of genes associated with different phenotypes of astrocyte activation identified GFAP, CXCL10, and Ggta1 as significant responses activated in the APP/PS1 KI mice exposed to chronic IH.
USING TISSUE CLEARING TO CHARACTERIZE PHRENIC MOTOR NEURON SURVIVAL AFTER SPINAL CORD INJURY

Poster: 187
Huffman, Emily
Faculty Mentor(s): Dr. Warren Alilain

The diaphragm is the major muscle involved in breathing. Innervated by the phrenic nerve, it is controlled by phrenic motor neurons (PMNs), which receive descending inputs from the medulla. When these bulbospinal-pathways are damaged or severed in spinal cord injury (SCI), the external effects of injury are seen immediately, as the diaphragm becomes paralyzed and the individual loses the ability to breathe. However, the effect of injury on the internal circuitry, specifically PMN survival, is largely unknown. Contradictory evidence has surfaced, suggesting that there is large PMN death after injury, or conversely, that there is an absence of PMN death. The histological techniques utilized in these studies, however, have exposed the data to factors through which certainty cannot be guaranteed. These discrepancies are important to parse out because characterization of PMN survival is integral to studies of plasticity. The present study attempted to bridge this gap in knowledge and used XClarity clearing methods to accurately determine PMN survival after cervical SCI. XClarity transforms the tissue into a transparent medium. This allows for the whole spinal cord to be analyzed without tissue loss, as is common in other histological techniques. Sprague-Dawley rats were hemisected at the second level of the cervical spinal cord (c2Hx), which is a common experimental model of cervical SCI. Animals were divided into three groups: naïve, two weeks post-c2Hx, and five weeks post-c2Hx. Before perfusion, these animals were intrapleurally injected bilaterally with CTB-488, a retrograde tracer that labels PMNs. Depending on their group assignment, animals were perfused at five weeks post-injury, two weeks post-injury, or immediately after CTB-488 uptake. Cords were then processed with XClarity and PMN survival was characterized with Lightsheet microscopy. Analysis of PMNs is ongoing, however, preliminary data suggests that XClarity techniques are the preferable route to characterize PMN survival after injury.

ESTABLISHING A GEL MODEL TO STUDY THE EFFECTS OF MICROGRAVITY ON MOLECULE INFUSION DISTRIBUTION

Poster: 188
Authors: Katherine Kloska, Emily Meredith
Faculty Mentor(s): Dr. Luke Bradley

Tissue mimetics serve as non-biologic models of desired tissues/organs/tumors for numerous research applications (including diffusion/distribution studies for drug delivery and surgery, tissue engineering, diagnostics, basic research) to study a vast array of diseases (including glioblastoma and many other cancers; neurodegenerative diseases, such as Parkinson's disease, Alzheimer's disease, ALS; injuries to the brain and spinal cord; and many others). In addition, 3-D cell culture studies, which utilize tissue mimetic scaffolds, are emerging as the preferred cell-culture technique for drug discovery, drug screening, drug-safety testing, biomedical research, and precision medicine due to its better representation of an in vivo multicellular environment. Using a gel model of a section of human brain targeted for drug delivery in Parkinson's disease, the purpose of this experiment is to establish a rigorous and reproducible model to address the question how microgravity affects the volume of distribution of molecules infused into the gel. These data will be compared to data obtained with the standardized gel model in the lab and will determine the model reproducibility on the International Space Station - and thus demonstrate broad applicability for different models and applications.
DETERIORED PIOGLITAZONE ADMINISTRATION PROVIDES NEUROPROTECTIVE EFFECTS FOLLOWING SEVERE TBI
Poster: 189
Spear, Krista
Faculty Mentor(s): Dr. Patrick Sullivan

Traumatic brain injury (TBI) affects millions of people each year in the US. It is characterized by neuronal disruption primarily due to impact. This primary injury is further exacerbated by secondary pathways which includes mitochondrial dysfunction that leads to elevated reactive oxygen species and can cause cell death. In this study, Pioglitazone, an FDA approved antidiabetic which targets the mitochondrial protein mitoNEET, is evaluated to examine its efficacy as delayed treatment for TBI. To test this, C57B/6 mice received either a sham or severe (1.0mm) controlled cortical impact (CCI) followed by the initiation of Pioglitazone administration at either 3h or 18h post injury, which included a bolus injection of Pioglitazone or Vehicle. Osmotic mini pumps (20mg/kg/day) of either Pioglitazone or Vehicle were inserted, and booster injections were given every 24h. At 7d post injury, animals were euthanized and brains sections (35 μm) were mounted and stained with Cresyl Violet. Tissue sparing analysis was used to calculate cortical tissue loss following injury and treatment. Stereology was then done to measure the number of neurons present in the dentate gyrus and the CA3 regions of the hippocampus. Pioglitazone treatment at 18h after TBI resulted in a significant increase (p<0.05) in tissue sparing compared to Vehicle treatment. This was highlighted by, on average, a 12% cortical loss in vehicle treated animals in comparison to a 6% loss in Pioglitazone treated animals. No significant difference was found after 3h initiated treatment. Pioglitazone is a possible translational treatment for TBI due to its therapeutic window.

NURSING

PERCEIVED RISK OF LUNG CANCER, HEALTH BELIEFS, HOME RADON TESTING, AND SELF-EFFICACY TO MITIGATE AMONG HOMEOWNERS IN APPALACHIA
Poster: 190
Mitchell, Chelsea
Faculty Mentor(s): Dr. Ellen Hahn, Dr. Karen Butler

Background: Exposure to radon is the second leading cause of lung cancer. Exposure to radon, ≥ 4.0 pCi/L accounts for 10-15% of all lung cancer cases and is associated with an estimated 21,000 preventable deaths in the U.S. annually. The risk of lung cancer is higher when exposed to both radon and tobacco smoke, creating synergistic risk. It is estimated that 20% of U.S. homes test high for radon, however, few test and fix their homes for radon. Aim 1 examined associations between risk perception of lung cancer and home radon testing and self-efficacy to mitigate. Aim 2 assessed the association between tobacco use, socio-demographics, and self-efficacy to mitigate. Aim 3 explored the perceived benefits and barriers of radon mitigation. Methods: Our community-academic team of youth citizen scientists and nurse researchers conducted a mixed-methods study with Appalachian homeowners. Youth citizen scientists administered a 14-item survey to their parent to evaluate health beliefs (i.e., perceived risk, susceptibility, severity) related to radon in the home and lung cancer prior to deploying free radon test kits. If radon levels tested high, the youth citizen scientist informed their parent of the option to mitigate using a voucher of $1,000 (approx. half the cost). We conducted semi-structured interviews with participants using qualitative methods to assess motivation (i.e., perceived benefits, barriers) to mitigate. Results: Data collection is ongoing.

Discussion: Appalachians are at an increased risk for lung cancer due to tobacco use, weak smoke-free laws, and radon exposure. Most are unaware of the synergistic risk between tobacco smoke and radon for developing lung cancer. Low risk perception, low self-efficacy, and financial limitations are potential barriers to radon testing and mitigation.

** Denotes STEMcats project
OVULATION IS INHIBITED BY EXPOSURE TO AN ENVIRONMENTALLY RELEVANT PHTHALATE MIXTURE VIA DISRUPTED PROGESTERONE PRODUCTION IN MOUSE ANTRAL FOLLICLES IN VITRO

Poster: 191
Authors: Katie Land, Madison Lane
Faculty Mentor(s): Dr. Thomas Curry

Phthalates are chemicals that are used as solvents and plasticizers in many common consumer products such as cosmetics, food/beverage containers, medical tubing, etc. They are known endocrine-disrupting chemicals and reproductive toxicants, in which exposure could possibly inhibit ovulation and reduce fertility in women. The luteinizing hormone (LH) surge initiates the ovulatory process, which includes differentiating the preovulatory antral follicle into a progesterone producing corpus luteum (CL) via LH-induced increases in steroidogenic genes (Star, Cyp11a1, Hsd3b1 Parm1, Pgr). Progesterone signaling is essential for downstream processes required for ovulation and fertility. We hypothesized that an environmentally relevant phthalate mixture inhibits ovulation via disrupted progesterone production. Antral follicles were isolated from CD-1 mice and were cultured for 96hr in media supplemented with follicle-stimulating hormone to stimulate pre-ovulatory development, and treated with vehicle control (dimethylsulfoxide, DMSO) or phthalate mixture (PHTmix; 1-500μg/ml). The media was then replaced with maturation media ± hCG (an LH analog) to induce ovulation and treated with DMSO or PHTmix. Ovulation was assessed, and media and follicles/CLs were collected for progesterone measurements and analysis of gene expression, respectively, at time-points across the ovulatory period (0hr, 4hr, 11hr, 18hr, ovulation occurs at approximately 12hr) (n=3-10, p<0.05). The PHTmix inhibited ovulation in a dose-dependent manner. Progesterone levels were decreased at 4hr and 11hr by the 1 and 500μg/ml doses but were increased at 4hr and 18hr by the 10μg/ml dose when compared to hCG controls. This altered progesterone production was mediated by alterations in expression of Star, Cyp11a1, and Parm1 compared to hCG. Further, altered progesterone levels reduced expression of progesterone mediated downstream regulators of ovulation (Il6, Adamts1) in comparison to hCG. Ultimately, these data suggest that phthalate exposure inhibits ovulation by altering progesterone steroidogenesis, and therefore potentially contributing to the negative health effects associated with infertility in women. Supported by P01HD071875, K99ES028748.
AN ENVIRONMENTALLY RELEVANT PHTHALATE MIXTURE INHIBITS OVULATION BY DECREASING PROSTAGLANDIN PRODUCTION IN MOUSE ANTRAL FOLLICLES IN VITRO
Poster: 192
Authors: Madison Lane, Katie Land
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Faculty Mentor(s): Dr. Thomas Curry

Phthalates are endocrine-disrupting chemicals that humans are ubiquitously exposed to as a result of their widespread use as plasticizers and solvents in personal care products, building materials, food and beverage containers, and medical supplies. Exposure to these endocrine-disrupting chemicals may impact female reproduction by disrupting the production and metabolism of ovarian prostaglandins, which are integral molecules of the inflammatory response during ovulation. Prostaglandin synthesis is stimulated by the mid-cycle luteinizing hormone (LH) surge that triggers ovulation and formation of the corpus luteum (CL) from the preovulatory antral follicle. This study investigates the hypothesis that phthalates are able to inhibit ovulation by downregulating genes involved in prostaglandin production (Pla2g4a, Ptgs2, Ptges) and transport (Abcc4, Slco2a1) while increasing prostaglandin metabolic enzymes (Hpgd). Isolated antral follicles from CD-1 mice were cultured for 96hr in supplemented media containing follicle-stimulating hormone to induce pre-ovulatory development, and were treated with vehicle control (dimethylsulfoxide, DMSO) or phthalate mixture (PHTmix; 1-500μg/ml). Media were then replaced with maturation media ~+ hCG (an LH analog) to induce ovulation and treated with DMSO or PHTmix for 0, 4, 11, and 18hr. Next, oocyte release was observed, media were collected for prostaglandin measurements via ELISA, and the follicle/CL was collected for gene expression analysis (n=3-10, p<0.05). Treatment with PHTmix resulted in a dose-dependent decrease in ovulation at 18hr, with the 500μg/ml dose being statistically equal to the DMSO group that had zero ovulations. Compared to hCG controls, PHTmix decreased Hpgd expression and increased Slco2a1 expression. Further, treatment with PHTmix resulted in dose-dependent decreases in expression of Ptgs2 with corresponding reductions in the ovulatory mediator prostaglandin E2 when compared to hCG controls. These changes support the hypothesis that PHTmix inhibits ovulation by disrupting prostaglandin production, which may in turn lead to infertility and have negative effects on reproductive health. Supported by P01HD071875, K99ES028748.

PATHOLOGY AND LABORATORY MEDICINE

ANDROGEN REDUCED NATURAL KILLER CELLS RESPONSE IN UROTHELIAL BLADDER CANCER: SIGNIFICANCE TO GENDER DIFFERENCES IN BLADDER CANCER
Poster: 193
Sexton, Morgan
Faculty Mentor(s): Dr. Charles Lutz

Males are more likely than females to developing malignancy in most organs. This sex difference is especially striking in urothelial bladder cancer (UBC), where the disease is three to four times more prevalent in men. Androgens suppress the immune system through a variety of mechanisms. We investigated whether androgen induced immunosuppression may play a role in the male predominance of UBC. We focused specifically on NK cells due to their ability to halt UBC in early stages and their reduction of recurrence and metastasis of many cancers. We studied NK cell response to androgens by isolating NK and peripheral blood mononuclear cells (PBMCs) from donors and treating them with different concentrations of a synthetic testosterone. We used this synthetic testosterone, R1881, because it cannot be aromatized to estrogen. We then co-cultured UM-UC3 UBC cells with the treated and untreated lymphocyte preparations. Lymphocyte killing was analyzed using flow cytometry with a e-flour stain to identify dead cancer cells. We found that the NK cells and PBMCs treated with R1881 resulted in more live UM-UC3 events and therefore less cancer cell death. We also found that the killing achieved by PBMCs seemed to increase with lower doses of androgens, suggesting an inverse relationship between androgens and NK cell efficacy. To see if the androgen effect was due to endocrine effects on UM-UC3 cells, we treated UM-UC3s with R1881 and DMSO without exposure to NKs or PBMCs. We found no significant difference in live events between the two treatments, suggesting that androgens were not directly affecting the UM-UC3 cells. Based on our preliminary studies, we conclude that androgens suppress NK cell recognition and destruction of UBC cells.
DIFFERENTIAL METABOLIC REQUIREMENTS FOR CYTOKINE PRODUCTION BETWEEN NK CELLS AND CD8 T-CELLS
Poster: 194
Spear, Kenny
Faculty Mentor(s): Dr. Charles Lutz, Dr. Steve Presnell

Natural-Killer cells (NK) and CD8 T-cells share similar effector functions, those include cytolysis (attack and killing of foreign or aberrant cells) and the production of cytokines, such as INF-γ and TNF-α. Cytokines serve as signals by binding to the surface of nearby immune cells and activating their function to potentiate a successful immune response. Despite the similarities in effector function, NK cells and T-cells have different mechanisms by which they carry out cytolysis and release cytokines. We hypothesized that the metabolic requirements for effector function between NK and CD8 T-cells will be different, because NK cells and T-cells are activated by different mechanisms. Our results suggest that NK cells, when incubated for 2 days in low glucose, and stimulated with PMA/A23187 or IL-12/IL-18 have minimal loss of INF-γ and TNF-α production. T-cells were examined when un-activated and activated by either plate or bead-bound anti CD3/anti CD28 antibodies. CD8 T-cells underwent a strong reduction of INF-γ and TNF-α cytokine production in low glucose when activated by the plate-bound antibody, whereas bead activated CD8 T-cells showed less reduction of these cytokines. Our results suggest that beads cause a stronger activation of CD8 T-cells, which improves metabolism and prevents the cell death seen in weakly activated CD8 T-cells in low glucose. Activated CD8 T-cell production of INF-γ and TNF-α generally showed strong sensitivity to glutamine, while NK cells less so. In a tumor environment, glucose and glutamine concentrations are often lower than in a normal cell environment, so our results suggest that NK cells may be better effectors than CD8 T-cells in a cancer environment.

PHARMACEUTICAL SCIENCES / PHARMACOLOGY

THE ROLE OF EXOSOMES ON BRAIN INFLAMMATION AND MICROGLIA ACTIVATION IN ALCOHOL USE DISORDERS
Poster: 195
Bhojwani, Manish
Faculty Mentor(s): Dr. Hui Peng, Dr. Kim Nixon

Alcohol use disorders (AUDs) are fairly common in modern society with upwards of 14% of the population suffering from symptoms of the condition. While alcohol consumption is known to damage the nervous system, the exact mechanism for this development is not fully understood. Microglia - the main immune cells within the central nervous system - have been shown to play a major role in this process but how they respond to alcohol is similarly not understood. A plausible link between this alcohol-induced neurotoxicity and microglial activation may be exosomes. Exosomes are nano-sized extracellular vesicles that carry biomacromolecules, including proteins and microRNAs (miRNAs), and represent a novel form of intercellular communication. In order to elucidate the role that exosomes have on alcohol-induced neurotoxicity and microglial activation, a four-day binge alcohol rat model and primary neuronal cell cultures were utilized. Neurotoxicity and microglial activation were subsequently examined via Fluoro-Jade B and immunohistochemical staining, respectively. In addition, a novel protocol was implemented to isolate both neuronal cell culture-derived and hippocampal exosomes from the extracellular space of 4-day binge ethanol versus control rats. These exosomes were analyzed for both their proteomic and miRNA profile. The preliminary results showed that microglial activation coincided with neuronal death and toxicity. Neural exosomes were found to increase microglial viability. Exosomes derived from ethanol-treated brains had differential protein and miRNA profiles as compared to those from the control treatment. These changes included an upregulation of apoptotic proteins and alterations in the quantity of various miRNAs that may regulate microglia function and activation. These results may point to avenues of future research into the development of new AUD therapies.
CHEMERIN IS A BIOMARKER OF AGING IN MICE

Poster: 196
Authors: Claire Crosby, Stevi Howard
Faculty Mentor(s): Dr. Kevin Pearson

Chronological age is the time an organism has been alive, whereas biological age is how (un)healthy that organism is or how old it seems. Currently, research efforts are being devoted to developing biomarkers of aging which can accurately determine an organism's biological age and overall mortality risk. Chemerin is an adipokine secreted by white adipose tissue. Physiologically, chemerin is involved in adipogenesis and inflammation, and chemerin levels are elevated in patients with type 2 diabetes, obesity, and cardiovascular disease. Due to the tendency for adipose tissue to become fibrotic in later ages, the secretory phenotypes observed in senescent cells, and the observation that other cytokines are correlated with aging, we hypothesized that serum chemerin levels would increase with age in mice. We measured serum chemerin levels via enzyme linked immunosorbent assay (ELISA) in a longitudinal cohort of both male and female C57BL/6 mice. We discovered that serum chemerin levels significantly increased with age in both sexes; further, we found no correlation between chemerin and body fat mass or other adipokines such as leptin or adiponectin. Therefore, we propose that chemerin is a novel and independent biomarker of aging in mice. In the future, we will determine whether the chemerin levels we measured are correlated with survival and lifespan in the same mice. Moreover, we will examine serum chemerin levels in aging populations of nonhuman primates and humans from the CCTS biospecimens core. Further research will elucidate the role of chemerin in biological aging and could eventually establish chemerin as a clinical biomarker of life expectancy and biological age.

LOSS OF PVAT-MEDIATED ANTICONTRACTILE FUNCTION IN MSEW MICE

Poster: 197
De Jesus, Samantha
Faculty Mentor(s): Dr. Analia Loria

Obesity-induced hypertension (HT), a major risk factor for cardiovascular disease (CVD), affects >70 million Americans annually. Epidemiological studies point to early life stress (ELS; abuse, neglect, or loss during the first decade of life) as an independent risk factor for increased body mass index and blood pressure. Mice exposed to a model of neglect, maternal separation early weaning (MSEW) display obesity-induced hypertension when fed a high fat diet (HFD). Female MSEW mice, but not males, show exacerbated adiposity and metabolic dysfunction. The purpose of this study was to determine the effect of perivascular adventitial tissue (PVAT) on endothelial function in MSEW and control female mice. MSEW was performed by separating the pups from the dam for 4 to 8 hours during postnatal days (PD) 2 to 16 and weaned on PD 17. Control mice remained undisturbed and were weaned on PD 21. After 16 weeks of either a HFD or low fat diet, the thoracic aortic rings were dissected and cleaned of all the PVAT and mounted in the myograph chambers for analysis. PVAT is isolated and incubated with DMEM media for 2 hr, and then added to some rings to determine whether the presence of PVAT explants influence vascular function. MSEW mice show similar relaxation to acetylcholine in comparison to the controls when the rings are free of PVAT. In PVAT pre-incubated rings, the endothelial function is not changed in control mice (from 45.2 ± 3.7 to 50.2 ± 3.8 % relaxation) but significantly worsen in MSEW mice (from 56.2 ± 5.7 to 38.9 ± 3.1% relaxation, p<0.05). The dose-response curves strongly suggest that the PVAT from mice exposed to MSEW release factors that have a negative impact on the vascular function, increase the cardiovascular risk.
INFLAMMATORY CYTOKINES IN ANIMAL MODELS OF STATUS EPILEPTICUS

Poster: 198
Fessler, Bailey

Faculty Mentor(s): Dr. Bjoern Bauer, Dr. Anika Hartz

Epilepsy is a common neurological disorder that involves repeated unprovoked seizures and affects approximately 70 million people worldwide. Despite being a common disorder, the definitive cause and pathophysiology of epilepsy are still undefined. Recent studies have identified a link between blood-brain barrier dysfunction due to leakage and epileptogenesis. Vascular inflammation caused by inflammatory mediators both in the brain and in the peripheral circulatory system plays a role in blood-brain barrier dysfunction and barrier leakage. Part of these inflammatory processes are cytokines, which are mediators of cell communication that play a critical role in inflammatory pathways. The direct relationship between inflammatory mediators, barrier leakage, and seizure induction remains unclear. The current study addresses this gap in the knowledge base and aims to determine levels of cytokines that may be induced by seizure activity and result in blood-brain barrier leakage. Plasma samples from mice that underwent status epilepticus induction were used and compared to control mice. Multi-Analyte ELISArray Kits (MEM-004A) for mouse from QIAGEN were utilized to determine the concentration levels of multiple cytokines in plasma samples using the sandwich-based ELISA technique. The cytokines measured include: IL-1a, IL-1b, IL-2, IL-4, IL-6, IL-10, IL1-2, IL-17A, IFN-y, TNF-a, G-CSF, GM-CSF. The preliminary data showed an increase in the cytokines IL-6 and G-CSF in status epilepticus mouse plasma samples, indicating a possible increase in these cytokines during seizures. This study is important because it could identify the relationship between inflammation, epilepsy, and blood-brain barrier leakage, and indicate the potential for using anti-inflammatory medication in treatment of epilepsy. Future studies will focus on analyzing cytokine levels in brain tissue from rodent epilepsy models as well as human epileptic brain.

APOE4 MEDIATES AMYLIN DEPOSITION IN THE BRAIN

Poster: 199
Vaaragie, Subramaniar

Faculty Mentor(s): Dr. Florin Despa

Amylin is a hormone that is co-secreted with insulin by the pancreas. Human amylin, when produced in excess, has the property to aggregate and produce amylin oligomers which deposit onto different organs around the body including the brain. Recent studies found that the E4 version of apolipoprotein (apoE4) is a carrier of amylin. This study was determining whether there was more amylin deposition in the brains of amylin and apolipoprotein knockout mice who were injected with human amylin and apoE4 compared to control groups. There were three groups in this study. The first group had 3 double knockout mice that were injected with saline for 7 days. The second group consisted of 2 mice and were just injected with human amylin for 7 days. The third group consisted of 3 mice and they were injected with human amylin and apoE4 for 7 days. After the 7 days, the mice were sacrificed and their brains were collected and sectioned. Then immunohistochemistry staining was performed on the brain slides staining for amylin. The results found that there was more amylin deposition in the brains of mice injected with both amylin and apoE4. This suggests that amylin was carried by apoE4 to the brain and caused more amylin deposition which then could lead to more cellular dysfunction. This is important because people with the apoE4 gene are more likely to get Alzheimer’s disease. Finding a relationship between amylin and apoE4 can indicate a relationship between Alzheimer’s and amylin which could potentially lead to a therapeutic target for Alzheimer’s Disease. It also suggests that if people who have apoE4 receive blood transfusions that contain excess amounts of amylin, they can experience amylin deposition which can cause cellular dysfunction in the brain and in other organs.
STABILIZATION OF CENTER OF MASS IS PRESERVED IN INDIVIDUALS WITH MULTIPLE SCLEROSIS

Poster: 200
Liang, Jenny
Faculty Mentor(s): Dr. Geeanjali Gera

Introduction and Background: Quiet stance requires complex integration of somatosensory, vision, and vestibular information for postural control. In multiple sclerosis (MS) subjects, somato-sensation, especially in the feet, is impaired due to demyelination and axonal degeneration of spinal and supraspinal axons in sensory pathways. Thus, MS individuals increase their reliance on vision for postural control, i.e. stabilizing body’s center of mass (CoM). Aims: We investigated the coordination among body segments with respect to the stabilization of the CoM during a quiet stance task and the effects of vision on CoM stability in people with MS and healthy individuals. We hypothesized that individuals with MS will have impaired coordination leading to reduced stability of the CoM, more so for the eyes closed condition than the eyes open condition. Materials/Methods: Subjects were asked to stand quietly with either eyes open (EO) or closed (EC) on separate trials. We analyzed the structure of postural sway variance in joint space using the uncontrolled manifold (UCM) approach. The UCM is a statistical tool to analyze the structure of variance in a multi-dimensional set of data. Kinematic data for 17 MS subjects (EDSS: 2-4) and 10 control subjects was analyzed. Results: Overall, joint configuration variance was higher for the MS group compared to the control group (F(1,25)=5.02, P<0.05). However, the component of joint configuration variance that affects the CoM position was found to be substantially lower than joint configuration variability leaving the CoM position stable (F(1,25)=12.46, P<0.01) irrespective of whether eyes were open or closed for both the MS and control groups. Conclusions: Our findings indicate that joint configuration is more variable for mildly impaired subjects with MS, as compared to the healthy individuals. However, the structure of variance is not different from healthy individuals, indicating that the active coordination between different body segments remains intact.

DETECTOR OPTIMIZATION FOR MEASUREMENT OF THE NEUTRON DECAY LIFETIME

Poster: 201
Authors: Emily Ballantyne, Rebecca Calvert
Faculty Mentor(s): Dr. Christopher Crawford

The accepted neutron lifetime is ~15 minutes before it is converted into a proton [1]. If the light weight elements were not formed within this lifetime during the Big Bang, the universe would be nothing more than a pool of protons. The current measured precision of the neutron lifetime is 0.06% [2]. However, measurements using two different methods disagree by over 6 standard deviations! By optimizing the experiment BL3 which was recently funded by the NSF to run at the National Institute of Standards and Technology, the uncertainty can be reduced to 0.01% by making changes to the detectors as well as the target areal densities [2]. The previous LiF6 target areal density was 39.3micrograms/cm^2, and will now be adjusted to 5.0micrograms/cm^2. Whereas the previous B10 target areal density was 20.0micrograms/cm^2 will be adjusted to 40.0micrograms/cm^2 [2]. The changes in densities will result in better detection rates. The other adjustment to be made is to the detector angles in order to form a better solid angle [2]. This case was considered in 2-dimensions, in order to geometrically determine the ideal angle of the detectors when placed a given distance from where the absorption of a B10 beam produces Li7 and alpha particles. This was simulated in a Python program in order to test the alpha particle exiting the absorber at various locations and various angles (phi). The process was repeated in 3-dimensions using the solid angle formula. The ideal angle for the detector placement was found to be theta = 35 degrees.
A MIRROR WORLD? DETECTOR BACKGROUND MEASUREMENTS FOR A MIRROR NEUTRON REGENERATION EXPERIMENT
Poster: 202
Blose, Alexander
Faculty Mentor(s): Dr. Christopher Crawford
There may exist a hidden mirror gauge sector with a complete copy of our normal gauge sector, standard model matter. This so-called mirror world would interact only weakly through the gravitational force, making it a candidate for dark matter, and may allow neutrons to oscillate. An experiment to search for neutron oscillations will take place at Oak Ridge National Laboratory's High Flux Isotope Reactor (HFIR) using the General Purpose-Small Angle Neutron Scattering (GP-SANS) instrument and its low background Linear Position Sensitive Detectors (LPSD). We used a separate LPSD to characterize the sources of neutron backgrounds in the vicinity to determine the necessary shielding requirements for the GP-SANS detectors from backgrounds from cosmogenic sources or other instruments. We will present results of the detector characterization, comparison to the GP-SANS detector performance, and background studies at GP-SANS. Funding Acknowledgment: This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of Nuclear Physics, under Award Number DE-SC0014622. This material is based upon work supported by the UK Office of Undergraduate Research, University of Kentucky.

DESIGNING A NEW HIGH VOLTAGE MULTIPLIER FOR THE NEDM EXPERIMENT
Poster: 203
Croley, Rhett
Faculty Mentor(s): Dr. Christopher Crawford
The electric dipole moment of the neutron, a property that has never been observed, would be evidence of the violation of time reversal symmetry necessary to explain the existence of matter in our universe. A vital component of any experiment measuring this property is a sufficiently large electric field. The electric field causes precession of the neutron's dipole moment about the field, which is a sensitive frequency-based observable. In an efforts to streamline the experimental measurement, we have created a new high voltage multiplier capable of generating extreme electric fields over a large experimental volume. This apparatus operates similar to a Marx generator, which generates high transient voltages by charging capacitors in parallel and then discharging them in series. We present the design of this new, compact, high voltage multiplier, which charges a series of thin conducting plates one at a time in parallel, to generate high voltage from the ground up, one slice at a time.

DATA ANALYSIS SERVER FOR THE NAB EXPERIMENT
Poster: 204
Dennis, Mitchell
Faculty Mentor(s): Dr. Christopher Crawford
The Nab experiment is a research collaboration of numerous universities around the globe being conducted to measure the correlation coefficient "a" to a precision of 1E-3 and the Fierz interference term "b" to 3E-3. This experiment attempts to further the understanding of one of the forces of particle physics, the weak interaction. The "DAQ Pearl" Analysis Server was constructed almost entirely in C using an MPI compiler. The MPI compiler allows the use of the Message Passing Interface allowing cores to run identical code reducing the compilation time, RAM, and overall complexity of the code itself. The MPI Compiler sends identical copies of the code to each core identifying the cores by numbers. Conditions within the code allow different cores to execute different parts of the code. However, the decentralization of the structure allows the code to process faster. A separate version of the server was developed using p-threading. P-threading centralizes the code to share the memory between the processes reducing the amount of memory copied between processes while at the same time simultaneously processing data. While this does extend the length of the code, it enables all processes to be controlled by one other process structuring the code. This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of Nuclear Physics, under Award Number DE-SC0014622.
TIME-REVERSAL ANALYSIS OF NEUTRON OPTICS COMPONENTS IN THE NOPTREX EXPERIMENT
Poster: 205
Authors: Hejer Dhahri, Lillie Cole
Faculty Mentor(s): Dr. Christopher Crawford

By the CPT theorem, the search for new sources of time reversal (ST$\$) violation in particle interactions is crucial to our understanding of charge-parity (CP$\$) violation, which is required to explain the matter-antimatter asymmetry of the universe. The aim of the Neutron Optics Time Reversal Experiment (NOPTREX) is to search for ST$\$-violation in the transmission of polarized neutrons through polarized heavy nuclear targets such as $^{139}$La, which have large measured parity-violating resonances in neutron transmission. The development of quantum mechanical time evolution operators for each individual component of our apparatus is particularly critical for analysis of our experimental sensitivity to time-odd observables, and elimination of systematic errors through the Time Reversal Invariance Violation transmission theorem\cite{Bowman}. We will focus our discussion on the calculations of time evolution operators, including propagation through a magnetic field of the spin flipper, which we mapped this summer at FP12, Los Alamos Neutron Science Center (LANSCE). This material is based upon work supported by the US National Science Foundation under award OIA-1355438 and the U.S. Department of Energy, Office of Science, Office of Nuclear Physics, under Award Number DE-SC0014622.

ERROR FROM CONVOLUTION IN RELATION TO MUON G-2 EXPERIMENT
Poster: 206
Hulse, Thomas
Faculty Mentor(s): Dr. Tim Gorringe

The Muon g-2 experiment at Fermi National Accelerator Laboratory looks to perform a high precision measurement of the anomalous magnetic moment of the muon by observing the decay data of a beam of the particles accelerated around a storage ring. The precession of these muons within a magnetic field causes the decay counts picked up by detectors lining the ring to vary with time. This effect was modeled in ROOT through the method of convolution, and computational analysis was performed to observe how this method contributed to error. Specifically, correlations between parameters within an ideal decay function were studied, as were the effects of altering various factors in the program: the total number of bins in the histograms, the number of convolution bins in the histogram, and the convolution range. As the total number of bins increased, the convoluted fits approached their theoretical value; as the number of convolution bins increased, the convoluted fits drifted from their theoretical value; and as the convolution range increased, certain parameters showed clear trends away from their theoretical value while others did not show any trend. All aspects considered, the error on several parameters greatly exceeded one part per billion but, most importantly, the error on the frequency parameter, did not. To meet the desired precision, the total error from all considerations of the Muon g-2 experiment are wanted to not exceed 1 part per million.

DESIGNING COILS WITH HIGH PRECISION MAGNETIC FIELDS
Poster: 207
Kline, Michael
Faculty Mentor(s): Dr. Christopher Crawford

High precision magnetic fields are needed for nEDM experiments and other ultracold neutron or particle physics experiments. The process of precision field design can be inverted from calculating fields to calculating the coil windings using boundary value problems involving the magnetic scalar potential. In fact, a coil with windings that follow the contours of the scalar potential on the boundary of each region will produce the exact field used to specify the calculation, up to discretization effects. Points on the equipotential curve were extracted into MATLAB and modified to import back into COMSOL to solve for the resulting field. This was repeated iteratively, modifying the windings incrementally, until a solution converged. These windings will be used to create the coils needed to produce the high precision magnetic fields.

** Denotes STEMcats project
DEVELOPMENT OF GAMMA DETECTORS FOR THE NDTGAMMA EXPERIMENT
Poster: 208
Sahibnazarova, Diana
Faculty Mentor(s): Dr. Christopher Crawford

For the NDTGamma Experiment, the goal is to measure the directional asymmetry in the gamma-ray emission from the reaction $n+D\rightarrow T+\gamma$ (6.2 MeV). The gamma ray direction emission will be measured using an array of 100 CsI scintillators attached to photomultiplier tubes (PMTs). To test the individual PMTs to be used in the NDTGamma experiment a dark box was used with a Co-60 gamma-ray source. The current output from the PMTs was examined both for the dark current without a gamma-ray source as the high voltage was increased, and with the Co-60 source to ensure that the PMTs were functioning. Additionally, the effect of the cathode and anode currents were examined. The decrease of the noise in the in gamma-ray emissions is being investigated, as well as the design of connecting the PMTs and scintillator as one system. The scintillators processes, PMTs functioning, testing methodology, and results will be presented. A parity transformation of a system turns it into its mirror images. A reaction violates parity when it does not proceed the same in the transformed and untransformed states. For the NDTGamma experiment, the polarization direction does not change under a parity transformation so we can use that as a direct reference for measuring the change in the gamma-ray emission directions due to the parity transformation of the system. The goal of this project is to test the sixty Photomultiplier tube (PMTs). The first stage of the testing is to determine if the PMTs still function after being removed from storage. The second stage of testing will be to calibrate the PMTs response to gamma-rays from a cobalt-60 source with an attached CsI scintillator in the dark box. The motivation for testing is to detect the energy of gamma that comes from Earth and that converts to light inside the PMTs.

GPU ALGORITHMS TO FIND PARTICLE DETECTION TIMES IN THE NEUTRON DECAY EXPERIMENT NAB
Poster: 209
Shelton, Thomas
Faculty Mentor(s): Dr. Christopher Crawford

The goal of the Nab experiment is to measure the little ‘a’ and ‘b’ coefficients with a precision of $10^3 \times 10^{-3}$ and $3 \times 10^{-3}$, respectively. Neutron beta decay is one of the most fundamental processes in nuclear physics that would allow probing of the weak interaction. In order to achieve this, a crucial requirement is determining the time-of-flight of protons with a systematic uncertainty of less than 300 ps to reconstruct the electron energy and estimate proton momentum require for the calculation of the coefficients. The data acquisition system has the potential to continuously stream the full 250 MS/s waveform data from up to 5000 events per second. In order to keep up with this high data rate in near-line analysis, we have implemented flexible algorithms that utilize the architecture of a massively parallel graphic processor unit (GPU). A comparison of the extraction algorithms for a number of filters with be presented. This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of Nuclear Physics, under Award Number DE-SC0014622. This work was supported by the University of Kentucky Office of Undergraduate Research.

** Denotes STEMcats project
EXPERIMENTALLY VERIFYING A THEORETICAL MODEL FOR A HIGH VOLTAGE AMPLIFIER
Poster: 210
Authors: Hugh Skinker, Rohan Rauch
Faculty Mentor(s): Dr. Christopher Crawford

To measure the electric dipole moment of a neutron, scientists can use a strong electric field that is constant over an area, like the one that is produced in a parallel capacitor circuit. The goal of this project was to test a circuit that was theoretically believed to be able to produce a high enough voltage which could be sustained on the capacitor and create an electric field that could change the angular momentum of a neutron. In order to determine if the theoretical model for the high voltage amplifier would work, two procedural paths were taken. First an electrical circuit design was tested using a computer simulation known as LTspice, which would prove that a switching circuit would prevent voltage loss; then, that circuit design was modified, the circuit was built using physical parts, and its output voltages were tested. The primary concern of the experiment was the voltage across the main capacitor, yet the multimeter was individually connected to every capacitor to observe each's behavior. Once data collection was performed on the physical circuit, analysis showed that the circuit performed at 97% efficiency in multiplying the initial voltage by n. There were, however, some deviations from the mathematical model which were proven to be caused by drainage through the capacitors' dielectric and the use of a resistor in the circuit. Because of the 97% efficiency, the circuit was still proven to be effective in voltage amplification and the engineering goal was met. In further experimentation, there would be a complete removal of all resistors used as well as the machining of a capacitor cell which would have a much higher dielectric resistance.

DATA ACQUISITION PLATFORM FOR NUCLEAR PHYSICS EXPERIMENTS
Poster: 211
Wang, Yuke
Faculty Mentor(s): Dr. Christopher Crawford

Nuclear physics involves understanding the interactions between subatomic particles such as the electron and proton. These interactions are a challenge to observe due to their size of less than 10^-15 m, however, their speed and direction can be determined by measuring the energies deposited in detectors. When a particle impacts the detector, the detector outputs an electrical pulse about a microsecond long and a few millivolts in potential. From this, the energy and timing of the particle can be precisely determined. Background-noise is present in these measurements due to external electric fields and other causes for random fluctuations in voltage. The noise can be reduced by implementing filters to average out the noise but still retain sensitivity to the relevant signal. However, existing data-acquisition systems (DAQ) used to filter and capture the data proved to be expensive ($1500/channel) and lacking in performance. Recently, high-quality electronic digitizers, programmable logic circuitry, and open-source firmware, have hit the market. The Red-Pitaya is an affordable ($400) DAQ that included 2 analog-to-digital converters and a Zynq-7000 FPGA, however, it lacks the necessary firmware to process spectroscopy signals. This project involves creating a FPGA-bitmap capable of detecting, filtering, and saving events using the Red-Pitaya framework. The bitmap consists of a first order trapezoid convolutional filter, which greatly reduces noise and pileup, and an event detection module to output events of interest. Software is created for the DAQ to package data for sending over networks and client software is written to display events in real-time. Code is written to allow the CPU to write to registers on the FPGA to change filter behavior without needing re-synthesis. This project was successful in creating a system capable of filtering and capturing events at rates of around 100,000 events per second or 3,000 events per second at high precision (16bit).
**POSTER PRESENTATIONS**

**PHYSIOLOGY**

**MYELIN MODULATES MACROPHAGES BASED ON INFLAMMATORY ACTIVATION STATE**  
Poster: 212  
Bethel, Karen  
Faculty Mentor(s): Dr. John Gensel

A notable contribution to spinal cord injury (SCI) pathology is chronic inflammation and macrophage activation. It has been shown that the detrimental pro-inflammatory M1 macrophage response is sustained post-injury, while the reparative M2 response is diminished after 1 week. It is not clear why the M1 phenotype predominates, but the presence and clearance of myelin debris may be a potentiating factor. There is controversy as to the role of myelin; however, one clarifying hypothesis is that macrophages respond differently to myelin depending on their phenotype. In vitro, bone marrow-derived macrophages (BMDMs) induced with pro- and anti-inflammatory stimulants and unstimulated (control) macrophages were treated with and without myelin. Differential responses to myelin depending on activation state were observed via RT-PCR; myelin was shown to potentiate M1 pro-inflammatory mRNA targets (IL1β, TNF-α, and Marco) while M2 and control BMDMs were largely unresponsive. Myelin-treated M1 BMDM supernatant led to decreased F11 dorsal root ganglia differentiation, axon length, and neuron health. A further hypothesis is that M1 supernatant leads to increased neuron toxicity measured by N2a cell death. There was no significant difference in myelin phagocytosis between groups, suggesting that this is not the mechanism of action. Results suggest that myelin could be contributing to M1 phenotype predominance, and its molecular mechanism involving cPLA2 may account for this difference. Thus, a future direction will be in vivo, using macrophage-specific cPLA2 knockout (KO) mice. cPLA2 KO mice are expected to have decreased secondary injury progression and inflammation which could lead to neuronal regeneration post SCI.

**IMPACT OF MICRORNA-33A/B ANTAGONISM ON ATHEROSCLEROTIC LESION SIZE IN NONHUMAN PRIMATES**  
Poster: 213  
Kelly, Morgan  
Faculty Mentor(s): Dr. Ryan Temel, Dr. Lei Cai, Sierra Paxton, Peter Hecker

Atherosclerosis is a contributing factor to cardiovascular disease (CVD); the leading cause of death for both men and women in the United States. Atherosclerotic lesions can block arteries by stenosis or rupture-induced thrombosis leading to heart attack and stroke. Statins are widely prescribed to treat CVD but only reduce disease risk by ~30%. Our lab is studying microRNA-33 as a potential target to decrease residual CVD risk. The two members of the microRNA-33 family microRNA-33a and microRNA-33b coordinately regulate lipid metabolism with their host genes sterol regulatory element binding transcription factor 2 (SREBF2) and SREBF1. MicroRNA-33 antagonism in mice decreases atherosclerosis but mice have only microRNA-33a while humans and nonhuman primates (NHPs) have microRNA-33a and b. Therefore our lab used NHPs to test the hypothesis that antagonizing microRNA-33a/b will stabilize or decrease atherosclerotic lesion size. Male cynomolgus monkeys were fed an atherogenic diet for 20 months. A third of the animals were necropsied after 20 months to assess the progression of atherosclerotic lesions while the remaining animals were switched to a standard monkey diet and treated with either vehicle or an antisense oligonucleotide targeting microRNA-33a/b (anti-microRNA-33). The goal of my project is to section, stain, and analyze atherosclerosis in the abdominal aortas of the NHPs. Morphometric data that includes lesion size will be collected using Nikon elements software by drawing regions of interest (ROIs) on imaged cross sections of abdominal aorta. The morphometric data from the abdominal aortas will be statistically analyzed to detect differences between the progression, vehicle, and anti-microRNA-33 groups. In addition, I will qualitatively compare the morphometric data analyzed from the abdominal aorta to that of the coronary arteries that have been stained and analyzed previously. This latter analysis will allow us to determine whether anti-microRNA-33 treatment affects the abdominal aorta differently than the coronary arteries.
USING PLASMA AND BREATH MEASURES TO DETECT APOE-DEPENDENT CHANGES IN GLUCOSE METABOLISM

Poster: 214
Khanal, Rebika
Faculty Mentor(s): Dr. Lance Johnson

Apolipoprotein E (APOE) is present in both the periphery and the brain, and is associated with circulating lipoproteins. APOE is well known for its connection to both Alzheimer’s disease (AD) as well as cardiovascular diseases (CVD). In humans, there are three common isoforms of apoE: E2, E3, and E4. Compared to E2 and E3, E4 is associated with an increased risk of both AD and CVD. AD is associated with metabolic and vascular factors, both of which precede and may contribute to dementia. Interestingly, E4 is associated with deficiencies in both areas; there is both decreased cerebral glucose metabolism and lower cerebral blood flow in E4 individuals. However, the precise mechanism by which APOE alters metabolism is unknown. Therefore, we are conducting a human study in which we probe the effects of APOE on glucose and lipid utilization by measuring metabolic rate and respiratory exchange ratio (RER), a reflection of energy substrate usage, using indirect calorimetry. Our preliminary findings in 60 subjects show measurable increases in RER during a cognitive challenge, as well as APOE genotype specific effects on resting energy expenditure (REE). Additionally, a dietary glucose challenge resulted in an increase in RER only in E4 individuals. Plasma glucose levels also show an APOE-dependent change pre- and post- dietary challenge, with E4 individuals demonstrating larger increases. These findings are an important step toward elucidating the precise mechanism of APOE’s effects on metabolism in order to better understand the role of this important genetic risk factor on vascular disease and dementia.

THE MECHANISTIC ROLE OF DENND5B IN CHYLOMICRON SECRETION

Poster: 215
Khandani, Sara
Faculty Mentor(s): Dr. Scott Gordon

Dietary fat is absorbed by epithelial cells in the intestine called enterocytes. These cells absorb triglyceride from the diet and repackage it into lipid particles, called chylomicrons, for distribution throughout the body. The Gordon lab has previously discovered that the gene DENND5B plays an important role in chylomicron secretion and that genetic variants are associated with body weight in humans. However, it is not yet known how DENND5B carries out its function. This project was focused on understanding the mechanistic role of DENND5B in intracellular trafficking in enterocytes, more specifically, how DENND5B interacts with other proteins to facilitate chylomicron secretion. The DENN domain has been shown to activate RAB proteins which are known to perform important roles in vesicular trafficking. Immunofluorescence was used to determine the intracellular localization of DENND5B and RAB39, a suspected target of DENND5B, in the Caco-2 intestinal epithelial cell line. This revealed DENND5B localization to intracellular vesicles and punctate plasma membrane staining while RAB39 was detected primarily in punctate forms along the plasma membrane. The data suggests that DENND5B may interact with RAB39 at the plasma membrane to facilitate fusion of chylomicron secretory vesicles. Additionally, the effects of nutrients on DENND5B gene expression were investigated. Differentiated Caco-2 cells were treated with oleic acid plus the bile acid taurocholate (mimicking the intestinal contents after a meal containing fat) for 24 hours then RNA was isolated from the cells for gene expression analysis. Upon treatment, DENND5B expression increased by 3.4 fold. This data suggests that DENND5B expression may be upregulated after a fat-containing meal to accommodate an increased rate of chylomicron secretion. In conclusion, the data suggest that the action of DENND5B may require interaction with RAB39 at the plasma membrane during chylomicron secretion and that DENND5B levels may be dynamically regulated in response to dietary fat consumption.
APOLIPOPROTEIN E4 REDUCES ISOCITRATE DEHYDROGENASE ACTIVITY IN ASTROCYTES
Poster: 216
Piron, Maggie
Faculty Mentor(s): Dr. Lance Johnson

Apolipoprotein E (apoE) is a lipoprotein expressed in many different cell types, but predominantly in the brain and liver. Three main isoforms of apoE exist in humans (E2, E3, and E4). The E4 allele is the strongest genetic risk factor for late-onset Alzheimer’s Disease (AD). The increasing number of aged individuals in the population also means a rapidly increasing prevalence of AD, yet the underlying mechanisms of AD remain unknown. An interesting hallmark of AD is a regional pattern of cerebral glucose hypometabolism. Even more interesting is that E4 carriers display the same pattern of glucose hypometabolism decades prior to disease onset. The link between impaired glucose metabolism, APOE, and AD is a major unknown in the field. Using stable isotope-resolved metabolomics (SIRM), we hope to further elucidate the connection between glucose metabolism and E4’s AD risk. SIRM will allow us to examine at the molecular level the balance of glucose metabolism within various model systems. In human APOE targeted-replacement mice, the TCA cycle shows perturbations in E4 brains. Specifically, alpha-ketoglutarate was decreased in E4 suggesting further examination of isocitrate dehydrogenase (IDH), the enzyme responsible for the conversion of isocitrate to alpha-ketoglutarate. IDH activity was impaired in E4 astrocytes, which is consistent with our findings in mice brains. Further studies are aimed at identifying additional enzymes in other central carbon metabolism pathways and understanding substrate-enzyme dynamics with the hopes of uncovering potential therapeutic targets.

ANALYZING THE STATISTICAL PROPERTIES OF THE BASSO MOUSE SCALE FOR INJURED MICE POPULATIONS IN ORDER TO DETERMINE NORMALITY
Poster: 217
Richards, Kirsten
Faculty Mentor(s): Dr. John Gensel

The Basso Mouse Scale (BMS) is frequently utilized in Spinal Cord Injury Labs in order to measure the locomotor outcome of injured mice based on a 0-9 scale. More specifically, the BMS scale measures the locomotor function of mice on days 1, 3, 7, 14, 21, and 28 post injury. Throughout the years, the BMS scale has been used extensively, in turn generating a significant amount of data. The goal of the experiment is to determine the statistical population properties of the compiled BMS scores, focusing on 75 kdyn (severe) injuries. It is hypothesized, that through compiled data, the normality of the population can be determined, and in turn generate many statistical tests including: 95% and 75% confidence intervals, median based on categorical deviation, score frequency, etc. for each day post injury (dpi). Once determined, this data will better assist future studies by establishing exclusion criteria. In the future, it would be ideal to apply a more refined statistical analysis of this data in order to further the understanding and quantification through the use of the BMS. By doing so, a baseline for the control population will be determined.

** Denotes STEMcats project
** AGO1 PROTEIN INFLUENCE ON ARABIDOPSIS SUSCEPTIBILITY TO CUCUMBER MOSAIC VIRUS**

Poster: 218  
**Authors:** Tabitha Charter, Samuel Herrington, Mindy Lockhart, Kayla Putty, Felicity Shirkey

**Faculty Mentor(s):** Dr. Aardra Kachroo, Dr. Pradeep Kachroo

The genetic code can encode for certain proteins to provide immune support in an organism. Depending on the pathogen, the immune responses of the plant may vary. We examined whether the Argonaute gene (AGO1) in the *Arabidopsis thaliana* plant was the main influence of immune support in the plant. To assess this, two lines of *A. thaliana* were inoculated with a RNA-based plant pathogen- the cucumber mosaic virus. One line of plants was the transgenic line of arabidopsis and the other was a mutagenic line. It was hypothesized that the transgenic line having the AGO1 gene would be resistant to the virus while the mutagens lacking this gene would be more susceptible. To track the location of the proteins in the Arabidopsis plant cells encoded by AGO1, Anti-GFP was utilized, then the fluorescence was observed through a confocal laser scanning microscope.

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**POLITICAL SCIENCE**

**THE POTENTIAL ELECTORAL INFLUENCE OF INTERNET MEMES**

Poster: 219

**Hatfield, Sierra**

**Faculty Mentor(s):** Dr. Stephen Voss

The rising popularity of social media has affected the communication methods of political candidates within the United States. Given the online presence of candidates in recent years, this paper argues that it's time to consider internet memes, one of the many facets most commonly found on social media as political rhetoric. This paper seeks to discern which components of an internet meme are most effective in persuading a young voter, using a visually rhetorical approach to understand which characteristics make it most effective. The study also seeks to find which demographics are most likely to be influenced, using Cambridge Analytica's belief that voter personalities matter. Using Limor Shifman's three memetic dimensions (content, form, and stance) the author created three pairs of memes about a fictional political candidate, Jonathan Bell, and then distributed the memes as a Canvas survey for 159 college students. The effectiveness of the meme was measured by its ability to influence a young voter to share it, like the candidate it references, and evaluate their knowledge of the candidate referenced as reliable. Using STATA contingency tables and ordered probit analyses, all four of the significant findings of the study were determined as not influenced by the characteristics of the memes, but rather the characteristics of their recipients. Prior exposure and interaction with internet memes, gender, race, and grade point average were the determining factors for a young voter's susceptibility to the rhetoric contained within the memes in the survey. This paper offers empirical results to anyone with an interest in memetics, the young electorate, or political communication. It suggests that if internet memes want to be treated as a form of communicative media, scholars first need to understand to whom memes communicate and why.
Coal Crash Politics: The Decline of the Coal Industry and the Democratic Party in Central Appalachia

Poster: 220

Melton, Timothy

Faculty Mentor(s): Dr. Justin Wedeking

The late 2000s and 2010s saw two major shifts in Central Appalachia— a cataclysmic decline in the coal industry and major losses in state legislative races for the Democratic Party. While it is often speculated that these two events were related, little to no research has been done on the subject. This project examines the possibility of a distinctly Appalachian voting pattern, and once that is demonstrated, determines the empirical impact of the decline in the coal industry on the voting patterns of Appalachian counties affected by it. The theoretical basis for this project is the idea that economic forces influence the choices of voters. This choice could be made at the individual level, as voters take into account the sociotropic effects of the decline seen in their friends, family, or neighbors, or at the macropolitical level as voters witness the decline of the regional economy. The theory of issue ownership is also addressed, as what was once a bipartisan issue in the region became polarized under the Obama presidency. As the economy worsened and the Democratic Party was increasingly painted as the anti-coal party, the region began shifting towards Republicans. To test whether this shift was due to the crash of the coal industry or from other factors that happened to coincide with the crash, this project uses a fixed effects model to test the impact of the decline in coal employment on the share of votes received by Democratic candidates for Kentucky and West Virginia state legislative seats, while controlling for other economic and demographic factors. Understanding the nature of the decline of Democratic support in the region will help shed light on the role of economic factors on shifts in voting behaviors.

Psychology

Peripheral Blood MicroRNA Levels in Females with Cocaine Use Disorder

Poster: 221

Aguzzoli Heberle, Bernardo

Faculty Mentor(s): Dr. Joshua Beckmann

Background: There is growing emphasis in the field of psychiatry on the need to identify candidate biomarkers to aid in diagnosis and clinical management of addictive disorders. MicroRNAs (miRNAs) are small nucleotide sequences with the ability to regulate gene expression at the transcriptomic level. However, the role of miRNAs as potential biomarkers for addiction is still underexplored. Based on translational and clinical findings, we compared the expression levels of microRNA-124 (miR-124), microRNA-181 (miR-181), and microRNA-212 (miR-212) between a group of females with cocaine use disorder (CUD; n = 30) and a group of healthy female controls (HC; n = 20). Methods: Blood expression levels of miR-124, miR-181, and miR-212 in the HC and CUD group were determined by qPCR, using two miRNAs as endogenous controls (miR-24 and miR-126). Substance use behavior was assessed by self-report using the Addiction Severity Index (ASI-6) and depressive symptoms severity was measured using the Beck Depressive Inventory (BDI-II). Urine screen test was performed to detect cocaine metabolites. Results: Mir-124 and miR-181 were upregulated in the CUD group (p > 0.01). Furthermore, increased cognitive/affective depression symptoms were identified among a CUD subgroup with the higher miR-181 expression levels (p > 0.05). No significant difference in expression levels was found for miR-212. Conclusions: Mir-124 and miR-181 show promise as biomarkers for CUD when assessed in the peripheral blood. Further investigation is needed to elucidate the molecular mechanisms underlying these associations and to validate target genes regulated by these miRNAs.

** Denotes STEMcats project
EXAMINING BYSTANDER INTERVENTION AND INHIBITION ACROSS PERPETRATOR AND VICTIM GENDERS IN SEXUAL ASSAULT CASES

Poster: 222
Baker, Dylan
Faculty Mentor(s): Dr. Jonathan Golding

The "bystander effect" is the phenomenon in which individuals are less likely to help a victim (bystander inhibition) if other people are present. It became a topic of study following the tragic murder of Kitty Genovese in which witnesses failed to aid Genovese during her attack, or even to call the police until the assailant had escaped. Initial research following the Genovese murder revealed a pronounced bystander effect, in which the addition of passive bystanders decreased bystander intervention in simulated emergencies (Darley & Latané, 1968; Latané & Darley, 1968, 1970; Latané & Nida, 1981). Subsequent research, however, revealed that the bystander effect is not consistent across all conditions. The effect was lessened (and thus bystander intervention increased) in high-danger and unambiguous situations (Harari et al., 1985; Schwartz and Gottlieb, 1976; Fischer et al., 2006). The present study seeks to further understand bystander inhibition and intervention by understanding its relationship with gender in sexual assault cases. In the present study, participants were presented with a description of two simultaneous instances of sexual assault, where the assaults vary by victim and attacker gender. The participant must engage in bystander intervention by helping one victim and at the same time bystander inhibition by failing to help the other victim. Furthermore, participants were asked for reactions regarding sympathy for the victim, anger towards the perpetrator, seriousness of the situation, and vulnerability of the attacked. In this manner, the bystander effect is examined with regard to gender (i.e., the gender pairing of perpetrator and victim) and the reactions behind such effect. This study contained two hypotheses: 1) participant gender would impact participant reactions as females would rate higher across all reactions and 2) conditions with a female victim would garner greater bystander intervention.

EXPLORING THE ROLE OF ORBITOFRONTAL CORTEX FUNCTION IN DRUG-RELATED DECISION-MAKING

Poster: 223
Baker, Hayley
Faculty Mentor(s): Dr. Joshua Beckmann

Drug users do not take drugs in isolation; rather, they are often faced with several concurrently available commodities (e.g. monetary goods, social relationships). Thus, using choice measures to assess the relative subjective value of drug reinforcers in both humans and animals promotes a translational understanding of mechanisms that govern drug-associated decision-making. Additionally, while the orbitofrontal cortex (OFC) has been shown to be involved in value-based decision-making between qualitatively different non-drug alternatives, its role in valuation of drug vs. non-drug alternatives is largely unknown. To better understand the role of the OFC in drug-related decision-making, we used reversible inactivation (baclofen/muscimol microinfusions) and oximetry (a proxy of neuronal activity) in rats performing under a novel cocaine vs. food choice procedure that dissociates preference from intake. Inactivation of the OFC produced a specific decrease in sensitivity to relative cocaine-food magnitude changes, an effect that is consistent with the existing literature implicating OFC function in encoding the relative subjective value of qualitatively different choice alternatives. Further, using a separate group of rats, OFC neuronal activity (as measured by oxygen consumption) was positively correlated with choice, tracked changes in preference with changes in cocaine-food magnitude, but was unrelated to actual reinforcer (food or cocaine) delivery. Thus, we have potentially isolated drug vs. food preference from intake effects due to the fact that OFC activity was specific to choice behavior and associated subjective value. Taken together, these data add to the research suggesting that the OFC is critical for decision-making processes involving qualitatively different goods and extends those results to drug-associated choice mechanisms in substance abuse disorder.

** Denotes STEMcats project
SO YOU'RE GAY AND YOU WANT A BABY: A THEMATIC ANALYSIS OF LGBTQ PERCEPTIONS OF FUTURE PARENTHOOD

Poster: 224
Bass, Chelsea
Faculty Mentor(s): Dr. Rachel Farr

This study examined the perceptions LGBTQ+ people have about future parenthood. The pathway to parenthood presents unique hardships for LGBTQ+ couples throughout history, such as discriminatory adoption policies and general negative biases. There is also a lower rate of parenthood among LGBTQ+ individuals than there is with heterosexual people. Because of these factors, LGBTQ+ people can have a distinct way of perceiving future parenthood. This poster is part of a larger longitudinal study of 104 participants on intended parenthood, the focus here being on narratives related to perceptions of future parenthood. In order to find how these perceptions manifest, two open-ended questions pertaining to parenthood were asked to participants. Thematic analysis was used to pinpoint salient themes present in the answers to these questions. Themes such as "My child will be more open-minded as a result of my identity," "Parenting will be intentional," and "I am worried about discrimination," among others appeared in participant narratives. Given the history of discrimination towards LGBTQ+ people and future parenthood, understanding their narratives can help us further understand the specific views on parenting that members of this community have, and can also add insight on the reasoning for their comparatively low rate of parenthood. In addition, by compiling the views and intentions LGBTQ+ people have about future parenthood, steps can be made against current and future policies that inhibit the ability of LGBTQ+ individuals to become parents.

ACADEMIC MOTIVATION AND ATTITUDES IN MIDDLE SCHOOL

Poster: 225
Browning, Lindsey
Faculty Mentor(s): Dr. Christia Brown

Students’ success in school is associated with a number of academic attitudes, including academic self-efficacy, mastery goal orientation, skepticism of school, and low achievement presentation. Previous research has shown that academic self-efficacy and mastery goal orientation decrease with age (Yeung, Lau, & Nie, 2011), while low achievement presentation increases with age (Juvonen & Murdock, 1995). Additionally, boys have lower mastery goal orientation and academic self-efficacy than girls (Yeung et al., 2011), but higher low achievement presentation and skepticism (Daubman, Heatherington, & Ahn, 1992). Much of this prior research has focused on high school or elementary school students; thus, the current study examined middle school students. The participants of this study were 142 middle school students, ages 11-15 (99 girls). Students completed survey packets during school hours under the supervision of research assistants. Packets included demographic information and several scales from the Pattern of Adaptive Learning Scales (PALS; Midgley et al., 2000). As predicted, girls were higher in mastery orientation than boys (B = .23, t(136) = 2.71, p = .01). For boys, age negatively predicted academic efficacy (B = -.66, t(40) = -.62, p < .001). Age positively predicted both low achievement presentation (B = .23, t(136) = 2.73, p = .01) and skepticism of school (B = .33, t(136) = 4.04, p < .001) for boys and girls. These results suggest that as adolescents, particularly boys, transition across middle school, they become less motivated and engaged in school. This disengagement may have a lasting impact as adolescents then transition into high school and begin making decisions about college. Future research should examine the mechanisms underlying this shift away from academics, as well as examine whether these changes in attitude are subject specific.
GOD'S GREEN EARTH: THE RELATIONSHIP BETWEEN AFTERLIFE BELIEFS AND CLIMATE CHANGE CONCERNS
Poster: 226
Authors: Jennifer Bulin, Imani Linton, Luke Hayes
Faculty Mentor(s): Dr. Will Gervais, Sarah Schiavone

Americans' attitudes towards climate change appear polarized across partisan lines (Pew, 2016). In addition to political differences, previous research suggests that the endorsement of climate change is related to religious belief and affiliation (Morrison, Duncan, & Parton, 2015). The current study investigated the relationship between beliefs about an afterlife and concern about climate change. Participants (N = 871 undergraduates) completed a survey exploring attitudes towards climate change and various afterlife beliefs. Results suggest that afterlife beliefs (e.g., heaven, hell, the rapture) were significantly negatively correlated with concerns about climate change. Further, participants who did not believe in an afterlife were significantly more concerned about climate change than those who believed in an afterlife. Future research should seek to differentiate how specific domains of religious belief may, along with political ideology, predict Americans' attitudes towards climate change.

LOSING MY RELIGION: PERCEPTIONS OF PASSIVE AND ACTIVE ATHEISTS
Poster: 227
Authors: Madison Burt, Daisy Jarrell
Faculty Mentor(s): Dr. Will Gervais

Deconversion, or the process of leaving one's religious affiliation, can be perceived as either a choice or not a choice. Based on this perception, people may hold certain prejudices against those who deconvert. Given that the world's religiously unaffiliated population is growing steadily (Pew), understanding factors that may affect this prejudice is important. In the current research, we predicted that those who actively chose to deconvert will be perceived more negatively than those who passively deconverted. Data was collected from 227 undergraduates at the University of Kentucky, and results indicate that individuals who actively chose to deconvert were perceived as less moral and warm.

FAITH AROUND THE WORLD: GLOBALIZATION AND REDUCED RELIGIOSITY
Poster: 228
Authors: Elizabeth Chapleau, Quinten L. Harris
Faculty Mentor(s): Dr. Will Gervais, Nava Caluori

Nonreligion is increasing rapidly worldwide. In America, the last 70 years saw a 20% decrease in religious affiliation. Why is secularization increasing now after religion's longstanding stability, and why are some nations secularizing faster than others? We investigate globalization as a potential predictor of secularization. Globalization entails cultural mixing and broader conceptualizations of one's religious and cultural communities. Because of these factors, we predict that globalization should be negatively associated with religion across time and culture. Using data from the KOF Globalization Index and data about religious identification in the US and abroad, we test for a negative relationship between globalization and religiosity. We test for this relationship using longitudinal data from the United States between the years 1970-2014, as well as with recent cross-sectional data across 52 countries.
PERCEPTIONS OF WORKPLACE HARASSMENT
Poster: 229
Cremeans, Bailey
Faculty Mentor(s): Dr. Jonathan Golding

Workplace harassment is defined by the Equal Employment Opportunity Commission as "conduct that is severe or pervasive enough to create a work environment that a reasonable person would consider intimidating, hostile, or abusive (U.S. Equal Employment Opportunity Commission-EEOC, 1965). The majority of the literature exists regarding workplace harassment involves sexual harassment, as opposed to other types, such as verbal abuse. However, extensive research indicates that verbal abuse exists in the workplace and can be extremely damaging to employees. Victims of verbal abuse do not receive automatic legal protection unless the harassing comments that they face involve a protected status group. Thus, harassing comments are not illegal if they do not directly involve gender, race, ethnicity, sex, age or a disability. This is a problem for individuals who suffer workplace verbal abuse based on characteristics such as general appearance, socioeconomic status, or intelligence. The current study aimed to further investigate perceptions of verbal abuse, specifically related to weight and intelligence. A 2 (participant gender) X 2 (employer gender) X 2 (employee gender) X 2 (insult type-weight/intelligence) mixed-factor design was used. Employer gender, employee gender, and insult type were within-participant variables. Participant gender was a between-participant variable. Participants read scenarios describing possible workplace harassment and judged each scenario on various dimensions. We hypothesized the following with regard to severity of the incident: (1) a main effect of the type of comment—comments about one's intelligence would be perceived as LESS severe than comments about one's weight; (2) a main effect of victim gender—female victims would provoke higher ratings of severity than male victims; (3) a main effect of perpetrator gender—male perpetrator would provoke higher ratings of severity than a female perpetrator; and (4) a main effect of participant gender—female participants would rate all scenarios more severe than male participants.

PROCRASTINATION IN THE PIGEON: CONDITIONED REINFORCEMENT MAY CONTRIBUTE TO HUMAN PROCRASTINATION
Poster: 230
Elena Martin, Ines
Faculty Mentor(s): Dr. Thomas Zentall

Procrastination is the tendency to put off the completion of a task. Although people are typically known to procrastinate, research suggests that they sometimes "pre-procrastinate" by initiating a task sooner than they need to (Rosenbaum et al. 2014). In the present experiment, we used a procedure with pigeons that was similar to procedures used by Rosenbaum et al. Pigeons had a choice between two sequences. Choice of the "procrastination" chain resulted in color A, which 15-s later would change to color B and 5-s later resulted in reinforcement. Choice of the "pre-procrastination" chain resulted in color C, which 5-s later would change to color D and 15-s later resulted in reinforcement. Both chains led to reinforcement after 20 s. Results indicated that the pigeons procrastinated; preferring the 15-5 chain over the 5-15 chain. The results are consistent with Fantino's (1969) delay reduction theory, which posits that stimuli that signal a reduction in the delay to reinforcement, such as the 5-s stimulus that occurred immediately prior to reinforcement, serve as conditioned reinforcers and should be preferred. To support this theory, the pigeons pecked most at the 5-s stimulus that led immediately to reinforcement, indicating it had become a strong conditioned reinforcer.
ACES WILD: AN EXPLORATION OF ATTITUDES TOWARDS ASEXUALS
Poster: 231
Floyd, Sydney
Faculty Mentor(s): Dr. Rachel Farr

The attitudes non-aseXual individuals (e.g., heterosexual [straight], lesbian, gay, bisexual, pansexual, and queer persons) have towards asexual people was investigated in this explorative study. Asexuality is an identity term for people who experience little or no sexual attraction, with "ace" used informally to refer to an asexual person. The purpose of this study was to explore which negative or false-positive stereotypes about asexual individuals that non-aseXuals most commonly hold. There has not been a study of this particular subject. The effect that identity (i.e., sexual orientation, sex assigned at birth, religious membership, political orientation) and knowledge of asexuality has on the attitudes towards asexual people was also explored. Data were collected through the University of Kentucky's SONA system. These questions are included in the psychology pre-screen questionnaire, which is available to every student taking PSY 100, 215, and 216. Using Crandall's prejudice measures adapted to include asexual individuals, we asked to what extent respondents endorse such statements like "asexual people say that they're asexual to avoid being gay" and "asexual people are asexual due to sexual trauma," on a six-point scale from strongly agree to strongly disagree. We also ask about two traits: trustworthiness and intelligence. The hypotheses are that heterosexual individuals will endorse more anti-aseXual attitudes than will LGBQP people. All groups will rate asexual people as "extremely intelligent" as compared to the other groups included. Those who do not know what asexuality is will rate asexual people more neutrally (i.e., choose either "slightly agree" or "slightly disagree") than those who do know what asexuality is. The implications of this study are to legitimize the existence of anti-aseXual prejudice and to serve as a starting point for future research.

THE EFFECTS OF ALCOHOL WITHDRAWAL ON TRAUMATIC BRAIN INJURY
Poster: 232
Gebhardt, Jessica
Faculty Mentor(s): Dr. Mark Prendergast

There are 2.8 million traumatic brain injury (TBI)-related emergency visits in the United States, with 35-81% of cases involving intoxication during the time of injury. Additionally, 42% of TBI patients were heavy drinkers before the onset of injury (The Influence of Alcohol on Mortality in Traumatic Brain Injury, 2013). Alcohol tolerance and dependence is caused by the upregulation of the glutamatergic receptor, N-methyl-D-aspartate (NMDA), and is responsible for much of the hyperexcitability in the central nervous system (CNS) during alcohol withdrawal. TBI causes excitotoxicity through the unregulated release of glutamate and calcium influx, theoretically making individuals experiencing alcohol withdrawal more susceptible to the effects of trauma. This study sought to determine if the maladaptive neuroplasticity of the glutamatergic NMDA receptors in response to alcohol exposure and withdrawal would be synergistically impacted by trauma. Organotypic hippocampal slice cultures were exposed to five days of alcohol in vitro. The cell cultures were then subjected to twenty-four hours of alcohol withdrawal, followed by a TBI model of a cut to the cornu ammonis 1 (CA1) region of the hippocampus. Uptake of the non-vital fluorescent dye, propidium iodide, marking cell death, was used to image the data. In conclusion, trauma was significant in increasing cell death, but alcohol withdrawal did not significantly increase the cell death in combination with trauma. This could be due to the single withdrawal period. However, there was a sex effect with female rats having a greater area of trauma than male rats. Further studies should evaluate how multiple withdrawals could increase alcohol's effect on TBIs and give further elucidation on how hormones and their relationship to trauma could lead to the observed sex difference. Acknowledgements: National Institute on Alcohol Abuse and Alcoholism, Julia Jagielo-Miller, and Caleb Bailey.
PARENT-CHILD GENDER TRENDS AMONG LESBIAN, GAY, AND HETEROSEXUAL PARENT ADOPTIVE FAMILIES

Poster: 233
Authors: Evelyn Gonzalez-Lozano, Calisse Burand
Faculty Mentor(s): Dr. Rachel Farr

Same-sex couples are adopting at increasing rates, despite potential obstacles from societal forces stemming from concerns about children’s gender socialization, parents may also have concerns about socializing children of a different gender than their own. Therefore, it is important to know how parents sexual orientation and gender identity may influence adoption trends related to children’s gender. We propose the following hypothesis: lesbian and gay couples will be more likely to have their first adopted child match their respective gender, meanwhile, later siblings might be of any gender. Therefore, our central research question is: Are there differences in adoptive parents sexual orientation and the gender(s) of the children they adopt? We anticipate that lesbian mothers will be most likely to adopt girls as their first child, gay fathers will be most likely to adopt boys, and heterosexual parents will have no observable differences in the gender of their first adopted child. However, in later adopted siblings, we anticipate that there will be no observable differences between parents sexual orientation and their child’s gender. Our data comes from a larger ongoing longitudinal study examining lesbian, gay, and heterosexual parent adoptive families (106 total families). We will run chi-square independence test analyses to test our hypothesis. Our findings will expand upon the limited research that exists examining adoption trends and preferences related to parents sexual orientation and child gender. Continued research in this area could have important implications for policymakers and adoption professionals working with these diverse families. As such, providing information to these diverse families and the professionals whom work with them is a necessary service.

JURY PERCEPTIONS OF EMOTIONAL ABUSE ON CHILD ATHLETES: WHEN IS ENOUGH ENOUGH?

Poster: 234
Graham, Olivia
Faculty Mentor(s): Dr. Jonathan Golding

Some athletic coaches have recently been under scrutiny, accused of emotionally abusing athletes. Emotional abuse is “a repeated pattern of caregiver behavior or extreme incident(s) that convey to children that they are worthless, flawed, unloved, unwanted, endangered, or of value only in meeting another’s needs” (American Professional Society on the Abuse of Children, 1995). Many downplay this type of abuse involving a coach when a coach has a successful team or athlete. In addition, for some, emotional abuse of an athlete is less damaging than physical and sexual abuse, and may be harder to identify than other types of abuse (Kaplan, Pelcovitz, & Labruna, 1999). In the realm of athletics, emotional abuse can occur between coaches and athletes because coaches hold immense power over athletes, and coaches believe that they are merely pushing their athletes to reach their full potential. The present study investigated the perceptions of mock jurors to a case of emotional abuse in civil court. We used a 2 (Victim Gender) x 2 (Victim Age, <19 vs. >17 years old) x 2 (Participant Gender) between-participants design. Each participant read a civil trial summary, after which they rendered a decision for the plaintiff or defendant, and rated witnesses for credibility, etc. Based on prior research we had four hypotheses. First, we predicted a main effect of participant gender—female participants should be more pro-victim (e.g., more plaintiff rulings) than male participants. Second, we predicted a main effect of victim age—younger victims should receive more pro-plaintiff judgements than older victims. Third, we predicted a main effect of victim gender (e.g., more plaintiff decisions) when the victim is female than male. Finally, although not manipulated, we predicted that participants who did not participate in organized sports as a child should be more pro-victim than those who did participate.
THE IMPACT OF SOCIAL MEDIA USE AND GENDER TYPICALITY ON ENDORSED SEXUALIZED GENDER STEREOTYPES
Poster: 235
Grieff, Abigail
Faculty Mentor(s): Dr. Christia Brown

Social media use is frequent among adolescents, as 89% of teens age 13-17 in the US have at least one social media account (Pew Research Center, 2018). The majority of media targeting adolescents is highly sexualized, defined as content that places a person's value on their appearance and sexual appeal (APA, 2007). Highly sexualized media conveys sexualized gender stereotypes, which includes the notion that women are sexual objects, men are sexual pursuers, and reinforces the importance of appearance and sexual attractiveness for both men and women (Ward, 2015). Because adolescents spend many hours on social media, they may be highly exposed to sexualized images; this may, in turn, promote their endorsement of sexualized gender stereotypes (Ward, 2003). As sexualized gender stereotypes reinforce gender-typical appearance and behavior, the relationship between social media use and sexualized gender stereotypes might be especially strong for adolescents who perceive themselves to be more typical for their gender (Egan & Perry, 2001). The current study examined the association between frequency of social media use and endorsement of sexualized gender stereotypes, and whether this relationship was moderated by perceived gender typicality. It was hypothesized that higher frequency of social media use would predict higher endorsement of sexualized gender stereotypes, and that this relationship would be stronger for those with higher gender typicality compared to those with average or lower gender typicality. Participants were N = 142 (43 boys, 99 girls) with a mean age of 12.44 years (SDage = .61). Participants identified as White/European American 45%, Latino/Hispanic 22%, Black/African American 19%, multiracial 13%, and Asian 1%. Contrary to the hypotheses, results indicated a significant interaction between social media use and gender typicality, such that higher social media use predicted higher endorsement of sexualized gender stereotypes only among individuals who were average or low in gender typicality. Implications of results will be discussed.

SELF-EFFICACY FOLLOWING SCHOOL-BASED INTERVENTIONS FOR ADHD
Poster: 236
Griffiths, Caiti
Faculty Mentor(s): Dr. Elizabeth Lorch

Attention Deficit Hyperactivity Disorder (ADHD) includes inappropriate levels of hyperactivity, inattentiveness, and impulsivity. Children with ADHD encounter reading comprehension problems more often than their peers. Although medications prescribed for ADHD can improve attention and behavioral issues during school, they do not address deficits in higher-order functioning, which enables comprehending narratives. Children with ADHD often experience academic failure, which may influence their self-efficacy, or the belief in one's ability to succeed in a given situation. This project will examine the change in comprehension-specific skills and self-efficacy for third- and fourth-grade students at risk for ADHD following participation in a narrative comprehension intervention (NS) targeting deficits experienced by children with ADHD. These results will be compared to the change in comprehension-specific skills and self-efficacy for children in a counterfactual intervention targeting social problem-solving skills (PS). We predict that from pre-test to post-test, children in the NS group will show greater improvement on both comprehension skills and self-efficacy than the PS group and that there will be a positive relation between change in comprehension-specific skills and self-efficacy.
THE WORLD IS LOSING ITS FAITH

Poster: 237
Authors: Quinten Harris, Elizabeth Chapleau
Faculty Mentor(s): Dr. Will Gervais, Nava Caluori

Nonreligion is increasing rapidly worldwide. In America, the last 70 years saw a 20% decrease in religious affiliation. Why is secularization increasing now after religion's longstanding stability, and why are some nations secularizing faster than others? We investigate globalization as a potential predictor of secularization. Globalization entails cultural mixing and broader conceptualizations of one's religious and cultural communities. Because of these factors, we predict that globalization should be negatively associated with religion across time and culture. Using data from the KOF Globalization Index and data about religious identification in the US and abroad, we test for a negative relationship between globalization and religiosity. We test for this relationship using longitudinal data from the United States between the years 1970-2014, as well as with recent cross-sectional data across 52 countries.

DRESS TO IMPRESS OR IMPRESSED TO DRESS? AN ANALYSIS OF HOW LGBTQ+ INDIVIDUALS FEEL THAT THEIR IDENTITY IMPACTS THE WAY THEY DRESS

Poster: 238
Hegge, Morgann
Faculty Mentor(s): Dr. Rachel Farr

Clothing, accessories and other forms of presentation can be important tools in identity representation in everyday life. The way we dress can non-verbally communicate aspects of our identity to those around us. For many individuals, their sexuality is a core factor of their identity. Little research has been done on the importance of presentation, especially in gender nonconforming populations. Here, we explore how LGBTQ+ individuals feel that their identity impacts the way they dress. Collective narrative data was pulled from a larger online sample looking into different aspects of LGBTQ+ life. Subjects were collected from university online subject pool and broader online data collection (N=123). Participant age ranged from 18-64 (M=30). The majority of participants identified as bisexual (n=56), heterosexual (n=26), gay (n=17), lesbian (n=12), asexual (n=5), pansexual (n=3), self-described (n=3), and queer (n=1). Participants were asked to complete a questionnaire including assessments of feelings about how their identity influences the way they dress, gender congruence, and demographic information. We intend to analyze the relationship between LGBTQ+ feelings of identity and their dress. Particularly we wished to see if participants felt that their LGBTQ identity associated their appearance choices through individual preference (i.e. "I dress how I want to") changes or through adherence to group norms (i.e. "People that are part of the LGBTQ+ community tend to be more daring"). We plan to test whether these attributions differed by LGBTQ identity through a series of ANOVA tests, comparing narrative themes between participant identity. Responses were also compared other demographic factors, such as the age of the participant. Findings from this research provide informative knowledge on the importance of identity presentation in minority populations, as well as the role of community in presentation.
THE EFFECT OF IMPLEMENTING A DELAY IN A TEMPORAL DISCRIMINATION TASK IN PIGEONS

Poster: 239
House, Dalton

Faculty Mentor(s): Dr. Thomas Zentall

Earlier research in our lab has shown that a simultaneous discrimination task in which pigeons are given a choice between a stimulus that gives 1.5 seconds of reinforcement (e.g. red light) and a stimulus that gives 3 seconds of reinforcement (e.g. green light) can actually be a difficult discrimination. One reason for this difficulty may be attributed to the natural impulsivity of pigeons, which would tend to make the immediate outcome for either alternative more similar. If it is impulsivity, one way to reduce it is to delay the outcome following choice. In the present experiment, we manipulated the magnitude of reinforcement as well as the time from choice to reinforcement. One group had a choice between 1.5 and 3 seconds of reinforcement with a 10 sec delay, while the other group the same choice but without the delay. The pigeons showed some tendency to choose the choice that led to a longer access of food, but this pattern was present in both the delay and no delay groups. Both groups chose the longer reinforcement about 70% of the time, significantly above chance. In the next experiment, we plan to manipulate quantity, instead of timed access to grain (e.g. 1 versus 2 food pellets rather than 1.5 versus 3.0 seconds access to grain).

JUROR PERCEPTIONS OF CHILD SEXUAL ASSAULT

Poster: 240
Huber, Holly

Faculty Mentor(s): Dr. Jonathan Golding, Dr. Christia Brown

In the US, one in nine females less than 18 years old will experience a sexual assault. In addition, 93% of child sexual assault victims know their attacker. Despite these data, only six out of every 1,000 perpetrators will be convicted of sexual assault (Rape, Abuse, & Incest National Network, 2013). One way to understand this discrepancy is to evaluate situational factors that could influence jurors. These factors include the behavior of the victim when attacked. Krulewitz and Nash (1979) reported that adult victims who resist a sexual assault are believed more in court. It is currently unknown, however, if this effect is also true for child victims. Additionally, most research conducted on legal decision making in rape trials involves a completed act of sexual intercourse; very little research has investigated attempted rape. The purpose of the present study is to examine jurors' decisions as a function of a child sexual assault victim’s behavior, and whether a rape is attempted or completed. Community members serve as participants, receiving a trial summary and then answering questions about the trial. I used a 2 (rape completion: attempted or completed) x 3 (disruption type: scratching assailant, knocking at the door, or no disruption) x 2 (participant gender) between-subjects design. My hypotheses are (1) main effect of participant gender: female mock jurors will be more pro-victim (e.g. more guilty verdicts) than male mock jurors; (2) main effect of disruption type: physical resistance (scratching) will render more guilty verdicts than an external disruption (knocking at the door) and both will be higher than a control condition; (3) main effect of rape completion: completed rapes will lead to more guilty verdicts than attempted rapes. Finally, I predict that (4) if disruption type affects verdict there should be evidence of mediation through ratings of victim credibility.
THE EFFECT OF EMOTIONAL INVESTMENT IN SOCIAL MEDIA ON BODY IMAGE AMONG COLLEGE STUDENTS

Poster: 241
Hudson, Raven
Faculty Mentor(s): Dr. Christia Brown, Ilyssa Salomon

Social media use is extremely common and 88% of young adults age 18-29 in the United States use some form of social media (Pew Research Center, 2018). Because social media platforms place such focus on sharing photos of the self, an individual’s emotional investment in social media (defined as the importance of social media to one’s life) may reinforce the importance of physical appearance (Manago et al., 2015). According to objectification theory, when individuals engage in excessive monitoring of their outer appearance (i.e., body surveillance), they often develop body shame, or negative thoughts and feelings toward the body (Fredrickson & Roberts, 1997). Previous research has demonstrated that higher involvement in social media, including frequency and emotional investment, can predict body surveillance and body shame (Manago et al., 2015). The current study investigated whether body surveillance mediated the association between emotional investment in social media and body shame controlling for frequency of social media use. Participants were N = 84 (20 men, 62 women) with a mean age of 18.94 years (SD age = 1.05). The ethnic breakdown of participants included: White/European American 76.8%, Black/African American 9.8%, Asian 6.1%, multiracial 3.7%, Latinx/Hispanic 2.4 %, Native Hawaiian/Pacific Islander 1.2%. Participants predominately identified their sexual orientation as heterosexual 95.1%, with some identifying as pansexual 2.4%, asexual 1.2%, and bisexual 1.2%. Results indicated that controlling for gender and frequency of social media use, body surveillance mediated the association between emotional investment in social media and body shame. Specifically, using a bootstrap sample of 5,000, there was a significant indirect effect of emotional investment on body shame through body surveillance, effect = .16, 95% CI [.0478, .2863]. Overall, the results indicated that when individuals felt that social media was very important to their lives, they monitored their appearance more frequently, which resulted in higher body shame.

ROCKETS AND REVELATIONS: CREATIONISM, SPACE EXPLORATION, AND THE SEARCH FOR EXTRATERRESTRIAL LIFE

Poster: 242
Authors: Madison Hurst, Andrew Mannion
Faculty Mentor(s): Dr. Will Gervais, Sarah Schiavone

Americans are largely supportive of space exploration (Pew, 2015). However, Evangelical Christians are the least supportive of these efforts and the most doubtful of discovering extraterrestrial life in the universe (Ambrosius, 2015). To explore these differences, participants (N = 344) completed a survey investigating beliefs about religion and creationism and attitudes towards space exploration and beliefs in extraterrestrial life. Multiple linear regression and Bayesian analyses were conducted to predict space attitudes and extraterrestrial beliefs from creationism, religious beliefs, and political ideology. Results indicate that creationism predicted significantly more negative attitudes towards space exploration and beliefs in extraterrestrial life, whereas belief in god predicted slightly more positive attitudes and beliefs. As the space industry continues to grow, understanding how various beliefs may shape public support could become increasingly important. Research examining attitudes towards specific areas of science, such as space exploration, may also provide insight into broader conflicts between science and religion.
INVESTIGATING THE REVERSE EFFECTS OF TRANSCRANIAL DIRECT CURRENT STIMULATION ON BEHAVIOR
Poster: 243
Authors: Sami Jabbour, Daniel Peng
Faculty Mentor(s): Dr. Nathan DeWall

Transcranial direct current stimulation (tDCS) is a neurostimulation procedure that targets multiple brain regions using low direct currents. The electrical currents are delivered via electrodes placed on the cortex region of the head. The tDCS device generates the electrical currents targeting the cortex causing the neurons to more likely fire in that region. The study aims to investigate the reverse effects of tDCS on behavior using anodal excitatory stimulation. The effects of tDCS vary depending on individual differences in personality and neurochemistry. 124 participants from the University of Kentucky participated in this study. The experiment begins with the UPPS impulsivity scale, followed by the tDCS procedure. Participants received either the anodal excitatory stimulation (experiment) or the sham stimulation (control), both targeting the prefrontal cortex of the brain. During tDCS, participants performed multiple computer tasks that caused mental fatigue. Finally, participants performed the Stop Signal Task, which measures the levels of impulsivity. Although tDCS has shown positive impact on behavior in past studies, it was hypothesized that it will have reverse effects on behavior and impulsivity. The main finding of the study is that people with high impulsivity measure based on UPPS performed poorly and had increased error in the Stop Signal Task possibly due to tDCS. Participants with low impulsivity measure based on UPPS had no tDCS effect. Extensive analyses of past research studies on the reverse effects of tDCS were conducted.

LOSING OUR RELIGION: PERCEPTIONS OF ACTIVE AND PASSIVE ATHEISM
Poster: 244
Authors: Daisy Jarrell, Madison Burt
Faculty Mentor(s): Dr. Will Gervais

Deconversion, or the process of leaving one's religious affiliation, can be perceived as either a choice or not a choice. Based on this perception, people may hold certain prejudices against those who deconvert. Given that the world's religiously unaffiliated population is growing steadily, understanding factors that may affect this prejudice is important. In the current research, we predicted that those who actively chose to deconvert will be perceived more negatively than those who passively deconverted. Data was collected from 227 undergraduates at the University of Kentucky, and results indicate that individuals who actively chose to deconvert were perceived as less moral and warm.
COMPREHENSION SELF-EFFICACY AND UNDERSTANDING OF GOAL STRUCTURE FOLLOWING A NARRATIVE STRUCTURE INTERVENTION FOR CHILDREN WITH ADHD
Poster: 245
Jodts, Jenna
Faculty Mentor(s): Dr. Elizabeth Lorch

Attention Deficit Hyperactivity Disorder (ADHD) includes inappropriate levels of hyperactivity, inattentiveness, and impulsivity that often are associated with academic difficulties. Specifically, children with ADHD encounter reading comprehension problems more often than their peers. Although medications prescribed for ADHD can improve attention, they do not address deficits in higher-order functioning. One problem is children’s difficulty understanding and using goal structure in narratives. Goals are what a story character wants to achieve. A goal is followed by attempts to achieve the goal, and then positive or negative outcomes of the attempts. These Goal-Attempt-Outcome (GAO) sequences are central to narratives. Also, the academic difficulties that children with ADHD often experience may influence self-efficacy, or beliefs about their ability to succeed academically. These children often initially rate themselves higher than peers in self-efficacy but are quicker to give up when faced with difficult tasks. The current study compares two interventions to examine whether change from pre-test to post-test in comprehension self-efficacy is associated with change from pre-test to post-test in goal-based performance on a storytelling task. The two interventions are a Narrative Structure (NS) intervention that targets comprehension difficulties specific to children with ADHD, and a Reciprocal Teaching (RT) intervention that is effective for comprehension problems of struggling readers but does not target specific narrative structure difficulties experienced by children with ADHD. Children in third and fourth grade who are at risk for ADHD as demonstrated by the Conners Teacher Behavior Rating Scale-Revised are randomly assigned by school to participate in an intervention. Children are pretested on comprehension self-efficacy and storytelling before taking part in the 15-session interventions, then post-tested on the same measures to evaluate improvement. I am predicting that there will be a significant positive association between comprehension self-efficacy and storytelling in the NS intervention, but not in the RT group.

IMPLICIT AND EXPLICIT RACISM TOWARDS AFRICAN AMERICAN INDIVIDUALS WITH HIGH STATUS JOBS
Poster: 246
Authors: Oumaima Karimi, Brooke Osborne
Faculty Mentor(s): Dr. Kate Leger

A person from New York city recently graduated from Harvard Law school. The Graduate is a tennis player, pianist, and is tri-lingual. The new graduate moved to Los Angeles to work as a Litigator for one of the biggest firms on the west coast. Imagine this graduate in your head, who do you see? What is their race? age? gender? The brain is building an image of this description based on your schemas, experiences, and perceived and implicit biases. Do you think this person is trustworthy? Do you think they are competent? What about kind? Does race have any correlation with how people answer these questions? This research will collect information on if race has an effect on how people answer questions about a person character with a high status job. It will also analyze if there is a correlation between explicit symbolic racism and how you view someone with a high status job. Participants will be given a survey that has a short description similar to the one above. The participants will all have the same description except with a difference in race. half the participants will get the description as a black person, and half of the participants will get the description as a white person. They will then be asked questions about the character of the person. After the first series of questions, they will be asked a second series of questions about their racism using the Henry, P. J., & Sears, D. O. (2002) symbolic racism scale.

** Denotes STEMcats project
MEASURING LEVELS OF PERCEIVED STIGMA, IDENTITY ACHIEVEMENT, AND DEPRESSIVE SYMPTOMS ASSOCIATED WITH LGBTQ+ INDIVIDUALS

Poster: 247
Kirk, Katie
Faculty Mentor(s): Dr. Rachel Farr

In today’s world, a nuanced understanding of sexual orientation and gender is important so as to better help individuals with often-marginalized identities navigate their lives and futures. This study, which took place as part of a larger one about understanding ambiguous loss and future parenthood amongst LGBTQ+ individuals, primarily looked at the results from a survey to draw conclusions about its population. As part of this study, LGBTQ+ identified individuals were asked a variety of questions about their experiences with stigma, identity achievement (the level of positive elements of personal growth associated with their sexual or gender identity), and levels of depressive symptoms experienced in their day-to-day lives. Results of the study suggested no significant differences among variables of interest based on sexual or gender identity. However, there were noteworthy differences in two categories: bisexual and pansexual-identified people reported more depressive symptoms than lesbians, and cisgender (those who identify with their birth sex) men experienced more internalized stigma than transgender and gender non-conforming people (those who identify as a gender other than their birth sex). While more research is necessary to determine meaning from these results, the role of masculinity and overall perceptions of sexual identity will be discussed.

THINK YOU ARE BETTER IF YOU BELIEVE? AN ANALYSIS OF THE BETTER THAN AVERAGE EFFECT AND CONSPIRATORIAL MINDSET

Poster: 248
Authors: William Knell, Brianna Baker, Loui Chang, Rachel Finefrock, Mary Lenhof, Emily Wrenn
Faculty Mentor(s): Dr. Steven Arthur, Dr. Andrea Friedrich

Belief in conspiracy theories was once relegated to fringe groups, but in recent times have gained popularity through new forms of media and in turn permeated traditional forms of media. Undergraduates at the University of Kentucky were surveyed using preexisting measures to examine the relationship between the better than average effect (BTAE) and conspiratorial mindset measure. The BTAE examines the phenomena that people will consistently judge themselves as performing better than an average. This effect appears to play a role when considering an individual’s endorsement of conspiratorial ideation. The analysis indicates that there is a positive relationship between these two factors, such that those who score higher on the conspiracy mindset measure also tend to rate themselves as better than average on a host of personality dimensions (e.g. mature, creative, observable).

THE EFFECTS OF GENDER AND EMOTIONALITY IN THE OUTCOME OF RAPE TRIALS

Poster: 249
Kuryla, Marissa
Faculty Mentor(s): Dr. Jonathan Golding

Adult rape is a pervasive problem in our society today; statistics show one in every six American women and one in thirty-three American men have been the victim of sexual assault in their lifetime (RAINN, 1998). Regrettably, the prosecution of rape is also problematic with only 14-18% of rape cases actually making it to the courtroom and only 3.4% leading to a conviction (UK Center for Research on Violence Against Women, 2010). When rape cases are brought to the courtroom, it has been shown that a verdict is based less on actual evidence, and more on the credibility of the victim. Credibility may be based on a number of factors, including the demeanor, or emotional expression, of the victim when they testify. The goal of the present study is to examine the effect of emotion shown by both adult men and women who are victims of sexual assault on the verdict of the defendant. We used a 2 (victim courtroom emotionality (crying vs. no crying)) x 2 (victim gender) x 2 (participant gender) between-participants design. The participants were asked to read a trial summary and render a verdict for the case. Based on prior research we had three hypotheses. First, we predicted that there should be a main effect of participant gender—female participants should render more guilty verdicts than male participants. Second, we predicted a main effect of victim emotionality, a crying victim in the courtroom will lead to more guilty verdicts than a victim who was not crying. Finally, we predicted a main effect of victim gender—a female victim will lead to more guilty verdicts than a male victim.

** Denotes STEMcats project
PERCEPTION OF STALKING IN CIVIL COURT: THE IMPACT OF VICTIM GREED
Poster: 250
Lennon, Taylor
Faculty Mentor(s): Dr. Jonathan Golding

Kentucky law defines stalking as intentional behavior that makes a person or persons feel alarmed, annoyed, intimidated, or harassed. Not only can stalking cause serious psychological damage for victims, but it can also have negative impacts on their career, education, and social life. Although stalking cases are typically handled in criminal court, a stalking victim has the option to bring their case to civil court. The purpose of the present study is to investigate stalking in a civil court context to determine: 1) if men and women rule differently in stalking trials and 2) the factors that impact differences in civil court decisions (e.g. perceiving the victim as greedy). We are using a 3 (type of trial) x 2 (participant gender) between-subjects design. The three types of trials are 1) a civil case where the victim testifies as to why she is seeking compensation in civil court (e.g., she needs money to pay for therapy), 2) a civil case where the victim does not testify as to why she brought the case to civil court, and 3) a criminal trial. We presented a trial summary to community members and they rendered a verdict. After reading a summary, they will answer questions about the trial. These questions include making an overall decision about the case and questions about the victim's credibility, greed, etc. Based on prior research, we had two hypotheses. First, we predict that women mock jurors will decide more for the victim (i.e., rule for the plaintiff in a civil trial and a guilty verdict in a criminal trial) than men mock jurors. Second, we predict that the order of decisions in support of the victim will be civil trial with an explanation for seeking this trial > civil trial with no explanation > criminal trial.

EFFECTS OF PERCEIVED WARMTH AND GENDER ON HIRING DECISIONS FOR DIFFERENT JOBS
Poster: 251
Authors: Mary Levi, Alexander Urs
Faculty Mentor(s): Dr. Jazmin Brown-Iannuzzi

The Stereotype Content Model (SCM) suggests two factors underlie stereotypes: warmth and competence (Fiske, Cuddy, Glick, & Xu, 2002). We were interested in whether differences in the warmth domain as well as gender would affect hiring decisions for jobs that are stereotypically assumed to be either high or low in warmth. We hypothesized that women who were perceived as warm would be more likely to be hired for positions that are associated with high competence and warmth, i.e., a pediatrician, and that cold males would be more likely to be hired for positions that are associated with high competence but low warmth, i.e., a chemical engineer. To test this hypothesis, participants (N = 821) were asked to help hire a new department head. In a between-subjects manipulation, participants were randomly assigned to hire for a stereotypically high competence and low warmth job (Chemical Engineer Department Head) or to hire for a stereotypically high competence and high warmth job (Pediatrics Department Head). All participants were present with four candidates: two men, two women, and two candidates who were described using warm characteristics (e.g., Passionate, Empathetic) and two candidates who were described using cold characteristics (e.g., Unemotional, Analytical). After reading these candidate profiles, participants ranked the order in which they would hire these candidates. Consistent with our hypothesis, results indicated that for the Head of Pediatrics, warm candidates were more likely to be hired than cold candidates. Additionally, women were more likely than men to be hired overall. For the job of Head of Chemical engineering, results indicated that cold candidates were more likely to be hired than warm candidates. Taken together, these findings suggest that a person's gender or perceived warmth could affect the likelihood of being hired for different jobs.

** Denotes STEMcats project
IMPACT OF JAILHOUSE INFORMANTS IN SAME-SEX SEXUAL ASSAULT CASES
Poster: 252
Miller, D’Andrey
Faculty Mentor(s): Dr. Jonathan Golding

The United States Supreme Court argued in Bruton v. United States that confessions are "probably the most probative and damaging evidence that can be admitted" (Kassin and Neumann, 1997). By confessing one’s guilt to a crime, an individual essentially disregards any chance of a jury finding them innocent. Although confessions are powerful, it is highly unlikely that a defendant will confess to a crime during a trial. However, it is possible to use a secondary confession in court. A secondary confession involves having an individual (already an inmate in jail) testify that he heard the defendant confess to the crime when the defendant was incarcerated, and the inmate giving this secondary confession as a jailhouse informant (JI). The purpose of the present study is to investigate the influence of a jailhouse informant in a sexual assault trial. The experiment used a 2 (Victim Age: 6 years old vs. 25 years old) x 2 (JI vs. no JI) x 2 (gender of the participant) between-participants design. Each individual who consented to participate in the study was presented with a trial summary, and was required to render a verdict as well as provide reasoning for their verdict. Based on prior research we had three hypotheses concerning the number of guilty verdicts. First, we hypothesized a main effect of participant gender — female participants should be more likely to render a guilty verdict than male participants should. Next, we hypothesized a main effect of victim age — participants should render a guilty verdict more for a 6-year-old victim compared to a 26-year-old victim. Finally, we hypothesized a main effect of jailhouse informant, such that there will be more guilty verdicts with the presentation of a jailhouse informant compared to the absence of the informant.

GREATER COST RESULTS IN BETTER MIDSESSION REVERSAL ACCURACY BY PIGEONS
Poster: 253
Authors: Daniel Peng, Dalton House
Faculty Mentor(s): Dr. Thomas Zentall

The midsession (MSR) task requires the subject to engage in a simultaneous discrimination between 2 stimuli (S1 and S2). For the first 40 trials of each session, S1 is correct. For the remaining 40 trials, S2 is correct. Optimal accuracy can be achieved by the adoption of a win-stay/lose shift strategy: Choose S1 until it stops being correct, then choose S2. In a typical MSR task, one peck is required to either stimulus. Even after considerable training on the MSR task, pigeons choose S2 before the reversal (making anticipatory errors) and continue to choose S1 (making perseverative errors) after the reversal, as if they are trying to use the passage of time as a cue to reverse. We hypothesized that anticipation of choice of S2 and interference between choice of S1 and S2 is responsible for many of the errors. To test this hypothesis, in the present experiment, S2 was devalued by increasing the response requirement to 10 pecks for reinforcement while keeping the response requirement to S1 at one peck. This should have served as a deterrent by making the selection of S2 more effortful. This change virtually eliminated anticipatory errors while not introducing a greater number of perseverative errors. Thus, paradoxically, increasing the effort to obtain reinforcement when selecting S2 improved accuracy on the midsession reversal. It appears that by increasing the effort when selecting S2, the pigeons were encouraged to shift from attending to the anticipation of reinforcement for choice of S2 to using the absence of reinforcement for incorrect choice of S1 as the basis for choice of S2.
EXAMINATION OF ANXIETY WITH MODERATE PRENATAL ETHANOL EXPOSURE IN A RODENT MODEL USING A "MARBLE BURYING TEST"
Poster: 254
Punzal, Emily
Faculty Mentor(s): Dr. Susan Barron

Fetal Alcohol Spectrum Disorders encompass a range of behavioral and structural consequences following exposure to ethanol in utero. The goal of this study was to develop a model of voluntary ethanol consumption by rats prior to and throughout pregnancy to assess the consequences of a low dose exposure. Rats were exposed to a voluntary regime of 5% ethanol in a sweetened saccharin solution for 4 hours daily, during the dark cycle. Exposure began prior to breeding and was continued until 48 hours prior to parturition. Pair-fed and non-treated control groups were also included. A marble burying test was used to assess whether prenatal ethanol exposure altered the levels of anxiety in rats. Offspring were tested between postnatal days (PND) 42-46. Cages were filled with 5 inches of bedding with 4 rows of 5 marbles. Rats were given 5 min to habituate to the test room and then placed in the test cage for 20 min. Increased marble burying is significantly correlated with increased anxiety. Females exposed to ethanol prenatally buried more marbles than controls. However, this ethanol-related effect was not apparent in males. Our data show that marble burying is differentially affected across sex following prenatal exposure to a low dose of ethanol. This may indicate females may be more anxious than males in a novel environment following exposure to a low dose of ethanol. Very little data is currently available on the consequences of low dose ethanol and so further work is clearly needed.

ASSESSING THE KNOWLEDGE OF THE PUBLIC ON PLEA BARGAINING
Poster: 255
Authors: Courtney Quiroz, Dylan Baker
Faculty Mentor(s): Dr. Jonathan Golding

According to Redlich, Bibas, Edkins, and Madon (2017), approximately 95% of convictions in the United States, both at the federal and state levels, are a result of guilty plea bargains. A plea bargain is defined as an option offered to the defendant to plead guilty in exchange for an offer from the court, typically a reduced charge or reduced sentence. If the defendant does not accept the plea bargain, he or she must proceed to a trial (Redlich et. al., 2017). With the increasing use of plea bargains, and increased regulation of the plea bargain process, plea bargains have become an efficient way to deal with the overload of cases that prosecutors and judges deal with. Although plea bargains are the norm for criminal cases, it is unclear how much laypeople know about this common legal procedure. The purpose of the present study is to investigate individuals' knowledge about plea bargains. Community members recruited from the online site Mechanical Turk and undergraduates recruited from Introductory Psychology courses will be presented with 10 questions about plea bargains and will be asked to rate each question on a 1 (definitely false) to 10 (definitely true) scale. We had two specific hypotheses. First, community members should be more accurate (e.g., have more knowledge) than undergraduate students. This is based on the general idea that community members have had more life experiences than undergraduates, thus more exposure to the concept of plea bargains in their life. Second, we predicted that participants would be more accurate when questions dealt with general aspects of plea bargaining (e.g. A Judge in a case generally makes the final decision about a plea bargain) than when the question asked a more specific question (e.g. Plea bargaining is generally seen as a way to decrease the backlog of criminal court cases).
CRYING IS BELIEVING: THE IMPACT OF DEMEANOR ON THE STAND IN SEXUAL HARASSMENT CASES
Poster: 256
Sawaya, Sophia
Faculty Mentor(s): Dr. Jonathan Golding

Sexual harassment is a pervasive problem in our society today; statistics show 81% of females and 43% of males have experienced some type of sexual harassment. Regrettably, the majority of these cases will go unreported (Chatterjee, 2018). When individuals bring sexual harassment cases to the civil courtroom, research shows that a juror’s decision is based less on actual evidence, and more on the credibility of the plaintiff. A number of factors impact a plaintiff’s credibility, including the demeanor, or emotional expression, of the plaintiff when they testify. Research has shown the impact of demeanor in the courtroom. For example, Golding, Fryman, Marsil, and Yozwiak (2003) examined the effect of a child victim's emotions on a mock jury's verdict. In the study, participants were presented with a drawing of a victim showing one of three levels of emotion (i.e., no crying, crying a little, and hysterical crying). The results of Golding et al. (2003) showed that there were more guilty verdicts when the child was crying a little compared to no crying or hysterical crying. The goal of the present study is to examine the effect of emotion (shown by a plaintiff) on mock jurors’ perception of the victim and hence the trial. Male and female participants will read a trial summary of a civil sexual harassment trial and view a plaintiff having one of two levels of emotionality: no emotion (control) or crying. We predicted that there should be a main effect of demeanor — the cry condition will render more plaintiff rulings than the no cry condition. We also predicted that there would be a main effect of participant gender — females participants rule for the plaintiff more than male participants. Our final prediction was the plaintiff decisions will be mediated by dependent variables such as victim credibility.

THE EFFECT OF RESISTANCE TYPE ON JUROR DECISIONS IN ATTEMPTED RAPE TRIALS
Poster: 257
Authors: Jennifer Schaper, Beeson Shin
Faculty Mentor(s): Dr. Jonathan Golding

One out of every six females in the United States has been a victim of either attempted or completed rape (RAINN, 2019). Despite these data, the prosecution of rape is not keeping pace—only 14-18% of rape cases actually making it to the courtroom, and only 3.4% of cases resulting in a conviction (UK Center for Research on Violence Against Women, 2010). Research investigating perceptions of rape in the courtroom have The purpose of the present study is to examine juror decision-making in attempted and completed rape cases involving active resistance by a victim or a disruption during the attack. The experiment uses a 3 (type of resistance) x 2 (completion of rape) x 2 (participant gender) between-subjects design. Type of resistance included a victim offering no resistance (control), active resistance with the use of pepper spray, or passive resistance by an interrupted knock at the door. After reading a trial summary, participants rendered a verdict. The participants were then asked to rate the credibility and levels of blame for both the victim and the defense. In the present study, there are three hypotheses. First, we hypothesized that female participants will have higher pro-victim judgments (e.g., more guilty verdicts, higher ratings of victim credibility) than male participants. Second, this study hypothesized that the use of pepper spray will have the highest number of guilty verdicts, followed by a knock at the door, and then the control condition. Third, we predict a main effect of the completion of rape such that more guilty verdicts when completed rape than attempted rape.
POSTER PRESENTATIONS

USING A PROBLEM-SOLVING PARADIGM TO EXPLORE THE EFFECTS OF LOW-DOSE PRENATAL ETHANOL EXPOSURE IN RATS
Poster: 258
Shellhaas, Rachel
Faculty Mentor(s): Dr. Susan Barron

Prenatal ethanol exposure in high doses can cause severe behavioral and physiological deficits in offspring. Our understanding regarding the effects of lower doses are not well understood although this is likely applicable to a larger human population. This study looked at the effects of low-dose, voluntary ethanol consumption during pregnancy on a problem solving task in rodent offspring. Female rats were given access to a low dose of ethanol (5%) in a sweetened solution for 4 hours daily during their dark cycle prior to conception and throughout pregnancy. Pair-fed and non-treated control groups were also included. Offspring were tested as adults (approximately 90-110 days of age) in a digging maze task. This paradigm required subjects to use a species typical behavior (digging) to solve a novel problem (gaining access to water). While subjects from all three treatment groups were able to solve the problem, more ethanol exposed offspring failed to learn the task relative to controls. Subjects that failed to learn the task on the first trial were given a second trial. All control subjects solved the problem on the second trial. In the ethanol-exposed group, 75% of subjects who failed on trial one also failed on trial two. These results suggest that in utero exposure to a low dose of ethanol can affect performance on a problem-solving task. This task has been shown to be sensitive to cortical and subcortical damage. Further work is needed to better understand how low-dose ethanol exposure in utero affects these CNS regions.

CAN I CHANGE THE ENVIRONMENT? A REVIEW OF RESEARCH MEASURING SELF-EFFICACY FOR CREATING ENVIRONMENTAL CHANGE
Poster: 259
Stanley, Brianna
Faculty Mentor(s): Dr. Ellen Usher

As outlined by Albert Bandura (2008) in his Environmental Harm paper, the Earth is experiencing "hazardous global changes with mounting ecological consequences." Bandura notes that many of these environmental problems are the consequences of human action. This literature review aims to examine this relationship between man and earth in a social science context by evaluating studies which focus on the connection between an individual's self-efficacy and pro-environmental behavior. Self-efficacy, or the beliefs that people have in their capability to achieve a goal, has been shown to predict human behavior in diverse realms of functioning (Bandura, 1997). More recently, self-efficacy has been studied within the context of pro-environmental behavior (PEB). PEB refers to behavior that is judged within the context of a society as environmentally protective and/or contributing to a healthy environment (Krajhanzl, 2010). In theory, unless people believe that they can change the environment for the better, they will have little motivation to undertake pro-environmental actions that are necessary to combat the myriad of environmental problems across the world (Meinhold & Malkus, 2005). This review critically examines existing methods to measure self-efficacy in relation to pro-environmental behavior and its behavioral correlates, as well as the findings of existing environmental self-efficacy research. The review provides future directions for measuring self-efficacy for engaging in pro-environmental behavior and outlines the importance of research in this field.
BRIEF SOCIAL BELONGING INTERVENTION FOR FIRST-YEAR STUDENTS AT A LAND GRANT UNIVERSITY: DOES MODALITY MATTER?

Poster: 260
Authors: Kaitlyn Stevens, Joanna Mitsos
Faculty Mentor(s): Dr. Ellen Usher, Dr. Christia Brown

Students who are the first in their family to attend college face many challenges as they transition to college. Many first-generation (FG) college students lack a strong sense of belonging, which is needed to thrive. When students, particularly those from socially disadvantaged backgrounds, feel a higher sense of belonging, they experience more positive college outcomes. Social belonging interventions might help improve outcomes for those historically underrepresented in college (e.g., first-generation students); however, few studies have examined the psychosocial mechanisms behind their efficacy. Nor have many investigators examined the differential effectiveness of intervention delivery modalities (e.g., reading passages, watching videos). The purpose of this study was to test the effects of a social belonging intervention for first-year students at a land grant university. We examined the effects of an intervention on students' academic (GPA, academic standing, retention) and psychological (sense of belonging) outcomes. Participants were 2,744 first-year students attending a public, land-grant university in the southeastern U.S. (60.4% women; 69.6% White; 25.3% FG). We used stratified (by FG status and ethnicity) random sampling to assign students to either a written intervention (n = 889), a video intervention (n = 940), or a control condition (n = 915). The results suggest that the intervention reduces achievement gaps between the most at-risk students (FG-URM) and the least at-risk students (CG-non URM) at the university. Results and analysis also indicate that the intervention may influence other complex psychological processes that positively influence academic outcomes.

AN INVESTIGATION INTO IDENTITIES, GENDER CONGRUENCE, AND SOCIAL DISCREPANCIES

Poster: 261
Sullivan, Queen-Ayanna
Faculty Mentor(s): Dr. Rachel Farr

The specific identity a person holds can dramatically impact how they perceive the world. Recently a gender discrepancy icon study began at the University of Kentucky. This study's main aim was to see how people’s opinions about clothing is influenced by the identities they hold. Undergraduate participants were invited to join via the SONA system, and were asked numerous questions on specific variables. Some of the questions presented in the study were multiple choice and asked about the perceived qualities of the clothing items, including the masculinity or femininity of the item, or its perceived cost. Additionally, participants were asked to describe who they believed the article of clothing was marketed for, which lead to personal narratives, which were coded using qualitative analyses. Examples of themes found in these narratives include: socio-economic status, Greek Life affiliation, career or hobby-oriented activities, weather specific clothing, geographic location specific clothing, and much more. There are three main research questions that we wish to raise. First, how do identities align with beliefs about gender congruence? Secondly, from the narratives that were collected, which group of people are most likely to report certain themes within clothing items? And lastly, what common themes about items of clothing arise when identities and gender congruence are simultaneously taken into consideration? This research is important because it is new within the field of psychology, and as a result is a largely exploratory project. This project will demonstrate that people around you will judge others solely on self-presentation.
JUROR PERCEPTIONS OF OVERMEDICATION IN A MOCK TRIAL

Poster: 262
Wesloh, Cory

Faculty Mentor(s): Dr. Jonathan Golding

The Kentucky Cabinet for Health and Family Services (KYCHFS, 2017) defines elder abuse as a "silent crime", in which the elderly are abused, taken advantage of, and neglected. In 2017 alone, the KYCHFS (2017) reported 12,618 cases of elder abuse in Kentucky. One type of elder abuse is neglect, when a caregiver fails to properly attend to an elder and provide for their needs (American Psychological Association, 2019). A subtype of elder neglect is overmedication and is a major problem. According to Human Rights Watch (2018), US nursing facilities administer antipsychotic drugs to almost 200,000 adults who do not have psychosis. One reason for overmedication is that antipsychotic drugs make patients docile and easier to control. Overmedication can lead to a court case, in civil or criminal court. The present study investigated courtroom perceptions of elder overmedication using community members as mock jurors to render a verdict on a trial summary. The experiment used a 2 (victim gender) x 2 (case type: civil or criminal) x 2 (participant gender) between-participants design. The primary dependent variable was juror decision. We hypothesized more decisions in favor of the plaintiff (i.e., victim) in civil cases than guilty verdict decisions in criminal cases. This was based on evidence for civil trials needing to be only 51% in favor of the plaintiff, but evidence must be beyond a reasonable doubt in criminal cases (i.e., a higher percentage is required). Next, we hypothesized a main effect for victim gender-- guilty decisions for a female victim would be higher than those of a male victim-based on there being more sympathy for a female victim. The final hypothesis was that female participants would decide in favor of the victim more than male participants, based on past elder abuse research (e.g., Golding, Yozwiak, Kinstle, & Marsil, 2005).

PUBLIC HEALTH

LONGITUDINAL PATTERNS IN THE LINKING OF INDIVIDUALS TO HEALTH AND SOCIAL SERVICE

Poster: 263
Cook, Madalyn

Faculty Mentor(s): Dr. Rachel Graham

A way of improving health and population health systems is by monitoring what activities they provide to improve community health. One important function of the system is linking people to the services that are needed to keep them healthy. This may include referring individuals from private healthcare organizations to their public and nonprofit community partners. This study seeks to understand how often population health systems are linking individuals to health and social services, how that has changed overtime, and which organizations typically contribute to this activity. Methods: The National Longitudinal Survey of Public Health Systems (NALSYS) contains a stratified random sample of the nation’s 3000 local public health officials (n=397) who were surveyed in 1998, 2006, 2012, 2014, 2016, and 2018 (70% response) to measure the availability of 20 core public health activities within their jurisdictions and the range of organizations that deliver each activity. A longitudinal cohort design using data from 2006 on was used to examine the changes in how often public health systems are linking people to the health and social services outside of their own scope of practice and which organizations typically contribute to this activity. Standard descriptive statistics were run on the data. Results: The provision of linking of people to needed health and social services has declined from 68.7% in 2006 to 52.9% in 2018. Communities serving larger populations are more likely to provide the service on average than those serving smaller. Hospitals, local government agencies, and nonprofits have consistently been the organizations most likely to contribute to the activity. Conclusions: Linking patients to services is a key factor in bettering one’s quality of life and the ultimate prevention or rehabilitation of a variety of health outcomes, making it vital that changes in this activity be explored.
"THERE IS NO BIGGER SIN THAN HAVING KIDS THAT ARE CLOSE IN AGE": BIRTH SPACING AS A MOTIVATOR FOR FAMILY PLANNING USE IN RWANDA
Poster: 264
Ntakarutimana, Chimene
Faculty Mentor(s): Dr. Hilary Schwandt

An average 10% of women in sub-Saharan Africa (SSA) have an unmet need to space their births, leading to inflated fertility rates and contributing to economic and social strife. These factors serve as obstacles in attaining the SDGs of Sustainable Cities and Communities and No Poverty. In contrast, Rwanda’s rate of unmet need is only 5.6%, and its fertility rate has continuously decreased. This may be attributable to the country’s highly successful family planning (FP) program, which has allowed FP use to double in the past decade. Our research suggests that use of FP in Rwanda is motivated by the desire to lengthen the time between births, thus advancing quality of life in countless areas. This study was conducted in July 2018 in the Musanze and Nyamasheke districts of Rwanda. The data came from interviews with 32 FP users. Data analysis was guided by the thematic content analysis approach and executed using Atlas.ti 8 software and group level matrices. IRB approval was obtained at Western Washington University and with the Rwandan Ministry of Education. "Birth spacing" was a common theme across interviews; nearly every interviewee mentioned it in some capacity. Many women identified spacing as critical not only to their own health and to their ability to provide for their children, as well as the health of their children. Since birth spacing is critical to women’s health and maximizing families’ working potential, the ability to regulate space between births may be instrumental in encouraging the use of FP by women in SSA. More than two-thirds of Rwanda’s population lives in rural communities where subsistence farming is widespread, putting space between births is essential to health and prosperity. Therefore, it should follow that spacing is among the primary motivators in using FP in Rwanda.

NOVEL APPROACHES TO UNDERSTANDING AND DISMANTLING HEALTHCARE DISPARITIES
Poster: 265
Iqbal, Hina
Faculty Mentor(s): Dr. F. Douglas Scutchfield

A great question exists at the intersection of healthcare and social services, involving how socio-ecological and economic realities as well as physicality impact one another to affect the accessibility of healthcare for underserved populations. In an effort to uncover how, where, and why disparities in healthcare exist, this paper: (1) explores where disconnects between current overlapping systems are taking place, (2) assesses where current means of support exist on both macro/structural levels as well as meso/community-based levels, and (3) provides a framework by which potential solutions can be uncovered through more novel approaches. Methods to address these questions will frame current barriers in healthcare in the context of social determinants of health, the socio-ecological model, intersectionality, physicality, and community. The purpose of this work is to guide conversations in the realms of social services, public health, and healthcare towards increasing accessibility in order to counter a history of inaccessibility and disparity.

** Denotes STEMcats project
**POSTER PRESENTATIONS**

**STUDY OF HEALTH LITERACY IN APPALACHIAN KENTUCKY**

Poster: 266  
Wilson, Kaylee  
Faculty Mentor(s): Dr. F. Douglas Scutchfield  

As defined by Healthy People 2010, health literacy is "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions." Many studies highlight the importance of health literacy to the livelihood of individual patients, the health outcomes of a population, and the wellbeing of a community's healthcare system as a whole. One study highlights many of the issues faced by patients with low literacy (in general), explaining how difficult it can be to simply navigate a hospital/clinic, fill out required forms, and even follow medication instructions. Many studies have been done to provide insight into the status of health literacy in many areas of the US and around the world. However, there is a lack of data and research being done to understand the state of health literacy in the populations of both Appalachia and Kentucky in general. What is the state of health literacy in the patient population of Appalachian Kentucky? This study aims to heighten healthcare professional awareness of the importance of health literacy to the health of the Appalachian population of Kentucky. This study is being done in hopes that this information will identify and work to bridge any existing gap in communication between healthcare provider and patient. The study employs the use of a demographic survey to identify factors such as socioeconomic status (SES) and education level alongside a health literacy-screening tool called the Short Test of Functional Health Literacy (s-TOFHLA). Analyses will compare survey items and SES indicators to s-TOFHLA scores and use s-TOFHLA scores to create a baseline data set for the health literacy of this patient population.

**SOCIAL WORK**

**LEXINGTON HOME PREFERENCES SURVEY: A REPORT ON PRELIMINARY FINDINGS**

Poster: 267  
Authors: Leigha Cameron, Cassandra Kruchten  
Faculty Mentor(s): Dr. Allison Gibson, Dr. Natalie Pope  

Background: Since 2006, the World Health Organization's (WHO) age-friendly cities and communities program has provided guidelines to help communities prepare for rapid population aging. Within this context, the domain of housing (i.e., accessibility, providing social inclusion) is an important determinant of health and well-being. When considering the development of housing for older adults, there is a need to determine what preferences and values are most essential to this population. Methods: In collaboration with Lexington's Age Friendly initiative, a cross-sectional survey was administered online via Qualtrics and face-to-face data collection. Participants 30+ were invited to complete a 10 to 20 minute survey consisting of closed and open-ended questions about their housing preferences and values pertaining to where they reside. Results: Data analysis included descriptive and inferential statistics (i.e., Chi-squares); as data collection is ongoing, preliminary findings will be shared. Of our 518 respondents, half were older than 60 (50.0%), most respondents were women (73.2%) with adequate financial means (91.0%). Many respondents were employed full time (43.0%) or retired (35.0%). In regards to preferences, the top five considerations for housing included "safety" (78.8%), "affordability" 73.2%, "privacy" (51.9%), "proximity to services I frequently use" (50.6%), and "accessibility" (42.4%). Conclusions: When considering the housing preferences of those residing in Lexington, characteristics such as safety and affordability should be prioritized in planning for housing development. A limitation of this study was the close-ended nature of the survey and the limited engagement of diverse individuals as well as those with inadequate financial means. Future research should employ additional strategies to engage residents of lower income in data collection (i.e., methodological approach or locations for data collection). Future studies could also explore why individuals value these preferences, as well as how this population defines affordability in terms of housing.

** Denotes STEMcats project
POSTER PRESENTATIONS

SUBSTANCE ABUSE WITHIN CPS CASES
Poster: 268
Meiners, Abby
Faculty Mentor(s): Dr. David Royse

Within majority of Child Protection cases, addiction is a common trend. It will be examining what percentage of long-term cases (over 6 months long) involve substance abuse. Substance abuse is a struggle within the state and can make reunification more difficult to obtain due to the effects this abuse has on a person. The available resources in a county and income level within a family can also contribute to the result in a case.

SOCIOLOGY

VIOLENCE AND HEALTHCARE
Poster: 269
Ali, Noor
Faculty Mentor(s): Dr. Robyn Brown

The world we live in today is continuously fighting forces to protect what is right. Every day there is a choice that humans make to either help humanity or further create more chaos. This choice is seen most prevalently in war zones around the world. Many countries that are amid war or a civil war have little to no healthcare access. Furthermore, non-profit organization volunteers that want to help the civilians put their lives in danger and at risk. The social relevance to this topic is that many societies are impacted because individuals are not getting adequate healthcare due to the instability of their government or a second party. Also, many laws on war have been broken, which has set a precedent for future battles. The way that I would like to develop this project is to look at three wars that are on-going or are in the recovery stage. These wars are the Civil War in Syria, the war of occupation in Palestine, and the injustices of Yemen. The war in Syria has been going on since 2011. The Palestinian occupation has been going on since 1948, and the crimes of Yemen have been going on since 2015. Historical knowledge will be needed for all these wars, which will then help in figuring out who is causing the healthcare oppression and what precisely the abuse is. The anticipated results are that most of the damage that is being done is by the governments of the country itself or from another world power. From this project, I would like to learn the history of these three wars, what the world has done to help and hinder these vulnerable populations, and what damage has been done to these societies from a healthcare standpoint. The implications of this project will be an understanding of how violence affects vulnerable populations.
HEALTH CARE ACCESS BARRIERS AMONG LATINOS: AN EXAMINATION OF KEY FACTORS
Poster: 270
Archer, Luke
Faculty Mentor(s): Dr. Robyn Brown

Hispanics represent the largest and fastest-growing ethnic minority in the United States, yet they still face many barriers in accessing healthcare. They are a growing minority group that cannot be ignored. As of today, they make up more than 18% of our population. If the growth trend continues, it is estimated that by 2060 they will make up approximately 28.6% of our population. More than one out of every four Americans will be Hispanic, which is why their disproportionate access to care is undeniable important. To develop this project, I collected information from a variety of literature including scientific articles and online journals. The problem is multifaceted; however, some of the main factors that influence the lack of access to healthcare include language and cultural barriers, health services, and social determinants of health. Indicators of this inequality include illnesses that disproportionately affect Hispanics such as liver disease and diabetes. The issue facing Hispanic-Americans will become too pressing for our country to ignore. Several implementations could improve the access to care for Hispanics. Increasing the overall number of Hispanic physicians could resolve many facets of this issue. There is limited research on the successful reduction of barriers to healthcare for Hispanics. We need to begin implementing the programs proven to work and garner evidence for other programs.

FACTORS AFFECTING HEALTHCARE ACCESS IN RURAL KENTUCKY
Poster: 271
McCarthy, Sean
Faculty Mentor(s): Dr. Robyn Brown

Introduction: For my capstone, I will be researching and reporting on factors influencing healthcare access and outcomes in rural versus urban Kentucky environments. In my one and a half years working as an EMT in Lexington, I have seen health disparities firsthand. These disparities have been made especially apparent to me when transporting patients back to their residences in rural areas of Kentucky. Because of these transports, I have been reminded of the true humanity that is shared by all people, regardless of who they are or where they have come from. I know that access to healthcare plays many roles in a population's overall health and risk factors for a variety of diseases, and it is my intent to explore this idea further.

Methods: I conducted a comprehensive review of news media and academic research related to healthcare access in Kentucky, specifically in rural areas. I also conducted qualitative interviews among EMTs and Paramedics in Lexington, KY and Winchester, KY. Results: My results are entirely anticipated at this point, but I would expect to learn that socioeconomic status and access to education are two factors that play a large role in limiting possible healthcare access. Implications: In my almost four years here, I have become very passionate about working to disprove stereotypes as well as stand up for underrepresented groups in our society. I think this project will help me further invest in this passion by arming myself with knowledge and being able to teach other people about this issue. If I can use the information I learn to humanize the Kentuckians that are too often subjected to stereotypes including obesity, diabetes, lack of education, and smoking to others, I think this project will be well worth it.
THE UTILIZATION OF VIVITROL OVER BUPRENORPHINE IN OPIOID ADDICTION TREATMENT
Poster: 272
Smith, Dakota
Faculty Mentor(s): Dr. Robyn Brown

The Opioid Epidemic has rose exponentially to almost three times the overdose rates from 1999 to 2014 with a significant spike increase in just the last two years. This has arisen interest from the community as well as the local and federal government throughout the United States. Since this, the addiction treatment field of medicine has seen a parallel increase of individuals that are prescribed opioid treatment long-term medication protocols with the use of buprenorphine or methadone. This has brought to question what the legitimacy behind this medication really is by means of addiction recovery rather than just temporary cessation especially when Vivitrol, a new intramuscular injection opioid treatment with no potential for abuse, is currently on the market for insurance companies and current opioid addicts today. This project delved into the world of addiction recovery to interview the experts in the field that deal with not only addiction recovery, but also Medication Assisted Treatments for opioid addiction. Previous interviews of mine from professionals in the field of addiction recovery have initiated the general census that buprenorphine and methadone MAT’s don’t really have a good place in addiction recovery since they are seen as more of a crutch than a tool. I hope this exploration of the use of other MAT’s over Vivitrol, a medication used for the same thing that has no potential for dependency or abuse, will explore the reason behind why we have yet to make the switch. To conclude, I believe this project will open a lot of doors by highlighting the controversies of MAT protocols in the field of addiction recovery and will bring to question the legitimacy of the use of buprenorphine and methadone rather than other treatment plans that have shown promise to be more effective but aren’t as widely used. I expect to see that after buprenorphine has been thoroughly examined for the barbaric medical treatment that it is, there will be a push for Vivitrol to become the forefront of addiction treatment.

CAN PREVENTATIVE CARE REDUCE RISKS OF ALZHEIMER’S DISEASE?
Poster: 273
Southard, Alexis
Faculty Mentor(s): Dr. Robyn Brown

Alzheimer’s disease is one of the most progressive brain disorders that slowly destroys a person's memory. This disease can cause significant problems with memory loss, behavior and other cognitive abilities that can interfere with daily life. This disease is a major problem that is affecting people at all ages, especially people that are 65 and older. The purpose of this research was to analyze secondary data sources and determine if a correlation does exist. The question is asked, Is there a correlation between an increase of preventative care (eye exam, dental check-ups/cleanings, etc.) and a decrease in the risk of Alzheimer’s disease occurring. Secondary data sources of peer reviewed research were reviewed and tabulated. The data was statistically tested to discern whether the research supports or negates the hypothesis stated. The implications of this research highlight the need for further understanding of ways in which preventative services might reduce the risks associated with Alzheimer’s disease. Although, this disease is currently ranked the sixth leading cause of death in the United States, it could potentially move up if more research is not done to help find a cure. If a correlation between preventative care and a decrease in the risk of Alzheimer’s disease is supported, then that is one step closer to a medical breakthrough.
COLLEGIATE LIFE AND DISABILITY: PERSPECTIVES OF THE PHYSICALLY HANDICAPPED STUDENT

Poster: 274
Williams, Lauren
Faculty Mentor(s): Dr. Robyn Brown

Through interpretive investigation and article analysis, this project examined the experiences and perceptions of college students living with physical disability, focusing on the accommodations and modifications universities provide, the feeling of community and inclusiveness in the classroom and campus, and adaptations of academic requirements. Semi-structured interviews were conducted with two college students living with disability on University of Kentucky's campus, and resulted in a unique opportunity to juxtapose the experiences of a student with a visible disability to that of a student with an invisible disability. An interview with the University of Kentucky's Disability Resource Center (DRC) explored our own university's disability accommodations and limitations. Insight into the perceptions of students living with physical disability could improve awareness and acceptability of disability in the academic setting. Enhanced faculty-student interactions, university support, and interpersonal interactions are potential repercussions of this exploratory project.

SPECIAL COLLECTIONS RESEARCH

THE INFLUENCE OF STEREOTYPES ON CULTURE BEARERS: MUSIC AND STORYTELLING IN RURAL KENTUCKY

Poster: 275
Banks, Katerina
Faculty Mentor(s): Carol Street

Since the development of the recording industry and proliferation of mass media in the early 20th century, musicians and writers from rural areas of the American South have had to confront deeply entrenched and often negative stereotypes that dominate mainstream American understanding of rural Southern ways of life. James Hines (1926-2017) of western Kentucky was one such individual, who by the mid-1950s had established himself as a writer of short stories in periodicals published throughout the United States and was actively exploring his rural Kentucky roots in his writing. Several volumes of Hines’ published musical and literary works, along with relevant incidental materials, now form a permanent archival collection at the University of Kentucky Special Collections Research Center. Through analysis of both published and unpublished writings found in this collection, including Hines’ extensive correspondence with publishers and creative collaborators, this project will examine whether lived experience of local culture or capitulation to prevailing stereotypes of rural Southerners played a greater role in shaping Hines’ portrayal of rural Kentucky life. The ways in which a difference in creative medium (music versus print) shaped the subjects and idiom of Hines’ creative output will also be considered.

** Denotes STEMcats project
A PORTRAIT OF THE DEVELOPMENT AND EMPHASIS OF TECHNOLOGY UTILIZING THE 1931 NAUTILUS EXPEDITION AND SPACE X
Poster: 276
Burgess, Emily
Faculty Mentor(s): Carol Street

Prior to the 20th century, the means of exploration were typically solely the jurisdiction of governments and world leaders. Industrialization, however, created a wealthy, nongovernment class of people who sought to increase their wealth, exploit natural resources, and derive fame from their accomplishments. Where once governments oversaw every aspect of exploration, this field of authority expanded to individual entities such as these private, affluent sponsors. That is seen today in Elon Musk’s private venture SpaceX. In 1931, Sir Hubert Wilkins had a mission to return to the unexplored Antarctic, which he had been previously through numerous plane journeys and find a shortcut to England and conduct scientific analysis of the Polar region. This paper explores the degree to which the government and private corporations or people operate outside of each other when a new technology is developed and what that technology means for society at that time. The analysis of Sir Hubert Wilkins’ 1931 Nautilus expedition will emphasize the role of the Nautilus in a time of economic grief and through Wilkins’ drive to return to the Polar region what his agreement with the government at the time means. Methods include archival processing of the Harry Ross Papers collection at the University of Kentucky Special Collections Research Center and analysis of historical research. Research reveals that despite the appearance of vast distance between government entities and independent entities, there is still an underlying connection in terms of technological development and expedition. Governments now offer contracts to private corporations on a competition basis to fund technologies. What Hubert Wilkins and his quest for the Antarctic domain once meant for the 1930s is now what Elon Musk and SpaceX offers for modern society.

EXPLORING OWNERSHIP: AN ANALYSIS OF EARLY KENTUCKY COURT RECORDS
Poster: 277
Clark, Shelby
Faculty Mentor(s): Carol Street

Prior to its statehood, Kentucky was seen as a promising frontier that attracted settlers who wanted to own their own land and be independent, self-sufficient citizens. However, many people who migrated to Kentucky, such as women, African Americans, and the poor, instead found a continuation of the institutional poverty and the owning of people that structured the original thirteen colonies. By analyzing an archival collection of Kentucky court records from the early 1800s at the University of Kentucky Special Collections Research Center, research will uncover how the idea of ownership, specifically land acquisition and debts, affected Kentucky settlers. These court records comprise different types of bonds that ensure the exchange of property and sums of money in accordance with the rulings of the courts. Through the study of these early bonds, we can understand the role that the government played in issuing debt and controlling ownership between different parties. By tracing the lives of the individuals that appear in these records, we can better understand how the court’s control of property shaped the lives of early Kentuckians and how this institution of ownership went against the frontier’s promise of becoming an independent citizen. Further research will uncover how ownership was dealt with in the early history of the Commonwealth and explain how the judicial system shaped modern ideas and boundaries of ownership.
EXPLORING LOCAL NEWSPAPER COVERAGE OF THE CIVIL RIGHTS MOVEMENT MADE BY THE LEXINGTON HERALD-LEADER

Poster: 278
Garcia, Jillian
Faculty Mentor(s): Carol Street

Coverage of the Civil Rights Movement was largely neglected by Lexington, Kentucky's local newspapers. This decision caused a collective African American voice to be excluded from Central Kentucky's civil rights narrative. Primary sources held at the University of Kentucky Special Collections Research Center and the Louie B. Nunn Center for Oral History will be examined for their portrayal of the Civil Rights Movement in Lexington, Kentucky. Research will establish discourse between a collection of historical images taken by the city's local newspapers at the time, the Lexington Herald and the Lexington Leader, and audio interviews from the Blacks in Lexington Oral History Project. What events were covered by the newspapers? What events did not receive coverage? How did the neglect from a mainstream news source affect individuals in the struggle for equality? Events that were covered by the Lexington Herald and Lexington Leader during key moments of the struggle for equality will be identified, and the depiction of the city and surrounding regions by mainstream news sources will be compared to testimonies told by members of the African American community. By analyzing these two accounts of the Civil Rights Movement in Lexington, Kentucky, research will explore implications to solving the continued issues of wide discrepancy and exclusions of communities made by news sources today.

IMPACT OF LITERACY: HOW BOOK DONATIONS AFFECT DEVELOPING ECONOMIES

Poster: 279
Simpkins, Shelby
Faculty Mentor(s): Carol Street

Rarely has one person made such a positive impact on the lives and literacy of people around the world than Harriet Drury Van Meter from Lexington, Kentucky. After traveling to India and seeing long lines of people waiting for books, she was inspired to create the International Book Project. Since she sent her first book overseas in 1966, her organization has delivered over 7 million books to people in over 140 countries in the developing world. More than 50 years later, the organization is still thriving; however, no one has yet quantified the impact of her giving on the communities that have received these books. Using historical data from her collection of papers held at the University of Kentucky Special Collections Research Center; the International Book Project's records; as well as current qualitative economic data, this analysis will explore the correlation between increased literacy rates and the evolution of corresponding international economies on areas that benefitted from donations made by the International Book Project.
Intraventricular hemorrhage (IVH) is one of the most common causes of brain injury in preterm infants and can lead to the development of lifelong neurological deficits. The mechanisms of this injury may be direct cellular injury by hemoglobin, or the activation of inflammatory signaling cascades in the brain, which then cause cell death. Both inflammation and direct hemoglobin-mediated cell death may involve oxidative stress. Microglia are the endogenous immune cells of the brain. Brain injury and oxidative stress lead to a rapid and intense response from microglia, which is essential to long term central nervous system recovery and repair, but also has the potential to worsen the immediate injury. This study sought to more clearly understand the mechanisms of neurological injury due to IVH, as well as test a possible treatment for oxidative stress and cytotoxic effects induced by microglia. Specifically, hemoglobin’s impact on microglial survival and oxidative stress was measured with the goal of determining a temporal relationship of inflammation and oxidative stress, as well as the effects of azithromycin treatment, which others have shown to reduce both inflammation and oxidative stress. Using primary microglia cultures derived from rats, different timepoints were examined after the hemoglobin exposure. The development of oxidative stress and cytotoxicity were measured using LDH and DCF-DA assays. Microglia were then exposed to azithromycin and the azithromycin’s effects on inflammation, oxidative stress and cytotoxicity were assessed. Cytotoxicity increased over time in microglia treated with hemoglobin. Furthermore, it was found that cytotoxicity increased in microglia treated with hemoglobin and azithromycin, but not in microglia treated with azithromycin only. Azithromycin also reduced oxidative stress induced by hemoglobin. Azithromycin should be tested further and considered as a treatment for neurological disorders in which microglial oxidative stress plays a role.
IDENTIFICATION OF A LARGE, HIGHLY POLYMORPHIC REGION ON CHROMOSOME 1 OF THE AXOLOTL (AMBYSTOMA MEXICANUM) GENOME

Poster: 281

Authors: Cassity High, Caitlin Labianca

Faculty Mentor(s): Dr. S. Randal Voss, Dr. Jeramiah Smith, Nataliya Timoshevskaya

The axolotl (Ambystoma mexicanum) genome was recently sequenced and assembled, thus providing a valuable new resource for studies of tissue regeneration, early development, and evolution. The assembly was put together by our lab and a lab in Dresden Germany using DNA sequences from two different axolots. We identified a large (~140 Mb), contiguous DNA region on chromosome 1 (Ch1) that showed considerable sequence divergence between the Dresden-axolotl and the Ambystoma Stock Center axolotl (AGSC-axolotl) that were used in these genome sequencing projects. This was an unexpected finding because both axolots trace their ancestry to the AGSC population. We hypothesized that one of the axolots either carried a relatively ancient Ch1 segment that is segregating in the AGSC population or it carried a Tiger salamander (A. tigrinum) Ch1 segment that was introgressed into the AGSC population in 1962. To test this hypothesis, we used PCR and DNA sequencing to determine Ch1-segment genotypes for axolots from the AGSC. We also compared Ch1-segment sequences to outgroup species (A. mavortium, A. californiense) and a sequence previously identified as introgressed from A. tigrinum. In the AGSC population, the Dresden-axolotl Ch1 segment was low frequency and primarily found among Dresden-axolotl descendants that were re-introduced into the AGSC in 2005, while the AGSC-axolotl Ch1 segment was high frequency. While one PCR amplicon suggested the Dresden-axolotl Ch1 segment was marginally more similar than the AGSC-axolotl Ch1 segment to orthologous sequences from the outgroup species, a diagnostic A. tigrinum SNP from a second PCR amplicon was identified in both Dresden and AGSC axolots. Our results suggest that polymorphism on chromosome 1 is most likely explained by introgression and recombination of a highly divergent A. tigrinum chromosomal segment. The biological significance of this and other introgressed A. tigrinum segments will be investigated in future studies.

SEXUAL PROFILING FOR EXTENT AND DURATION OF OXIDATIVE DAMAGE FOLLOWING TBI

Poster: 282

Walden, Joseph

Faculty Mentor(s): Dr. Edward Hall, Rachel Hill

Neurological damage following TBI is incurred through various biochemical cascades which occur in response to both primary and secondary injury mechanisms. These mechanisms generate oxidative damage, an imbalance between pro-oxidant and anti-oxidant agents that exacerbate cellular damage. Little has been done to explore TBI in females, as TBI is more common in males than females. But, as females begin to increase their participation in contact sports, as well as a preexisting likelihood of both sexes to experience TBI due to unforeseen incidents, the need to conduct research determining differences in therapeutic window, severity and duration due to the sex of the subject is necessary. Therefore, this project aimed to explore sex-based differences in markers relating to the balance between oxidative damage and activation of endogenous anti-oxidant mechanisms following TBI. Specifically, the current study looked at: 1) reactive aldehydes 4-HNE and acrolein resulting from the peroxidation of lipids by reactive species; 2) downstream markers of Nrf2-mediated activity: NQO1, HO-1 and GPx4; 3) Ca2+-mediated enzymatic degradation of spectrin, a neuronal cytoskeletal protein. As higher levels of estrogen in females have been postulated to be neuroprotective, we hypothesize that there will be significant sex-dependent differences between one-day and seven-days post TBI. We found that the extent and duration to which secondary damage occurs in the brain, was significantly different in the females, compared to males following TBI. These findings help us to understand how sex-related characteristics may affect recovery and assist in the development of sex-specific pharmacological strategies for clinical use in TBI patients.
SURGERY

EFFECTS OF OBESITY ON T CELL ACTIVITY
Poster: 283
Gonzalez, Juan
Faculty Mentor(s): Dr. Roberto Gedaly, Dr. Francesca Marti

In the field of transplantation, allograft rejection is a critical area of study, and recent data has identified the balance between graft-reactive effector cells and graft-protective suppressor regulatory T cells (Tregs) as the major determinant of long-term allograft survival. However, the impaired function and reduced numbers of circulating Tregs in obese patients limited this group's involvement in the determinant. In this study, the goal was to characterize Treg cells from healthy/non-obese subjects to provide functional context for future experiments involving obese patients to ultimately determine if the lack of balance between T effector cells and Tregs in the obese microenvironment can be altered to extend allograft survival. To achieve a thorough characterization, analysis of the function and stability of expanded Tregs was performed through the evaluation of metabolic activity, phenotypic character, expansion, lineage stability (methylation), and suppressor activity. Seahorse XF Analyzers, cell surface and intracellular phenotype staining, traditional cell recount, a PCR modification, and CFSE-labeled flow cytometry were utilized respectively. It was determined that metabolically, in both the OCR and ECAR scenarios, the T cellular tendencies towards Glycolysis as well as the Treg cellular tendencies towards Mitochondrial Respiration were displayed. With regards to phenotype, expansion, and suppression, Tregs from healthy/non-obese subjects showed an increased expression of phenotypic markers and cell proliferation that were consistent with their suppressive activity. Lastly, lower methylation levels of the FOXP3 gene were associated with higher Treg activity in both the proliferative and suppressive scenarios. From this, it was concluded that the function and stability of expanded Tregs from healthy/non-obese patients act with expected tendencies both metabolically and in relation to the mTOR pathway. It was also concluded that further characterization of Tregs from obese patients to identify phenotypic and functional differences with non-obese ones is necessary.

PUBLIC HEALTH

KENTUCKY ACCESS NURTURING DEVELOPMENT SERVICES HOME VISITING PROGRAM IMPROVES MATERNAL AND CHILD HEALTH OUTCOMES AMONG MULTIGRAVIDA
Poster: 284
Avery, Morgan
Faculty Mentor(s): Dr. Corrine Williams, Sarah Cprek

Background and Objectives: Since 2004, Kentucky Health Access Nurturing Development Services (HANDS) program has been providing both prenatal care and post birth continuous home visitation programs to Kentucky's at risk first-time parents. As a result of increased funding, HANDS was expanded to include multigravida in 2011. This is the first study, to our knowledge, that assesses the impact of home visiting programs on multigravida. Methods: A quasi-experimental study was used to calculate the possible different health outcomes among multigravida HANDS participants who received at least one prenatal visit and multigravida who were referred to the HANDS program but did not receive a visit. Individuals eligible to be included in this study were referred to the program between January 1, 2012 and December 31, 2016. Results: Multigravida who received a prenatal HANDS visit had significantly less risk of a pre-term birth compared to mothers who did not receive a prenatal HANDS visit (12.5% vs. 18.3%, respectively; p<0.001). Multigravida who received a prenatal HANDS visit were less likely to give birth to a low birth weight infant compared to mothers who did not receive a prenatal in-home visit (10.2% vs. 16.0%, respectively; p<0.001) and less likely to report inadequate prenatal care (27.2% vs. 32.8%, respectively; p<0.001). Conclusions: The HANDS program appears to be effective in improving maternal and child health outcomes in multigravida. These findings highlight the need to encourage prenatal enrollment in the HANDS program among this demographic and support expansion of other home visiting programs to include multigravida.
PSYCHOLOGY

CITIZEN’S KNOWLEDGE OF BAIL IN THE LEGAL SYSTEM
Poster: 285
Riegler, Kayla
Faculty Mentor(s): Dr. Jonathan Golding

According to May (2018), nearly 70 percent of people held in local jails are there because they don’t have enough money to pay bail. The U.S. Legal definition of bail is the money a defendant pays as a guarantee that he or she will show up in court at a later date. Recently, the state of California has become the first state to abolish bail stating, “California will continue to lead the way toward a safer and more equitable (legal) system,” (Romo, 2018). Bail has become seen to become unconstitutional because it may give wealthy an advantage in the legal system over the poor. The Washington Post, described the bails system as, “unfair and penalizing poor defendants, while rewarding others with the means,” (2017). Although bail seems simple, there are many aspects most common citizens do not understand which could affect them in a scenario with legal issues. The purpose of the study is to investigate how much a common person knows about bail in the legal system.

Undergraduate students and community members were recruited to use the online platforms of SONA and Mechanical Turk respectively. On these platforms, they were asked to rate statements on a 1 (Definitely False) to 10 (Definitely True) scale. Following this the participant was then asked to rate their confidence in their answer on a 1 (not at all) to 10 (extremely) scale. Although both accuracy and confidence were measured and analyzed, only accuracy was the focus for the study. It was hypothesized that community members would have more accuracy than undergraduate students because of their greater amount of life experiences and exposure and concern with the legal system. Furthermore, it was also expected that both undergraduates and community members to have greater accuracy in general aspect of bail versus specific questions.

NURSING

MINDFULNESS-BASED NATURE THERAPY FOR HOSPITALIZED PATIENTS WITH ACUTE PAIN
Poster: 286
Damron, Brianna
Faculty Mentor(s): Dr. Mary Arthur

Nature therapy is the process of interacting with the natural environment to improve mental and physical health. Many studies have shown that being outdoors can result in measurable reductions of stress and chronic conditions, but none have examined the impact that it has on acute pain. Our pilot study seeks to analyze how virtual nature therapy impacts acute pain, as well as state feelings of mindfulness and connectedness to nature. Participants (n=10) are recruited from floors 8, 9, and 10 of UK Hospital’s Pavilion A to watch a ten-minute video on the GetWellNetwork that features footage of the UK-LFUCG Arboretum, nature sounds, and a guided meditation. Heart rate, respiratory rate, blood pressure, and pain are measured before and after watching the video. Participants are also asked to answer ten questions before and after watching to rate their feelings of mindfulness and connectedness to nature. We hope to see a decrease in vital signs and pain, as well as increased mindfulness and connectedness to nature.
ANTHROPOLOGY

TRADITIONAL HANDCRAFTED NECKLACES FROM ECUADORIAN AMAZON

Table:  1
Authors: Ivanova, Dayana
Faculty Mentor(s): Dr. Renee Bonzani, Bruce Manzano, Christian Mittendorf

A research at the William S. Webb Museum of Anthropology was conducted to determine the materials utilized in the construction of traditional handcrafted objects of indigenous necklaces from the Ecuadorian Amazon. Thirty necklaces were donated to the museum, which had been collected from indigenous groups identified as the Shuar and Achuar. The influences of modernization and new laws threaten traditional artisanship and the materials that Amerindian groups can use. The premises of the project was to understand the processes and materials, particularly the plants and animals, utilized by these peoples. Each necklace was drawn, measured and described. Brief descriptions of the taxa and their uses are presented. The botanical identifications were made to species level, whenever possible. Faunal remains were identified by Type of body parts. The identified seeds represent 9 families, 14 genera, 6 species and faunal materials represent 10 Types. Scientific reference manuals and museum staff and faculty from the Department of Anthropology assisted in the identification of the objects. The audience can see the broad use of plants and animals that are integral to the traditional lives of indigenous peoples of the northwest Amazon. Original handcrafted necklaces are on view.

ENGINEERING

SIGHT AND SOUND: MUSIC ~ COMPUTER PROGRAMMING ~ ART

Table:  2
Authors: James Bryant
Faculty Mentor(s): Dr. Jerzy Jaromcyzk

This presentation aims to show how Art, Music, Math, Science, Engineering, and Technology can all work together to unify logic, science, beauty and creativity. Playing guitar (physical action) makes music (audible signals), and a computer (digital signal processing) stores it as an audio file (bits). Then Math with Computer Programming transforms the audio file into an image of the music that is displayed on a computer screen (a visualization of the audible signals). In effect, our software application (coded in Java) takes in an audio/music file and, using that file, it constructs a computer animation/visualization that is displayed as the audio/music file is played. This demonstration will also include a walkthrough of the creative process that made this animation possible, starting with the live recording of a musical composition (played on guitar). Once recorded, the musical composition will be converted to an .mp3 file, inputted into the program, which will then run a Fast Fourier Transform (FFT) on the decoded .mp3 file in order to extract the frequency spectrum data that is necessary for deriving and rendering the corresponding computer animation/visualization.
ALGOCRAFT: TEACHING ALGORITHMS AND AI USING MINECRAFT

Table: 3
Authors: Brian Carlson
Faculty Mentor(s): Dr. Jerzy Jaromcyzk

AlgoCraft is a platform for teaching programming, algorithms, and AI principles in an environment that encourages exploration of programming concepts. It uses gamification in the form of Minecraft to make learning more effective and enjoyable. AlgoCraft can be run entirely in the cloud and is available from the browser, allowing easy access for users. Through the provided wrapper of Microsoft’s Project Malmo, the same tool constructed for reinforcement learning research can be used to teach simple algorithms and encourage progression into harder AI concepts. The AlgoCraft project is written in Python, packaged into a Docker container, and displays graphics using noVNC. It also uses Jupyter notebooks for writing and executing the code that interacts with a Minecraft client. AlgoCraft was initially developed for educating middle school and high school students, for example, participants of the Kentucky Student Technology Leadership Program.
2018 5-MINUTE FAST TRACK RESEARCH COMPETITION FINALISTS

TOP 10 STUDENT FINALISTS

First Place:  CHRISTOPHER KOSITZKE – Mentor: Dr. Stephen Dobson; Build a Better Beetle Trap: Novel Pest Management Technique

Second Place:  ALYSSA MERTKA – Mentor: Carol Street; Fragmenta Ne Pereant: An Analysis of the Endpapers of MS Latin Kentuckiensis III

Third Place:  NATALIE HAWES – Mentor: Martha Biddle PhD, RN, APRN, CCNS, FAHA; The Effects of Inadequate Sleep on Obesity and Depression in Older Farmers

Honorable Mention:  MORGAN ANDREWS – Mentor: Nick Heebner PhD, ATC; The First Step Toward the Future of Wearables in Rehabilitation

Honorable Mention:  BRITTANY AU Vil – Mentor: Dr. Susan Barron; Reducing Deficits of Fetal Alcohol Spectrum Disorders

Honorable Mention:  SHELBY BROWNING – Mentor: Dr. Jeffrey Seay; Sustainable Approach for Green Pesticide Production in Kenya from the Croton Meegalocarpus Trees

Honorable Mention:  DAVID CHEN – Mentor: Dr. Jia Luo; A Synergistic Effect of Alcohol and Arsenic Exposure on Neuron Apoptosis

Honorable Mention:  JOSHUA PRESTON – Mentor: Dr. Kevin Pearson; Chemerin is a Positive Biomarker of Aging in Mice

Honorable Mention:  VERONICA SCOTT – Mentor: Dr. Guy Bosmans; Gratitude, Attachment, and Depression

Honorable Mention:  HANNAH THOMPSON – Mentor: Dr. Daret St. Clair; Inflammatory Effects of Extracellular Vesicles Released Following Chemotherapy
# 2018-2019 Oswald Research and Creativity Competition Winners

## Biological Sciences

**First Place:** USMAN HAMID - Mentor: Dr. Michael Bardo; *Effects of Environmental Conditions on c-fos Expression in Rat Nucleus Accumbens After Remifentanil*

**Second Place:** HANNAH THOMPSON – Mentor: Dr. Daret St. Clair; *Inflammatory Effects of Extracellular Vesicles Released from the Normal Tissue Target of Doxorubicin*

**Honorable Mention:** JOSHUA PRESTON – Mentor: Dr. Kevin Pearson; *PCB126 Exposure during Pregnancy Significantly Affects Maternal and Fetal Gene Expression*

## Design

**First Place:** TEONNA RADEVSKI - Mentor: Lindsey Fay; *Symbiotic Spaces*

**Second Place:** ALYSSA WEIR - Mentor: Lindsey Fay; *Interlocking Harmony of Opposites*

## Fine Arts

**First Place:** SAMANTHA HENSLEY – Mentor: Crystal Gregory; *Gathering My Friends*

**Second Place:** ALEXIS (ALI) DEANE – Mentor: Ruth Adams; *Amniotic Fluid Study*

## Humanities: Creative

**First Place:** CHRISTIAN TIPTON – Mentor: Dr. DaMaris Hill; *Creative Writing in Digital Spaces: Digital Story Book*

**Second Place:** KENNETH ARNETT – *Shindig*

**Honorable Mention:** HALEY DRAKE – *Some Poems*

## Humanities: Critical

**First Place:** ANNA ROMANIUK – *Droga Pani Ministro*

**Second Place:** ALYSSA MERTKA – Mentor: Dr. Armando Pratts; *When This You See, Remember Me: The Vietnam Veterans Memorial and World War I Monuments*

## Physical and Engineering Sciences

**First Place:** KATIE KLOSKA – Mentor: Dr. Ryan Fortenberry; *Gas Phase Spectra of MgO Molecules: A Possible Connection from Gas Phase Molecules to Planet Formation*

**Second Place:** KAITLYN KEARNS – Mentor: Dr. Martha Grady; *Relationship Between Sucrose Concentration and Spallation Region in S. Mutans Biofilms Loaded by Laser-induced Stress Waves*

**Honorable Mention:** BRANDON ENBODY – *Biomimicry of Aquatic Organisms for Community Storm Design Applications*

## Social Sciences

**First Place:** HANNA CARLSON - *Client Protection Regulations for Microfinance Institutions in Ghana, Kenya, and Tanzania*

**Second Place:** SIERRA HATFIELD – Mentor: Dr. Steven Voss; *The Potential Electoral Influence of Internet Memes*

**Honorable Mention:** MEGAN COFFINBARGAR – Mentor: Dr. Robyn Brown; *An Assessment of Disability Access at the University of Kentucky*

**Honorable Mention:** HINA IQBAL – Mentor: Dr. F. Douglas Scutchfield; *Cultural Competency and its Effects on Social Capital*

Sydney Adkisson - Mentor: Dr. Sabrina Brown
Contributing Factors leading to Suicide in Children: Kentucky 2005-2016

Sarah Ann Anderson - Mentors: Dr Kristen Ashford, PhD, APRN, WHNP-BC, FAAN; Dr Lisa McGee, DNP Quality of Care Strategies and the Subsequent Improvement of Kangaroo Care Incidence Rates in Premature Infants

Brittany Auvil - Mentor: Dr. Susan Barron
Can Solidago Nemoralis Reduce Deficits Following Prenatal Ethanol Exposure in a Rodent Model

Umair Bhutto - Mentor: Dr. Robin Cooper
Pharmacological Identification of Cholinergic Receptor Subtypes in Modulation of Neural Circuits in Drosophila melanogaster

Shelby Buckman - Mentor: Dr. William Hoyt
Effects of Shifts in the Local Tax Base on Economic Outlook: Evidence from Kentucky Cities

Caiti Griffiths - Mentor: Dr. Elizabeth Lorch
Comprehension Self-Efficacy Following a Narrative Structure Intervention

Usman Hamid - Mentor: Dr. Michael Bardo
Effects of Naltrexone on Alcohol and Nicotine Use in Female P Rats

Emily Huffman - Mentor: Dr. Warren Alilain
Clearing Up the Phrenic Motor Neuron Survival Debate After Cervical Spinal Cord Injury

Bryan Kirshe - Mentor: Dr. Sherali Zeadally
Analysis of Vulnerabilities of Internet of Things (IoT) Devices Online

Caroline Miracle - Mentor: Lindsey Fay
Staff Perceptions of Changing from Open Bay System to Single Patient Family Rooms

Kenyatta Mitchell - Mentor: Dr. Anastasia Curwood
Civil Rights Coalitions during the 1960s in Mississippi

Hannah Newberry - Mentor: Dr. Janice Fernheimer
‘Pa-jew-cah’: Reclaiming the History of Paducah’s Jewish Community

Aaron Silverstein - Mentor: Dr. Warren Alilain
Exploring Approaches to Promote Respiratory Motor Plasticity Through Varied and Fixed Interval Intermittent Hypoxia

Daimen Stoltz - Mentor: Dr. Warren Alilain
Balancing Neuroprotection with Functional Recovery: The Role of the Perineuronal Net in Preventing Excitotoxicity after Spinal Cord Injury

Hannah Thompson - Mentor: Dr. Janice Fernheimer
Louisville Jewish Hospital’s “Tikkun Olam”: A Case Example of Continuity for American Jewish Hospitals

Cierra Waller - Mentor: Dr. Dhananjay Ravat
The Undeniable Attraction of Lunar Swirls

Megan Woodrum - Mentor: Dr. Joao Costa
Using an Implantable Microchip for Measuring Body Temperature in Dairy Calves
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