The Showcase of Undergraduate Scholars

Celebrating ideas for over a decade!

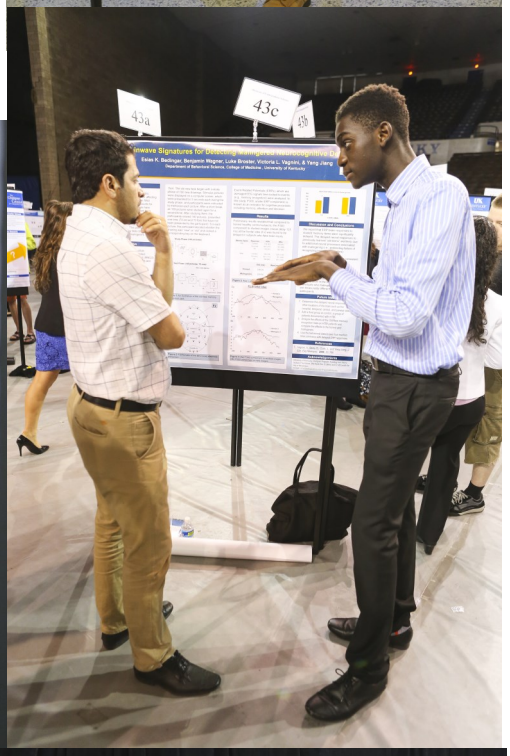
University of Kentucky

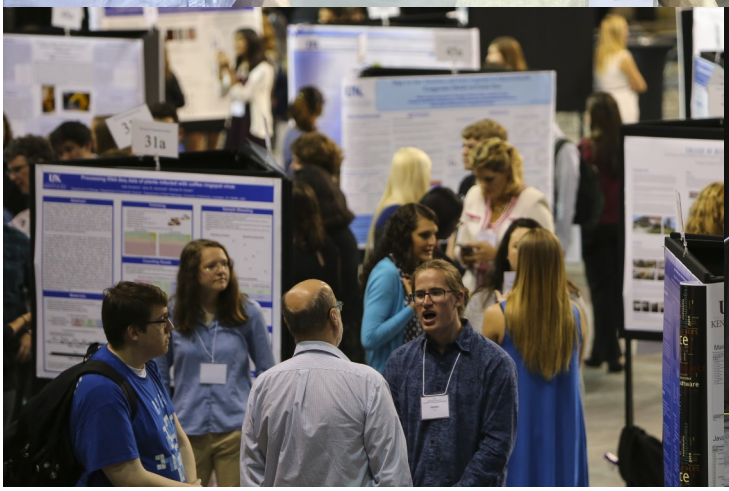
April 26, 2017

3:00PM - 6:00PM

2016

Showcase of Undergraduate Scholars





see blue.™

Table of Contents

Eleventh Annual Showcase of Undergraduate Scholars

Wednesday, April 26, 2017
Memorial Coliseum
3:00 – 6:00PM

Opening Remarks and Moderators
Joy Kim, Aaron Mueller, Ivanka Rainer, SPUR

Welcome
Dr. Philipp Kraemer, Interim Assistant Provost for Academic Enrichment

Comments
Dr. Lisa Cassis, Vice President for Research

Presentation about IAmAWomanInSTEM
Women in STEM Officer

A Different Perspective to Undergraduate Research
Cannon Hanebuth, Dr. Michelle Butina, Dr. Randa Remer

Presentation of the 9th Annual Faculty Mentor of the Year Awards
SPUR

Presentation and Performance
Coleman Scott, Rose Street Brass

Closing Remarks
Joy Kim, Senior SPUR President

Reception (Floor), Poster Presentations (Floor), and Oral Presentations (Concourse A and B) Begins
Enjoy!

Welcome to the 2017 Showcase of Undergraduate Scholars!

The Office of Undergraduate Research and all supporting partners welcome you to the *11th Annual Showcase of Undergraduate Scholars (2017)*. 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 of the behalf of these students.

As in past years, the *Showcase* affords a forum for students, faculty, staff, and guests to view the achievements of students engaged in faculty-mentored scholarly inquiry. Students will present descriptions of their scholarly research and creative activities 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 partaking in undergraduate research. The 2017 Faculty Mentor Awards will also be announced.

The *Showcase* is a special opportunity for the UK campus to appreciate the diversity, depth, and breadth of student engagement in faculty-guided research in all disciplines. It also highlights the invaluable educational impact that undergraduate research can have on promoting student success. Finally, the *Showcase* demonstrates that true academic enrichment is best achieved by collaborations and partnerships among faculty, academic departments, colleges, and units and programs dedicated to academic excellence.

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

Bessie M. Guerrant
Associate Director

Evie Russell
Assistant Director

Danna Barnett
Student Service Program Specialist

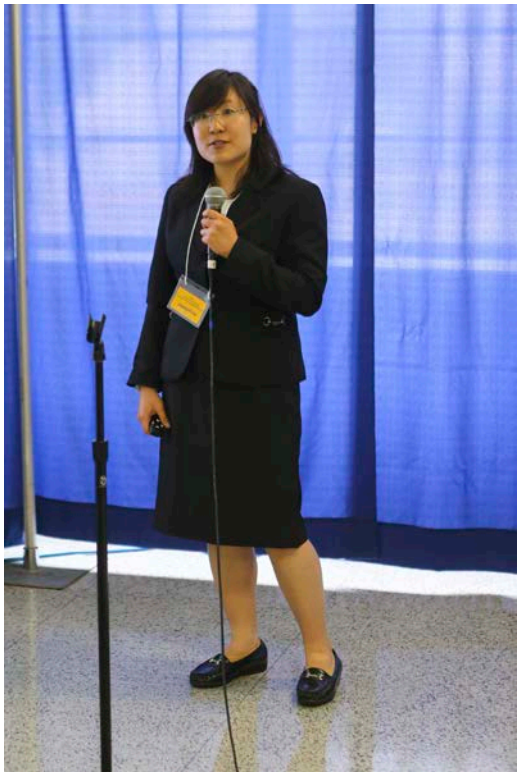
Philipp J. Kraemer
Interim Assistant Provost for Academic Enrichment

What a piece of work is a man! how noble in reason!
how infinite in faculty! in form and moving how
express and admirable! in action how like an angel!
in apprehension how like a god! the beauty of the
world! the paragon of animals!

- *Hamlet* (2.2.295-299)

Prince Hamlet captures the enthusiasm for the remarkable capacity of the human mind that marks the Showcase of Undergraduate Scholars. We are gathered today to celebrate the curiosity that has led to so many discoveries and innovations. Equally important as the exciting potential to contribute to society, undergraduate research encourages exploration and growth in the leaders of tomorrow. Students may be tempted to be discouraged in the face of statistically insignificant or inconclusive results. This showcase (and many wise mentors) send the message that it's okay. Undergraduate research cultivates traits such as critical thinking, public speaking skills, creativity and perseverance that will stay with students long after they have graduated. Lifelong learning promotes a journey that is as great as the destination.

Thank you to all the mentors, undergraduate researchers, and inquisitive supporters for making this event a reality. You are part of the culture that makes University of Kentucky a leading research university. By sharing your hard work with the public or taking the time to listen in on a student presentation, you are being an invaluable advocate for undergraduate research.
It is the delight of the Office of Undergraduate Research, Student Outreach Team, Chellgren Center, and the Society for the Promotion of Undergraduate Research (SPUR) to welcome you to the 2017 Showcase of Undergraduate Scholars. We highly encourage you to take this opportunity to connect with researchers from disciplines both in and out of your own. Here's to learning something new today!



Cheers,

Josephine Kim
SPUR Co-President

Keynote Speakers

Michelle Butina

Dr. Michelle Butina is the Medical Laboratory Science Program Director in the College of Health Sciences. She has been in medical laboratory science education since 2003 and has been at UK since 2010. Her research interests include admission/programmatic predictors for success in allied health program and history of the medical laboratory science profession. Dr. Butina's first experience with an undergraduate research student began in the spring of 2015.

Cannon Hanebuth

Cannon Hanebuth is a junior, Human Health Sciences major on the Physical Therapy track. She is from the northern suburbs of Chicago, IL. She currently serves as a College of Health Sciences Student Ambassador, secretary of the Pre-Physical Therapy Student Association, and is on the executive board for the Red Shoe Crew. She got involved in research in 2015, and has really enjoyed developing research questions and exploring what predicts success in Physical Therapy students.

Left to right: Butina, Hanebuth, Remer

Randa Remer

Dr. Randa Remer is the Assistant Dean for Admissions and Student Affairs for the College of Health Sciences. She has been in student affairs and academic roles since 1998 and has been at UK since 2006, specifically in Health Sciences since 2011. Her research interests include educating individuals to increase cultural competency, predicting student success, and using intervention models for increasing student success in undergraduate and graduate programs. Dr. Remer's first experience with an undergraduate research student began in spring of 2015.

TITLE OF PRESENTATON:

A Different Perspective to Undergraduate Research

TITLE OF RESEARCH PROJECT:

"Comparison of Academic Performance Between Rural and Urban Physical Therapy Students"

DESCRIPTION OF WORK:

Research suggests that rural education, primarily in elementary and high schools, is associated with lower performance rates when compared to urban schools. Most often the lower academic performance rates are due to socioeconomic disparities. Few data on the impact of the rural geographical setting on professional level of education are available. Data were collected from five of the most recent Physical Therapy (PT) graduating classes, spanning from 2010-2014 (300 students) at a research institution in the southeast. The professional program consists of two campuses, rural and urban, which were used for comparison. Approximately 46 students are accepted into the urban campus each year, while only 16 students into the rural campus. Overall, participants reported being 67.6% women, 97.4% white, 92.3% of traditional age, and 38.5% growing up in a rural community when entering the program. Two groups of variables will be analyzed: undergraduate academics (grade point average, graduate records examination, highest degree achieved) and PT program success (course grades, board pass rates, overall grade point average). A multiple regression analysis will be used to determine if the rural campus varied on any of the above listed variables. Findings and implications are pending.

I. Coleman Scott

Coleman Scott is a sophomore trumpet artist and music education major at the University of Kentucky. Coleman was one of four trumpet players in the world to receive the International Trumpet Guild's "Young Artist Award" in 2016. He has performed with various world-renowned artists including Jeff Coffin of the Dave Matthews Band, Vince DiMartino, Roger Ingram, Jeff Jarvis, Rick Hirsch, and Wycliffe Gordon. Coleman has also performed and recorded with Caleb Chapman's Crescent Super Band, repeatedly recognized by DownBeat Magazine as the best high school jazz ensemble in the United States. In 2014, Coleman attend the Interlochen Arts Camp, the world's premier summer arts program, where he studied classical and jazz trumpet performance. Coleman is also a frequent performer at the Great American Brass Band Festival with Frankfort Brass, Rose Street Brass, the Capital City Community Band and the Advocate Brass Band. Coleman is a co-founder of the "Frankfort Trumpet Guild," a chapter of the International Trumpet Guild based in Frankfort, KY.

II.Rose Street Brass

Rose Street Brass is a professional brass quintet consisting of five music education students at the University of Kentucky. These musicians are Coleman Scott and Zach Robinson (trumpets), Daniel Taylor (French horn), Denver Pascua (trombone), and Daniel Cox (tuba). RSB performs in the Central Kentucky and surrounding areas at church services, schools, weddings, community festivals, recitals, and other events, including the Great American Brass Band Festival. RSB plays many different styles of music, including original compositions and arrangements by its own members.

Jonathan Golding

Dr. Golding received his Ph.D. from the University of Denver in 1986 and joined the Department of Psychology faculty at the University of Kentucky in 1988. In November 2011, the Carnegie Foundation for the Advancement of Teaching and the Council for Advancement and Support of Education named him the Kentucky Professor of the Year. With regard to psychology and law, his research focuses on investigating the impact of witness memory in the courtroom. Dr. Golding has mostly studied child witnesses in court, but has now extended to studying elders as witnesses. His research is centered on understanding the effect of instructions to forget on memory. This phenomenon is typically referred to as directed or intentional forgetting. In addition, he has examined how information is represented in memory following these cues, and the mechanisms that lead to intentional forgetting.

Jeffrey L. Osborn

Dr. Osborn graduated Amherst College, Amherst, Massachusetts with a B.A. Biology in 1974, followed by obtaining both his M.S and Ph.D in physiology from Michigan State University, East Lansing, MI. by 1979. He is currently the president of Biomedical Sciences Research Group, LLC (BSRG). BSRG provides research opportunities to academic scientists and corporate research in a variety of physiological model systems. As a professor and the associate-chair of the Department of Biology at the University of Kentucky, he also manages his Laboratory, The laboratory of Dr. Jeffrey Osborn. The laboratory of Dr. Jeffrey Osborn provides a specialized environment where all students experience "science in action". The physiological research laboratory focuses upon the neural control of renal sodium and water balance and the role of renal sympathetic nerves in the control of blood pressure.

Concourse A

4:00 PM	**Brandon Lee,** *Behavioral Intention of Attorneys Using LeGuard: A Legal Billing System that Tracks Time Work In-The-Moment*
4:30 PM	**Ted Ferguson,** *Hardware Implementation of Synapses Using Memristors*
5:00 PM	**Alexander Parmley,** *Indigenous Sidelining: A Documentary Case Study of Systemic Indigenous Disenfranchisement within Costa Rica and Its Implications for the Americas*
5:30 PM	**Madelyn McDonald and Honour McDaniel,** *Adverse Childhood Experiences and Rates of Bystander Intervention Among College Students*

Concourse B

4:00 PM	**Joshua Preston,** *Maternal Nicotine Exposure Prior to and during Pregnancy and Nursing Increases Offspring Obesity Risk*
4:30 PM	**Benjamin Troupe,** *An Earth Ethic for the New Millennium: Investigating the Moral Status of the Natural World*
5:00 PM	**Caroline Smith,** *Work in Motion: Furthering Opportunity*

Agriculture

Anatomy

Animal and Food Sciences

Anthropology

Applied Energy Research

Architecture

Behavioral Sciences

Biochemistry

Biology

Chemistry

Chinese

Communication

Communication Sciences and Disorders

Computer Science

Dairy Science

Reeves, Selene
39A *Evaluating Teat Skin Condition in Response to Phenoxyethanol as a Post-Milking Teat Disinfectant on Lactating Dairy Cows*

Dentistry

Kozal, Anastasia
39B *P. Gingivalis Activates Notch-1 in Human Oral Epithelial Cells*

Miller, Samuel
39C *Bleeding Complication Associated With Direct Anticoagulant Drugs And Oral Surgical Procedures*

Design

Travis, Alexandra
40A *Eliminating Enslavement*

Dietetics and Human Nutrition

Anschutz, Meghan
40B *Breakfast Frequency and the Future Plans of Adolescents*

Berger, Abigail
40C *Relationship Between Caffeine Consumption, Academic Performance, and Sleep Patterns Among College Students*

Berger, Allison
41A *Association Between Time Spent Exercising and Grade Point Average*

Bertke, Raye
41B *Association Between Alcohol Consumption and Academic Performance*

Bischoff, Nicholas
41C *Binge Alcohol Consumption: Adverse Academic and Mental Health Implications Among University Students.*

Blair, Rebecca
42A *College Student Caffeine Consumption and its Overall Effects on Circadian Rhythm*

Branham, Allyson
42B *The Effect of Sleep Duration On Eating Frequency*

Brown, Kurt
42C *Association Between Fast-Food Consumption and Year In College*

Campbell, Haley
43A *Artificially Sweetened Beverages and BMI Status*

Carter, Alexandria
56C *Analyzing How the Common Cold Affects Performance of Female Collegiate Soccer Players*

Chadwick, Robert
55A *Association of dinner time shift from high school to college in relation to BMI*

Cotter, Amanda
43B *The Effects of Stress on Eating Habits in Students at the University of Kentucky*

Education

Engineering

English

61A **Latta, Haley**
Her Bed is India: The Making and Unmaking of The New Yorker Writer Christine Weston's Reputation

61B **Mertka, Alyssa**
De Sphera: Circle Diagrams, "Scientific" Knowledge, and Popular Culture in Five Medieval Manuscripts

Oral **Parmley, Alexander**
Indigenous Sidelining: A Documentary Case Study of Systemic Indigenous Disenfranchisement Within Costa Rica and Its Implications for the Americas

Entomology

61C **Biedenbender, Seth**
Downregulation of the aggression-correlated brain metabolism gene OXPhos may provide differentiation between robbing and normal foragers in the honeybee Apis mellifera

Environmental Science

62A **Dantzer, Julianna**
Creating a Community Guide Through Analysis of Successful Hydraulic Fracturing Pipeline Resistance Movements

Forestry

62B **Coy, Grace**
UK Tree Corps: A Pilot Study to Assess Attitudes and Sustainability of Lexington's Urban Forests

62C **Graas, Willie**
A Socioeconomic Assessment of Reintroduced Elk Species in Kentucky

63A **Lambert, Michaela**
Improving Detection of a Threatened Anuran Species (Lithobates areolatus) in Western Kentucky

Health Behavior and Epidemiology

Oral **McDonald, Madelyn**
Adverse Childhood Experiences and Rates of Bystander Intervention Among College Students

Health Management and Policy

63C **Crawford, Julie**
High School and College Student Knowledge on Aging Based on School Curriculum

63B **Regard, Michael**
Policy Initiatives that can be Taken by the State of Kentucky to Address the Growing Prescription Opioid and Heroin Epidemic

Health Sciences

64C **Dixon, Mary**
Issues Affecting the Increase in Childhood Dental Decay in Kentucky

65A **Hanebuth, Cannon**
Comparison of Academic Performance Between Rural and Urban Physical Therapy Students

Mathematics

Medicine

Merchandising, Apparel, and Textiles

Microbiology

Neuroscience

Nutrition

Pharmacology

Philosophy

Physics and Astronomy

Physiology

Police Department

Political Science

Psychology

Rehabilitation Sciences

Social Work

104B **Biggs, Elizabeth**
Immigration Policy in the United States

105A **Holtzworth, Martha**
Indexing Welfare Restrictiveness: A Quantitative Analysis of Regional Trends in State TANF Regulations

105B **Tillson, Martha**
Age of First Arrest, Sex, and Drug Use as Correlates of Adult Risk Behaviors Among Rural Women in Jails

Sociology

106A **Henning, Kaitlin**
Religiosity, Religious Self-Regulation, and Intimate Partner Violence Perpetration

106B **Kudrimoti, Meghana**
The Continuum of Medicalization

107A **Latta, Hannah**
Negative Outcomes of Teen Sexual Activity: A Regional Analysis of Florida, Kentucky, New York, and Tennessee

107B **Rawe, Jennifer**
Understanding the Relationship between Homicide Rates and Gun Control in Highly Developed Countries

Theatre and Dance

Oral **Smith, Caroline**
Work in Motion: Furthering Opportunity

Veterinary Science

108A **Paudel, Sandhya**
The Use of IgG(T) as a Diagnostic Tool in Foals with Naturally Acquired Rhodococcus equi Pneumonia.

Communication

Brandon Lee

Mentor(s): Brandon Lee, Kimberly Stoltzfus

Behavioral Intention of Attorneys Using LeGuard: A Legal Billing System that Tracks Time Work In-The-Moment

This study examines if lawyers will adopt the software technology LeGuard as a way of keeping billing records. The purpose of this study is to determine whether attorneys will change their current billing methods and implement LeGuard as a new way of keep billing records. All current legal billing methods are retroactive, after-the-fact. As mentioned in this article, retroactive billing systems can be a problem because lawyers often log in their hours after days, weeks, or even months later forcing them to recall the time spent on a client's case. LeGuard eliminates this issue by tracking lawyers time-worked live in real time by making them hit a start and stop on the LeGuard application. In this study, I will be surveying over 100 participants (100 attorneys) using the technology adoption model as a means of predicting behavior intention. From the TAM variables: (1) perceived usefulness and (2) perceived ease of use, I will be able to predict the participants' behavioral intention of using the LeGuard application.

Engineering

Ted Ferguson

Mentor(s): Jeffrey Hastings

Hardware Implementation of Synapses Using Memristors

Memristors are excellent candidates for hardware implementation of synapses used in neural networks. They are nonlinear devices which change resistance based on the charge history through the device. The change in resistance is caused by a physical movement of ions through the substrate causing an increase in conductivity between the terminals. The voltage threshold is the amount of voltage needed between the terminals to cause a change in state. Memristors can have a low voltage threshold, high frequency response and a wide range of resistance values making them excellent for analog computing. After purchasing memristor chips, the goal of my research was to test the claims made about memristors. After forming the device the hysteresis curve can be observed, which describes the electrical response. Direct measurement of the resistance is difficult since the ohmmeter can change the state in the process of measuring it. The greatest harm comes to the device when it falls into a low resistance state and a large amount of current flows through it. A voltage pulse can increment the state, but the change in resistance will vary due to the nonlinear distribution of states. To implement the memristor as a synapse it is necessary to create a learning system in which a signal is transmitted with a weight. There are multiple valid ways to implement memristors as synapses.

English

Alexander Parmley

Mentor(s): Dan Howell

Indigenous Sidelining: A Documentary Case Study of Systemic Indigenous Disenfranchisement Within Costa Rica and Its Implications for the Americas

The indigenous peoples of Costa Rica currently face state endorsed discrimination, exploitation, and violence. They are the victims of land theft, political assassinations, and governmental indifference. This research-based documentary posits that the alienating treatment of indigenous groups within Costa Rica, considered against the backdrop of the small nation's typically progressive and inclusive social atmosphere, should indicate the need for a total reevaluation of the way in which the countries of the Americas coexist with native groups.

Health Behavior and Epidemiology

Madelyn McDonald

Additional Authors: Honour McDaniel

Mentor(s): Sarah Cprek, Corrine Williams

Adverse Childhood Experiences and Rates of Bystander Intervention Among College Students

Research has shown that adverse childhood experiences (ACEs) correlate with many negative adult health outcomes. We aim to investigate potential positive outcomes of adverse experiences, such as helping others remove themselves from situations that could lead to similar experiences. We hypothesize that students with previous experiences with violence may be more vigilant, and thus aware of potentially dangerous situations. This study will analyze the relationship between ACEs and college students' attitudes regarding bystander intervention and violence prevention on campus. Our sample consists of 2,900 undergraduate students from a sample of 10,000 at two large public universities, randomly selected for a web-based survey administered during March 2015. This survey included questions from the Adverse Childhood Experiences Survey (ACEs), which asks about negative experiences which occurred prior to the age of 18, including psychological, physical, or sexual abuse; violence against mother; or living with household members who were substance abusers, mentally ill or suicidal, or ever imprisoned. Chi-square tests of independence and logistic regression models will be used to evaluate the relationship between ACEs and self-reported perceived ability to help prevent violence on campus, and willingness to engage in a bystander intervention. Analysis will control for previous bystander intervention training. We expect to find increased ACE scores to have a positive significant effect on rates of both bystander intervention and perceived ability to prevent violence on campus. These findings will have implications for interventions focusing on reducing rates of violence among college students by targeting primary prevention strategies.

Pharmacology

Joshua Preston

Mentor(s): Kevin Pearson

Maternal Nicotine Exposure Prior to and During Pregnancy and Nursing Increases Offspring Obesity Risk

Research shows that babies born to mothers who smoked during pregnancy are at increased risk for obesity later in life. Nicotine is considered one of the most deleterious chemicals in cigarette smoke. Thus, this project examined the potential mechanisms of offspring obesity susceptibility following perinatal nicotine exposure in a mouse model. Dams were exposed to vehicle or nicotine before and during pregnancy and nursing. At 7 weeks of age, male offspring of nicotine-exposed dams showed a trend toward greater body fat percentage ($p=0.079$) compared to vehicle-exposed offspring, and at 12 weeks of age, nicotine-exposed offspring displayed significantly impaired glucose tolerance ($p<0.05$) compared to vehicle offspring. Additionally, skin fibroblasts were isolated from the offspring after weaning (3 weeks), grown in culture, and incubated in media that stimulated the cells to accumulate lipid droplets. Lipid levels and mRNA markers related to obesity (chemerin and adiponectin) were quantified. Strong trends toward greater lipid staining ($p=0.053$) and adiponectin ($p=0.067$) expression levels were observed, as well as significantly increased chemerin expression levels ($p<0.05$) in cells collected from nicotine versus vehicle-exposed offspring. Thus, this project found that cells isolated from offspring born to nicotine-exposed dams are programmed for increased lipid storage shortly after birth, which proposes a mechanism for the increased body fat percentage observed in offspring born to nicotine-exposed dams. Future studies will increase sample size, evaluate protein expression in offspring, and examine the effects of maternal smoking versus maternal nicotine exposure. This study is relevant due to the rise of e-cigarettes and nicotine replacement therapies.

Philosophy

Benjamin Troupe

Mentor(s): Eric Sanday, Bob Sandmeyer,

An Earth Ethic for the New Millennium: Investigating the Moral Status of the Natural World

This is a pivotal moment in human history. Human exploitation of the natural world is resulting in environmental consequences that threaten the very existence of life on Earth. These global environmental threats facing us today require a new ethic to address this serious concern. This obliges us to pursue new ways of understanding humanity's relationship with the natural world, and the status of its moral value. Such a morality requires us to collaborate together in order to shift our sentiments towards a way of living that promotes the well-being of the environment. Environmentalism has fallen short of providing a successful articulation of how humanity's relationship with the environment necessitates attributing to it moral value. I will frame the conditions for a collaborative inquiry focused on a novel way of viewing our relationship with the environment, and how we should adopt an ethic that accords a new moral status to the natural world. I will introduce the notion of human membership within a natural system model of the Earth to demonstrate our relationship with the environment. I will explain how this holistic notion of human membership is evident in human experience and traditions, which requires us to address the moral value of the Earth-system as a whole. Ultimately, I will introduce a concept of the human place in nature, such that it demands of us a

new morality that accounts for our membership in the natural world. This membership within an Earth-system requires us to adopt a new ethic recognizing that the natural world is something that flows through us, and that we in turn are part of this natural system. This requires a re-evaluation of the sense in which we as a human community are not superior, as conquerors of the natural world, but subordinate, as participants.

Theatre and Dance

Caroline Smith

Mentor(s): Susan Thiel

Work in Motion: Furthering Opportunity

Caroline will give a presentation on her research findings at the American Dance Festival 2016, and report what she has done with the research. She will show a video of a dance work she created during her time at the program, her applications of the research on her hometown, and her applications of her findings in her dance career. She will share what the obstacles of her research were, and also what rewards she found from the research.

Agriculture

1A. Ariana Chambers

Mentor(s): Jessica Houlihan

Brains and Booze, a Closer Look

Background: Most students would agree that alcohol consumption is an integral part of the "college experience," but it can lead to consequences. There is supporting evidence for both sides of the alcohol consumption and GPA argument. However, a gap exists when the student began consuming alcohol throughout their undergraduate years. Most studies only looked at a specific group of students for a short time. Therefore, this study is hoping to examine the role of delaying alcohol consumption to 21 years old versus students who do not and student GPA. Methods: Data was collected from 50 University of Kentucky college students (41 females and 9 males). Self-reporting cross sectional surveys were distributed to students from various academic backgrounds through UK Qualtrics. The survey recorded the participants' alcohol consumption and frequency, GPA, factors influencing GPA, and whether or not drinking caused them to miss class. Descriptive statistics were employed using Microsoft Excel to analyze the data. Results: The data concluded that there does not seem to be a correlation between the age at which students began drinking and their freshman or current GPA as the p-value was 0.936. Therefore, it is not statistically significant. Of the survey population, 70% began drinking at 18 years or younger, while 12% waited until they turned 21. Conclusion: The results suggest that alcohol consumption is not correlated to GPA. Additionally, students do not believe that their consumption of alcohol is related to their shift in GPA regardless of when their alcohol consumption began. More research needs to be completed as these results counteract the hypothesis. One future step would be to expand the study to a larger scale or to open the research up to several universities and compare the results in that way.

1B. Leva Sabet-Sharghi

Mentor(s): Jessica Houlihan

Impact of Living Status and Lifestyle Habits on BMI and Fruit/Vegetable Intake of College Students

Background: The concept of college being a time of weight gain is quite a well-known trend, being supported by countless research studies. There is very little research looking into the specifics of what may contribute to this weight gain, for example the impact of student living status. There are limited studies examining f/v intake and BMI in college students living off vs. on campus. Methods: The population for this study was 62 University of Kentucky students of various levels and majors. Anonymous responses to a cross-sectional online survey were randomly recorded via Facebook. The survey recorded student class level, campus living-status, current height and weight, average F/V intake, cooking level, quantity of meal preparation, and weekly restaurant frequency. Descriptive statistics and p-values were calculated. Results: The data indicated that 55% participants lived off-campus, while 45% lived on campus. Regarding percentages of BMI categories, 4.84% of participants were found to be underweight, 74.19% normal, 11.29% overweight, and 9.68% obese. Regarding college level, 27% of participants were freshman, 21% sophomores, 18% juniors, 21% seniors, and 3% graduate students. Three T-tests were performed, between BMI/living status (p=.924), average fruit intake/living status (p=.550275948) and average vegetable intake/living status (p=.038572702). Conclusion: Regarding the p-values for both BMI and fruit intake being above .05, the difference in averages of both is

seen as statistically insignificant between students living on and off campus. As for vegetable intake, there is a statistically significant difference in averages for students living on and off campus.

1C. Kyle Skaggs

Mentor(s): Jessica Houlihan

Association Between Weekly Alcohol Consumption and Academic Success, Self-appraisal, and Overall College Enjoyment.

Background: This research is needed to help understand the relationship between weekly alcohol consumption and whether it affects a college student's school success and overall enjoyment. Current research is missing a full comprehensive study that includes not only school-induced anxiety as a result of drinking, but also overall enjoyment and self-appraisal. Methods: The data was collected from 65 college students, with 62.13% being male and 37.87% being female ranging between the ages of 19 and 23. Self-reporting surveys were distributed randomly to students from various backgrounds across the University of Kentucky's campus. The survey recorded the participants' alcohol consumption (quantity), their self-appraisal, overall college enjoyment, school-induced anxiety, anxiety levels, and cumulative GPA. Microsoft Excel was used. Results: The data collected indicated that the correlation between drink frequency and self-appraisal had an r-value of -0.2485. The correlation between drink frequency and college enjoyment had an r-value of 0.119. The correlation between drink frequency and cumulative GPA had an r-value of -.0492. Drinks consumed and school-induced anxiety had a slightly higher correlation at r=0.3788. The p-values of all results were significant ($p = 0.001$.). Conclusion: The r values of each do not indicate a strong correlation between weekly alcohol consumption and any of the outcome variables. However, the significant p values allow us to reject the null hypothesis, meaning there is a relationship not due to chance. The t-tests were conducted with weekly alcohol consumption and overall college enjoyment, self-appraisal, cumulative GPA, and school-induced anxiety levels.

2A. Julie Witt

Mentor(s): Jill Stowe

The Relationship Between Mare Value, Stud Fee Input and Profitability at Public Auction

Central Kentucky is widely regarded as one of the top Thoroughbred nurseries in the world, and the Thoroughbred racehorse is not only an integral part of Kentucky culture, but of the state economy as well. Roughly 54,000 Thoroughbreds call Kentucky home, have an estimated valuation at $5.5 billion dollars and help employ thousands. At the core of the industry is the breeder, or the owner(s) of the mare, and this research project aims to gain insight into one of the breeder's key decisions. The majority of breeders in Kentucky fall under the 'commercial' title, meaning breeding their mares with the aims to sell the offspring at public auction for a profit. Every year a breeder must carefully choose which stallion each of their mares will be bred to, and part of this is deciding the ratio of their mare's value compared to the stud fee paid for the stallion's services. Sales offer a competitive and selective market, and being profitable is not guaranteed, with 55% of breeders analyzed realizing a profit and 73.73% of foals returning their stud fee. The Keeneland and Fasig-Tipton auction companies' databases were utilized to identify mares who sold at public auction while

not in foal and whose resulting progeny also sold at auction either as weanlings and/or yearlings dating back to 2004. The costs of production were obtained by consulting various industry professionals to gain an average cost. The resulting data was then organized and analyzed with the help of Excel. Overall, the average progeny sold at auction for $254,041, and profitable progeny were bred when an average of 13.95% of their dam(mother)'s value was put into that season's stud fee.

Anatomy

2B. Hina Iqbal

Mentor(s): James Geddes, Yu Chen-Guang, Greg Gerhardt

Extracellular Glutamate Following Spinal Cord Injury

Glutamate-mediated excitotoxicity plays a critical role in the acute pathophysiology of traumatic spinal cord injury (SCI). However, understanding of the time course of glutamate release and uptake kinetics and the ability of potential neuroprotective agents to affect glutamate-mediated secondary injury processes has been hampered by the inability to obtain continuous, real-time measurements of glutamate kinetics in the normal and injured spinal cord. Measures of in vivo, extracellular glutamate in spinal cord (SC) have relied predominantly upon traditional in vivo microdialysis, which samples simultaneously from multiple SC compartments at 5-20 minute intervals. The poor spatial and temporal resolution of this methodology is a major limitation. Recently developed flexible, multisite microelectrodes provide rapid measures of glutamate release and uptake by electrochemical detection. This technique measures tonic and phasic release of glutamate or oxygen in intact tissue with nanomolar sensitivity, excellent selectivity, and a temporal resolution of 1 second. The aim of this project is to evaluate the efficacy of flexible microelectrodes for in vivo electrochemical recordings of extracellular glutamate, oxygen, and electrical field potentials in rat spinal cord gray and white matter in dorsal and ventral regions, both during and following experimental spinal cord injury.

2C. Katie Kloska

Additional Authors: Max Scalf, Emily Major, Lydia Fletcher

Mentor(s): Luke Bradley

Development of a Model Post-Translationally Modified Protein Library

As the use of proteins has become more widespread in biotechnology and medicine ($60B/year industry worldwide), the demand for these engineered molecules to specifically perform their desired/designed functions (without side effects) increases significantly. While combinatorial libraries have been utilized as powerful technology for the development of novel protein specificity, post-translational modifications, which nature uses to alter protein activity, are overlooked. To incorporate these regulatory elements into protein combinatorial libraries, we previously developed a bacterial co-expression system, utilizing calmodulin methyltransferase (CaM KMT) as a model system, to completely trimethylate a diverse protein library of the calmodulin (CaM) central linker region. Characterization of 17 randomly selected library members show that all library sequences were over-expressed and post-translationally modified. In addition, we show that

trimethylation differentially altered the conformational changes of the protein associated with the binding of calcium, the protein's thermal stability, and binding specificity towards CaM-peptide binding target sequences. However, to guide future library designs and applications of this technology, it is necessary to gain a better understanding of the binding specificity of CaM KMT. We constructed and verified 22 different mutations designed to alter/disrupt the charges around the CaM KMT target and solvent-accessible residue, Lysine-115. Collectively, these data and ongoing studies suggest that the use of CaM KMT to produce an unbiased and targeted post-translationally modified library of novel sequences is possible, thereby providing an additional tool for designing and generating protein with stringent protein-target specificities for biomedicine.

3A. Kayla Kuhfeldt

Mentor(s): François Pomerleau

Using Acid Vapor Hydrolysis to Deactivate a GluOx Enzyme on Microelectrode Arrays

For the past 15 years Dr. Gerhardt's lab has been trying to improve the enzyme matrix coating on ceramic based microelectrode arrays (MEA) used to measure neurotransmitters (e.g. glutamate) in the CNS. To measure glutamate an enzyme matrix composed of glutamate oxidase (GluOx) and bovine serum albumin (BSA) is polymerized using glutaraldehyde (Glut) on recording sites and juxtaposed recording sites are coated with only BSA and used as a sentinel site. It was proposed that denatured GluOx and BSA should be added to the sentinel site to make the matrix similar to the GluOx recording site. For matrix forming purposes we cannot add acid directly to the GluOx solution, so the main purpose was to determine if acid vapor hydrolysis would be effective in deactivating the enzyme. For the experiment, two acid (HCl) concentrations were used, 1M & 12M. Recording sites 1 & 2 were coated with GluOx/BSA and able to cross-link to the electrode sites' surfaces for a minimum 48 hours. Then the selected electrodes were held over a 1M acid bath for 30 or 45 minutes and a 12M acid bath for 5 or 10 minutes. Then the juxtaposed sites 3 & 4 were coated with GluOx matrix, but not placed over the acid bath. A calibration procedure using known amounts of glutamate was performed to determine activity of the enzyme matrix coating. The data showed that the 45 minutes (1M) and the 5 or 10 minutes (12M) acid vapor hydrolysis was successful in curbing enzyme activity. Acid vapor seems to affect the enzyme matrix cross-linking to the MEAs as liftoff of the enzyme matrix was observed. Overall, acid vapor hydrolysis successfully deactivated the GluOx enzyme but we observed liftoff suggesting that this procedure is not a viable solution for inactivated enzyme coating of sentinel sites.

3B. Daniel Ma

Mentor(s): George Quintero, Greg Gerhardt

Ganging Enzyme-Coated Microelectrode Sites Produces Greater Sensitivity to an Analyte in a Biosensor

When neurons are excited and an action potential occurs, vesicles containing neurotransmitters are fused with the neuronal membrane and released into the synaptic cleft. Enzyme-based biosensors can be implanted at specific sites to measure these chemical signals. By studying a biosensor's sensitivity to peroxide and to a particular analyte, it is possible to predict how responsive the biosensor is. In the current biosensor design, each of the four platinum sites on the microelectrode's tip is wired to a recording channel in a miniaturized

preamplifier via a connector. This study sought to examine the effects of ganging microelectrode sites together using modified connectors on the microelectrode's analyte sensitivity, limit of detection, and level of noise; the two experimental connectors developed for this study either ganged all four sites into one recording channel in the miniaturized preamplifier or ganged all four sites into two recording channels. The peroxide and glucose calibration results showed that the slopes of the electrodes when connected to the modified connectors were much greater than the slopes of those same electrodes when connected to the control connector. The limits of detection for the two modified connectors were usually less than those of the standard connector, with the 4-in-1 connector generally having the lowest limits of detection. The noise level measurements did not show a consistent trend for the connectors, but the experimental connectors usually had slightly higher levels of noise than the control connector. An ANOVA test done on the hydrogen peroxide data confirmed that there was a statistically significant difference between the three connectors for both hydrogen peroxide slope and LOD, while the difference between groups for noise was not statistically significant. The ANOVA test done on the glucose calibration data found that only the difference in glucose slope was statistically significant between the three connectors.

Animal and Food Sciences

3C. Megan Coffinbargar

Additional Authors: Ashley Houghton, Camella Watts, Chase McQuillen, Christine Wirts, Gabrielle Geldhof, Haley Wathen, Lillian Davis, Lucia Brancoli, Trent Casebolt

Mentor(s): Amanda Lee, Jeffrey Bewley

Effects of Bedding Application on Bedding Temperature, Bedding Moisture, and Somatic Cell Count in Lactating Dairy Cows

Mastitis is an inflammation of the mammary gland. Somatic cell count (SCC) is a measure of the number of cells in the milk. The objective of the research was to discover how pack moisture, temperature, and time since bedding added affected SCC and culture results. The research was conducted at the University of Kentucky Coldstream Dairy Research Facility for five weeks with first parity Holstein dairy cows (n=17). Milk and pack samples were taken three times a week. Milk samples were processed through a Bentley to determine SCC and were cultured on University of Minnesota Tri-Plates. A cow was considered mastitis positive if the SCC ≥ 1 quarter was ≥ 200,000 cells/mL, the cow was considered positive for mastitis. Nine samples and temperatures of the compost-bedded pack barn were taken. A random sample was then dried and weighed to find moisture content using a Koster machine and a mean temperature was calculated. There was a low correlation between pack moisture and mean temperature (r=0.21 P=0.66). To perform a regression analysis, the general linear model procedure of SAS 9.4 was used. The days since bedding added had no significant effect on pack temperature and moisture (P=0.56). The GLIMMIX procedure of SAS 9.4 was used to examine days since bedding added, mean temperature, percent moisture, positive and negative mastitis status and their interactions. Sources of error within this study include: cows being milked and sent back before getting milk samples, cows being in the wrong pen, and the narrow range of temperature (112.0 ± 4.9 ºF) and moisture (55.3 ± 1.5 %). The understanding of how bedding added and moisture and temperature affect SCC and culture results creates a better understanding the relationship between compost bedded pack barns and mastitis.

4A. Hannah Himmelmann

Mentor(s): Barbara Wadsworth, Jeffery Bewley

Effects of the Addition of Electrolyzed Water to a Footbath Solution on Digital Dermatitis Incidence

Digital dermatitis (DD) can cause lameness and pain in dairy cows. The objective of this 11-week study, conducted at the University of Kentucky Coldstream Dairy Research Farm, was to test the effects of electrolyzed water, in a copper sulfate solution on DD. A split, plastic footbath was used to deliver two footbath solutions. The control solution, assigned to the left hooves of the cow, contained 79.5 L of water with 1.75 kg of copper sulfate, and 325 mL of acidifier. The treatment solution, assigned to the right hooves of the cows, contained the same solution as the control side with the addition of 7.5 L of electrolyzed water. The footbath solutions were made Monday through Friday before morning milkings. Cows walked through the footbath while exiting the milking parlor once a day. The solutions were dumped after the completion of morning milkings. Holstein cows (n = 77) DD were scored biweekly in the milking parlor to determine active or inactive DD. Rear hooves were hosed off to remove debris before being evaluated. A headlamp was worn to provide clarity of hooves while scoring. The FREQ Procedure of SAS (SAS Institute, Inc., Cary, NC) was used for a chi-square analysis and a McNemar's test was used to compare the number of hooves with active DD (scores of M1 and M2) to the number of hooves with non-active DD (scores of M3 and M4). No significant differences in DD between the control and treatment groups existed ($P \geq 0.05$); however, over the course of the study, both footbath solutions improved DD overall (Table 1; $P \leq 0.01$). These results suggest that the addition of electrolyzed water in a footbath solution had no negative effect on DD.

4B. Katherine Kelly

Mentor(s): Jeffrey Bewley

Trace Mineral Injection Effects on Trace Mineral Liver and Blood Concentrations.

Trace minerals (TM) are required in small amounts by the body and vital for dairy cow reproduction, immunity, and production. The study objective was to determine if a TM injectable provided increased liver storage of selenium (Se), manganese (Mn), copper (Cu), and zinc (Zn) and greater TM concentrations in blood following calving. Thirty-two dairy cattle, 16 primiparous (PC) and 16 multiparous (MC), received either 5 cc of TM injection (MULT; Multimin 90, Multimin USA, Fort Collins, CO) or 5 cc of sterile saline (CONT). Blood samples and liver biopsies for TM concentrations were taken at -60, -30, 14, 30, and 60 days in milk relative to calving (DIM). The GLIMMIX procedure of SAS (Version 9.4, SAS Institute, Inc., Cary, NC) was used to assess sample day, treatment, parity, and 2-way interactions for all models. Stepwise backward elimination was used to remove non-significant interactions ($P \geq 0.05$) with all main effects remaining in the models regardless of significance. Selenium and Cu liver concentrations decreased before calving but increased after 30 DIM ($P \leq 0.01$, respectively). Multimin 90 liver Se increased compared to CONT ($P = 0.02$). Multiparous cows increased in blood Se compared to PC ($P = 0.01$). Liver Cu was increased significantly in MC compared to PC (P < 0.01). Liver Zn ($P = 0.03$) and liver Mn ($P = 0.01$) exhibited sample day significance on 14 DIM. Liver Mn demonstrated a treatment and parity interaction ($P = 0.01$). Multimin 90 blood Mn levels were increased over CONT ($P = 0.05$). No significant differences were found between the CONT and MULT for liver Cu and Zn, and blood Se, Cu, or Zn. Trace mineral

supplementation increased storage of Se and Cu, indicating MULT may be a beneficial addition to dry cow management. Keywords: trace minerals injectable, liver concentrations, blood concentrations

4C. Sarah Mac

Mentor(s): Jeffrey Bewley, Carissa Truman

Evaluating the Ability to Detect Calving Time Using Precision Technologies That Monitor Tail Movement and Lying Bouts

Calving is a critical time point in a cow's life because of the range of issues that can arise. Accurately predicting calving time is essential to the health of the calf and cow. Predicting calving time allows the farmer to be present during the time of calving to assist in cases of dystocia, or difficulty calving. Dystocia has the potential to increase calf mortality, decrease milk yield, lower conception rate, and increase uterine disorders. The objective of this study is to evaluate the ability of a precision technology, Moocall, to precisely detect calving time (Moocall, Dublin, Ireland). The Moocall device monitors tail movement, and sends an SMS text to designated phones when the device determines that the cow is in labor. Accuracy of Moocall is evaluated by comparing the text alert time to the actual onset of calving, determined by video analysis. By determining the accuracy of this device, it presents the possibility that the Moocall can be used to monitor cows around calving to detect the onset of calving and assists in cases of dystocia.

Anthropology

5A. Sarah Knox

Mentor(s): George Crothers

Form and Function of Bipointed Bone Tools on the Green River, Kentucky

Bipointed bone tools are found all over the world. They have various uses in different cultures, most notably as gorges for fishing and hunting in the Pacific Northwest. Classification of these tools lies with the discretion of the analyzing archaeologist and are often categorized differently from person to person but likely fulfill the same function. This research aims to develop on previous knowledge and discover the purposes of the bipointed bone tool in Late Archaic populations on the Green River through metric and use-wear analysis of 120 bipointed bone artifacts from the region. The results of this study are expected to reinforce that the use of these artifacts were as a tool for fishing in shallow water communities. Within the anthropological and archaeological community, this research also strives to heighten awareness of the importance of gorges in historical communities where fishing was a mode of subsistence, and additionally to change current interpretations of these artifacts to include gorges as a primary interpretation more frequently.

5B. Elise McConnell

Mentor(s): Mark Whitaker

Creativity Within Educational Contexts: Teachers' and Students' Perspectives on Creativity in Summer Classes

This summer research project studies creativity as a cultural practice in summer classes in Lexington, Kentucky. The study addresses the questions: How do teachers define creativity and what benefit do they see in students' use of creativity? How do students define creativity and how do they respond to encouragements to be creative? Through interviews and fieldwork at the Carnegie Center for Literacy and Learning, the Living Arts and Science Center, the Lexington Children's Theatre, and the Fine Arts Institute, the researcher observed shared understandings of creativity in the classroom. Students of ages 8 to over 60 were interviewed, providing a wide perspective of the topic. Research also drew upon existing scholarly works on creativity, contributing to the growing field of study. Understanding how teachers and students define and express creativity is foundational to improved implementation of creativity in educational settings. Conclusions from this research could be used to encourage funding and strengthen curriculum for creativity-based programs in educational institutions.

Applied Energy Research

5C. Sarah Hodges

Mentor(s): Tom Robl

Manipulation of pH in the Creation of Piezoelectric Cements

There are two main types of cement used in modern construction, Calcium Sulfoaluminate (CSA) cement and Ordinary Portland cement (OPC). Both types of cement contain ettringite, a piezoelectric mineral after hydration. To determine ettringite's functionality as a piezoelectric mineral in cement, research was conducted on the effect that the pH solution has on the formation of ettringite fibers in cement. Five sample batches of nine mortar cubes were created from solutions of varying pH values: 7, 10, 12, 13, and 14. The cement samples were then run through a series of tests including: tensile strength, voltage drop, resistance, and cyclic loading to determine the effects of ettringite on the integrity of the cement and whether the piezoelectric properties correlated with a change in pH. Samples were also crushed, and then analyzed using scanning electron microscopy (SEM) and X-ray diffraction (XRD) to obtain information on the presence of the ettringite in the cement. A second batch of samples was also conducted utilizing CSA cement and OPC type 1 cement in cylinders. The cylinder testing cycle was composed of various sized aggregate mixed in with the cements and included pH values 7 and 12. The cylinder testing cycle underwent the same trials as the cube testing cycle, in order to observe the piezoelectric properties on a larger scale. Confirming ettringite as the source of piezoelectricity in cement, and understanding the mechanisms that can maximize its piezoelectric response is a key step in the process to develop energy harvesting materials.

Architecture

6A. Shengmian Wang

Mentor(s): Gregory A Luhan

Re-localizing Industry: Material, Space, and Architecture

Through a series of rigorous iterative design and engineering processes, this research produced a portfolio of factory built structures for single family, multi-family, professional/clinical, classroom, or other suitable applications. The project goal–to trademark and commercialize a product line of factory-built modular structures that maximizes energy efficient performance–has resulted in minimizing cost per square foot and achieved market viability across a number of scales and use groups. To further enable this research, each of the residential prototypes were equipped with photovoltaic generation systems and were designed to align with the American Institute of Architects 2030 Challenge to be carbon neutral by the year 2030. The impact of this research has led to a significant reduction in Kentucky's energy use and advances in the design and production of energy efficient factory-built structures including the construction of a thirty-unit, net-zero residential development in Emlyn, KY. Project Objectives: 1. Reduce Kentucky's growth in energy use through the design and production of energy efficient factory-built structures equipped with photovoltaic generation systems, that meet or exceed Energy Star or other recognized standards. Place special emphasis on maintaining energy performance while reducing the cost per square foot. 2. Monitor energy performance of occupied HBEER prototypes and analyze their lifecycle costs against pre-1980 mobile homes and conventionally built structures of same use type. 3. Manufacture modular, energy-efficient, factory-built structures equipped with photovoltaic generation systems, to be installed in the Tennessee Valley Authority (TVA) service area within the State of Kentucky.

Behavioral Sciences

6B. Daniel Abul-Khoudoud

Additional Authors: Morgan Moses

Mentor(s): Yang Jiang

Using Biofeedback to Allow for Voluntary Control of Heart Rate in Humans

Bodily functions such as heart rate, skin temperature, and blood pressure are involuntary processes that go on in the body without any conscious thought or effort. Problems arise when a human's involuntary processes become unhealthily abnormal such as a high blood pressure or heart rate. Biofeedback is used as a treatment for several conditions such as these and it works to control body functions that are usually considered involuntary by promoting relaxation. This experiment examines the effect of biofeedback on persons' heart rates. We explored a protocol to provide visualization techniques as biofeedback to change a person's heart rates using BioPac. We hypothesized that persons can be trained to lower their heart rate (measured by the BioPac equipment) through mental trial and error. The experiment is done by attaching a sensor to the skin in order to measure human participants' heart rates. As a person's heart rate increases, the lights on the machine will begin to light up, and vice versa when heart rate is reduced. This study will train people to control their heart rate, which has implications of treating abnormally fast heart rates due to stress or anxiety.

6C. Leticia Koher

Mentor(s): Matthew Webster

An Analysis of West Virginia DUI Training and Arrest Rates

Impaired driving is an issue that takes twenty-eight American lives every day. Law enforcement officials are targeting this issue by increasing the depth of police officer training on drug and alcohol impairment. This study will investigate whether there is an association between increased police officer training on DUIs through the Advanced Roadside Impaired Driving Enforcement (ARIDE) class, and increasing numbers of DUI alcohol and drug arrests in West Virginia. Secondary data analysis will be conducted on an administrative data set containing all West Virginia DUI arrests from 2011 to 2016. This information will be combined with an attendance log from all Advanced Roadside Impaired Driving Enforcement (ARIDE) training classes held since 2011 to determine the percentage of ARIDE trained officers making DUI arrests each year, and determine if there is an association between receiving ARIDE training and making increased numbers of arrests. Additionally, the data will be analyzed to determine if the number of DUI drug arrests has increased with increased ARIDE training.

7A. Sami Abul-Khoudoud

Mentor(s): Yang Jiang, Sabrina McIlwrath

Effects of Brain Injury on Working Memory Frontal Brainwave Patterns in Veterans

Veterans suffering from mild Traumatic Brain Injury (mTBI) are at increased risk of early onset dementia as well as developing other neurological diseases. The effects of mTBI-associated damage in neural mechanisms are not very well understood. This study utilizes event-related potential (ERP) signatures found in relevant working memory targets, and on those found in memory distractors, allowing for the investigation of brain responses among the mTBI group compared to the control group (veterans with healthy brain function). Several neuropsychological tests were used to assess attention, processing speed, and executive function for both groups. Data was collected via 32-channel scalp EEGs from 25 veterans. Final results are pending. General trends show that the veterans with mTBI displayed reduced mean P3 amplitude in the left frontal ERPs when compared to the control group during the working memory tasks. Similarly, ERP differences in the right frontal region were also found, but were not statistically significant for memory target. There was also found to be a significant correlation between left frontal P3 in retrieving memory target and distractors, and in frontal executive functions (as determined by the Trail Making Test). Current data indicates that veterans suffering from mTBI have frontal brainwave patterns that are altered from the control group veterans when working memory is used. Furthermore, these brainwave patterns also tend to be distinct from those of older adults with other mild cognitive impairments.

Biochemistry

7B. Catherine Crawford

Mentor(s): Craig Vander Kooi

Receptor-coupled GIPC3 and Its Interaction with Myosin 6 in the Mechanotransduction Pathway

Recent genetic analyses have identified mutations in the protein GIPC3 as a cause of hearing loss. Normally, GIPC3 localizes in the hair cells of the cochlea and thus contributes to mechanotransduction using its three structural domains, GH1, PDZ, and GH2, but little is known about the specific mechanism of GIPC3 in signal transduction. Mutation of GIPC3 is specifically linked to sensorineural hearing loss, which results from damage to the inner ear. The twelve disease causing mutations identified to date are distributed throughout its domains, but the specific effect of these mutations is not known. We offer structural insight into how GIPC3 functions via both cooperative and competitive intra- and inter-domain interactions. Our data reveal the structural basis for cell surface receptor binding and how this couples to Myosin VI binding. Ultimately, equilibrium between GIPC3 dimerization, GIPC3 intradomain binding, and GIPC3 C-terminus binding to Myosin VI reveals the essential role of each domain in carrying out the protein's overall function. Further, we demonstrate that hearing loss mutations disrupt the function of GIPC3 by directly affecting key intermolecular interactions.

7C. Alberto Rondon

Mentor(s): Matthew Gentry

Protein Engineering to Efficiently Degrade Carbohydrates for Biofuel Production

Traditional fermentation of starch-rich biomass requires significant energy and resource input to degrade the starch into simple sugars like glucose for downstream processing to convert it into ethanol. Starch accumulates in plants when the excess glucose sugars produced in the presence of sunlight are joined together into chains. During the night, plants must access the glucose energy within starch to continue cellular functions. The Gentry lab has been investigating the enzymes plants use that enable the starch to become more accessible to degradation. These enzymes contain two regions, a binding region and an action region. The binding region attaches the enzyme to the starch while the action region modifies the starch into a more soluble form. It was hypothesized that different binding regions from other enzymes could be appended to the action regions in order to target the starch more effectively or increase the selectivity towards different carbohydrates. As proof of principle, new enzymes were engineered that contained a new starch-selective binding region to demonstrate the action region maintained activity towards starch. When comparing the activity of the original and engineered enzymes, it was found that one of our engineered enzymes possessed greater activity than the original. These results allow us to expand our work to other carbohydrates such as cellulose, the most abundant carbohydrate found in nature. This project contributes to efforts in diversifying energy resources and increasing sustainable fuel sources with investigations into second-generation cellulosic biofuels that are exploring more efficient methods for breaking down cellulose into more simple sugars for fermentation.

8A. Nicholas Scheper

Mentor(s): Robert Dickson

How Myriocin Affects the Chronological Lifespan of Yeast

Nicholas is doing research concerning the process in which yeast ages and how restricting the amount of amino acid intake affects this process. The specific yeast that he uses during lab is Saccharomyces cerevisiae and he treats it with the drug, myriocin. The overall objective of his experiment is to determine if myriocin has an effect on the chronological lifespan of yeast. Myriocin aids in the reduction of sphingolipid synthesis which leads to many things including the enhancement of mitochondrial function and genomic stability which, in turn, lead to healthier and longer lives. The Sch9 pathway is activated by amino acids and is responsible for regulating lifespan. Therefore, restricting the amount of amino acids an organism takes in should lengthen its lifespan. This is because reducing the level of amino acids will stall translation and will lead to the accumulation of uncharged tRNAs. The uncharged tRNAs then bind to the protein kinase, GCN2, which sense nutrient deprivation resulting in slowed growth and a longer lifespan. Myriocin is also responsible for this reduction in the amount of amino acids because it targets the Sch9 pathway. Inhibition of the Sch9 pathway leads to extended chronological lifespans and reduced age related genome instability. This means that not only is the organism living longer, but it is also living healthier.

Biology

8B. Chris Guzman

Mentor(s): Jessica Houlihan

Association Between the Consumption of Stimulant Medication and Improvement in Students' Grades in a Class and the Side Effects It May Bring after Consuming

Background: In hopes to achieve academic success by improving class grades, the illegal consumption of prescribed stimulant medication has become a routinely habit among college students. Stimulant medication including amphetamines (Adderall) and methylphenidate (Ritalin and Concerta) is illegally consumed by thousands of undergraduate college students across the nation. Research has been conducted to see the effects stimulant medication has on consumers, however little research has shown if such medication does have a positive effect on a student's class performance. Methods: Data was collected from 49 undergraduate students (29 males and 20 females) ranging between the ages 18-24 years old that are attending the University of Kentucky. Self-reported surveys were conducted via social media platforms via Facebook and twitter. Students from various academic backgrounds submitted their overall daily consumption, verified if it was prescription or not, the difficulty to obtain such medications, if they actually received positive results, and if they noticed any side effects while using. Excel was used to record data, a Fisher's exact test along with a t-test was used to analyze the data collected. Results: The data concluded that 72.5% of undergraduate students have consumed stimulant medication. Of the 72.5%, about 49% were not prescribed by a physician. 34.7% who have taken stimulants do believe that these medications did help in improving class grades. Also, only 20.4% of students reported having negative side effects, 30.6% reported not feeling bad the day after and 8.2% had mix feelings about the side effects. When asked on how hard it was to obtain stimulant medication, 12.2% reported being very easy, 20.4% reported being somewhat easy, 59.2% reported neither being easy nor difficult and for being somewhat difficult and difficult 4.08% for each was reported. A Fisher's test was conducted and showed no

significant correlation between males' and females' consumption. Conclusion: The results concluded that some undergraduate college students that attend the University of Kentucky do consume stimulant medication to improve class grades. Surprisingly, most of them are not prescribed and can easily get ahold of such medication and majority reported not having any negative side effects the next day.

8C. Dalton Adamson

Additional Authors: Teaghan Richman

Mentor(s): Julie Pendergast

Effects of Lifestyle on Circadian Rhythms in College Students

Circadian rhythms are 24-hour cycles in humans that control sleep and wake. Chronotype, which is a person's preferred time to go to sleep and wake up, is controlled by internal circadian clocks. Ignoring our internal clocks causes social jetlag, which is when our social obligations disrupt our natural circadian rhythms. It has been observed that social jetlag is associated with health issues and cognitive impairments. Social jetlag is greatest in individuals with late chronotypes. Chronotype varies with age and is latest around age 19, which is the average age of most college students. Therefore, in this study we examined how lifestyles of college students affected their circadian rhythms. We surveyed 158 undergraduate and graduate students (68% women), ages 18 through 25. We gave each student two surveys. First, we gave them the Munich Chronotype Questionnaire, which asked about sleep and wake times on work and free days. Second, we designed a questionnaire that asked about demographics and lifestyle habits. Eighty-two percent of students had at least 1 hour of social jetlag. We also found that gender, age, major, number of credit hours, caffeine consumption, exercise habits, and naps had no relationship with chronotype or social jetlag. However, we found that subjects who participated in intramural sports had increased social jetlag. We also found that subjects who reported low alertness after waking had more social jetlag and late chronotypes. Similarly, subjects who consumed alcohol more frequently had late chronotypes. However, alcohol consumption had no effect on social jetlag. In sum, we found that some lifestyle factors have significant influences on circadian rhythms in college students.

9A. Carrie Anderson

Mentor(s): Catherine Linnen

Morphometric Analysis of Ovipositor Structure Between Sawfly Populations Utilizing Two Northern Pines

In plant-feeding insects, shifts and subsequent adaptation to different host plants is suspected to drive the formation of new species. This host-driven speciation has long been hypothesized to occur in Neodiprion, a Holarctic genus of pine sawflies. One of the diagnostic characteristics of sawflies is their ovipositor, or egg-laying organ, which they use to embed their eggs within the tissue of host needles. Females that cut their egg pockets too deeply may sever the resin canals inside the needle, causing the needle and all eggs within to dry out, resulting in severely reduced fitness due to decreased egg hatch rate. Consequently, variation in host architecture utilized within this cluster is expected to exert strong divergent selection on oviposition behavior and morphology. To test this prediction, we focused on the red-headed pine sawfly, N. lecontei, a widespread pest species harboring three distinct genetic clusters, each of which is found in a different geographic region

and exploits a different set of morphologically variable host plants. In one of these clusters, sawflies primarily use either red pine (Pinus resinosa) or jack pine (Pinus banksiana). We examined ovipositors from eleven N. lecontei populations collected from jack and red pine across the northern United States and Ontario. Two of the locations harbored sympatric populations, with individuals on both hosts occurring in close spatial proximity and likely having ample opportunity to exchange genes. As extensive gene flow is expected to eliminate differences between populations, any observed differences between these populations are likely evidence of strong divergent selection. Using geomorphic morphometric analysis, we looked for overall structural differences cluster-wide and at the sympatric locations. Overall, we found significant differences in ovipositor morphology between sawflies utilizing red pine and those utilizing jack pine cluster wide and within some of the sympatric sites.

9B. Sloan Anderson

Additional Authors: Garett Davies

Mentor(s): Vincent Cassone, Jiffin Paulose

Gut Microbiome Rhythm Expression in House Sparrows, Passer domesticus

Current exploration into the workings of the gut microbiome, the complement of microorganisms inhabiting the gut, are undertaken using mouse models; however, mice are less than ideal for modeling human gut microbiome activity due to differences in diet, bacterial make-up, and sleep-wake patterns. Preliminary research into the subject suggests house sparrows (Passer domesticus) have a gut microbiome similar to humans with similar bacterial make-up. The purpose of this experiment is to investigate the gut microbiome of house sparrows to identify changes in the amount of 16s rDNA in the gut microbiome throughout a 24-hour time cycle. To establish if those changes in the gut microbiome of house sparrows are present, three experiments were performed with three different photoperiod environments; standard 12-hour light/dark (LD) cycle, a constant dark (DD) cycle, and a constant light (LL) cycle. For the fourth experiment, melatonin was supplied after LL-induced arrhythmicity to restore the hypothesized bacterial population rhythms in the gut microbiome. Fecal samples were taken every four hours for 24 hours. After collection, the genomic DNA of the fecal samples was analyzed using quantitative, real time PCR (qPCR). Data from the qPCR reactions were analyzed through the use of ANOVA on ranks to compare the means of different sparrows across different time points. The ANOVA test revealed a pattern of bacterial gene expression for All-Micro DNA that appeared rhythmic. More analysis is needed to reveal if the pattern is significant as well as if the trend is seen in Markers for bacterial classes important to human health and disease, such as enterobacteria and lactobacilli. If similarities are found between human and house sparrow gut microbiome rhythms, then this will support house sparrows as a viable model for human gut circadian rhythms

9C. Luke Archer

Mentor(s): Julie Pendergast

Daily Behavioral Rhythms in Obesity-Resistant Mice

Daily, or circadian, rhythms are 24-hour cycles of the body's physiological processes and behaviors, such as eating, sleeping, and waking. Abnormalities in daily rhythms, such as those caused by shift work, increase the risk for obesity. Previous studies have also found that eating a high-fat diet disrupts daily rhythms and this is a mechanism contributing to diet-induced obesity. These previous studies were performed in the C57BL/6J strain of mice, which are considered obesity-prone because they gain weight on a high-fat diet. Other strains, such as BALB/c mice, are obesity-resistant because they do not become obese when given a high-fat diet. The aim of my experiment was to determine if daily rhythms in obesity-resistant mice were protected from disruption by high-fat feeding. At 7 weeks old, BALB/c mice were single-housed in light-tight boxes in 12h light/12h dark and their daily rhythms of activity and eating behavior were recorded. At 8 weeks old, the mice in the experimental group were switched to high-fat diet (45% kcal fat) and the control mice were maintained on low-fat diet (10% kcal fat). My early studies show that the eating behavior rhythm in BALB/c mice is partially protected from disruption by high-fat feeding. While the locomotor activity is altered in C57BL/6J mice, I found no effect on high-fat eating on activity in BALB/c mice. In future experiments, I will analyze other strains of obesity-resistant mice. If I find that the daily rhythm of eating behavior is not disrupted by high-fat diet in obesity-resistant strains, then we can search for the genes responsible for this protection.

10A. Carly Ballinger Boone

Additional Authors: Tristan Donovan, Priscilla Boachie, Brendon Stockwell, Andrea Cooper, Riley Shumard, Meaghan Melody, Emma Higgins, Krystina Monticello, Amanda Ho, Meaghan LaBarre, Micaiah McNabb, Brittany Slabach

Mentor(s): Robin Cooper

Poked, Prodded, and Bothered: Dangers of Poor Diet

We tested the effect of diet on behavior, specifically investigating the effect of diets that varied in protein and fructose on drosophila larval behavior. We expected the larvae fed on the higher protein diet to exhibit more pronounced responses to stimuli that, biologically, would signal immediate danger in the form of a predator. Larva were raised on diets of either 10% fructose, 10% protein, 25% fructose, 25% protein, or cornmeal (control). Third instar larva were used for all experiments. Peristaltic waves of larva from control and experimental treatments (e.g., diets) were recorded for 15 seconds prior to any stimulation. Larva were then stimulated once each on the head, abdomen, and tail, with order randomized per individual larva. A thirty second pause occurred between each stimulation; behavioral response to each stimulation was recorded via an ethogram. Our results replicate earlier work, demonstrating that larvae respond more frequently to stimulations on the head and abdomen. Larvae fed diets of at least 25% protein or 25% fructose, were more responsive overall. C-bend movements and pauses were the most frequently recorded behaviors and were almost exclusively in response to head stimulations. Our results suggest that dietary habits have a negative impact on the ability of individuals to respond to stimuli. Further understanding of how diet impacts motor response has broader implications for our understanding of neural processes and human health. [Funded by

KY Sci. and Eng. FDN; RLC, Howard Hughes Medical Institute (Grant #52008116) awarded to the University of Kentucky (VM Cassone, PI)].

10B. Cady Barbour

Additional Authors: Nakita Bryan, Ge'ona Witcher

Mentor(s): Jiffin paulose

Searching for Circadian Clock Mutations in a Gastrointestinal Bacterial Commensal

The purpose for the research study was to search for circadian clock mutations in bacterium in the gastrointestinal system of human DNA. Circadian clocks are present in every living organism. They have no physical characteristics but rather are an internal cycle. This mechanism is responsible for maintaining stability and functionality by regulating bodily functions. Through extensive research it has been discovered that Enterobacter aerogenes in the gastrointestinal system when affected by neurohormone melatonin can cause mutations to this clock, throwing off the natural rhythm and gene expressions of your body. Melatonin is a hormone that is made by the penial gland, this hormone helps control the body's sleep and wake cycles. Small amounts of melatonin can be found in food. The circadian rhythm present in these gastrointestinal bacteria have a tremendous influence on the GI tract health and many gastrointestinal diseases, such as Crohn's Disease. The question is how. The hypothesis being tested is that certain genes control the circadian rhythm of swarming in Enterobacter aeogenes. To test the hypothesis, we duplicated our plasmid multiple times. We then inserted the DNA into E. aerogenes, and proceeded to allow the plasmid to mutate a random gene in the E. aerogenes via transposition. From this we took the new colonies from the plate to see if it grew in the presence of kanamycin, a resistance gene. We then scanned for mutation and later sequenced the plates to see if they had mutated. The results of this showed swarming on both the control and melatonin plates, but there seemed to be growth defects on the melatonin plate compared to the controls. There was a decrease in size one some of the plates that contained melatonin from the first 9 hours incubation to 96 hours of incubation. Although we do not know the specific results we can conclude that the genome of E. aerogenes has been mutated using a transposase. In the weeks to come, these mutations will be further characterized using sequencing. This research is important in understanding the circadian rhythm of E. aerogenes, in hopes of leading to a better understanding of how it works, and it's contribution to human gastrointestinal health.

10C. Morgan Blair

Mentor(s): Doug Harrison

The Role of Wingless Genes in Spermatid Differentiation in Drosophila

Cyst cells are somatic cells present in the testes of Drosophila melanogaster. Evidence has shown that these cells play a role in spermatid differentiation, but the signaling pathway between these cells and spermatid bundles is still unknown. Previous research has identified certain signaling genes that may have a role in the spermatid maturation and differentiation in fruit flies. These genes had increased expression during spermatid differentiation, and our project examines four such genes: Wnt-2, Wnt-4, Wnt-5, and Wnt-6. The Wnt signaling pathway, or wingless pathway, codes for a family of glycoproteins, which is essential for a variety of cell functions. By decreasing expression of these genes, we can determine if the Wnt pathway has a role in

spermatid differentiation. Knockdown flies which have a heat sensitive RNA interference (RNAi) construct were used to see the effect lowering gene expression had on spermatid differentiation. This construct only affected gene activity on the cyst cells. A GAL4 activator was used to initiate transcription of the RNAi gene, and temperature dependent GAL80 was used to inhibit GAL4 at temperatures below 29°C. After a week of increased temperature in which GAL 4 was active and Wnt activity was impaired, the testes of male flies were dissected and stained. Staining allowed for us to see the different individualization complexes (ICs) and spermatid bundles forming in the testes, and compare the results to a wild type genotype. If Wnt does have a role in spermatid differentiation, particularly in the role of cyst cell signaling, we expect to see a change in the number of ICs present in the testes.

11A. Olivia Boughey

Mentor(s): Rose Marks

Determining the Gene Mechanism Underlying the Dehydration Tolerance in M. inflexa.

The adaptations that allow plants to cope with drying are very relevant in light of current climate change and associated changes in water availability. Dehydration tolerance (DhT) is one such adaptation that allows plant tissue to dry to very low water content and then recover normal metabolic function once rehydrated. There is reason to believe that this trait is controlled by gene expression patterns that are coordinated with the onset of drying. We investigated the genetic mechanism underlying DhT using Marchantia inflexa, a dioecious tropical liverwort, as a model system. Initially, we demonstrated that the meristem tissue of M. inflexa has a higher tolerance than differentiated vegetative tissue. To do so, tissue samples were subjected to a dehydration assay that desiccated the samples at 75% humidity for 22 hours. Samples were then rehydrated and the area of recovery was measured using a dissecting microscope and the program ImageJ. It was found that 100% of meristem tissue survived desiccation compared to the differentiated vegetative tissue. In addition, previous work has shown that females of this species exhibit more DhT than males. Thus, we predict that the changes in dehydration induced gene expression will be both tissue and sex specific. To characterize dehydration induced gene expression patterns in M. inflexa, vegetative tissue from male and female plants was subjected to a dehydration assay and sampled at 5 different time points during the dehydration and rehydration process. At each time point tissue was dissected into meristem and differentiated vegetative fractions, RNA was extracted from each sample, and prepared for sequencing. We predict that there will be identifiable differences in gene expressing profiles among samples that correlate to the observed differences in DhT of these tissues and sexes.

11B. Lucy Bowers

Additional Authors: LaShay Byrd, Jenni Ho, Clare Cole, Samantha Danyi, Katherine Johnson, Sushovan Dixit, Madan Subheeswar, Ruth Sifuma, Hunter Maxwell, Emma Rotkis, Christa Saelinger, Maddie Stanback, Brecken Overly, Kaitlyn Stevens, Alli Bender

Mentor(s): Robin Cooper Gilson Capilouto

Attempting to Improve the Health of Kentucky Citizens Through Educating the Youth with Integrating School Work and Health Content

Kentucky consistently ranks among the top ten states nation-wide for the highest rates of chronic, preventable diseases. High school graduates in Kentucky are only required to successfully complete one semester of health, of which the course-work is didactic and rarely transformative. The adoption of the Next Generation Science Standards, which advocate for deep understanding, application of content, and using science to make informed decisions, provides a natural opportunity to integrate the National Health Education Standards into required science classes. We are developing an educational unit related to Metabolic Syndrome (MSy). Most of the health issues relate to the life style choices people are making and the lack of understanding of the disease process as a consequence. Bringing middle and high school science teachers into the fold to promote healthy behaviors by elucidating the science behind physiological processes, screening techniques, advancements in health care, and mechanisms of diseases and technologies associated with health care can be engaging and life improving for students. A unique aspect of our educational approach was that the students investigated their own health status as well as the health status of their community. Then, within their classroom, they related the health issues to STEM based curricular activities. In addition, the students had a dialogue about their research and their STEM based project to university undergraduate and graduate students as well as faculty in a mentoring based course via on line video recording in conjunction with blogging. Acclaim accounts allowed all participants to annotate posted audio and video clips generated via mini- classes which promoted easy and effective feedback, discussion, and collaboration. University students using multimedia to make presentations on their students' activities and progress to expand science content knowledge & foster collaboration. [Funding College Health Sci;HHMI(#52008116) to UK (VM Cassone, PI). Personal funds were also used (RLC)].

11C. Tiffany Buckley

Mentor(s): Julie S. Pendergast

Effects of Melatonin on Daily Rhythms in Mice During High-Fat Feeding

Circadian rhythms are approximately 24-hour cycles that are synchronized to the environment. It has been shown that high-fat diet feeding disrupts circadian rhythms and causes mice to gain weight. Melatonin, produced by the pineal gland, is known to regulate circadian rhythms and seasonal reproduction. Studies in obese mice have shown that melatonin reduces fat around the organs (visceral adipose tissue) and fat in the stomach (subcutaneous adipose tissue). Obesity is a worldwide problem. Melatonin is an over-the-counter drug that could treat obesity. In this experiment, I sought to determine if melatonin would protect the daily rhythm of eating behavior and inhibit weight gain in C57BL/6J mice during high-fat diet feeding. At 7 weeks old, C57BL/6J male mice were individually housed in light-tight boxes in a 12:12 light-dark cycle. They were given low-fat diet and melatonin in their water ad libitum. At 8 weeks old, some mice were randomly selected

to switch to 45% high-fat diet and maintained on melatonin. Control mice underwent the same procedures, but they were administered vehicle (0.75% ethanol) in their water. Locomotor activity and eating behavior were measured in the mice. Body weight and food intake were measured weekly. Body composition was determined at the end of the study. This study will determine if melatonin affects daily rhythms during high-fat feeding.

12A. Etoria Coatley

Additional Authors: Leah Hollander, Lexius Lynch

Mentor(s): Kausalya Shenoy

Smell or Swag? Something Fishy's Going On!

A female will not mate with a male if the female knows the male is sperm depleted because of the time and energy required to mate. The female will only use her limited energy to mate with a male who will provide her with the highest fitness. In a previous experiment, it was determined that a female preferred a male that was not sperm depleted, and this was consistent even when odor cues were blocked. We wanted to test if the female could detect whether a male was sperm depleted through odor cues. We also tested if the males' mating behavior differed when they were sperm depleted. To determine if females could detect sperm depletion through odor, males of similar color and size were paired together. One of the males were sperm depleted while the other was sham depleted. The males were placed on opposite sides of a tank behind opaque dividers with small holes throughout to allow water through. A female was placed in between the dividers so she could smell but not see the males. The females movement within the tank was recorded for 10 minutes. This was repeated for 14 trials. To see if sperm depleted males behaved differently, males were either sperm depleted or sham depleted were placed into a tank with a female. The number of times a male performed courtship displays and tried to mate were recorded for 10 minutes. 10 trials were done with males that were either sperm depleted or sham depleted. We expect there will be no difference in female preference for sperm depleted or sham depleted male when she is presented with only odor cues. We believe the sperm depleted male will be less likely to court the female and make fewer attempts at mating than the sham depleted male.

12B. Richard Cooper

Additional Authors: La Shay Byrd, Jenni Ho, Jennifer Wilson, Rebecca Krall, Gilson Capilouto, Steven Code, Clare Cole, Samantha Danyi, Katherine Johnson, Sushovan Dixit, Madan Subheeswar, Ruth Sifuma, Hunter Maxwell, Emma Rotkis, Christa Saelinger

Mentor(s): Robin Cooper, Gilson Capilouto, Rebecca Krall

Guided Inquiry in Modeling Health Risks with In-Class and Distance Learning

The targeted communities in KY for this project rank high in obesity, inactivity, cardiovascular diseases, and overall poor quality of health. Communities face a number of issues related to poor health outcomes. In some cases this is a result of personal choices, and in others, this is due to a lack of access to healthy food or knowledge about the consequences of poor health choices. Bringing middle and high school science teachers into the force to promote healthy behaviors by elucidating the science behind physiological processes,

screening techniques, advancements in health care, and mechanisms of diseases and technologies associated with health care can be engaging and life enhancing for students. We approached this by providing robust teaching modules aligned to the Next Generation Science Standards. A unique aspect of this educational approach is that the students investigate their own health status as well as their community and then within their classroom relate the health issues to STEM based curricular activities. In addition, students in the distant schools from the university mentors have presented general questions on science content which the university mentors would converse and address. The students and mentors have a dialogue with on line video recording in conjunction with blogging about their research and their STEM based project to university undergraduate and graduate students as well as faculty in a mentoring based course. [Funded by Col Health Sci.; Ky Sci Eng Fnd; HHMI (#52008116) UK (VM Cassone, PI). Personal funds were also used (RLC)].

12C. Riley Cutler

Additional Authors: Sarah Milburn

Mentor(s): Brian Rymond

Exploring the Spliceosome Cycle Through Yeast Genetics Screens

After transcription, cellular messenger RNA (mRNA) undergoes splicing to remove its introns and generate the mature mRNA. Pre-mRNA splicing is essential for gene expression and is conserved across all eukaryotes. This RNA processing step is catalyzed by the spliceosome, a dynamic enzyme with over 100 subunits. For each round of splicing, the spliceosome must assemble, activate, catalyze intron removal, and disassemble. Our group identified Cwc23 bound to the Spp382 spliceosome recycling factor in a high-stringency proteomic study. Like Spp382, Cwc23 is required for efficient RNA processing. Unlike all other splicing factors, Cwc23 has a Dna-J domain characteristic of co-chaperones that stimulate HSP70-like proteins, which drive protein complex assembly and disassembly. Our goal in this study is to learn more about Cwc23 and how its DnaJ activity contributes to the poorly understood steps of spliceosome turnover. Phage display, in vitro mutagenesis, and the yeast two-hybrid system have been used to investigate the Cwc23-Spp382 protein interaction. The data collected thus far suggest that Spp382 doesn't interact with Cwc23 through the latter's DnaJ domain, but through its C-terminal region. We have extended the yeast two-hybrid study to refine our understanding of the Cwc23-Spp382 interaction. We have also begun open ended gene dosage suppression and synthetic lethal screens to identify yeast genes that may interact with CWC23 to drive the spliceosome cycle. The genetic screen data indicate that, unlike other splicing factors explored through the same methods, the Cwc23 interaction network may be quite restricted. This suggests a unique and perhaps independent contribution of Cwc23 to splicing.

13A. Yujie Ding

Mentor(s): Anika Hartz

Effects of PCN on Cognition and Motor Function in hAPP-Overexpressing Mice

One hallmark of Alzheimer's disease (AD) is the accumulation of amyloid-beta (Aβ) in the brain. Impaired clearance of Aβ at the blood-brain barrier (BBB) is a possible mechanism that contributes to Aβ brain accumulation and cognitive deficits in AD. In this regard, it has been demonstrated that the BBB transporter, P-glycoprotein (P-gp), is involved in the clearance Aβ from the brain and that P-gp levels are significantly reduced in AD. Yet, strategies to restore P-gp clinically are not available. Here, we evaluate the therapeutic benefit of restoring P-gp through activation of the nuclear receptor PXR to reduce Aβ brain levels and improve cognition in a transgenic AD mouse model. We are currently performing a long-term feeding study with the PXR activator pregnenolone-16--carbonitrile (PCN) on male transgenic mice that overexpress the human amyloid precursor protein (hAPP). Cyclosporin-A (CsA), a p-gp antagonist, was used as a treatment control group. Mice were fed ad libitum, where doses of PCN (50 mg/kg) and CsA (25 mg/kg) in diet were introduced orally. To monitor PCN peripheral toxicity, we established an ALT assay to measure alanine-aminotransferase levels in the liver of all treatment groups. We also tested these mice using a behavioral battery that included the following assays: accelerating rotarod, open-field activity, Y-Maze, and Morris Water Maze. Within the first 12 months, we found significant differences in motor function between wild type (WT) mice and hAPP mice as measured by rotarod performance and the open field test, an effect of genotype (WT vs transgenic). More importantly, we observed a trend among treatment groups in both the Y-Maze and the Morris Water Maze, such that PCN mitigated the cognitive dysfunction seen normally in the hAPP transgenic mouse model of the same age. This suggests that future experiments may demonstrate a more robust PCN treatment effect: enhanced P-gp-mediated transport of Aβ from the brain ameliorates cognitive deficits seen in aging hAPP mice.

13B. Matthew Eastham

Additional Authors: Sungmin Kang

Mentor(s): Julie Pendergast

Daily Eating Rhythms are Disrupted in College Students

Circadian rhythms are 24-hour cycles in humans including regular eating, sleeping, and activity patterns. Studies have previously shown that when these eating patterns are disrupted, due to behaviors such as breakfast skipping and late night eating, an individual's risk for obesity increases. An individual's chronotype is his or her preferred time to go to sleep. A condition known as social jetlag arises when a person's chronotype does not match up with his or her social (work or school) schedule. College students are often portrayed as having erratic eating and sleeping times. We sought to determine if these schedules are truly aberrant, and if so, whether they are associated with disrupted circadian rhythms. We first surveyed 158 University of Kentucky students to gather information about their circadian rhythms and lifestyle choices related to eating. Our survey results showed that irregular eating times, breakfast skipping, and late night eating were associated with increased social jetlag and late chronotype. Next, 6 undergraduate students maintained food and sleep logs for a week. Each student had a distinct and irregular eating pattern. There was

a trend for breakfast skippers to have greater social jetlag. This study showed that college students have abnormal eating rhythms. These behaviors could impair metabolic function.

13C. Maya Gershtenson

Mentor(s): Catherine Linnen

Annotation of Neodiprion lecontei (Hymenoptera) Ionotropic Receptor Genes: Do These Genes Function in Smell and Host Plant Detection?

Plant-feeding insects have a very close relationship with their host plants. Plants are not only food sources, but often where mating and development occur. Insects use the senses of taste and smell to identify suitable habitats and mates. Ionotropic receptors (IRs) are a type of protein thought to function in insect smell; however, not a lot is known about how IRs are used to detect host plants in insects. The sawfly Neodiprion lecontei is a hymenopteran (related to ants, bees, and wasps) that is only found on pine trees. In this project, N. lecontei is used to study what role, if any, IRs have in detecting pine habitats. The first step is to identify the IR genes in N. lecontei. To do this, IR genes in the N. lecontei draft genome are manually annotated using iterative TBLASTN searches and known IR genes from other insect species. This approach makes it possible to identify homologs to known IR genes and any genes unique to N. lecontei. Once a complete set of N. lecontei IR genes is identified, comparative studies of hymenopteran IR gene families will be performed. Specifically, a gene phylogeny will be used to identify N. lecontei species-specific IR gene expansions, which will then be tested for signatures of positive selection. By comparing IR genes from N. lecontei, a plant specialist, to other insects, data from this study will help shine light on the possible role of IRs in plant-specific detection.

14A. Reed Gilbert

Mentor(s): Jakub Famulski

Examining the Role of Lhx5 in POM Cell Migration and Eye Formation

Periocular Mesenchyme (POM) Cells are cranial neural crest cells that migrate to and develop the anterior structures of the eye. Glaucoma can arise when defects in anterior structures result in the inability to properly regulate intraocular pressure. Thus, a better understanding of the regulation of POM cell biology can help us gain an understanding of how glaucoma arises. The transcription factor Lhx5, a member of the LIM homeodomain (LIM-HD) family of proteins of which zebrafish express several prologues, is expressed in the forebrain during development and may play a role in POM cell migration. To examine the function of Lhx5 during anterior segment formation I have been characterizing a loss of function mutant zebrafish line. Examination of mutant embryos indicates Lhx5 plays a role in eye formation but the mutant line exhibits incomplete penetrance. To examine the cause of incomplete penetrance I compared the expression of other genes in the LIM-HD family in Lhx5 mutant embryos to wild type at 24 and 48 hours post-fertilization. To date no significant difference in expression patterns of LIM-HD family members has been observed. In order to examine Lhx5's role in eye formation I also examined expression of Sema6a, a cell guidance molecule, in Lhx5 mutant embryos. Preliminary in situ hybridization results indicate decreased expression of Sema6a in

Lhx5 mutant embryos that exhibit the mutant phenotype. Future work will concentrate on examining whether the loss of Lhx5 and therefore Sema6a expression impacts POM cell migration.

14B. Logan Gilland

Additional Authors: Sarah Yount

Mentor(s): Julie Pendergast

Light Exposure at Night Affects Circadian Rhythms in College Students

Our bodies' internal clocks control our circadian rhythms, which are approximately 24 hour cycles that regulate when we sleep, eat, and get out of bed. The most important natural cue for synchronizing internal clocks to the environment is the light-dark cycle caused by the rotation of the earth. However, college students often have inconsistent schedules resulting in light exposure after dark. This light exposure could disrupt synchronization of circadian rhythms to the natural light-dark cycle. In this study, we sought to determine the influence of light exposure on circadian rhythms of college students. To do this, we first surveyed 158 students at the University of Kentucky about their sleep times and daily habits. We found that 89% of students used a light-emitting device (phone, TV, computer) in the hour before bedtime. To further explore this, we next continuously monitored light exposure and activity using actigraphy watches in 6 undergraduate students for 1 week. We found that students who were exposed to more light after 7pm were also more active at this time. These students also kept detailed sleep logs so we could analyze their chronotype, a person's desired sleep and wake times. We found that our students studied generally had later chronotypes meaning their circadian clocks tell them to go to bed later. We also discovered that students with greater light exposure after 7pm had later chronotypes. Finally, we explored our 6 undergraduates' social jetlag. Social jetlag is when a person's internal clock tells them to keep sleeping, but their alarm clock tells them to wake up. We found that students who experienced more light exposure after dark had a trend towards greater social jetlag. In conclusion, our data found that light exposure after dark is incredibly influential to a college student's circadian rhythm and overall sleep habits.

14C. Raeann Goins

Additional Authors: China Grundy, Ty'Asia Jones

Mentor(s): Phil Crowley

The Relationship Between Female Fertility and Color Preferences

Evidence suggests that women during their fertile windows will prefer the colors red and pink more when compared to non-fertile women. Although exact reasoning for this is unknown, proposed explanations include displaying visual cues of seeking a mate, cultural implications of red representing love, and the idea that men tend to prefer women wearing red or pink clothing, which women then tailor to. Our research team sought to test this idea, formulating the hypothesis that women during their fertile window will be more likely to wear red or pink clothing compared to women not in their fertile window. An email was sent out to undergraduate women at the University of Kentucky asking them to participate in a short electronic survey which included images of various clothing pieces in a variety of colors. The participants were asked to choose

their preferences as to what items they would be most likely to wear. Questions that provided insight on menstrual cycles, fertile windows, and demographic data were also asked. Women who were on hormonal birth control were included as a control to compare results against. The findings from this research could indicate whether or not human female fertility plays a part in color preference. If our hypothesis is true, findings can lead to further independent research that could lead to the discovery of why this phenomenon happens, and how this preference became common among fertile women via evolutionary links, certain visual stimulation cues, or some other reason entirely.

15A. Justine Green

Additional Authors: Kathleen Gossen, Saultzman Autumn, Saisindhu Marella, Sarah Ann McDonald, Brooks McNee, Thomas Ruggles, Maria Shamai Salinas

Mentor(s): Rebecca Kellum

Using a SxlPe-GFP Promoter Fusion Transgene in Assays of Rapgap1 Mutants in Promoter Activation

The master regulator of sex determination (both sexual differentiation and dosage compensation pathways) in Drosophila is the sex lethal gene, Sxl. To ensure the female mode of development, the early embryonic promoter of the gene (SxlPe) must be activated in females and it must not be activated in males. Defects resulting in improper dosage compensation of the X chromosome result in sex-specific lethality. The SXL protein is a splicing regulator that must be expressed early in development to ensure sex-specific splicing of Sxl transcripts. Genetic and biochemical experiments showed that two heterochromatin proteins (HOAP and HP1) that are best known for their gene repression activities regulate the activity of SxlPe. HOAP acts as a conventional repressor at the promoter, but unexpectedly HP1 has both repressive and activating roles. Genetic screens have been used to identify other regulators of the SxlPe promoter. Mutants for Rapgap1 yielded a similar phenotype to that of HP1 mutants in a genetic assay used to identify regulators of SxlPe that reduce viability of female progeny carrying only one functional copy of the Sxl gene. A transgenic line for a promoter fusion construct in which the SxlPe promoter drives expression of a Green Fluorescent Protein (SxlPe-GFP) is being used to determine if the activity of the reduced female viability is a result of reduced activity of SxlPe. The assays two different mutant Rapgap1 alleles (Rapgap122 and Rapgap147) in the SxlPe-GFP activity assay are currently underway.

15B. Rachel Hammer

Additional Authors: Caylyn Railey

Mentor(s): Nicholas McLetchie, Rose Marks

Do Leaves of a Common House Plant (Dracaena fragrans) Exhibit Dynamic Photosynthetic Responses to Changing Light Intensity

Photosynthesis is an important process that allows plant tissue to produce oxygen, which is critical for the survival of many organisms. In the terrestrial habitat photosynthesis is performed by leaves. The physical condition of a leaf and the environmental conditions (temperature, humidity, and sunlight) determine the photosynthetic performance. We manipulated the amount of sunlight reaching individual leaves of different

ages to test if leaves can respond to changes in light intensity and if the responses differ within a leaf. To do so, we used 10 Dracaena fragrans plants, and tested the response of two leaves per plant (a young leaf and an old leaf). Each leaf was divided into a left and right section; the sections were then randomly assigned a high light or low light treatment. The treatments were created by using acetate to remove roughly 33% (high light) and 90% (low light) of the natural light. Initial measurements of photosynthetic efficiency were recorded, and then plants were kept in the light conditions for six weeks, after which additional measurements will be recorded. After six weeks, the treatments will be terminated and final measurements of photosynthetic efficiency, chlorophyll content, and maximum photosynthetic rate will be taken. We predict that within a leaf the photosynthetic response will depend on the light conditions. The portions of leaves that are under lower light conditions will have more efficient photosynthesis, lower photosynthetic rates, and higher chlorophyll content. Furthermore, we expect that the younger leaves will be more responsive to the changes in the light environment compared to the older leaves. This study will provide enlightening information about the dynamic capabilities of plants and their ability to respond to their environment.

15C. Haley Heard

Additional Authors: Allison Goldsmith

Mentor(s): Yang Jiang

Music and Cognition

The purpose of this study is to help determine a difference between the brain of an individual who is heavily influenced through music (more right-brain) and one who focuses more on the hard sciences or maths (more left-brain). We will investigate effects of different types of music on human brains by recording electroencephalogram (EEG) during music play. Additionally, a series of neuropsychological tests will also be conducted on the human participants. Four healthy subjects will be separated into two groups (math versus music) and tested while wearing an EEG headset system. The brain signals will then be recorded, compared, and analyzed for a general trend in differences revolving around memory.

16A. Samantha Heighter

Additional Authors: Katherine Rowe

Mentor(s): Phil Crowley

Intrasexual Competition Between Women

This project is exploring intrasexual competition between women. Intrasexual competition is the level of competitiveness between members of the same sex. This study is based off research done at the East China Normal University. The research done there suggests that intrasexual competition is more likely to increase when women are fertile. The hypothesis was that intrasexual competition levels change at different points in the woman's menstural cycle. A prediction was made that intrasexual competition is heightened when a woman is fertile. A survey was sent out to female undergraduate students at the University of Kentucky. The survey was completed by these students and data were collected. Using scenario questions, the survey determined how women interact at different points in their menstrual cycle. The scenarios used in the survey

were written to mimic competitive social situations between women (e.g. parties, shopping, and classroom environments).

16B. Christina Hermanns

Mentor(s): Robin Cooper

Considerations in Repetitive Activation of Light Sensitive Ion Channels for Long-Term Studies: Channel Rhodopsin in the Drosophila Model

Optogenetics is a technique used in various animal models that also holds a potential for therapeutic possibilities in mammals. There are technical issues with the use of light sensitive ion channels: reproducible effects over time, controlling where the non-native proteins are targeted and changes in the biophysical properties of the cells they are expressed in. We used a variant of channel rhodopsin (ChR2-XXL) and targeted expression (light pulses) in motor neurons of larval Drosophila to investigate acute and chronic activation of the channels on synaptic function. The rhodopsin channel modifier all trans retinal (ATR) also plays a role in the sensitivity of the channel to light. Periods of acute, repetitive and pulsatile blue light exposure over larval development produced attenuated responses. This is more prevalent when ATR is used. These blue light sensitive ion channels, with ATR, show accommodation and produce an electrical refractory period in inducing synaptic responses. The electrical refractory response is not observed after blue light conditioning or in the absence of ATR. The biological significance and aim of this study is to demonstrate that in controlling particular neurons or neuronal circuits with optogenetics, over time, and throughout development, one will have to understand the dynamic nature of activating and silencing the light sensitive channels as well as the biophysical effects on neuronal activity. The significance of this study is demonstrating the need to determine what conditions might be best for particular investigations when using light sensitive channels.

16C. Tori Hickey

Additional Authors: Zana Majeed, Carly Ballingerboone, Morgan Cornelius, Tristan Donovan, Hunter Garrigus, Emma Higgins, Meaghan Labarre, Alexa Larson, Micaiah Mcnabb, Krystina Monticello, Riley Shumard, Brendon Stockwell, Priscilla Boachie, Amando Ho, Andrea Cooper

Mentor(s): Robin Cooper

Course-Based Undergraduate Research Experience (CURE) with Online Interactions for a Neurobiology Class in Iraq and in the USA: Alterations in Synaptic Transmission

The goal in this project is threefold: (1) address an authentic physiology research question for a neurobiology course as a group project for educational purposes; (2) To address the role of extracellular free Ca2+ in potentially contributing to synaptic depression with motor neurons expressing channel rhodopsins at the larval Drosophila neuromuscular junction; and (3) To address how short bursts of neural activity can have lasting effects on frequency of spontaneous vesicle fusion events. For this presentation the focus will be how we went about developing and implementing the CURE with on-line interactions for experimentation, data analysis and delivery of educational content. The advantages and disadvantages of language barriers and level of knowledge base on the content will be addressed from the two interacting sites (Iraq and USA). Specific

data analysis was handled by using a given set of software in order to have reliability and publishable data along with interactive, discussion based blogs on digital movies. The research question is one of interest to the neurobiology field for experimental design with physiological salines and clinical implications with hyper- and hypo-calcemia which can occur in disease states (i.e., parathyroid problems, bone injury) as well as novel therapeutic techniques which are starting in humans concerning light activated ion channel rhodopsins in neural tissue. Hypercalcemia is also a factor with being in space (zero gravity) for long periods of time. Heightened or dampened neural activity can also alter Ca2+ homeostasis within the narrow synaptic clefts within the CNS and have effects on the presynaptic as well as postsynaptic function. (Funded by Kentucky Science and Engineering Foundation; Sustaining Excellence-2014 competition grant from the Howard Hughes Medical Institute (Grant #52008116) awarded to Cassone).

17A. Emma Higgins

Additional Authors: Carly Ballinger Boone, Tristan Donovan, Meaghan Labarre, Alexa Larson, Micaiah McNabb, Nina Monticello, Riley Shumard, Brendon Stockwell, Priscilla Boachie, Amanda Ho, Andrea Cooper, Meaghan Melody, Brittany Slabach

Mentor(s): Robin Cooper

Optogenetically Stimulating Motor Neurons and Implications on Synaptic Transmission: Addressing Long-Term Consequences

Neuronal synaptic transmission occurs because of calcium entry at the nerve terminal, which in turn causes vesicle fusion at the synaptic terminal. This is a highly regulated process. Understanding the mechanisms in this calcium regulation is important for the basic understanding of pathological conditions and potential therapies. The approach of optogenetics is novel, but the details of understanding the consequences of optogenetics have not yet been fully discovered. Our goal is to try to understand neuronal responses to these light-activated channels and we are focusing on spontaneous fusion of vesicles, referred to as minis. We used the motor neurons of Drosophila larvae as our experimental model. We are trying to address how rhodopsin affects synaptic transmission. We are investigating the rate of spontaneous synaptic transmissions by activating these channels. Activating these channels causes a tremendous number of these vesicle events, leading us to believe that this repeated stimulation could lead to apoptosis. This research is significant because it sheds more light on factors important in regulating synaptic transmission and ways that synaptic transmission can be regulated. [Funded by KY Sci. and Eng. FDN; RLC, Howard Hughes Medical Institute (Grant #52008116) awarded to the University of Kentucky (VM Cassone, PI)].

17B. Jenni Ho

Additional Authors: Lashay Byrd, Katelyn Armstrong, Clare Cole, Samantha Danyi, Katherine Johnson, Sushovan Dixit, Madan Subheeswar, Hunter Maxwell, Emma Rotkis, Christa Saelinger, Maddie Stanback, Brecken Overly, Suraj Rama, Gaaya Veeraragavan, Jennifer Wilson

Mentor(s): Robin Cooper

The Effects of Extreme Diets on Development, Survival and Physiology Using the Fruit Fly as an Educational Model to Address Human Health Issues

There are various nutritional plans for humans and other animals such as high fat for a ketogenic diet, high protein for bodybuilding and high carbohydrate for endurance training. How these various diets in the extreme effect the physiological aspects of the body are still being investigated. For example, a ketogenic diet being implemented for managing epilepsy may dampen the neural circuits but how would this impact a developing brain in a child or cardiac function? The effects of a high fructose diet or a protein diet on a developing fetus are just some of the recent concerns in the medical community at present. We set out to address the effects of extreme diets of high fat, high protein and high carbohydrate diets on the development and survival of fruit flies as a model system. We assess the physiological effects in these three diets with larval and adult behavioral assays, measure of larval heart rate, sensitivity to modulators of the heart and central nervous system as well as address synaptic properties at the neuromuscular junctions. We are developing an educational unit related to Metabolic Syndrome (MSy). We have started with high school classes defining the disease of MSy and contributing factors. High school classes are now designing live models of fruit flies fed different diets and examining the health (behavior, heart function, development and survival) of the fly populations. Students are developing talking points based on what they have personally learned, design displays, and use their models to teach others. For a culminating event, students will set up their demonstrations and displays in the places where local people congregate the most - parent teacher conference night, churches, ball games, flea markets.

17C. Hannah Hughes

Mentor(s): Vincent Cassone, Jiffin Paulose

Melatonin's Effect on the Circadian Rhythm of Enterobacter Aerogenes

The gastrointestinal system is a complicated part of the body, much like the brain. Which is why we are studying how melatonin affects the gut bacteria that has been known to have a circadian rhythm. In doing so we can discover how bacterium, known as Enterobacter areogenes, affects the circadian rhythm's movement on levels outside of the body. With this we can hypothesize that the circadian rhythm present in Enterobacter aerogenes require a variety of certain genes to function. To test the hypothesis, we duplicated our plasmid multiple time to get an abundance of plasmid yield. We then inserted the DNA into E. aerogenes, and proceeded to allow the plasmid to mutate a random gene in the E. aerogenes via transposition. Taking this we took the new colonies from the plate and see if it proceeded to grow in the presence of kanamycin, and thus providing us with the knowledge it has the kanamycin resistance gene. We then proceed again to scan for mutation and later sequence the one that prove to have mutated. The results of this showed swarming on both the control and melatonin plates, but there seemed to be growth defects on the melatonin plate compared to the controls. Thus, the conclusion of the study is that melatonin may have some effect on the

Enterobacter aerogenes's circadian rhythm. This research that we have done in the lab, along with trial and error of the different tests, are what allow us to discover the inner workings of the gastrointestinal system. All done in hope of providing better and a variety of different treatments in the future.

18A. Bradford Hull

Additional Authors: Mya Scheib

Mentor(s): Doug Harrison

We Have to Stick Together: Jak/Stat is Required to Maintain Polar Cell Cohesion and Coordination

The Drosophila eggshell is a specialized structure that protects the embryo from harsh environmental conditions. However, the sperm cannot penetrate the shell to fertilize the egg because of this. To solve this problem, a small tube called the micropyle is formed during development of the egg to allow sperm entry. Key to its formation are the polar cells, a pair of cells located at the anterior of the egg which form extensions into the micropyle and create the lumen. The polar cells stimulate a cell signaling pathway called Jak/Stat in the border cells to promote their migration. Our lab found that polar cells that lost the Jak/Stat ligand Upd3 had a higher frequency of blocked micropyles which correlated with mistargeted polar cell extensions. We set out to understand the requirement for Jak/Stat signaling in the polar cells in its role for targeting polar cell extensions. Our first hypothesis was that Jak/Stat reduction in polar cells affected border cell migration timing. Pathway activity was specifically reduced in polar cells by impairing Stat using RNA interference, a method that directs the destruction of specified gene products. Surprisingly, we found that Stat RNAi in polar cells does not affect border cell migration or formation of the extension, but does affect morphology by causing extensions to be significantly longer than those in wild type cells. Because the polar cell extensions were more poorly coordinated, we then hypothesized that this may be due to failed polar cell adhesion to their environment. To investigate this, we are looking at distribution and patterns of expression of adhesion molecules such as cadherin, FAS3, and integrin in Jak/Stat mutants to determine if they are reduced and if this is affecting polar cell cohesion and extension formation. Data from these experiments will be presented.

18B. Harsha Iyer

Additional Authors: Duck-Young Na

Mentor(s): Kausalya Shenoy

Intensity of Zebra Finch Beak Color as an Indicator of Immune Function

Evolutionarily, it is important to choose a mate that can increase the individual's fitness. Over multiple generations, animals have developed certain traits such as ornaments that can indicate to the opposite sex that they have good genes. For example, a brightly colored beak of a male zebra finch indicates strong immune system in these birds, and is sexually selected for. In this experiment, we aim to confirm this hypothesis by testing whether the beak color intensity of a zebra finch correlates with immunocompetence, measured by the bactericidal efficacy of the bird's blood. Confirming this idea will allow us to proceed to the next part of our experiment, where we aim to analyze the effects of an estrogen mimic, ethinylestradiol, on the relationship between these two variables. We will use ten male zebra finches. Each bird's beak color will be measured using

spectrometry. Immunocompetence will be measured for each bird by using a bactericidal-efficacy assay. We will add a small sample of blood from an individual bird to a known concentration of E. coli bacteria mixed in standard medium. We will make a bacterial lawn with the solution on an agar plate, and count the number of bacterial colonies that grow. If a large number of E. coli bacterial colonies have grown on the plate, it would imply that the bird has low immunocompetence, and vice versa. We predict that birds that have brightly colored beaks will have high immunocompetence, and birds that have duller coloration will have low immunocompetence.

18C. Christina Kallik

Additional Authors: Alysia Kohlbrand, Madeline Conrad, Lucy Hart, Jeremy Helton, Logan Hickey, Geoffrey Johnson, Mackenzie Knabel, Nicholas McVay, Daimen Stoltz, Brittany Turba, Yuechen Zhu

Mentor(s): Robin Cooper

Does Riluzole Have Anti-Glutamatergic Action at the Drosophila and Crayfish Neuromuscular Euromucular Junctions and Does It Block the Production of Action Potentials ?

Riluzole (Rilutek, Teglutik) is a medication that is being used to alleviate symptoms which arise from amyotrophic lateral sclerosis, Alzheimer's disease, generalized anxiety disorder and mood disorders. However, it appears the precise mechanism of how this drug works mechanistically is still not fully resolved. There are reports that it may have anti-glutamatergic action but only when used with TTX sodium channel blockers. We set out to use invertebrate models to help address mechanisms of action of this drug as the invertebrate preparations allow easily detectable quantal responses at glutamatergic neuromuscular junctions (NMJs) as well as direct actions on the shape and properties of directly measured responses of TTX sodium channels that give rise to action potentials. Addressing modes of suspected action in mammals using a model invertebrate preparations has been a history in pharmacological practice for many years and has paved the way in better understanding the action of pharmacological agents used in mammals. The crayfish and Drosophila NMJs are model glutamatergic synaptic preparations and the chordotonal organs of the crab and MRO of the crayfish serve as good models for the effect of the generation and amplitude of Na+ dependent action potentials. Our neurophysiology course took this project on as a course-based undergraduate research experience (CURE) to address an authentic research question. (Funded by student course Bio446 use fees and Department of Biology, Univ. of KY).

19A. Rebika Khanal

Additional Authors: Heba Boustany, Osereme Unuakhalu, Elise Maul, Kennedy Ballard, Muna Shakhashiro, Tsage Douglas, Mackenzie Donoho, Adan Deeb, Elizabeth Driehaus, Katrina Kozak

Mentor(s): Edmund Rucker

Role of Autophagy in Cell Death of Cancer Cells

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 three cell lines: 1) MDA-MB-231, a triple negative breast cancer cell line, 2) HeLa, a cervical cancer cell line, and 3) L929, a mouse fibroblast cell line. The experiments are being conducted with the following treatment groups: 1) negative control, 2) camptothecin only, 3) cycloheximide only, and 4) camptothecin plus cycloheximide. After treatment at 24 or 48 hours, cell numbers are quantitated by hemocytometer. Follow up experiments will examine the effect of autophagy induction or suppression on the efficacy of the chemotherapeutic drugs with the three cell lines.

19B. Trevor Kohari

Additional Authors: Garrett Fannin, Stephanie Kristl

Mentor(s): Douglas Harrison, Peter Mirabito

The Influence of Extracellular Matrix Proteoglycans in the Individualization of Drosophila Testes.

Through prior research it is hypothesized that the role of extracellular matrix (ECM) proteoglycans is essential in the development of sperm cell individualization. A proteoglycan is a glycosylated protein within the ECM and on the surface of numerous cells. The function of these carbohydrate modified proteins is the protection or regulation of movement of numerous ligands and cations in the ECM. This study is investigating proteoglycan function in Drosophila individualization, the process in spermatogenesis in which interconnected spermatid cells separate from each other in a cluster. To determine the role of proteoglycans played, six individual genes of drosophila were used in the process and each of our genes are connected in that the chemical makeup are similar and each are a meaningful component of the ECM. To see if each of our genes were important to reproductive success, we turned off the gene by blocking the switch activator called GAL4 via an inhibitor known as GAL80. The switch activator turns on the gene but we aim to turn it off and find the function of the gene. In turn, the outcome of this manipulation was the dysfunction of Drosophila reproduction. Furthermore, each fly was dissected and the testes were stained in two separate processes to view the individualization of sperm cells which shows that the gene functions during reproduction. The staining enables access to microscopic viewing of the stage of individualization. Our results will show the presence of individualization and the relevance of our genes in the system of reproduction. If it is seen that individualization or reproduction is defective in one or more lines, it exemplifies proteoglycans functional role. Further research will show a look at the chemical and molecular effect on individualization and Drosophila reproduction.

19C. Alysia Kohlbrand

Additional Authors: Kallik C, Conrad M, Hart L, Helton J, Hickey L, Johnson G, Knabel M, McVay N, Stoltz D, Turba B, Zhu Y.-C

Mentor(s): Robin Cooper

Actions of Capsaicin in Blocking Stretch-Activated Channels in a Model Invertebrate Preparation.

The type of stretch-activated receptors in the chordotonal organs in the crab (Callinectes sapidus) walking leg and of the muscle receptor organ (MRO) in the crayfish (Procambarus clarkii) abdomen have not yet been classified as to their molecular or pharmacological profile. Since many stretch-activated receptors share some pharmacological profiles, we screened the effect of capsaicin, the compound responsible for the spicy kick in hot chili peppers, on the proprioceptors of the crayfish and crab which are activated by stretch-activated channels (SACs). Various displacement rates, as well as static positions that activate the stretch-activated receptors, were used in examining the pharmacological profiles. Within 20 minutes 4 out of 5 preparations in the crab completely shut down at 0.1 mM and 5 out of 6 crayfish MROs shut down with 0.1 mM. At 0.01mM the time for the preparations to reach complete shutdown was longer than 20 minutes but nevertheless shut down like the high concentration preparations. All preparations recovered with saline washout. The molecular makeup of the channels also awaits characterization. The findings build on results from last year's class which showed that these two sensory types of organs are not sensitivity to two common SAC blockers (amiloride, ruthenium red) nor was there a significant increase in activity due to H+. However, Gd3+ did have rapid effects in shutting down activity. This would suggest that the SAC within the COs and MRO are not of the DEG/ENaC channel subtype. Given Gd3+ at 1mM blocked the activity rapidly, it is suggestive that access of the other agents is not an issue. We would suggest referring to the SACs within these COs as amiloride, ruthenium red, and acidic insensitive channels but capsaicin-sensitive. Since Gd3+ is a broad non-selective inhibitor of SACs, it was not surprising that the SAC in the neurons of these COs were blocked. Our neurophysiology course took this project on as a course-based undergraduate research experience (CURE) to address an authentic research question. (Funded by student course Bio446 use fees and Department of Biology, Univ. of KY).

20A. Meenu Krishnasamy

Mentor(s): Vincent Cassone

Properties of Circadian Rhythmicity in Enterobacter Aerogenes

Circadian rhythms regulate several fundamental physiological processes in vertebrates through endogenous oscillators that entrain with environmental cues. The human gastrointestinal system is driven by one such biological clock. It has been established that the commensal human gut microbiome is regulated by the host's circadian clock, but the exact mechanisms of synchronization are unknown. Previous research has established that a strain of Enterobacter aerogenes, a human gut bacterium, expresses circadian patterns of swarming and motility that are synchronized by the neurohormone melatonin. Here, we attempt to further characterize the properties of the microbiome circadian clock in another strain of E. aerogenes. UCI-15 is a clinical strain of E. aerogenes with interesting antibiotic resistance properties. In prior studies on E. Aerogenes, the motility protein gene MotA and the manganese transporter gene mntH have been shown to play a role in the mechanisms underlying circadian rhythmicity. MntH:lux, a luciferase reporter under the control of the mntH

promoter and MotA:lux, a luciferase reporter under the control of the MotA promoter, were introduced into UCI-15 through electroporation. Gene expression of MotA and mntH were measured using a real-time bioluminescence recorder. Transformed UCI-15 is predicted to exhibit roughly 24-hour patterns of swarming that can be measured through motility assays. Through these studies, we hope to better define the properties of the circadian clock in E. aerogenes, including the identification of specific genes involved in the circadian regulation pathway. Investigating circadian mechanisms in the human gastrointestinal system has therapeutic implications as disruptions in circadian regulation lead to a variety of pathological conditions.

20B. John Marcum

Mentor(s): Jiffin Paulose

Exploring the Impact of Circadian Rhythm Disruptions on the Gastrointestinal System

Most scientific minds are familiar with melatonin, and understand it's role in circadian rhythms. Interestingly, melatonin has been found in gut microbes and plays a vital role in gastrointestinal processes and regulation. The microbiota of the gastrointestinal tracts is affected by things that typically ale the humans circadian clock: Jet lag and dietary changes. Some very serious ailments occur because of disruptions within the gastrointestinal tract: Crohn's Disease and Irritable Bowel Syndrome. This discovery is significant because these tissues within the gut do not communicate with any commensal bacteria, yet maintain homeostasis and are disrupted in the same ways the host is when exposed to clock disruptions. Melatonin has been thought to be an isolated neural process, but the microbiota of the gastrointestinal tracts has, convincingly, shown to have capabilities of melatonin synthesis. It is not yet apparent which cell(s) the microbiota communicate with, or how exactly melatonin is involved, but we set out to give evidence of at least one possible signal for the processes by using a transposase. Before inserting the transposase, the kanamycin resistant gene was inserted into the plasmid. Then, the transposase was introduced into the E. aerogenes, and all mutants have been characterized using sequencing. Two plates were made, one with melatonin, the other without, to allow a proper comparison. The bacteria present on the plates with melatonin exhibited many defects, but growth was minutely affected. Using these characterized mutants to better understand E. aerogenes will allow us to attempt to ease or eradicate the aforementioned diseases, and lead to a better understanding of the gastrointestinal system.

20C. Kayla Mattingly

Mentor(s): Catherine Linnen

Testing Reduced Fertility in Male Hybrid Neodiprion Sawflies

In a species hybrid, the sex that experiences reduced fertility or ability to survive is often the heterogametic sex. This rule is known as Haldane's Rule. One group of organisms that are thought to obey Haldane's Rule are Neodiprion sawflies. These organisms are haplodiploids, where the males develop from unfertilized eggs and are haploids and the females develop from fertilized eggs and are diploids. Therefore, it is predicted that hybrid haplodiploids experience the inviability and sterility outlined in Haldane's Rule. We tested this hypothesis in male hybrid Neodiprion sawflies to determine whether or not the heterogametic sex in haplodiploids follows Haldane's Rule. To test for reduced fertility in male sawflies, we measured their mating

ability, sperm quality, and fertilization success. The ability for hybrid males to mate is measured according to their willingness to mate with a female in two hours or less. The sperm quality of the hybrid males is measured according to their sperm size, sperm motility, and sperm quantity. Finally, the fertilization success of hybrid males is measured according to the viability of their offspring after mating with a female. It is predicted that there will be a reduction in one or more of these qualities in hybrid male Neodiprion sawflies when compared to purebred male Neodiprion sawflies. A decrease in one or more of these qualities in hybrid males indicates reduced fertility or inviability, confirming that male hybrid Neodiprion sawflies follow Haldane's Rule as predicted.

21A. Ethan Michels

Additional Authors: Emily Cashman, Imani Linton, Ciara Frassinelli

Mentor(s): Peter Mirabito, Douglas Harrison

The Effect of Proteases and Peptidases on Spermatogenesis in Drosophila Melanogaster

Spermatogenesis is the process of creating, developing, and individualizing sperm. The goal of this project was to discern the roles of specific proteases and peptidases in individualization, a specific stage of spermatogenesis, by inhibiting the expression of these genes in the somatic cells of the testes in male Drosophila Melanogaster. To accomplish this goal, we crossbred knock-down male Drosophila with virgin females to create flies that specifically express RNAi for each of the genes in the somatic cells of the testes. The RNAi inhibits the translation of the designated protein in the male Drosophila. In order to determine if spermatogenesis was affected, we counted the number and position of ICs and waste bags through dissection and staining. Preliminary evidence suggests that some genes studied will significantly influence spermatogenesis. Results of analysis of a larger sample of males will be presented. We anticipate, with further results, some of the selected genes will be shown to impact individualization in spermatogenesis, therefore demonstrating the role of the somatic cells on controlling differentiation.

21B. Tucker Moseley

Additional Authors: Madeline Wermeling, Olivia Walker, Ashlee Harris

Mentor(s): Doug Harrison, Peter Mirabito

The Impact of Cell Surface and Membrane Proteins on the Spermatogenesis of Drosophila

Drosophila, commonly known as fruit flies, produce sperm that can be more than twenty times the size of their bodies. The goal of this project is to determine whether the gene activity of cell surface proteins in cyst cells influences spermatogenesis. By interfering with gene activity using RNAi in somatic cells, we can test whether each cell surface protein affect spermatogenesis of germline cells. In this study, the genes being tested can be analyzed during individualization. Individualization is the process in which 64 interconnected spermatids separate into individual sperm, when this occurs there cystic bulges and individualization complexes produced that can be seen through staining. Cystic bulges are produced because cytoplasm is being removed from each individualizing spermatozoa. Individualization complexes are bundles of actin that drive the process of the removal of cystic bulges. If both structures are produced it is assumed that individualization

is occurring and that the gene being tested is indeed not necessary for spermatogenesis to occur; conversely, if defects in the formation or progression of the defects are observed, we can infer that spermatogenesis has been affected. This class of genes could also be shown to have a function in the somatic cells in regulating spermatogenesis. By, observing the effect of the inhibition of the RNAi genes it can be determined that the somatic cells are communicating with the germline cells. The effect can be determined by staining the testes of the flies containing the RNAi gene and looking for structures that correspond with individualization. It is predicted that because of the analysis, there will be aspects of the spermatogenesis that are defective. Conclusively, genes that code for membrane proteins generally influences the spermatogenesis.

21C. Elyse Mosher

Additional Authors: Tori Ragsdale

Mentor(s): Phil Crowley

Fertility Trends in Undergraduate Women

This study was designed to see if women change the way they dress when they are fertile. Specifically, the degree of clothing provocativeness was measured to see if there were noticeable changes in the choices women make during their fertile periods compared to menstrual periods. It was hypothesized that women within their fertile window would dress more provocatively than when they are menstruating. The sample consisted of 20 undergraduate women. Each participant's fertility was determined by the completion of an initial survey on their menstrual cycles. Text messages were sent during these two windows asking participants to send non-facial selfies: provocativeness of clothing was judged from each picture. Any clothing that is tight, short, lacey, shows cleavage, or shoes with 2.5+ heels is considered provocative. Data was collected over three weeks, and descriptive analysis of the selfies was completed. This study is significant because it helps determine whether women advertise their fertility status, perhaps without being aware of the change in their own behavior.

22A. Aya Omar

Mentor(s): Robin Cooper

Pharmacological Identification of Cholinergic Receptor Subtypes in Modulation of Drosophila Melanogaster Sensory-Motor Circuits.

Acetylcholine (ACh) is an abundant neurotransmitter found in many species across various taxa. In mammals, it is integral in modulating neural circuits underlying processes such as learning, memory, and reward processing. In Drosophila melanogaster, ACh exhibits comparable importance. The receptors that facilitate synaptic transmission at cholinergic synapses 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. We have used a combined behavioral and electrophysiological approach to identify important cholinergic receptor subtypes within the Drosophila central nervous system (CNS) that may be crucial in modulating defined neural circuits. We have exposed intact Drosophila 3rd instar larvae to various concentrations of ACh agonists and antagonists by way of feeding to observe modulation of

locomotion and feeding behavior. In addition, we have utilized an electrophysiological approach to assess the efficacy of a defined sensory-CNS-motor circuit in the presence of cholinergic agonists and antagonists exposed directly to the CNS of an excised larval preparation. Preliminary results suggest that exposing the CNS directly to ACh and agonists, nicotine and muscarine, enhances electrical activity of a sensory-CNS-motor circuit. Conversely, acute feeding of nicotine and acetylcholine suppresses locomotion and feeding. These results suggest both nAChRs and mAChRs within the CNS act to modulate motor circuits that mediates general locomotion and feeding in larval Drosophila.

22B. Weston Owen

Mentor(s): Vincent Cassone Jiffin Paulose

Using Reverse Genetics to Investigate Mechanisms in Enterobacter aerogenes Circadian Rhythmicity.

Circadian rhythms regulate human physiological function in a 24-hour cycle. Research indicates gut microbes expressing a circadian rhythm in the human gastrointestinal tract. The gut microbiome circadian rhythm regulates intestinal homeostasis, and disruption can lead to irregularities in abdominal health. Previous studies show an enteric bacterium, Enterobacter aerogenes, as expressing endogenous circadian patterns in the presence of melatonin in response to a host circadian clock. Here, a reverse genetics approach is used to identify the mechanisms regulating circadian patterns in E. aerogenes. The manganese transporter gene MntH is a hypothesized integral component of the circadian clock mechanism. Lambda red-mediated recombination was used to insert a kanamycin resistant gene PCR fragment into the MntH DNA sequence, effectively knocking the gene out.A MntH gene knockout is predicted to show a disruption in E.aerogenes rhythmicity in the presence of melatonin. Electroporating the MotA:: lux gene into the E. aerogenes genome produced mutants which exhibit a daily pattern of bioluminescence in the presence of melatonin. Daily changes in bioluminescence are used to quantify rhythmicity after MntH knockout, and to observe phenotypic change in circadian rhythm due to ineffective MntH gene functionality. The reverse genetic approach is used to understand the function of MntH in the E.aerogenes endogenous circadian clock. These experiments provide insight into the gut microbiome's complex relationship with the host's circadian rhythm, while facilitating further investigation into other candidate genes integral to the circadian clock mechanism.

22C. Brennan Pike

Mentor(s): Nicholas McLetchie

Habitat Specific Acclimation to Dehydration in the Tropical Liverwort Marchantia Inflexa

A rare, valuable adaptation possessed by some plants is to tolerate dehydration. Previous studies on a tropical liverwort, Marchantia inflexa, found plants which grew in a drier habitat had higher dehydration tolerance (DhT). The current study aimed to discover if this DhT difference is due to genetic adaptations or acclimation to local conditions. Plants were collected from sites in Trinidad, three being moist, closed canopy sites and two being drier, open canopy sites. To quantify the relative temperature and humidity, a WatchDogTM model 450 data logger sensor was utilized and the resulting data was analyzed using a mixed linear model. In addition, canopy photos were taken onsite and were analyzed using WinSCANOPY 2003A to determine the canopy openness and the amount of light penetrating the canopy. The DhT of plants was

tested after field collection, and then clone samples were transported to the University of Kentucky. Plants were grown in a common garden and then tested again for DhT, utilizing dehydration assays, conducted in dehydration chambers where relative humidity is maintained at 85% with a saturated salt (NaCl) solution. Samples are hydrated in a dark area for 24 hours, dehydrated in the chamber until dry, then rehydrated with distilled water. Recovery is assessed using chlorophyll fluorescence to determine the efficiency of photosystem II, using a fluorometer to measure quantum yield (Fv/Fm) of dark-adapted leaves. We predict that DhT will still be higher in plants collected in drier sites when they are grown in a common garden. If true, the results suggest that a genetic adaptation in these plants has increased DhT. Understanding such a useful adaptation would be beneficial in uncovering the genetic basis of DhT.

23A. Jacob Reffitt

Mentor(s): Jiffin Paulose Vincent Cassone

Finding The Circadian Clock Gene in E. Aerogenes

Inside a gastrointestinal tract many things happen. One of those things is the breaking down of material by bacteria, but how do they know when to eat? There is a genetic mechanism that is encoded in their DNA known as a circadian clock. The lab has been manipulating the genome of the bacteria E. aerogenes by randomly inserting a jumping gene that also encodes kanamycin resistance into their genome. The purpose of this is to find any genes that controls their circadian rhythm by interrupting their expression. The lab is hoping to find these genes by observing the bacteria after we insert the jumping gene. But before observing them, they must be indexed for later reference. After imaging the colonies that they are plated in both melatonin and control plates, after a growing period a decrease in growth for a few of the plated colonies is seen. The lab is expecting to see, through DNA sequencing, a disruption in a gene or genes that controls circadian clock of the bacteria in the colonies containing decreased growth. The results of the sequencing have rendered the expected result, and we have found the gene that controls the circadian clock in E. aerogenes.

23B. Sarah Robbins

Additional Authors: Caroline Jenkins, Katie Benedict

Mentor(s): Philip Crowley

The Effects of Scent on Mate Selection Across Women's Ovulatory Cycle

Several studies have shown that a woman's mate choice changes across her ovulatory cycle. The leading explanation for these changes—the good genes hypothesis—predicts that women should prefer presumed characteristics of genetic benefits ("good genes") most strongly when fertile and when evaluating men as short-term sexual partners. However, previous research has also suggested that males who display traits valued in long-term relationship investment (e.g., warmth and faithfulness) are preferred by women when they are not fertile. This experiment was conducted to analyze whether the scent of males plays a role in a woman's mate choice. The researchers had women at different points in their ovulatory cycle rate the attractiveness, odor intensity and pleasantness of t-shirts that were worn by independently characterized masculine and unmasculine males. The researchers then examined how women's preferences for the smell and traits, typically valued in long-term and/or short-term mates, varied according to their fertility status.

23C. Emma Rotkis

Additional Authors: Kay Johnson, Jenni Ho, Angel Ho, LaShay Byrd, Clare Cole, Sushovan Dixit, Madan Subheeswar, Ruth Sifuma, Hunter Maxwell, Christa Saelinger, Maddie Stanback, Brecken Overly, Richard Cooper, Kaitlyn Stevens, Alli Bender

Mentor(s): Robin Cooper

The Effects of A High Protein Diet: Modeling the Topic in Fruit Flies for Educational (9-12 Grades) Experiences

In helping to encourage today's youth (14-18 year olds) to understand the effects of diet on bodily function and health, an approach we have taken is to develop school based educational content which is feasible to be introduced. The national trend is for high school curriculum to be integrative and engaging to students with activities and hands-on learning as well as being meaningful to the student. The Next Generation Science Standards (NGSS) of STEM is an approach many states have adopted to integrate science content. So we are developing modules with integrated biology, math, statistics, engineering, design and modeling as well to promote creativity but with a focus on health. This particular module focuses on a high protein diet and the effects on health and wellbeing. The module is being designed for students to gather information on topic and determine the pros and cons of such a diet. They are to also plan a model using fruit flies to explore this topic and ways to measure health and wellbeing. A number of activities are presented to the students to use and modify to their liking. Students are encouraged to research the literature in the use of fruit flies for effects on diet and construct novel approaches to carry out various experimental designs for statistical analysis. The results of the findings are directed to ways data could be graphed and analyzed. Presentations of the findings are guided to a poster or oral presentation to classmates as well as out in the community for improving their local community health awareness. This educational project is ongoing and our preliminary undertakings will be presented. [Funded by Howard Hughes Medical Institute (#52008116) to the UK (VM Cassone, PI). Personal funds (RLC)].

24A. Olivia Sandlin

Additional Authors: Christina Bintowski, Danielle Norman, Madison Reed

Mentor(s): Douglas Harrison, Peter Mirabito

The Effects of Membrane Proteins on Spermatogenesis in Drosophila

Drosophila is a genus type of flies commonly called fruit flies. One type of Drosophila is known for having unusually long sperm for its size. The production of sperm, called Spermatogenesis, is a complicated process involving many genes. Membranes are important parts of stem cell environments as they provide structure and polarity that is a source of growth factor for the stem cells that will become sperm cells. It is possible that membrane proteins have a greater effect on spermatogenesis, but has yet to be definitively proven. GAL4 turns on the RNAi gene which affects the expression of a designated gene. The specific GAL4 used in this experiment targeted somatic cells. At certain temperatures, GAL80 will stop GAL4 from allowing RNAi to be produced. At higher temperatures, GAL80 will stop working and GAL4 will allow RNAi to be produced. If a fly with GAL80 and GAL4 is put at a higher temperature, such as 29 degrees Celsius, GAL4 will turn on the expression of RNAi, stopping a certain gene from being produced. The goal of this research was to determine if certain genes had effects on spermatogenesis. There were eight different RNAi lines used to assess the

hypothesis. The RNAi lines used each have an effect on membrane proteins. Males from each line were bred with female virgins that contained GAL4 and GAL80 genes until males with the RNAi gene and GAL genes were determined. From that next generation, only one specific type of genotype was tested. The wanted males were put at a temperature of 29 degrees Celsius to allow the RNAi line to be expressed. The males were dissected and acridine orange and phalloidin stains were used to test if there were any normal cystic bulges and to count the number of ICs in the mutant males. The shape of the bulges and the location of the ICs determine whether or not spermatogenesis is occurring normally. The first results show that there is no significant difference in the flies with the eight RNAi lines. Further results will be presented. It is expected that the results will show which genes do or do not have an effect on spermatogenesis.

24B. Tiffany Seale

Mentor(s): Philip Crowley

Sequential Decisions in the Nesting Game: Trade-offs, Conflict, and Infanticide

Conflict between members of the same family occurs in many organisms. For many of these organism's substantial parental care is required by each offspring, limiting the ability of the parents to invest in their other offspring. This increases parental involvement in family dynamics and potentially exacerbates conflict. The goal of this study is observe house sparrows to better understand the sequence of decisions made by parents and nestlings and how these decisions culminate in an expected number of offspring fledged, as well as to test qualitative predictions about the relationship between environmental conditions and family dynamics. Decisions made during breeding by each parent and any resulting offspring can be sequenced and therefore fit the conditions for a game theoretical model called an extended form game. In this simple model, the "Nesting Game," in an environmental context that features intrusion rate, predation risk, and food available, the total parental effort per parent is fixed, enabling the inclusion of features common in nature but poorly represented in other theoretical analyses. This allows investigation of two key parental trade-offs: provisioning-defense trade-off, and present-future reproductive trade-off. In cases of the provisioning-defense trade off studied, except ineffective policing of fights between siblings and attacks by non-family members, infanticide seems to be decided in the interests of the parents (filicide), though a sib may be executioner. In cases of the present-future reproductive trade-off, while males looking for provisions away from the nest, they also pursue extra-pair copulations(EPC). This creates conflicts between parents, but not generally over extra-pair paternity, more likely over the distribution of effort between defense and provisioning. This can result in "dwindling." It was concluded that a dynamic programming model could better address the sequence of events associated with seasonal patterns of food availability that may culminate in thriving or dwindling or siblicide.

24C. Riley Shumard

Additional Authors: Meaghan Melody, Andrea Cooper, Priscilla Boachie, Krystina Monticello, Emma Higgins, Micaiah McNabb, Brendon Stockwell, Meaghan LaBarre, Amanda Ho, Carly Boone, Alexa Larson, Tristan Donovan, Tori Hickey, Hunter Garrigus,

Mentor(s): Robin Cooper

The Dependence on Nerve Evoked Conditions in Relation to the Occurrence of Spontaneous Quantal Events at Drosophila Neuromuscular Junctions

When an electrical signal reaches a nerve terminal for inducing synaptic transmission, normally voltage-gated Ca2+ channels open which results in synaptic vesicles fusing to the presynaptic membrane. This allows for the release of transmitters inducing a postsynaptic response. In the absence of evoked vesicle fusion, vesicles will also spontaneous fuse which appears to be a random occurrence of events. These spontaneous events are generally assumed to be due to a single vesicular event when they occur at a low frequency. We set out to examine if the occurrence of spontaneous events after a series of evoked stimulations is correlated to the frequency and duration of a stimulus train. Short-term facilitation (STF) at the neuromuscular junctions (NMJ) of the frog, crustacean and larval Drosophila is due to residual Ca2+ in the nerve terminal by the time a subsequent evoked stimuli arrives. So, we predicted then this residual Ca2+ should also affect the frequency in occurrences of spontaneous events. However, if evoked release from high efficacy synapses resulted in evoked depression then maybe the limiting factor is the number of readily release vesicles to sense residual Ca2+. Thus, a lower frequency in occurrences of spontaneous events would occur depending on the degree of the evoked synaptic depression. The frequency in occurrences of spontaneous events may also be independent on the evoked events if the vesicles which give rise to the evoked and spontaneous events are independent of each other. These are the topics we are addressing as a class in analyzing the frequency in occurrences of spontaneous events with differing stimulating conditions using the Drosophila NMJ. credited courses around the nation and worldwide. [Funded by KY Sci. and Eng. FDN; RLC, Howard Hughes Medical Institute (Grant #52008116) awarded to the University of Kentucky (VM Cassone, PI)].

25A. Eashwar Somasundaram

Additional Authors: Aya Omar

Mentor(s): Robin Cooper

Activity-Dependent Modulation of Somatosensory Processing in Drosophila Melanogaster: Behavior, Development, and Sensory-Motor Circuit Physiology

The ability of an animal to respond to a variety of sensory stimuli is crucial to its survival. An understanding of sensory processing is only beginning to be fully grasped. The model organism, Drosophila melanogaster is a useful model in studying sensory processing due to its relatively simple, yet functionally complex nervous system. Its peripheral nervous system is made up of distinct subsets of sensory neurons. One such subset is the Class IV multidendritic (md) sensory neurons, which are known to be integral in mediating response to noxious stimuli, including tactile touch. Here, we have utilized a thermogenetic and optogenetic approach to alter the activity of this subset of sensory neurons and observed the acute, activity-dependent modulation of response to tactile touch. Preliminary results have shown that silencing and activation of this subset of sensory

neuronal activity diminished motor response to the touch stimulus; suggesting this subset is necessary in mediating response to a noxious mechanical touch. Acute observations set the stage for longer term, developmental studies in which the activity of this subset of neurons will be chronically altered throughout embryonic and larval development. The activity-dependent formation of this neural circuit will be assessed by a combined behavioral and electrophysiological approach whereby the efficacy of communication within this circuit may be assessed. This work allows for the investigation of the role of activity in formation of a defined sensorimotor circuit and enhancement in understanding of somatosensory processing that can be translated to additional models.

25B. Rachel Stevenson

Additional Authors: Habiba Ahmed, Ruth Brown, Sydney Vestal

Mentor(s): Peter Mirabito, Doug Harrison

The Role of Ligands and Signaling Proteins in Drosophila Spermiogenesis

The process of spermatogenesis can be analyzed effectively through use of Drosophila as a model organism. Stem cells first undergo mitotic division and then meiotic division (becoming spermatid bundles) encapsulated by cyst cells that direct the processes through the JAK/STAT pathway. The spermatid bundles then go through the process of individualization. During individualization, actin cones situated at the head of a spermatid bundle move towards the tail, pushing cytoplasm out from interconnected sperm and allowing membranes to sheath individual sperm cells, also creating bags of cytoplasm called cystic bulges that eventually pinch off at the end (waste bags). The goal of this project is to determine if selected candidate genes involved in the coding of various ligand/signaling proteins are required in the Drosophila cyst cell for individualization (complete spermiogenesis) to occur. To test the role of these genes in the spermiogenesis process, their activity was inhibited and the effect of their inhibition on individualization in spermatids was analyzed. Several Drosophila crosses were set up to create knockdowns for each candidate gene. Next, desired progeny flies were identified and underwent testes dissection. Acridine orange staining (recognizing the presence of cystic bulges) and phalloidin staining (recognizing the presence of actin cones) were performed on the selected testes and finally, the testes were examined for spermiogenesis defects (specifically indicating lack of individualization). Preliminary results from analysis indicates that most candidate genes involved in ligand/signaling proteins did not affect spermatogenesis (individualization continued to occur). However, analysis of results from a few genes indicated that individualization was inhibited. We anticipate that the outcome of these experiments will inform us about the role of specific candidate genes (involved in coding of ligands/signaling proteins) in the process of spermatogenesis.

25C. Austin Taylor

Mentor(s): Jakub Famulski

Extracellular Matrix Remodeling of the Optic Fissure in Pax2 Zebrafish

Extracellular matrix (ECM) remodeling and epithelial sheet fusion occur during development of many different tissues, including the vertebrate eye. During morphogenesis of the eye, the ventral hemisphere of the developing retinal tissue forms an opening called the optic fissure which must undergo epithelial fusion. Failure of optic fissure fusion leads to a congenital blinding disorder called coloboma. A long standing question pertaining to the mechanism of optic fissure fusion is exactly which ECM remodeling enzymes are actively involved? To answer this question a gene expression screen using zebrafish embryos was undertaken. This screen identified ADAMts6, MMP 9, and MMP 24 matrix metalloproteinases to be expressed in the optic fissure during its fusion. To determine any functional contribution these enzymes may have in fissure fusion the characterization of their expression in a zebrafish mutant line was used to model coloboma, Pax2noi. Using RNA in situ hybridization the expression of MMP 9, MMP 24, and ADAMts6 was compared between wildtype and Pax2 mutant embryos at 24, 32, and 48 hours post fertilization (hpf). Preliminary results indicate that expression of MMP 9 and MMP 24 is reduced in Pax2 mutant embryos, while ADAMts6 expression appears unaffected by loss of Pax2 function. These findings suggest that failure of epithelial fusion in the optic fissure may result from the misregulation of ECM remodeling enzymes MMP 9 and MMP 24. Future work will focus on examining fissure fusion in response to gain and loss of function of MMP 9 and MMP 24 using mRNA overexpression and CRISPR/Cas9 mutagenesis, respectively.

26A. Hannah Thompson

Additional Authors: Justin Buck, Anusha Gollamudi, Bailey Hiles, Chandler Albright, Christina Fallis, Eddie Morrison, Jacqueline Kowalke, Lauren Seeger, Mary Beth Begley, Natalie Gurnett, Scotty Farmer, Shaddys Gamble, Zachary Fleming

Mentor(s): Randall S Voss

Geldanamycin Inhibition of Axolotl Tail Regeneration: Microarray Analysis Implicates a HSP90-TGFß Signaling Mechanism

Axolotls are important biomedical research models because they can regenerate whole organs, including their limbs and tail. We performed experiments to determine the effects of a recently isolated geladanamycin (GDM) compound on axolotl tail regeneration. GDMs inhibit the ability of heat shock protein 90 (HSP90) to properly fold proteins with diverse functions, including cell cycle control and cell signaling. First, we administered tail amputations and treated axolotls with 1 µM GDM to demonstrate GDM inhibition of tail regeneration. Next, we administered amputations to 64 axolotls and treated half with 1 µM GDM and 0.01% DMSO, and the other half with 0.01% DMSO. Distal-tail tips were collected 24 hours post amputation (HPA) and pooled to form 4 GDM and 4 control samples for RNA isolation. RNA samples were analyzed by microarray analysis to identify differently expressed genes using statistical t-test (p < 0.001) and FC (>1.5 difference) criteria. A total of 69 genes were more highly expressed in GDM treated axolotls, including hsp90aa1 and other endoplasmic reticulum stress response genes that significantly enriched the protein-folding Gene Ontology (GO) term. Muscle GO terms were enriched with genes showing higher expression in GDM-treated axolotls. In contrast, 107 genes were more highly expressed in control axolotls.

These genes significantly enriched extracellular matrix and developmental process GO terms, and included target genes of TGFß signaling. Indeed, 56 of these genes showed a highly correlated (r=0.84) 24 HPA expression pattern in an earlier microarray experiment that used SB505124 to inhibit TGFß signaling (r=0.84). In conclusion, GDM inhibits axolotl tail regeneration and alters the transcription of ER stress response genes, genes expressed in differentiated muscle cells, and target genes of TGF signaling. Inhibition of tail regeneration may reflect GDM disruption of a novel HSP90-TGFß signaling mechanism that regulates early regeneration processes.

26B. Olivia Utley

Mentor(s): David Westneat

Hungry Hungry House Sparrows: Communicating Need in Passer domesticus

Parental care is a key component of behavior in altricial birds and contributes to the fitness of parents as it affects the survival and quality of offspring. A common form of care is the provisioning of food to offspring. Previous studies have suggested that offspring do not passively accept resources, but actively enhance their own fitness by communicating their needs to parents. Many forms of communication are apparent, however the focal form of communication in recent research has been the vocalized begging by offspring. Multiple models have attempted to explain the ways in which offspring communicate their needs to parents through begging including the Honest Signaling Model, which suggests that begging intensity directly reflects need, and the Scramble Begging Model, which suggests that competitive ability also plays a role in begging. In previous research we have worked to understand some of the more basic assumptions of these models by examining factors that influence begging and how begging influences parental behavior. We found that hunger did affect the intensity of offspring begging, but so too did the number of nestlings and nestling age. We manipulated the hunger of nestlings in a controlled environment and determined the effects on parent behavior after the manipulation. The results will help us to understand what drives offspring to beg and how parents respond to these signals.

26C. Madison Von Deylen

Additional Authors: Anjali Patel

Mentor(s): Phil Crowley

The Effects of Sexual Orientation on Male Olfactory Sensitivity to Cryptic Ovulation

This project investigated the correlation between male sexual identity and olfactory perception of female cryptic ovulation. This could indicate if a biological ability to identify fertility in a mate is linked to sexual identity and build an understanding of underlying biological indicators of sexuality. The study will identify either supportive or non-supportive evidence for a connection between sexuality and the ability to identify viable reproductive partners. The information gained from this research could help identify if a specific population of males which have a special ability to identify fertile females consistently. If those who identify as homosexual are at a disadvantage in fathering children in a traditional manner because of a lack of this olfactory ability, then this could offer support for gay couples seeking to adopt. If straight males do show a

significant advantage in sensing cryptic ovulation, then that group can be identified as target subjects in research looking at how males developed this capability.

27A. Alexandra Weber

Mentor(s): Jiffin Paulose, Vincent Cassone

Screening for Genes in E. aerogenes Affected by Melatonin

Prior research in the Cassone lab found that the microbe E. aerogenes, found in the gastrointestinal system, exhibits a circadian rhythm when in the presence of melatonin, a hormone that controls the Circadian rhythm. Because both melatonin and E. aerogenes are found in the gastrointestinal system in humans we hypothesize that the body has a way of communicating with its microbiome. This experiment is meant to find which genes of E. aerogenes are reacting to melatonin, by randomly inserting a transposon, or jumping gene, into the genome and screening for mutants that express altered characteristics from the wild type when plated on plates containing melatonin. Mutants were screened for swarming differently than the wildtype, larger and smaller areas. By looking at which genes of the bacteria that exhibit these altered behaviors in the presence of melatonin are mutated, the hope is to understand how a body can communicate with its own microbiome.

27B. Robert Wendroth

Mentor(s): Julie Pendergast

Period2 is not Required for Circadian Timekeeping by the Food-Entrainable Oscillator

Mammals coordinate their behavior to environmental cues such as cycles of light/dark and food availability. These ~24-hour circadian rhythms of behavior are controlled by internal clocks. The central pacemaker in the suprachiasmatic nucleus (SCN) of the hypothalamus synchronizes behavior with the light-dark cycle. The SCN keeps time due to rhythmic expression of genes, including Period2. There is another pacemaker, known as the food-entrainable oscillator (FEO), which synchronizes behavior to food availability. The measurable primary output of the FEO is food anticipatory activity (FAA), which is an increase in locomotor activity prior to food availability that is restricted to a certain time of day. FAA may be critical since animals that anticipate food availability are more likely to survive. Previous studies shown that Period2 knockout mice lack FAA, suggesting that this gene is required for timekeeping by the FEO. In this experiment, I determined if the FEO is functional in Period2 knockout mice. Our lab has developed optimal conditions for measuring FAA in mice. Male and female mPer2Brdm1-/- mice, which lack Period2 mRNA and protein, and wild-type littermates were single-housed in light-tight boxes in 12L:12D and fed for 4 hours during the daytime. I measured activity using a running-wheel. Period2 knockout (13 of 17 mice) and wild-type control (12 of 12 mice) mice demonstrated robust FAA during restricted feeding. I next fasted mice for 48 hours to measure the persistence of the rhythm in the absence of the food cue. Period2 knockout mice, like wild-types, had FAA during fasting. Since FEO timekeeping persisted through the period of fasting, the FEO in Period2 knockout mice is self-sustained. These results demonstrate that the Period2 gene is not necessary for timekeeping by the FEO. In addition, the FEO may have a separate molecular timekeeping mechanism from the SCN.

27C. Destiny Williams

Additional Authors: Katelynn Krick, Hailey Tao

Mentor(s): Melody Danley

Measuring Heart Rate and Oxygen Consumption Rates of Red Swamp Crayfish

Red swamp crayfish (Procambarus clarkii) increase activity when searching for a burrow site, and during construction of a new burrow. Past research has indicated that crayfish may begin burrow construction in several different areas before settling on a single location. It is unclear why crayfish show such behavior, as partially constructing many different burrows would seem energetically disadvantageous. Currently, research is lacking regarding the metabolic costs associated with these activities. Since burrow site exploration and construction requires increased activity, we predicted that crayfish heart rate and oxygen consumption rates would increase during burrow site exploration and construction, compared to periods of rest. In the current experiment, adult crayfish were observed during 24-hour periods to determine changes in heart rate and oxygen consumption rate associated with burrowing. Heart rate was monitored using ECG wires implanted over the cardiac region, and oxygen consumption was measured in a flow-through respirometry chamber. Although data is still being analyzed, we anticipate results will show increased heart rates and oxygen consumption rates during burrowing, reflecting an increased energetic cost associated with each type of activity.

28A. Lauren Williams

Mentor(s): Julie Pendergast

Effects of Altering the Microbiome on Diet-Induced Obesity and Daily Rhythms

Circadian rhythms are physiological internal timekeeping mechanisms that oscillate on a roughly 24 hour cycle, and can be entrained to the environment by external cues. Recent studies suggest intestinal microbiota exhibits oscillations that are influenced by feeding rhythms, leading to time-specific compositional and functional profiles of the gut bacteria over a 24 hour period. It has been shown that adjusting the microbiome in mice and humans can block diet-induced obesity. From a circadian biology perspective, we know that eating a high fat diet also causes arrhythmic eating behavior in male mice. In this study, we aim to investigate a circadian-dependent mechanism for obesity onset by determining if daily rhythms are altered in mice with minimal microbiota. At 7 weeks old, C57BL/6J male mice were single-housed in light-tight boxes in 12L:12D and given an antibiotic cocktail and LFD (10% kcal fat) for 1 week. The purpose of the cocktail is to significantly decrease the diversity of gut bacteria. One week later, by random assignment, control mice were given the same LFD while the experimental group was given HFD (45% kcal fat). The antibiotics were also removed and all mice were given autoclaved water. To investigate metabolism, body mass and food intake were measured weekly. I found that mice with an altered microbiome (antibiotic-treated) did not exhibit diet-induced obesity. Daily rhythms of activity and eating behavior were also recorded. Mice on LFD exhibited well-defined activity rhythms during feeding, and rhythms of HFD mice, although less robust, were still significant. LFD mice exhibited normal eating behavior rhythms. Some HFD mice with antibiotic treatment showed eating rhythms that were protected from disruption by HFD. With future analysis, it could be determined that alteration of microbial diversity influences the circadian rhythms of metabolic organs, providing a more detailed examination of the body's susceptibility to obesity.

28B. Kaili Ajim

Mentor(s): Douglas Andres, Sajad Mir

RIT2 Protects Retinal Ganglion Cells from Toll-Like Receptor 9 Mediated Cell Death

Toll-like receptor 9 (TLR9) mediated neuronal death is well known. However, the exact nature of such cell death in the retinal ganglion cell (RGC) death has not been characterized. RIT2 is a small GTPase of Ras family and is particularly expressed in the central and peripheral neurons. In order to understand the role of RIT2 in TLR9 mediated cell death in RGCs, the primary RGCs from the RIT2 WT and KO mouse pups were cultured until the maturity. At maturity (Div 15), the RGCs from the both groups were stimulated with either control TLR ligand or ODN1826 (TLR9 agonist, 1μM) for 48 hours followed by cell fixing. Next, the TUNEL staining (to identify the dead RGCs) was performed in all the groups. Using Image J based cell counting tool, the dead vs. live RGCs were quantified in all the groups. While the result showed 8% cell death at the baseline in all the groups, the cell death in the RIT2 WT RGCs was quantified to be 3.56% higher than the RIT2 KO. This result suggests that RIT2 might have a role in TLR9 mediated neuronal death. Keywords: RGC, TLR9, Neuronal Death, TUNEL.

28C. Thomas Owen

Mentor(s): Karla Lightfield

Visitor Sanitation at the University of Kentucky Albert B. Chandler Hospital Cafeteria

Every day hospitals are occupied by thousands of patients, employees, and visitors. Because of this, hospitals face a great challenge of putting forth systematic efforts to protect the health of every person to enter the facilities. Places such as operating rooms and patients' rooms that pose risks for hospital acquired infections (HAIs), have seen great changes to reduce the risk to patients over the past years according to the Center for Disease Control and Prevention. However, places not directly associated with patient care are often overlooked during efforts to improve. Hospital cafeterias are a place where everyone from staff to visitors frequent, and inherently where a vector for entry into the body exists for pathogens. When hands are not cleaned before a meal, pathogens can secure entry into the body where the immune system must then protect the body. The purpose of this research was to explore the current sanitation compliance rate at the UK Chandler Hospital Cafeteria, and to pursue ways to improve sanitation compliance through improving availability and convenience for visitors. By improving the compliance level, this vector for entry into the body could be minimalized. Currently, the cafeteria possesses one wall mounted sanitizing alcohol dispenser located outside of the entrance and the closest restrooms for hand washing are over 50ft away. The distance to the nearest restroom presents an inconvenience to those trying to rapidly secure their meal. On the contrary, the sanitizing alcohol dispenser is much more convenient. However, it is placed in an inconspicuous location. These factors have led to a sanitation compliance rate of 1.68% (n=3097 people). This experiment explores the efficacy of alternate sanitation opportunities to improve the sheer percentage of use by cafeteria visitors, as well as exploring ways to improve the quality of sanitation in which visitors can partake.

29A. Pooja Parikh

Additional Authors: Mackenzie Gibson

Mentor(s): Yang Jiang

The Effects Yoga and Meditation on Brainwaves

Pooja Parikh and Mackenzie Gibson BIO 199 Section 017 Dr. Yang Jiang Presentation of Research Abstract The Effects Yoga and Meditation on Brainwaves Abstract Alzheimer's disease (AD) is an old-age dementia associated with loss of short-term, ultimately, long term memory due to plagues and tangles developed in the brain. This has been seen most commonly in older adults above the age of 65 years. Although there is no cure to AD currently, recent research has begun to search effective preventions behind different factors that trigger the formation. The objective of the current study is to explore potential factors that slow-down the onset of AD by "mindfulness" training. We hypothesize that mindfulness training, meditation and yoga, change brainwaves critically to cognitive functions including attention and working memory. Mindfulness includes less rigorous recreational activities, e.g. yoga and meditation. We will investigate effects of yoga and meditation on human brains by recording electroencephalogram (EEG) associated with states of mindfulness. Additionally, a series of neuropsychological tests, using Psychology Experiment Building Language (PEBL) will also be conducted on human subjects during both states. As protocol development, we will record from each of four human subjects to practice meditation (A) and yoga (B) using ABBA experimental design. For subjects that will be made to practice 2-5 minutes of meditation, will be tested using an EEG immediately. This was we will be able to measure the difference in brain activity of people from the resting state. The group practicing yoga will also practice yoga for 10 minutes and immediately, thereafter, be tested with an EEG. The control group- the subjects that will practice neither will also be tested along with the group that practiced both. The averaged EEGs during each mindfulness conditions will be compared. The results of the study will aid future studies with larger statistical samples.

29B. Evan Blanford

Mentor(s): Phil Crowley

How Does the Trade-Off Between Survival And Reproduction Behaviors Change Based on Food Availability?

All organisms routinely make decisions that lead to behavioral tradeoffs. Females and males experience different trade-offs; specifically, females face a strong tradeoff between survival and reproduction. The strength of this trade-off may depend on a female's mating status and food availability. Death-feigning (time spent mimicking the appearance of being dead in order to increase survival in the presence of a predator) and distance traveled in search of oviposition sites (time spent moving in search of a location to deposit eggs) provide an excellent example of a behavioral trade-off; females that spend more time death-feigning will spend less time moving in search of mates and oviposition sites. In insects, the strength of the survival-reproduction trade-off is altered by nuptial gifts (nutrient abundant gifts transferred from male to female during copulation), whereby re-mating in food-limited environments is a priority for females even if with previously mated males that have a reduced nuptial gift. We studied a seed beetle (Callosobruchus maculatus), that exhibits death-feigning in response to a simulated predator stimulus and the males provide females with nuptial gifts, the nuptial gift decreasing with each copulation event. I hypothesized that the trade-off between survival and reproduction will depend on the size of the nuptial gift and food availability. Specifically, I

predicted that virgin females with no food supplement (but water on a cotton stick) will spend more time death feigning and less time in search of oviposition sites compared to females mated with virgin males (full nuptial gift) and no food supplement (besides water on a cotton stick). I also predict that virgin females with a food supplement (10% sucrose solution on cotton stick) will spend more time death feigning and less time ins search of oviposition sites compared to females mated with virgin males and given food supplement (sugar water). To quantify search movements, we placed females in the first of a series of connected petri dishes filled with cowpea beans (Vigna unguiculata). To quantify death-feigning we simulated a predator stimulus and recorded reactions after isolating beetles before emergence to ensure virginity, performed copulations 24 hrs after emergence on the same day as the behavioral measurements. I found that virgin females spent more time death feigning and less time in search of oviposition sites compared to non-virgin females. I also found that virgin females without a food source spent less time death feigning compared to virgin females with a food source. Our results indicate that female behavior does reflect a trade off between reproduction and survival, and this trade off differs based on food availability, obtained through either nuptial gifts or the environment. Experimenting with further female behaviors may provide deeper insight into the complex relationship between survival and reproduction.

Chemistry

29C. Corrine Elliott

Mentor(s): Susan Odom, Chad Risko

Steric Manipulation of Electrochemical Potentials in Conjugated Organic Molecules

Many of the electrochemical energy-storage systems under consideration for large-scale power storage and allocation rely on stable electroactive materials to shuttle and/or store charge. Here we seek to design a new class of organic compounds, based on the electroactive molecule phenothiazine, for use as (a) redox-shuttle additives to mitigate excess charge in overcharging lithium-ion batteries, and (b) catholyte materials for use in redox flow batteries. This presentation will include the results of density functional theory calculations that are used to model the physicochemical effects of substituent identity and placement on phenothiazine by introducing electron-donating and/or -withdrawing substituents at strategic positions around the heterocyclic core. Substituent crowding is shown to effect changes in oxidation potential at odds with those anticipated from Hammett constants, as well as changes in energetically optimal conformations, consistent with more-restricted relaxation pathways afforded by the additional steric strain. A subset of the compounds under consideration were subsequently selected for synthesis and electrochemical analysis. The results of this testing suggest that, unlike prior methods of increasing oxidation potentials using electron-withdrawing groups, strategic placement of substituents can be exploited to raise oxidation potentials without raising reduction potentials, thereby preventing access to reduction decomposition pathways. The results of this analysis reveal strategies for designing and tuning the properties of new electroactive compounds for energy-storage applications and beyond.

30A. Zachary Griffith

Mentor(s): Anne-Frances Miller, John Hoben

Comparison of Substrate Binding to a Hyperthermophilic vs. a Mesophilic Flavoenzyme

Understanding the intricacies of enzymes and their interactions with their substrates and cofactors is an integral part of many mechanistic studies, opening the possibility of manipulating the enzyme or its environment to cause desired outcomes. In this study, the focus was on a class of enzymes called flavoenzymes. Flavoenzymes make use of a flavin-based cofactor, for example flavin adenine dinucleotide (FAD) or flavin mononucleotide (FMN), to effect redox reactions central to energy metabolism and respiration. Flavin cofactors facilitate two- or one-electron redox chemistry due to their highly conjugated structure. The same electronic structure also makes flavins fluorescent and responsive to binding of pi-conjugated substrate analogues. It was hypothesized that the analogues able to donate electrons could quench flavin fluorescence by charge transfer and that this would provide insight into the cofactor's capacity for single electron acceptance. As can be expected, protein dynamics can play a major role in how substrates interact with the active site flavin upon binding. Using fluorescence emission analysis, binding with a shared substrate analogue (n-Phenylanthranillic acid) was compared for two flavoenzymes (Thermus thermophilus NADH Oxidase and Enterobacter cloacae Nitroreductase), over a range of temperatures to determine whether the two enzymes experienced different dynamics modulated by temperature, given that one enzyme derives from a hyperthermophile whereas the second derives from a mesophile.

30B. Angela Hinchie

Mentor(s): Peter Kekenes-Huskey

Computational Modeling of Ryanodine Receptor Calcium Flux

A Ryanodine receptor is a calcium dependent receptor located on the sarcoplasmic reticulum that allows calcium to flow into the sarcoplasmic reticulum. This project used computational methods to study the flux of calcium into the sarcoplasmic reticulum via this receptor. The computational model was based off of a four state model described by Shannon Bers 2004. Both an Ordinary Differential Equation (ODE) model and a Gillespie probability model were utilized. The ODE showed that the receptors has a sharp increase in calcium flux in the first few milliseconds before dropping to a steady state. The Gillespie model showed the same pattern, but also accounted for the relative number of Ryanodine receptors present. The level of calcium entering the cell depended directly on the number of receptors. Higher numbers of receptors also led to a shorter overall maximum flux time.

30C. Braxton McFarland

Mentor(s): Christopher Crawford, Bradley Irvin

Electroless Plating of Plastics

Electroless copper plating is a process similar to plating from a galvanic cell, but does not require an external energy source. The auto catalytic reaction occurs in a plating bath and results in a metal layer plated on top of a substrate. A plating bath is comprised of a reducing agent, complexant, stabilizer and ion source. The electroless method often involves plating metal onto other metal substrates, but also has the capability of plating metal layers on to plastics. We have determined an effective electroless plating process using nonmagnetic materials suitable for an electromagnetic coil as a 3-d printed circuit.

31A. Urooj Nasim

Additional Authors: Katherine Cotter, Danielle Berkowitz

Mentor(s): Stephen Testa

The Effects of Small Molecules on DNA Duplex Stability as Determined Using UV/Vis Spectroscopy

DNA duplex stability refers to the extent to which the two strands of DNA are able to be separated from each other by breaking the hydrogen bonds that connect base pairs. When some small molecules bind to DNA, they can have the effect of increasing or decreasing stability: making it more difficult for the strands to separate or making it easier. As expression of genes relies on the transcription machinery being able to access those regions in DNA, altering DNA duplex stability can affect the ability of cells to express different proteins and thus carry out different functions. This is the underlying mechanism behind several cancer drugs, such as Platinol (Cisplatin), Alkeran (Melphalan), and Cytoxan (Cyclophosphamide). These molecules target DNA duplex, reacting in a way that breaks the strands apart, leaving them unable to be used for DNA replication. The purpose of this project was to choose untested small molecules and analyze their effects on DNA duplex stability. The molecules chosen were dimethyl sulfoxide (DMSO), arsenic trioxide, potassium sorbate, sodium metabisulfite, hydrogen peroxide, and glutathione. Effects on DNA duplex stability were determined using UV/VIS spectroscopy to generate sigmoidal melting curves for DNA solutions over a temperature interval of 18-70 degrees Celsius at a wavelength of 260 nanometers. Comparing the sigmoidal curves of the absorbances of small molecule solutions to a DNA-only control reflects the interaction between DNA and the small molecules. If the melting temperature—the temperature at which the DNA strands separate—increases with the addition of a small molecule, then the small molecule increases DNA duplex stability; if the temperature decreases with the addition of a small molecule, then the small molecule decreases DNA duplex stability. The applications of ascertaining the effects of new small molecules on duplex stability range from augmenting understanding biological processes to developing future medications.

31B. Leona Nease

Mentor(s): Edith Glazer

Determining the Structure Activity Relationship of Ruthenium Based Compounds as Potential Chemotherapeutics.

Cancer is currently the second leading cause of death worldwide, with over 1.6 million people diagnosed this year in the US alone. A large majority of current treatment regimens include platinum-based drugs such as cisplatin, carboplatin and oxaliplatin. Unfortunately, there are several drawbacks to this class of compounds such as lack of potency, systemic toxicity, neurotoxicity and the tumors' ability to build resistance to the drugs. In an effort to solve these issues, we are exploring a new class of metal-based compounds where ruthenium(II) is used to coordinate derivatives of quinolone ligands, creating a three-dimensional structure to serve as a potential chemotherapeutic agent. Hydroxyquinoline compounds have been shown to have a wide variety of anti-cancer mechanisms, including inhibiting protein kinases, telomerase, and many more pathways. When coordinated to ruthenium, these ligands have been shown to produce a dramatic increase in cell cytotoxicity. For example, in the HL60 leukemic cell line, the EC50 value of a particular ligand improved from 4.09 μM for the ligand alone to 0.054 μM for the coordinated compound: a 75-fold change. I have researched the cell cytotoxicity along with effects on protein production of these compounds in order to determine a structure activity relationship between them. Knowing the structure activity relationship of compounds can help scientists to develop more effective and efficient anti-cancer agents.

31C. Nicholas Telesz

Mentor(s): Chad Risko

Understanding the Impact of Polymorphism on the Electronic Characteristics of Naphthalene Tetracarboxylic Diimide Derivates

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 make use of density functional theory methods to investigate the structural and electronic properties of naphthalene tetracarboxylic diimide (NTCDI) polymorphs. The properties in question include intermolecular electronic couplings, electronic band structures, effective masses, and cohesive energies. The results of these calculations will aid in an improved understanding of what applications these materials will be best suited for, provide data as to which derivate performs the best, and give theoretical insight into why the materials behave the way they do experimentally.

32A. Caroline Thornbury

Additional Authors: James Apo, Alexander Scherschel, Sydney Hineline, Cassady Pelphrey, Leah Ramsaran, Taylor Fee, Shannon Whitmer, Ansley Grigsby

Mentor(s): David Atwood

Honey Bees and Pesticides

Honey bees produce three cosmetically and nutritionally valuable biological products: honey, beeswax, and propolis. Pesticides are biologically harmful substances used in agriculture that target unwanted pests, bacteria, and fungi. As pollinators, bees come in contact with pesticides and internalize them. As a result, pesticides are a suspected factor in the Colony Collapse Disorder (CCD), a phenomenon described by the disappearance of a significant number of bees and bee hives. This research explores pesticide residues found in commercially available honey as an avenue to understand more about the confluence of honey bees, pesticides, and honey. Analyses were conducted using the QuEChERS multi-residue extraction method to isolate pesticides that may be found in honey, followed by gas chromatography mass spectroscopy. Pesticide residues found in honey raise concerns for not only the honey bees themselves, but the agricultural crops they pollinate and those who consume honey bee products.

Chinese

32B. Rachel Lietzow

Mentor(s): Liang Luo

Cultural Divergences in Chinese Ancient Folklore: The Legend of the White Snake in 1960s Cantonese and Huangmei Opera

Since ancient times, Chinese folklore has been ingrained in its culture and history. One such tale is the Legend of the White Snake (Baishezhuan 白蛇传). This tale has long captured the Chinese audience through traditional Chinese opera, even today. In the 1960s rendition, two female snake spirits, White Snake and Green Snake, spiritually cultivate for centuries. After reaching enlightenment, they assume human form and visit the mortal world. They meet Xu Xian, a man who had rescued White Snake many reincarnations prior. White Snake falls in love with Xu Xian. Soon after they marry, she is pregnant with a son. A Buddhist monk, Fa Hai, attempts to separate the couple, deeming the relationship wicked. After the two snake spirits battle the monk, White Snake is subdued by a Buddhist alms bowl. White Snake is imprisoned beneath the Leifeng Pagoda until her grown son receives pity from the immortals for his undying filial piety. The White Snake Legend's shapeshifting nature has facilitated different regions in China to offer unique renditions. This study examines the differing characteristics of White Snake opera renditions, focusing on the divergences between Cantonese and Huangmei Opera. Upon viewing and translating 1960s Chinese operas, such as Shilinjita (仕林祭塔), Duanqiaochanzi (斷橋產子), and Baishezhuan (白蛇傳), the research demonstrates that while Huangmei Opera's speaking and singing share a semi-formal style, Cantonese Opera has two contrasting forms of dialogue: colloquial speaking and singing that resembles classical Chinese poetry. Huangmei Opera singers also wear understated costumes to represent Chinese peasants, unlike the silk attire commonly worn in

Cantonese Opera indicating wealth. These differences, among many others, reveal that different operas had different audiences. This project uses history of Chinese communism and culture to explain said disparities.

Communication

32C. Caitlyn Barnes

Mentor(s): Kimberly Stoltzfus

Self-Disclosure on Computer Mediated Communications and the Affect on Romantic Relationships

The purpose of this study is to examine self-disclosure on computer-mediated communications and the affect on romantic relationships. The proposed study is of value because the effect on romantic relationships concerning self-disclosing information on computer-mediated communication has not been studied yet. This is important to study because the use of computer-mediated communication is on the rise in our society. It is important to understand if self-disclosing on computer-mediated communications has an impact on romantic relationships. To study these relationships a survey will be sent to college students (18-25) which will identify if they are in or have been in a romantic relationship. Respondents will then be asked a series of questions regarding self-disclosure on computer-mediated communication. The results of this study can be used to decipher if self-disclosing on computer-mediated communications affects romantic relationships among college students. The anticipated outcome of this research is that self-disclosing on computer-mediated communication will have a negative impact on romantic relationships among college students. The findings may be useful to highlight the importance of computer-mediated communications and the effect it has in the lives of those who use it.

33A. Jennifer Branscum

Mentor(s): Kimberly Stotlsfuz

Doctor and Patient Communication Satisfaction With Wearable Technology

The purpose of this research is to find out how healthcare communication between patients and doctors are affected by wearable technologies. This survey will ask participants who have these technologies (FitBit, Jawbone, etc.) about how they use the information to communicate with their physicians, and to determine if they are satisfied with the communication. This could be important in the future because patients with this autonomy might interact with their physicians differently via use of the technology, requiring different rules and options for communication in the future.

33B. Alyssa Dimmitt

Mentor(s): Kimberly Stoltzfus

An Investigation of How Snapchat Can Negatively Affect Romantic Relationships

The purpose of this study is to analyze the relationship between Snapchat, a significantly popular social media app, and its effects on romantic relationships within the younger generations. Snapchat allows individuals to engage in a unique type of communication that disappears within 10 seconds of receiving the message. There is an increased level of privacy created with Snapchat, allowing it to have the ability to cause conflict within romantic relationships. This study uses a survey of undergraduate students to examine the power Snapchat has in relational satisfaction, uncertainty, jealousy, and security. Frequency and motives for using Snapchat are examined to analyze the prevalence within romantic relationships. We addressed the levels of jealousy within specific situations by allowing the participants to rate how strong of feelings they would have towards these situations. With the increased amount of opportunity to take part in negative relational behaviors, it was important to analyze the overall relational effects Snapchat has. The anticipated outcome of this study is that there is a significant relationship between Snapchat and feelings of uncertainty and jealousy that can lead to individuals feeling strong levels of relational dissatisfaction. Due to the lack of scientific research done on Snapchat thus far, this research provides valuable information to help researchers understand the role of Snapchat in interpersonal relationships.

33C. Kiley Kinnison

Mentor(s): Kimberly Stoltzfus

How Is Patient Satisfaction Impacted by Age

The purpose of this study was to identify whether patient satisfaction is impacted by age. Going out to a doctor requires a lot of work just to get there, and then once there the patient and provider may not be on the same page, leaving room for inconsistency. This study uses an online survey from participants ages 18-90. They are asked questions about their recent visit to a provider and whether or not it was worth their time, if they felt like the provider was engaged in the conversation, and if they would have preferred to use an alternate method (e-visit, skype, internet). Patients are then asked whether or not they have used alternate methods and how their satisfaction was. This is to see if there is a correlation between alternate methods, in-visit, and how the overall satisfaction ranks between the two. The goal is to identify, based on their age, whether the older a patient gets the need to go see a doctor is stronger, than if the patient was younger.

34A. Madalyn Klika

Additional Authors: Madalyn Klika

Mentor(s): Kimberly Stoltzfus

How do Cellphones Effect our Communication Tendencies

Throughout the past decade, cell phones have become a necessity to function in our everyday society. What we didn't realize is that over time they have also become a sense of security when we are in situations where

are not entirely comfortable. As cell phones have become a way to occupy our time they have crept into our lives as a way to avoid outward communication with the world around us. In this research, I will look at how cell phones have impacted our sense of communication apprehension and communication avoidance in public situations. It will also look at how our communication competence has been effected due to high cell-phone usage.

34B. Shawn McLuckie

Mentor(s): Dr. Kimberly Stoltzfus

Social Media Usage and Adaption Among Chinese International Students

The purpose of this study is to identify what types of social media channels are used by Chinese international students and how they are used. This study seeks to explore Chinese student experiences because they have more freedom of media choice and selection while in the U.S. As international students, media choice can be strongly related to why they use the media, including as a coping strategy for home sickness or as a means of understand and assimilating to their new American home. The reinforcing theory that guides this research is the Users and Gratifications theory, originally developed by Blumler & Katz in 1974. Data collection will be done via an online survey or printed copy distributed to Chinese international students attending an university in the Midwest part of the U.S. The contribution of this research is to expand knowledge on social media use in a new context and to potentially inform international studies research about how social media is an important tool in the assimilation process.

34C. Courtney Page

Mentor(s): Kimberly Stoltfus

Will You Accept This Relationship: Effects of Viewing The Bachelor on Dating Expectations

This study looks at how viewing The Bachelor affects dating expectations of women 18-22. With millions of viewers turning in every week to view the extravagant dates and rapidly progressing relationships, The Bachelor remains one of the most watched reality television shows, having just ended its 21st season. Since women 18-22 are relatively new to the dating world, they are still forming expectations on what they respect from dating relationships, including what dates consist of and how quickly relationships develop. As Gerbner's Cultivation Theory predicts, what you view on television can have a profound effect on what you expect from real life. Through a survey of women aged 18-22, this study looks at what women who never, rarely, or consistently watch The Bachelor expect from relationships, both in the sense of reaching milestones and how extravagant they expect dates to be in the first few months of a relationship. It is expected that the survey will reveal that women who watch the show will expect to reach milestones more quickly and that they will be more open to, if not expect, more extravagant dates than those who never or rarely tune in.

35A. Alicia Perkins

Mentor(s): Kimberly Stoltzfus

Gender Differences in Self-Disclosure Avoidance Behaviors on Snapchat

The communication technology field is rapidly growing each and every day, enabling changes to be made regarding the ways in which individuals choose to go about communicating and interacting with each other. One communication technology that has become increasingly popular amongst young adults is the use of social networking applications, such as Snapchat. Although the Snapchat application has gained recent popularity, the social networking platform and its interpersonal communication capabilities have not been heavily researched. To examine the complexities of Snapchat and how young adults are using the application for interpersonal communication purposes, this research seeks to answer the question; how do the self-disclosure avoidance behaviors of males and females differ through the use of the Snapchat? To identify the different self-disclosure avoidance behaviors that males and females employ when using Snapchat, a survey was distributed to undergraduate college students at a southeastern university through the Qualtrics program. The results of this study can be used to explain how males and females utilize self-disclosure avoidance behaviors on Snapchat, as well as the ways in which the males and females self-disclosure avoidance behaviors differ. The anticipated outcome of this study is that males will use self-disclosure avoidance behaviors on Snapchat more strategically, and more often than females do. The findings of this research may be useful to illuminate the gender differences in the self-disclosure avoidance behaviors utilized by males and females on Snapchat.

35B. Briannah Poe

Mentor(s): Kimberly Stoltzfus

Studying the Usage of Twitter for News Consumption Amongst College Students

This study explains the ways in which high levels of news consumption using a Twitter feed versus traditional news channels affects the knowledge of current events in college students. College students are a large demographic of Twitter users and frequently use it specifically for the usage of news consumption. Whether this be to initially find a news story or if it is for finding additional information, Twitter users can easily access current news stories. This study will be held with a survey of about 50 college students who will voluntarily take the survey from a link posted on social media. The students who participate will be required to take a survey to give information on their Twitter usage and then will follow the survey with a questionnaire about current events. The data found should reflect a significant difference in current event quiz scores between those who primarily use Twitter and those who use traditional methods.

35C. Tiffany Salters

Mentor(s): Kimberly Stoltzfus

Small Talk, a Big Deal: the Role of Small Talk within a Business and Organizational Context

In today's society it seems people are losing sight of the importance and art of small talk. This has the potential to affect many situations throughout a person's life, especially during their time within organizations no matter their job. This study aims to explore the true place of small talk within our culture and how it leads into communication within a business and industrial context. In order to study this concept, interpersonal relationships and communication need to be considered heavily. This specific concept is especially valuable in that small talk has been a crucial aspect of interpersonal communication throughout decades and even centuries, but it appears to be a dying art in today's millennial generation and beyond. This study will delve into the topic of small talk in order to find out if this claim of the decreasing prevalence of small talk really is true, or if small talk has instead been reverted to a new and more purposeful form for modern communication. We ask the question; to what extent do young adults perceive small talk as important or unimportant to business communication such as client relationships, coworker relationships and more? The original claim and hypothesis of this study is that small talk has decreased throughout the generations and this has negative effects on these generations in the workforce and within the business industries. This hypothesis will be tested through a survey in which participants will answer questions concerning their view on the importance of small talk. Keywords: rapport, small talk, phatic communication

36A. Hannah Schuler

Mentor(s): Kimberly Stoltzfus

Examining Health Literacy in Middle Aged Adults

The purpose of this study is to examine the effect that health literacy has on a middle aged (40-60) adults' uncertainty about their own health and the impact it has on their perceived healthiness. Health literacy is a topic that is uncommonly studied in adults that have reached middle age. It is important to study the health literacy of this age group because this is the time in life when health concerns typically start to be significant. Determining the health literacy of adults that have reached middle age will help to ensure whether people are accessing the best health information and know how to effectively use that health information. To study these relationships a survey will be sent to adults testing their health literacy and answers to questions pertaining to uncertainty and perceived health. The results of this study can be used to explain why there is uncertainty about health in this age group. The anticipated outcome of this research is that if the health literacy level is low then the uncertainty will be high and perceived health will be low. The findings may be useful to highlight the importance of health in this age group and how to address concerns about health.

36B. Miles Thompson

Mentor(s): Kimberly Stoltzfus

Does Higher Social Media Usage Contribute to Higher Levels of Communication Apprehension when Talking about Self in Professional Situations?

Over the last few years our consumption of social media has grown at an exponential rate. We use it every day in multiple ways for various reasons. To some in our generation, it is a direct source of confidence or a boost of self-esteem, giving them an outlet to be something more or better than they feel they are in real life. There is also a hesitation and difficulty that has risen in our generation in promoting themselves in professional situations. In my research, I will look at how social media usage has affected communication apprehension in professional situations.

36C. Fotis Tompoulidis

Mentor(s): Kimberly Stoltzfus

FaceTime and Self-disclosure: How College Students Choose to Self-Disclose Private Information Over Computer Mediated Communication Media

The purpose of this study is to determine if college students prefer to self-disclose more private information over FaceTime over texting and talking over the phone to romantic partners. In addition, this study will also what types of private information and how often do partners choose to self-disclose. Furthermore, this study will use ideas based off of the social penetration theory to examine how people form relationships through the breadth and depth of self-disclosure. This study will be conducted through an anonymous online survey completed by 50 college students at the University of Kentucky. The survey will be constructed in an F test format which will examine the breadth and depth of private topics each participant discloses to a romantic partner over the three computer mediated communication mediums. The results are predicted to show that college students will choose to self-disclose more private topics to a romantic partner with FaceTime over texting and voice calling. Additionally, the length of the relationship will impact the results of the study as well.

37A. Emily Wakeley

Mentor(s): Kimberly Stoltzfus

Fidelity in a Romantic Relationship When Online Temptations Arise

Previous research on social media behavior has examined cognitive dissonance and infidelity in a romantic relationship typically finding that people follow through with the behavior that does not match their attitude. However, this study will research the thought process that leads to people matching their attitudes with their behaviors: that is, that they choose to remain faithful. This study will use men and women that are eighteen or older, data will be collected using an online survey of people who are or have been in a romantic relationship that use social networking as part of their communication process. The results of this analysis can be used to find which factors correlate with fidelity in a relationship when faced with temptations. This study will impact future research in behavioral, relational, and social media communication.

37B. Reid White

Mentor(s): Kimberly Stoltzfus

Desensitization and the Effects of Violent Video Games on Users

The purpose of this research is to examine how young adults have become desensitized to the violence in video games based on heavy exposure. The belief is that due to desensitization, frequent violent video game users do not realize or understand the degree of violence they are witnessing. This experiment will consist of a convenience sample of 12 males. Each participant will be given a brief survey prior to playing the video game in order to understand their previous video game knowledge. Eight of these participants will play an hour of a violent, first-person shooter video game, while the other four play an hour of a normal, non-violent video game. After each participant has completed their hour, they will be put through a brief interview to see if they show any effects from the exposure to violence, or if they'll fall under the hypothesis and not feel anything at all.

Communication Sciences and Disorders

37C. Peyton Pruitt

Mentor(s): Anne Olson

Patient and Family Centered Communication Choices for Children with Hearing Loss

In America, Universal Newborn Hearing Screenings identify thousands of babies with hearing loss each year. Ninety percent of those who are confirmed with severe to profound hearing loss by an audiologist will go home with hearing parents. These families will encounter several choices in relation to treatment for their hearing impaired child. The purpose of this paper is to describe the literature related to patient and family centered care and decision-making regarding communication choices for children with hearing loss. Previous research has shown that decision-aids foster satisfaction with complex medical choices. Key research findings are summarized within the contexts of a decision-aid matrix for health care providers, counselors and educators to use when working with such families.

38A. Christina Reynolds

Additional Authors: Hannah Pike, shannon sodergren, Elizabeth Thomas, Olivia Foster, Emily Sallie

Mentor(s): Robert Marshall

Performance of Normal Adults on Two Writing Fluency Tasks

Verbal fluency tasks require generation of words from categories or starting with specific letters. These tasks are sensitive to brain injury and diffuse neurological diseases. The effects of advanced aging on verbal fluency, however are less clear. Some seniors retain verbal fluency skills whereas others show significant declines. In contrast, writing fluency tends to slow down earlier than verbal fluency in older adults. A recent study revealed a writing fluency task successfully distinguished normally aging from those with mild cognitive

impairment (MCI). This suggests a writing fluency task could be used to screen age-related cognitive deficits. Accordingly, this study provides normative data for adults on two writing fluency tasks developed by the researchers, the Alphabetized Writing Fluency Test (AWFT) and the written FAS test (FAS-W). Method: On the AWFT, the examinee writes 10 words beginning with a specific letter in alphabetical order with the instructions to do this as quickly as possible. For the FAS-W, the examinee writes as many words as he/she can starting with the letters F, A, and S with a 1-minute time limit for each letter. Procedures: The writing fluency tasks were administered to 270 normal adults meeting specific selection criteria to address these questions: 1. Does writing fluency decline with age? 2. Is writing fluency impacted by gender, education, or literacy? 3. Do adults perform similarly on the AWFT and FAS-W tasks? 4. What strategies are used by adult normal subjects in carrying out the writing fluency tasks? Discussion: Discussion of the study will focus on the advantages of writing fluency tasks for clinicians working in medical settings and the use of these tasks to screen for dementia and related problems.

Computer Science

38B. Nathaniel Serpico

Additional Authors: Bailey Phan, Ethan Toney

Mentor(s): Jerzy Jaromczyk

MutChart: assisting mutation validation

We are using polymerase chain reaction-based random mutagenesis to generate a comprehensive library of mutations in the KCNH2 potassium channel gene that is responsible for ensuring proper heart rhythmicity. As part of this project, it is necessary to sequence a large number of PCR products to assess mutation density and spectrum. While candidate mutations can be identified by comparing the sequence data to a reference, each mutation should be manually validated to ensure its veracity. Many software programs are available for viewing raw sequence data for manual verification but none are designed in a way that facilitates high throughput visualization and validation steps. Here, we present a bioinformatics application, MutChart, which streamlines the mutation identification and verification process. MutChart takes as input raw sequence trace data and the results of a blast search against the reference sequence. It then displays each mutation in a window that provides relevant information about the reference and alternate allele, the sequence quality score and, most importantly, a sequence trace plot for five nucleotides on either side of the query nucleotide. The user views the trace plot to assess the candidate mutation's veracity and then accepts the mutation, rejects it, or marks it as questionable. This action automatically advances the plot window to the next mutation, thereby eliminating the need for further user navigation. MutChart was developed through a collaboration between computer scientists, who solved a number of challenges related to the processing and visualization of large datasets, and biologist who provide domain expertise in DNA sequence analysis and interpretation. The program utilizes caching to prevent the program from redundantly parsing previously used datasets and dynamic loading to render the voluminous datasets.

Computer Science

38C. Weilian Song

Mentor(s): Nathan Jacobs

Automatic Road Safety Assessment Using Deep Learning

The goal of this research is to create an automatic system for assessing how dangerous a road is to drivers, cyclists and pedestrians. Such assessments, currently performed as part of the U.S. Road Assessment Program (usRAP), require manual annotation of road attributes, which is labor intensive and requires extensive training for human annotators. This new approach utilizes state-of-the-art deep learning techniques to replace human annotators with a fully automatic system. Long-term goal is to achieve near human performance at a fraction of the cost. This will make it possible to quickly assess roads over a much larger region, enabling transportation departments to optimally allocate their limited funds to save the most lives.

Dairy Science

39A. Selene Reeves

Mentor(s): Jeffrey Bewley

Evaluating Teat Skin Condition in Response to Phenoxyethanol as a Post-Milking Teat Disinfectant on Lactating Dairy Cows

The objective of this study was to evaluate how a post-milking teat dip containing phenoxyethanol as the active ingredient and a 5% emollient (treatment) affected teat end condition compared to a 1% iodine solution (control). A 9 week, split-udder, non-inferiority study was conducted on 111 lactating Holstein dairy cows at University of Kentucky's Coldstream Research Dairy. The treatment (left side) and control (right side) were applied using a non-return dip cup. Teats were scored once a week, in accordance with NMC guidelines, for 9 weeks on a 1 (desirable) to 3 (undesirable) scale for teat skin chapping, teat skin dryness, and teat skin color. A 1 (desirable) to 4 (undesirable) scale was used for teat end condition. Data analyses were conducted with SAS Version 9.3 (SAS Institute Inc., Cary, NC). The FREQ procedure generated frequency distributions and the MIXED procedure generated a mixed linear model evaluating the effect of teat, week, and their interaction on teat end condition, teat skin color, teat skin chapping, and teat skin dryness. Teat skin chapping and teat skin color remained at a score of 1 throughout all 9 weeks and were not analyzed further. For teat end condition, no significant differences in scores between treatment and control teats were observed. For teat skin dryness, scores for treatment front teats were significantly greater than control front teats (1.10 ± 0.01 vs. 1.06 ± 0.01; $P \leq 0.001$). Temporary increases in dryness scores during study weeks 4, 5, 6, and 9 ($P \leq 0.01$) on the treatment side occurred during expected teat exfoliation. The scores comparing treatment and control teats are significantly different, but are minimal enough that they do not suggest a biological difference. Results indicate phenoxyethanol may serve as an alternative to iodine-based teat dips, which raise risk of iodine residues in milk.

Dentistry

39B. Anastasia Kozal

Mentor(s): Octavio Gonzalez

P. Gingivalis Activates Notch-1 in Human Oral Epithelial Cells

Objective: Notch-1 signaling pathway plays a central role in the development of multicellular organisms regulating cell differentiation, proliferation, and survival. Nevertheless, emerging evidence indicates that Notch-1 is also a key regulator of epithelial barrier function and mucosal immune responses in adult tissues. It has been shown that P. gingivalis (Pg) stimulates Notch-1 expression in aortic smooth muscle cells and osteoblast progenitor cells; however, the ability of Pg to activate Notch-1 in oral epithelial cells (OECs) remain unknown. Here, we sought to determine the ability of Pg to activate Notch-1 in OECs and identify potential mechanisms involved in these responses. Methods: Notch-1 expression was first evaluated by flow cytometry in human OECs. The ability of Pg and other oral bacterial strains to activate Notch-1 was tested through determination of mRNA levels of Hes-1 by qRT-PCR. Silencing of Notch-1 with a specific siRNA was used to validate Pg-induced Notch-1 activation. The role of Pg gingipains in Notch-1 activation was evaluated using a Pg mutant for these enzymes. Results: Notch-1 was constitutively expressed by OECs intracellularly and at the cell surface. Notch-1 activation was specifically induced by Pg and Notch-1 silencing significantly reduced Pg-induced Hes-1 expression. Pg mutant for gingipains failed to activate Notch-1. Conclusion: Pg activates Notch-1 in OECs through a mechanism that seems to involve gingipains. Activation of Notch-1 by Pg in OECs could be involved in early mechanisms associated with the pathogenesis of periodontal disease and other Notch-1-related oral diseases such as oropharyngeal cancer.

39C. Samuel Miller

Mentor(s): Craig Miller, Jessica Houlihan

Bleeding Complication Associated With Direct Anticoagulant Drugs And Oral Surgical Procedures

METHODS: This retrospective study collected data from patients undergoing oral surgical procedures at the University of Kentucky College of Dentistry. This was accomplished by searching the AxiUm ® database using current procedural terminology (CPT) codes for oral surgical procedures. Information extracted was age, race, gender, DOAC, dosage, concurrent anticoagulant, medical history, drug indication, smoking status, presence of kidney disease, comorbidities, whether the DOAC is discontinued prior to the invasive dental procedure, duration of discontinuation, date of surgical procedure, provider specialty status, procedure(s), number of teeth extracted/surgical sites, site of surgery, nonsurgical vs. surgical extractions, management of perioperative bleeding, post-operative complications and management, and outcome. This study was approved by the University of Kentucky IRB # 16-1108-X3B. Data were analyzed by Fisher's exact test. RESULTS: There were 11,320 unique patients since January 2011 that had one of 13 oral surgery CPT codes. Only 0.11% (13/11,320) of this cohort took a DOAC medication, with Rivaroxaban being the most commonly used (53.8%). Patients were females (n=3) and males (n=10), age ranging from 44 to 90 years. These 13 patients underwent 18 surgeries by 9 different practitioners that involved 99 extractions, 14 alveoloplasties, 2 tuberosity reductions, and 2 tori removals. For 9 surgical procedures, the DOAC was discontinued a mean of 52.5 hrs prior to surgery (range 12-120 hrs). There were no bleeding complications reported for patients who's DOAC was discontinued or continued. For 8 surgeries, DOAC continuation or discontinuation was

not documented. CONCLUSION: Bleeding was not observed in this oral surgery cohort and DOAC continuation was not a factor in the bleeding outcome. There was a poor agreement between practitioners regarding the duration of DOAC discontinuation prior to surgery and documentation regarding DOAC discontinuation was poor.

Design

40A. Alexandra Travis

Mentor(s): Lindsey Fay

Eliminating Enslavement

Sex trafficking is shockingly the second largest illegal industry behind drugs in the world, yet so many people are not aware of its everyday occurrence. Since 2007, there have been over 25,000 reported cases of sex trafficking in the United States and currently 4.5 million people enslaved globally (Polaris, 2017). This illegal industry was brought to my attention while visiting Phnom Penh, Cambodia for a mission's trip in the summer of 2015. After further examination of this topic, research indicates that sex trafficking is a $32 billion dollar illegal industry worldwide (UNODC, 2017). This is more money than Starbucks, Google and Nike make in a year combined ("The Common Thread", 2015). With the aim of bringing greater awareness to this issue, this research will examine how design can aid in freeing women from the chains of sex trafficking through the design of a rehabilitation facility in Columbus, OH. Through the use of evidence-based design, the facility will be strategically designed based on the unique needs of this population of women. The proposed design solution will allow survivors to be guided through emotional, physical, and spiritual restoration at a 24-hour rehabilitation facility. Shelter, various therapy options, and skill training will be accessible within a healing safe haven. This research will support the design of a facility that will allow the survivors to heal and express themselves in a personalized approach. Additionally, research will support designs that provide the staff with spaces that are functional, flexible, refreshing and that maintain a high retention rate for staff. It is my hopes that outcomes from this research and design proposal be shared with the university community and community members from Columbus, OH to bring greater awareness to this issue.

Dietetics and Human Nutrition

40B. Meghan Anschutz

Mentor(s): Jessica Houlihan

Breakfast Frequency and the Future Plans of Adolescents

Breakfast Frequency and the Future Plans of Adolescents Meghan Anschutz Mentor: Jessica Houlihan, John Kolesar Background: Research has shown eating breakfast can lead to many nutritional benefits such as better concentration and focus. Individuals who do not eat breakfast are shown to have significantly lower levels of concentration. This is especially important in adolescence. Research shows that adolescents who eat breakfast frequently tend to have better performance in school, however there is not much research into whether this is associated with their future education. Methods: Data was collected from 126 adolescents (67 males and 59 females) ranging from 6th to 8th grade in Staunton, Illinois. Self-reporting surveys were given to all students in physical education. The students answered questions concerning the frequency of their breakfast consumption and future plans. The results were analyzed through a Fisher's Exact Test. Results: The data concluded that 64% of participants stated that they consume breakfast frequently during the school week compared to the 36% who consume breakfast infrequently. Of the students who frequently consume breakfast, 77% plan to attend college in the future, compared to only 23% of students who have infrequent breakfast consumption. Only 12% of students who consume a frequent breakfast do not plan to attend college, or do not have a future plan. 88% of students with infrequent breakfast consumption do not plan to attend college or have no future plans. The difference was significant between groups (p=<0.0001). Conclusion: This found that there is an association between frequent breakfast consumption and college attendance plans. Students who are eating breakfast 3 or more days a school week are much more likely to plan to attend college than their counterparts who eat breakfast 2 or less days per school week.

40C. Abigail Berger

Mentor(s): Jessica Houlihan

Relationship Between Caffeine Consumption, Academic Performance, and Sleep Patterns Among College Students

Relationship Between Caffeine Consumption, Academic Performance, and Sleep Patterns Among College Students Abigail Berger Mentor: Jessica Houlihan Background: Within the United States, caffeine consumption has dramatically increased among college students. Caffeine consumption is a contributing factor to both academic performance and sleep deprivation, due to increased alertness and focus. Due to caffeine's effects, further research is needed concerning the amount of caffeine needed to positively influence both academic performance and sleep patterns. Methods: 136 college students (107 females, 27 males) participated in the study. A cross- sectional survey was distributed to UK 101 classes and posted on UK-related Facebook pages, incorporating students from varying academic backgrounds. Participants recorded their daily caffeine consumption, GPA, and average sleep. To examine the data, the relationship and association were calculated for caffeine and GPA and caffeine and sleep. Results: 83.82% of participants consumed daily caffeine. Students who consumed no caffeine had an average GPA of 3.584 with 7.15 hours of sleep. Those who consumed 1 cup/day had an average GPA of 3.581 with 7.11 hours of sleep. Students who consumed 2-3 cups/day had an average GPA of 3.571 with 7.12 hours of sleep. Those who consumed above 3 cups/day had an average GPA of 3.71 with 6.21 hours of sleep. Caffeine/day and GPA did not have a

relationship (r=0.031) but there was a significant difference between groups and caffeine/consumed (p=<0.001). A weak, negative relationship was found between caffeine/day and sleep (r=0.106) and there was a significant difference between recommended sleep and caffeine consumption per day. Conclusion: The results indicate college students who consume large amounts of caffeine received less adequate sleep in comparison to students who consume small to moderate amounts of caffeine. This is likely because caffeine increases focus and alertness, which decreases ability to sleep.

41A. Allison Berger

Mentor(s): Jessica Houlihan

Association Between Time Spent Exercising and Grade Point Average

Association Between Time Spent Exercising and Grade Point Average Investigator: Allison Berger Mentor: Jessica Houlihan ABSTRACT Background: Over the years the importance of exercise has grown as the rate of health related diseases continue to rise. Little research has been done on college students. Exercise can help improve one's grade point average by keeping the student healthy, providing time management skills, mental clarity, and help improve their studying. However, there is little research on how exercise impacts the grade point average of college students. Methods: Data was collected from 52 students (46 females and 6 males) undergraduate students at the University of Kentucky. These students ages fell between 18-24 years old. A link to a self reported survey was sent out to a class and posted on social media. The survey recorded the amount of time spent exercising weekly, amount of time spent studying, their grade point average (GPA), major, and whether their day allowed time for both exercise and studying. Descriptive statistics and a T-test were performed using excel. Results: The data concluded that 92.31% of students exercise at least once during the week but 57.69% of students are not meeting exercise recommendations of 150 minutes of moderate activity. Research also concluded that correlation between exercise and grade point average is extremely significant (p=.0001). Data also showed the major did not impact grade point average that as much. Conclusion: The results suggest that college students who exercise have an overall better grade point average then those who do not exercise. Those who meet recommendations for their age group also have a higher GPA than those who do not meet recommendations. This could be related to their time management skills.

41B. Raye Bertke

Mentor(s): Jessica Houlihan

Association Between Alcohol Consumption and Academic Performance

Raye Bertke Background: Binge drinking is increasing among adults in the US. Many factors support the action of binge drinking such as peer pressure, stress, and depression. Among college students all three of these factors are prevalent. Methods: Through the use of an online survey site, UK undergrad college students were asked questions on several factors of drinking and schoolwork. 50 students were surveyed (38 female, 12 male) between the ages of 18 and 23. Included were all human nutrition/dietetics students. Questions that were asked are if they missed class and because of binge drinking academic performance. How many times they binge drink weekly. Results: The data concluded that most participants of the study were female (76%) and Caucasian (78%). Of the students who binge drink 1-2 days a week (60%) most of those same students

answered they binge drink for at least 3 hours (64%). Nearly all students answered yes to noticing a decrease in mental acuity the next day after binge drinking (82%). All students who answered yes to the previous question also answered yes to binge drinking affecting their ability to do school work. According to the data from the survey there is negative correlation with how much and how often a student drinks and a decrease in mental acuity and compromised ability to do school work. The r value came out to be -.87. The fisher exact test statistic value came out to be .002857. These results were significant at p<.05. Conclusion: The results suggest that undergrad college students who binge drink at least 1-2 times per week have negative consequences on their academic performance and mental acuity. There is a correlation between frequency of alcohol and how the students feel the next day. This is due to the fact that most students will binge drink instead of only having one single drink.

41C. Nicholas Bischoff

Mentor(s): Jessica Houlihan

Binge Alcohol Consumption: Adverse Academic and Mental Health Implications Among University Students.

Background: Binge drinking has been linked to a variety of different physical health conditions and chronic disease. It also has been speculated to contribute to academic struggles, and mental health problems, yet little research has been conducted into the direct association between alcohol consumption among college students and the implications regarding academic struggles and mental health factors. Methods: Data was collected from 34 college students (17 females and 17 males) ranging between ages 18 to 22 years old at the University of Kentucky. Self-reporting surveys were distributed randomly to students from various class years. The survey recorded the participants' average single setting alcohol consumption, frequency of consumption, mental health and academic status, and the effects of drinking on academic difficulty and mental health factors. Results: 85.29% of participants reported consuming alcohol on a weekly basis, with 67.6% of participants classified as 'Binge Drinkers' (Consuming more than 5 drinks per sitting or 10 drinks per week for men, more than 3 drinks per sitting or 8 drinks per week for women). It was found statistically significant (P-value 0.034) that individuals classified as binge drinkers reported worsened depression and adverse mental health factors (34.78%), than non-binge drinkers (0%). While not statistically significant, heavy consumers also reported much higher academic strain (71.4%) than moderate consumers (41.1%) and non-consumers (20%). Conclusion: From the study, Binge drinking was found to be associated with adverse mental health implications including relationship strains, and worsened depression and anxiety symptoms. In addition, while not statistically significant, results suggest a possible correlation between binge drinking and academic strains. Future research should analyze specific factors of academic markers (i.e. course success, class attendance, etc.), and the implications of consumption, in order to better analyze the possible association.

42A. Rebecca Blair

Mentor(s): Jessica Houlihan

College Student Caffeine Consumption and its Overall Effects on Circadian Rhythm

Abstract: Background: Caffeine is the most widely used psychostimulant used in today's society. For many college students caffeine is the drug that increases alertness, promotes productivity and allows users to

function at a higher level for a longer period of time. Caffeine affects the Central Nervous System allowing users to feel more alert and stay awake longer. Over the last two decades there has been a rise in energy drinks available on the market, a lot of current research specifically looks at caffeine sourced from energy drinks in studies involving college students. However little is done on caffeine sourced from coffee beverages, tea, and even prescription drugs, and how it affects their sleep or circadian rhythm. Methods: Data was collected from 67 college students (46 females and 21 males). Self-reporting surveys were distributed randomly to students from various academic backgrounds. The survey recorded the participants' caffeine consumption (how much) and frequency (how often), their sleep quality, and if they are "morning" or "night" people. Results: The data concluded that of the 67 students surveyed 64.18% consumed caffeine. Females consumed more caffeine than males (73.91% females, 57.14% males). All students reported consuming more caffeine during the school week than on the weeks. The average weight among the students surveyed was 150.7 pounds (S.D. 32.74). Using the Pittsburg Sleep Quality Index, 81.53% students scored in the "poor sleep" category. The quality of sleep was close in males and females (males,75% and females, 84.44%). And the effect on circadian rhythm was inconclusive as most student scored in the "neither type" category. Conclusion: The results suggest that college students who do consume caffeine, and many report having poor sleep, however no correlation was found between caffeine consumption and circadian rhythms.

42B. Allyson Branham

Mentor(s): Jessica Houlihan

The Effect of Sleep Duration On Eating Frequency

The Effect of Sleep Duration On Eating Frequency Mentor: Jessica Houlihan Investigator: Allyson Branham, Human Nutrition, School of Environmental Sciences, University of Kentucky. Background: Sleep is a life-sustaining activity, yet research suggests that the duration of sleep for the United States population is decreasing every year. The effects of not attaining enough sleep can be detrimental to mental, physical, and physiological performance. According to recent research, lack of sleep causes a hormonal imbalance between appetite regulating hormones. There is little evidence in current literature to determine the frequency of meals consumed when sleep duration is less than recommended. Methods: This cross-sectional survey collected data from 50 University of Kentucky students (22% freshman, 40% sophomore, 16% junior and 22% senior). Anonymous, self-reporting surveys were issued to students on respective class Facebook pages. The survey examined average sleep duration, average eating frequency, sleeping patterns, and eating patterns. Data was analyzed using descriptive statistics, a Fisher's exact test and a Pearson's correlation. Results: Data indicates that 30 individuals get enough sleep and consume less than four meals daily, 17 individuals do not get enough sleep and consume less than four meals daily, 2 individuals get enough sleep and consume more than four meals daily, 1 individual does not get enough sleep and eats more than four meals daily. Conclusion: Results from this study do not support the hypothesis that students who do not consume 7-8 hours of sleep eat more frequently than students who do sleep 7-8 hours per night. The results were not significant (p=>1) and the correlation was close to zero, indicating no relationship. However, the results do indicate areas that need more research. There is a gap in current research on how eating frequency is influenced by sleep duration. Further research should look at a much larger sample size and utilize better resources to obtain data.

42C. Kurt Brown

Mentor(s): Jessica Houlihan

Association Between Fast-Food Consumption and Year In College

RESEARCH QUESTION Does fast food consumption change from freshman to senior year for UK college students? AIM Determine the association between college grade and fast-food consumption by a cross-sectional survey. HYPOTHESIS I hypothesized that fast-food consumption varies from freshman to senior year for University of Kentucky undergraduate students. ABSTRACT Background: Over the past several years, obesity has become more prevalent and shows no sign of slowing down. Alcohol consumption can be one of the contributing factors to weight gain and obesity, and perhaps lack of physical activity. However, little is known about the association between alcohol intake and the association with physical activity and obesity status among college students. Methods: Data was collected from 51 college students (35 females and 16 males) varying collegiate year from freshmen to senior. Self-reporting surveys were distributed randomly to students from various academic backgrounds to two undergraduate classrooms. The survey recorded the participants' fast-food consumption, cumulative GPA, and fast-food restaurants within "walking-distance." Results: The data concluded that there is not an association between fast-food consumption and year in college. However, it was found that there is a significant correlation between cumulative GPA and fast-food consumption. Furthermore, a significant correlation was found between number of FFRs in "walking-distance" and fast-food consumption. Conclusion: The results suggest that college students who consume more fast-food have lower GPAs and live near numerous FFRs. The theorized explanation of this finding is to accommodate the busy lifestyles of undergraduate students the students are selecting the convenient food option.

43A. Haley Campbell

Mentor(s): Jessica Houlihan

Artificially Sweetened Beverages and BMI Status

Artificially Sweetened Beverages and BMI Status Investigator: Haley Campbell ABSTRACT Background: Over the past several years, obesity rates in America have been on the rise. While there are many contributing factors to obesity, it can be assumed that drinking sugar sweetened beverages (SSBs) can cause significant weight gain as they are full of sugar and empty calories. One of the most popular ways people cut sugar sweetened beverages out of their diet is by replacing them with artificially sweetened beverages (ASBs) like diet soda. Little research has been done however on the impact of consuming these artificially sweetened beverages on obesity and weight gain. Methods: Data was collected from 66 college students (51 female and 15 male) from various colleges campuses with ages ranging from 18 to 28. Surveys were distributed online randomly from participants recruited from various social media sites and were from a variety of academic backgrounds. The survey recorded general demographic information as well as data about the participant's consumption of SSBs, ASBs, and their height/weight. Height and weight were used to determine BMI status. Results: The survey concluded that 47% of participants did not consume ASBs on a weekly basis, 24% consumed ASBs one to two times per week, 20% consumed ASBs five or more times per week, and 9% consumed ASBs three to four times per week. There was almost no correlation between the amount of times participants consumed ASBs and their BMI status (Pearson correlation value: 0.125). Conclusion: Based on the collected data it would seem that consumption of ASBs does not negatively impact BMI status in college

students. This is perhaps due to the fact that they are consuming less calories by not consuming SSBs when they regularly drink ASBs.

43B. Amanda Cotter

Mentor(s): Jessica Houlihan

The Effects of Stress on Eating Habits in Students at the University of Kentucky

Background: Since the rise of the obesity epidemic in America there has been an increase in fascination on how eating habits change in college age students. Stress has shown to have major effects on student life. Although there are copious amounts of research done on the stress and the eating habits of college students separately, there is little research linking the two. Methods: Data was collected from 86 college students at the University of Kentucky. Self-reporting, cross-sectional surveys were distributed online randomly to students from various academic backgrounds. The survey recorded the participant's stress levels during normal times of the semester and during midterms/finals as well as frequency of eating out. Preferences of eating habits and eating location were recorded. Excel was used to analyze data including Pearson's correlation, Fisher's exact, and frequency tables. Results: The data concluded that 60% of participants prefer to eat unhealthy foods when stressed and only 13% of students prefer to eat healthy foods. Also, it was found that there is a strong positive correlation between stress and unhealthy eating habits in college students during both normal and high stress times in the semester (r-value: 0.82). The data comparing association between stress and eating habits in students did not show statistical significance for either the normal stress period and midterms/finals period of the semester (p-values: 0.24 and 0.49 respectively). Conclusion: The results suggest that students who report feeling more stressed will prefer to consume a diet with an increased amount of unhealthy food options, however students are more likely to eat at home than eat out. This is likely due to the fact that while students are stressed they have less time to prepare a healthy meal or go out to eat and may resort to quick, processed food options at home.

43C. Sydney Cullop

Mentor(s): Jessica Houlihan

Association Between the Number of Roommates and Nutritional Choices Among University of Kentucky College Students.

Background: In a time when obesity is on the rise, it is increasingly important to make positive health decisions. The young adult period—or "college age"—is a crucial time in establishing healthy eating habits. While many studies have been done on how eating out and ordering foods from restaurants regularly can have negative effects, little has been done to determine how relationships among peers can influence these choices. Methods: Data was collected from 60 college students (58 female, 2 male) at the University of Kentucky. Through a self-reporting survey, students from different academic backgrounds and living situations were reached. The survey focused on recording how many roommates each participant had and the frequency in which they ate at home or away from home, ordered food, and shared meals with their roommates during a one week period. The final data was analyzed to determine correlation, significance, and trends in this population. Results: The data concluded that there was actually a negative correlation (-0.229) between the

number of roommates and how often students ate away from their home. The value was significant with a t-test value of <0.0001. The average number of roommates was reported as 2.02 ±1.33, and the average for meals eaten at home (8.82±1.33), away from the home (8.1±6.01), and with their roommates (6.23±6.29) were recorded. The confidence of cooking abilities was evaluated, with 68.3% feeling moderate to very confident and 26.67% felt only slightly or not confident at all. Conclusion: The results suggest that students with more roommates eat away from their homes less frequently than their counterparts. Though these results are in opposition to the initial hypothesis, further research into the quality of students' meal choices should be conducted to compare the nutritional value of meals being consumed at and away from the homes of students.

44A. Rebecca Davis

Mentor(s): Jessica Houlihan

Association Between a College Student's GPA and If They Have a Family History of Alcoholism.

Association between a college student's GPA and if they have a family history of alcoholism. Investigator: Rebecca Davis Background: Alcoholism is a disease that has been on the rise in America. Many kids are growing up in environments where alcohol has become an influence. Research has been done to see how this is affecting generations of children academically, however mostly during their elementary years. Very little research has been conducted on the long term effects of a family history of alcoholism on students, specifically at the university level. Methods: Data was collected from 74 college students (63 female, 11 male) at the University of Kentucky. Self-reporting surveys were used in order to obtain data. It recorded whether or not the student had a family history of alcoholism and if so who in the family suffered from the addiction. It also asked for the student's cumulative and fall of freshmen year GPA in order to measure academic success. Other variables measured include: how many drinks the student consumes per week, if they thought the addiction had an effect on them and if they considered themselves to be an adult child of an alcoholic. Results: The data concluded that 49% of students had a family history of alcoholism, while only 15% said that they considered themselves a child of an alcoholic. The data showed that students with a family history of alcoholism had lower cumulative GPA's than those without (p-value of .106). It was also found that those students with a family history of alcoholism tend to drink more weekly than other students (p-value .732). Conclusion: The results suggest that those students with a family history of alcoholism tend to perform lower in academics at a university level than those without a family history of alcoholism. A large scale study should be conducted in order to learn why these students are generally performing lower at a university level.

44B. Amanda Dentinger

Mentor(s): Jessica Houlihan

The Influences of Mother's Feeding Decisions for Infants and Toddlers

The Influences of Mother's Feeding Decisions for Infants and Toddlers Amanda Dentinger Mentor: Jessica Houlihan Background: Since the early 1970's, when the quantity of new mothers who initiated breastfeeding fell to nearly 20%, there has been a significant increase in information provided to women of childbearing age and health care professionals about the numerous health advantages of breastfeeding. While

we know the benefits that accompany breastfeeding there is little research done on the factors influencing a mothers feeding decision. Methods: Data was collected from 50 mothers (a mother of first time and multiple children) ranging between ages 19- 38 years old at a local nursery. Self-reporting surveys were distributed randomly to mothers from various stages of motherhood. The survey recorded the participant's ages and factors influencing their decisions to breast-feed or bottle-feed their child. A Fishers exact test and t-test were used to assess data with Microsoft Excel. Results: The data concluded that 84% of participants currently or have previously breast-fed their infant or toddler. Also, it was found that determining feeding method of an infant was correlated with mothers age (<.001), where the average age of women who decide before the infant was born was much older (29.1875) than the average age of women who decided after the infant was born (22.889). Factors influencing breast-feeding included prenatal courses (50%), hospital feeding assistance (60%), physician influence (34%), financial influence (48%), career influence (36%), and spouse influence (80%). Conclusion: Older age of mother is associated with earlier decision to breastfeed. The results also suggest that family and spouses are the most influential factor in a mother choosing to breast-feed. This is most likely due to the fact that support system in the action of breastfeeding is very significant. Targeting the highest influential factor could possibly raise the rates of breastfeeding initiation.

44C. Kathrine Donnowitz

Mentor(s): Jessica Houlihan

The Effect of Caffeine Consumption on Academic Success and Sleep Quality of College Students

Caffeine is a stimulant that is naturally present or added to foods and beverages. Excessive caffeine intake can lead to a variety of health issues including increased heart rate, insomnia, tremors, dehydration, headache, and anxiety. There is limited data on the effects of caffeine intake on humans as it relates to various lifestyle factors. This study focused on revealing the effects of caffeine intake via beverages on academic success and sleep quality among undergraduate students. Methods: Data was collected from 50 undergraduate students (35 females, 15 males). Self-reporting surveys were distributed to students via social media. The survey recorded participants' caffeine consumption, frequency, primary motivation for consuming caffeine, and in what form they consume it. It also collected data on GPA and sleep characteristics. Statistical ANOVA and correlation tests were performed. Results: The data concluded that 82% of participants consumed caffeine with the top three forms being soda, coffee, and tea respectively. The primary reason for consuming caffeine was going to class (48.78%). The average caffeine consumption was 17.1 ounces per day with 41.46% of the respondents drinking caffeine five or more times per week. 87.81% of caffeine drinkers were satisfied with their semester GPA. All participants reported getting at least 7 hours of sleep each night. The statistical tests were performed on weekly caffeine consumption and GPA ($p=0.86$, $r=-0.30$) and sleep quality ($p=0.31$, $r=0.002$) Conclusion: The results suggest that there is a small, insignificant correlation between weekly caffeine consumption and sleep quality. There was no significant correlation between weekly caffeine consumption and GPA. Although most the subjects do consume caffeinated beverages, it seems to be in moderate amounts that do not influence their academic success or sleep quality.

45A. Melanie Doretti

Mentor(s): Jessica Houlihan

Impact of Sleep Quality on Academic Success in College Students

Impact of Sleep Quality on Academic Success in College Students Melanie Doretti Mentor: Jessica Houlihan Background: Sleep is a major contributor to the health of a student throughout their undergraduate career. Sleep can have a great impact on daily life and cognitive function, resulting in the potential for sleep to affect academic performance. There has been evidence that various sleep patterns and habits can affect a student's academic performance. However, the affect of napping on academic performance has not been thoroughly studied. Likewise, GPA almost always solely measures academic performance, but other measures should be investigated. Methods: A survey was distributed to 39 students at UK. All students in a undergraduate course were given a survey regarding sleep habits and patterns, academic performance, subjective sleep quality, and demographics. Results: The data concluded that 20.5% of students never nap, and 79.5% of students do nap. The Pearson correlation between nap frequency and length, and resulting GPA were found to have weak negative correlations (R=-0.2327, -0.1935). Nap frequency and exam grade had a weak positive correlation (R=0.1540), and nap length and exam grade had a weak negative correlation (R=-0.1017). The T-tests found that the difference in average sleep reported in 24 hours during the semester, average sleep per night during the semester, sleep reported in the past 24 hours, and sleep reported last night below and above 8 hours and resulting GPA was statistically significant (p=0.0496, 0.0290, 0.0010, 0.0015) Conclusion: The results suggest that getting more than 8 hours of sleep either in a 24 hour period, or at nighttime results in higher grade point average than those getting less. It cannot be concluded that nap frequency and length affect academic performance. However, a majority of college-aged students reported that they do nap; therefore the topic should be further investigated.

45B. Sara Dryden

Mentor(s): Jessica Houlihan

Association Between Physical Activity Level and GPA of College Students

Background: Obesity is an increasing issue in the United States population but the practice of healthy eating habits and regular exercise can help prevent the development of this epidemic. It is essential to initiate good physical activity habits in young adults. There is a lack of research regarding the effects that physical activity level has on the academic success of college students. Methods: Data for this cross-sectional study was collected using an online self-reporting survey. Responses originate from 107 students (88 females and 18 males). The survey gathered demographic information and measured height, weight, academic difficulty (major and average number of hours taken per semester), academic success (average GPA), and student's exercise habits and motivations. Various statistical analyses methods were used including Pearson regression, T-tests, and co-variable analyses. Results: High regular exercise habits correlate to higher academic success rates. Per the Pearson correlation test (r=0.1899), there is a small correlation (0.1<r<.3) between GPA and self-reported physical activity level. An interesting relationship was found between self-reported weight category and weight category per calculated BMI. Students who were overweight or obese were more likely to incorrectly identify themselves in the normal weight category. Additionally, 36.45% of the students were not meeting the recommendations for daily physical activity. Students selected highly motivating for weight management/weight loss (35.83%) and stress relief (32.50%) most frequently, while training and competition

was the least motivating (58.82%). Conclusion: The most important motivating factor regarding exercise was weight loss or management, closely followed by stress relief. There is a relationship between academic success defined by GPA. However, the lack of diversity in the sample creates the need for further study of the role that major difficulty plays in motivating physical activity and success academically.

45C. Macy Epperson

Mentor(s): Jessica Houlihan

Effects of Caffeine Consumption on Grade Point Average

Background: Caffeine consumption among college students is on the rise for various reasons – taste of beverage, energy boost for all-nighters, etc. Starbucks and other coffee shops are being established all over college campuses, fueling the craze for caffeine among students. This obsession for energy beverages raises the question as to whether or not avid caffeine consumption is actually beneficial to these students' health and GPA. Methods: Data was collected from 79 college students (78.48% female, 21.52% male) ranging between ages 16-25 years old at the University of Kentucky Undergraduate Program. Self-reported surveys were distributed to varying student organizations among the University via Qualtrics, an online survey distributor. The survey analyzed participant's initial and current GPA, amount of caffeine consumed daily/weekly, whether or not the student had an underlying psychological condition, and the efficacy of the caffeine on GPA. Data was analyzed statistically using Microsoft Excel. Results: Data concluded that on average, students consume 6 cups of caffeine per week. It was also found that upperclassmen (Juniors and Seniors) are no more likely to consume caffeine than underclassmen (Freshmen and Sophomores) (p-value 0.2323). Data also reveals that energy is the primary reason for caffeine consumption, according to 35% of the respondents. Additionally, 38.75% of respondents believe that caffeine moderately affects their academic performance. There is a weak, negative correlation between caffeine consumption and GPA, regardless of the student's class level (r-value -0.0974). Conclusion: The results suggest that as caffeine consumption increases, GPA decreases, regardless of the student's academic year.

46A. Blake Farrar

Mentor(s): Jessica Houlihan

The Effects of Weight Training on Grade Point Average for Students at the University of Kentucky

Background: Throughout the past decade, there have been several studies conducted that have aimed to find a link between exercise and academic performance. However, little is known about the association between weight lifting and its effects on academic performance among college students. I hypothesize that individuals who weight train at a higher weekly frequency will have higher GPAs than those who weight train less or do not weight train at all. Methods: Data was collected among 53 college students (31 males and 22 females) ranging from 18 to 30 years old. Surveys through Survey Monkey were self-reported by subjects. The survey recorded preferences in regards to weight training and perceived academic performance. For example, one's weekly weight training frequency as well as their opinion on how this effected their overall academic performance on a scale of 1-5 was recorded. Pearson correlation values and t tests were then calculated. Results: The data concluded that 94% of the participants had at least weight lifted one time, while 53%

weight train at least 5+ times per week. Additionally, 89% said that they believe weight training has a positive impact on their academic performance. A pearson correlation test and t test were used to analyze the relationship between freshman GPA and current cumulative GPA. The results showed an r-value of 0.75 and a t test score of 0.0011. Conclusion: The results from this study suggest that weight lifting has a positive effect on one's academic performance. This is most likely due to the fact that the positive effects of weight lifting for an individual's health out weigh the negative effects. However, the degree of this effect will need to be further explored in future studies.

46B. Madeline Franklin

Mentor(s): Jessica Houlihan

Correlation Between Presence of Juicing and Overall Improved Nutrition and Health in University Students

Correlation between presence of juicing or juice cleanses and overall improved nutrition and health Investigator: Madeline Franklin Background: This study is necessary because it juicing is a new trend in the nutrition world and there is currently a lack of studies and data about the effects it has on the health of an individual. This population of university students was chosen for the survey because this age demographic tends to be more open to new trends, such as juicing. Methods: 52 college students at the University of Kentucky completed the survey. The survey collected data such demographics and nutrition information through Qualtrics using Facebook and class discussion boards to distribute. Results: A T-test was done on the relationship between purchasing a juice or never purchasing a juice and hours of exercise per week. The P-value this test gave was 0.34, which is not statistically significant. A Fischer's exact test was used to determine the correlation between purchasing a juice or never purchasing a juice and nutrition being important to the individual and nutrition not being important to the individual. The P-value for this was 0.034, which is statistically significant. It was found that the individuals who purchased juice thought their nutrition was important and those who did not purchase a juice did not place importance on nutrition. Conclusion: My research suggests that students, mostly female and Caucasian, who completed my survey purchased juice if they valued their nutrition. Individuals who did not place value on their nutrition were less likely to purchase a juice or do a juice cleanse. Overall, people who completed a juice cleanse or purchased a juice thought it increased their fruit and vegetable intake as well as their vitamin and mineral intake. This is most likely due to connotations that come with juices and juice cleanses.

46C. Yadel Gonzalez Arangure

Mentor(s): Jessica Houlihan

Association Between Student Breakfast Eating Habits and Their Likelihood of Purchasing Healthy Breakfast Foods on Campus.

Background: A wholesome breakfast has the potential to improve mood, college performance, and aid in maintaining a healthy weight. Despite that, college students show the lowest breakfast consumption. Factors that determine breakfast behaviors among students include time, food availability, setting, and heath beliefs. There is very limited information found in the literature that examines the outcome of having healthy breakfast available on- campus. Methods: Data was collected from 49 college students (35 females, 14 males)

at the University of Kentucky. Self-reporting surveys were distributed to students from various academic backgrounds. The survey recorded the frequency of participants' breakfast consumption, breakfast preparation, on-campus breakfast purchases, and likelihood of breakfast stand purchase. A Person's correlation and T-test were performed to find correlations and associations between categories. Results: The data concluded that 88% of the students live off-campus and 12% live on-campus, 16% of students having a meal plan and 84% not. On average, students eat breakfast 5.08 days a week, 3.95 days having breakfast at home. Students reported they would purchase breakfast from stands 1.24 days a week. The average BMI was 22.83. The Person's correlation coefficient between days a week students eat breakfast and prepare at home was +0.833 and the likelihood of purchasing from stands was -0.154. The T-test value for association between days students eat breakfast and BMI was 0.624. Conclusion: The results suggest that there is a positive correlation between breakfast consumption and preparing breakfast at home and a negative correlation between breakfast consumption and eating breakfast from food stands. The T-test showed that there is no significant association between amount of days students eat breakfast and BMI. Future studies should attain data from students living strictly on campus.

47A. Maggie Goodman

Mentor(s): Jessica Houlihan

The Knowledge of Eating Disorders Among Undergraduate Students at a Large Public University

Background: In recent years eating disorders and the eating habits of college students have been looked at more closely. Nutrition and Dietetic students are known to have a more excessive knowledge of diet and diet disorders. However, little is known about the association between academic background and their knowledge of eating disorders. Methods: Data was collected from 214 undergraduate college students (189 females and 25 males) ranging between ages 18 to 48 years old at the University of Kentucky. Self-reporting surveys were distributed in two nutrition classes and a Philosophy class to ensure various academic backgrounds was included. The survey recorded the participants' knowledge of the control a person has on an eating disorder as well as the extent of knowledge about the specific eating disorders. Descriptive statistics and multinomial regression were used with Excel. Results: The data concluded that most students (66%) stated they felt that individuals have some to a lot of control of developing an eating disorder. There was no correlation (r=0.1) between the student's academic background and their ability to identify classification of eating disorders. There was no association (p=0.41) between upper classman and underclassman in human nutrition and dietetics and their understanding about the control an individual has on developing an eating disorder. There was no association (p=0.32) comparing individuals of different background and their knowledge of control, regardless of class standing and age. Conclusion: The results suggest that human nutrition and dietetics students do not know more about general information of eating disorders. This is most likely due to the fact that there are still many stereotypes about eating disorders. Additionally the survey itself was short and unable to encompass everything about eating disorders.

47B. Katherine Greene

Mentor(s): Jessica Houlihan

Association Between BMI and Amount of TV Watched Containing Ads versus TV Without Ads

Background: Watching TV is becoming the most popular sedentary activity in America today. It has been proven that the more TV with ads people watch, the higher their BMI. There has not, however, been research done to show if this association extends to TV without ads (such as Netflix or Hulu). There is much research showing obesity is on the rise in the youth, but not as much for college students. This population needs to be looked at more closely because this is an important time when a lot of lifestyle choices are established. Methods: Data was collected from 100 college students (85 females and 15 males) from the University of Kentucky. Self-reporting, cross-sectional surveys were distributed randomly to students via various social media platforms online. The survey asked questions such as preference of TV or Netflix, amount of each watched, and current height and weight. Results: Of the participants, 7% were freshmen, 26% were sophomores, 18% were juniors, 44% were seniors, and 5% were classified as other. Contrary to the hypothesis, it was found that difference in BMI between those that watch more Netflix and those that watch more TV with ads was not significant (p=0.19334488). So those that watch more TV with ads were not found to have a significantly higher BMI. However, it is of interest that when students were asked which they prefer, 82% preferred Netflix. Conclusion: The results suggest no significant difference between the BMI of those who watched more Netflix as opposed to TV with ads. However, the popularity of Netflix is on the rise. It could be useful to do further research as to how the rising amounts of time spent on Netflix are affecting BMI and overall health.

47C. Hannah Hollenbach

Mentor(s): Jessica Houlihan

Correlation Between Diet Quality and Anxiety in College Students

Correlation Between Diet Quality and Anxiety in College Students Investigator: Hannah Hollenbach Background: Over the course of twenty years, obesity rates among all age groups have nearly tripled. The greatest increase in obesity rates, as indicated by BMI, has been observed in 18- to 29-year-olds and those with some college education. With tripling rates of obesity among college-aged students, many are wondering if poor diet quality and lifestyle may be associated with not only physical, but mental well-being. This study intends to determine if there is a relationship between dietary choices, BMI, and the presence of anxiety symptoms. Methods: Data was collected from 66 college students (32 females, 34 males). Self-reporting surveys were distributed randomly to students from various academic backgrounds. The survey recorded the participants' height and weight, frequency of stress, prevalence and severity of anxiety, and weekly consumption of several food groups. Microsoft Excel was used to run descriptive statistics, Pearson correlation, T-test, and Fischer's Exact test. Results: Data concluded that 55% of participants had experienced symptoms of anxiety, with females being more likely to have experienced anxiety (58%) than males (50%). A T-test comparing the mean BMI of those who consumed fast food 2 or fewer times/week and those who consumed fast food 3 or more times/week was statistically significant (P=0.0115). A T-test comparing the difference between the mean BMI of those who had experienced symptoms of anxiety and those who had not was approaching significance (P=0.1433). Conclusion: This study suggests a relationship between fast food consumption and symptoms of anxiety. Fast food is typically high in fat and refined carbohydrates, supporting the initial hypothesis that diets high in fat and refined carbohydrates may be linked to the prevalence of anxiety/anxiety disorders in college students. Larger studies are needed to determine more significant correlations in this field.

48A. Cherika Johnson

Mentor(s): Jessica Houlihan

Smoking Green and Not Eating Clean

Smoking Green and Not Eating Clean Background: Marijuana also known as cannabis or weed produces a euphoric effect in users and usually elicits an increase in appetite. Society's perspective of the drug has changed so much that more states are now legalizing it. However, not much research exists on if this drug has an effect on body mass index or the quality of food. Methods: Data was collected from 54 college students (46 females and 8 males). Self-reporting surveys were distributed randomly. The survey recorded the participant's body mass index, types of foods they normally eat and what types of foods they eat after smoking marijuana, and if they believe marijuana affects their BMI and quality of food. Descriptive statistics were used to evaluate the results. Results: The data concluded that 55.6% of participants do smoke marijuana on varying frequency levels. 2% had an underweight BMI, 53% had a normal BMI, 20% had an overweight BMI and 25% had an obese BMI. Those in the underweight category smoked at a higher frequency than those in other BMI categories which all smoked at about the same frequency. Fruits, vegetables and foods high in carbs were consumed on a normal basis however fried, processed, and foods high in sugar were consumed the most after the first few hours of smoking. The R-value from running a Pearson correlation test show there is no correlation in college student that smoke marijuana and BMI. Conclusion: Contrary to my hypothesis smoking marijuana does not result in a higher BMI. However, those that do smoke marijuana consume more unhealthy foods. The foods that are consumed have not affected their BMI and more than half of the participants that do consume marijuana believe that eventually it will not affect their BMI and quality of food.

48B. Emilu Johnson

Mentor(s): Jessica Houlihan

Food Insecurity: Whether it is Prevalent Among Students Attending the University of Kentucky

Background: More students now are able to attend college from several different socio-economic backgrounds and post-secondary education isn't just for the wealthy anymore. Food insecurity becoming is becoming more prevalent among college students at universities across America because of financial instability and competing expenses. Consuming foods that yield little to no nutritional value can impact a person's health negatively but not much research has been done on food insecurity and whether or not it affects a student's success. Methods: Data was collected from upper classman UK college students (7 males and 18 females) who are mostly majoring in some sort of scientific background. An 11-question survey was distributed through several forms of media using Qualtrics. The survey recorded demographics and if how often they consumed processed/fast-food meals and prepared/cooked meals. The survey concludes with the question if they personally felt like their nutritional needs were met or not. Results: The data concluded that roughly half of the students that took the survey felt that their nutritional needs were met and half didn't with the average GPA being 2.0-2.9. The data also showed that 76% of the participants said they consumed 3-5 prepared/cooked meals a week and 44% said they consumed more than three meals per week of fast-food or processed/microwavable food a week. A p-value was reported to be 0.673 meaning that the relationship between GPA and food insecurity among college students is insignificant. Conclusion: The results suggest that there is no association between food insecurity and a students GPA. This finding can be because of many

reasons such as a student's motivation. Results could potentially vary if the survey was distributed to a larger pool of participants from various majors and financial backgrounds.

48C. Whitney Kost

Mentor(s): Jessica Houlihan

How Stress Affects Dietary Choices of Students at UK

Investigator: Whitney Kost Background: Food impacts our health, and our health impacts our daily living. Stress and the impact it has on the human diet is remotely new. It is known that diet can affect stress and ultimately health, but little is known regarding college students specifically. Methods: Data was collected from 193 college students at UK. Their ages ranged from 18 to 23 (average age 20.8), and 164 females and 29 males completed the survey. Self-reporting paper surveys were distributed randomly to students with various majors (both science and non-science based). The survey recorded the amount of stress, as well as their appetite response (increase or decrease). The surveys were taken at no specific time in the semester (not during, dead week, midterms, finals, etc.). Results: The data concluded that of the students with a science major, 69.48% do experience stress, while 27.87% do not. Students with a non-science major, 3.10% do experience stress, while 2.07% do not. This was represented with a p-value of 0.463. Also, students with stress said they strongly agree (13.98%) and agree (73.05%) their appetite increases. Students without stress said they strongly agree (3.62%) and agree (9.32%) their appetite increases. This was represented with a p-value of 0.161. In both cases, there is weak evidence against the null hypothesis, so it fails to be rejected. Conclusion: The results suggest that the p-value was not significant, so there was not a statistically difference between type of major and stress. Additionally, a large percentage of students reporting stress agree to their appetite increasing during stress. The increased appetite can be correlated to stress level, and stress level can be due to type of major. A larger variety of majors need to be considered for future research.

49A. Ailey Layson

Mentor(s): Jessica Houlihan

Influence of Breakfast Skipping on BMI of College Students at the University of Kentucky

Influence of Breakfast Skipping on BMI of College Students at the University of Kentucky Investigator: Ailey Layson, Mentor: Jessica Houlihan Background: In the past several years, overweight and obesity in all age groups in the United States has been tremendously increasing. There are many factors that affect weight gain in children, adolescents, and adults. However, there is a gap in the research examining the relationship of breakfast consumption and weight status. More specifically, there is limited study on this relationship in college university students. Methods: A self-report survey was given and collected from 50 college students (62% females and 36% males) ages between 18 and 22 in a Physics class. The survey collected data on demographics, BMI, and frequency of exercise and breakfast consumption. A t-test was conducted using excel. Results: The data concluded that 36% of students consumed a low-frequency breakfast (0-3x/week) while 64% consumed a high-frequency breakfast (4-7x/week). It was also found that 50% exercised 5-7x/week and 40% exercised 3-5x/week; and 62% lived off-campus while 32% lived on-campus. The difference between low and high frequency breakfast and BMI (22.4 and 23.0, respectively) resulted in a P-

value of 0.58, concluding the data to be statistically insignificant. Conclusion: The results were not significant so there would not be a difference between BMI and breakfast consumption. Although the results are insignificant, a few factors, such as exercise and living situation, may have affected the BMI of the students. More studies are needed to control confounding factors to determine if and how breakfast consumption influences BMI in college students.

49B. Kayla Martin

Mentor(s): Jessica Houlihan

The Effects of Physical Activity on College Students' Academic Success

Background: Most college students don't get the recommended amount of physical activity. There is limited research conducted on college student's academic success in reference to physical activity. The aim of this study is to determine if the amount of physical activity a college student gets and its affect their academic performance. The hypothesis is that the college students who engage in regular physical activity each week will have higher GPAs compared to students that do not. Methods: The cross-sectional survey collected data from 55 University of Kentucky students through an online survey distributed by Qualtrics Survey Software. The participants were collected through the University of Kentucky Class of 2017, 2018, 2019 and 2020 Facebook groups. The data was analyzed using descriptive statistics and fisher exact tests using an Excel Spreadsheet. Results: About 78% of the students reported working out at least once a week, with 53% saying their workouts lasted 31-60 minutes. About 51% reported a cumulative GPA higher than 3.5 and 60% reporting a semester GPA higher than 3.5. Fisher exact was run comparing Exercise Frequency and duration with both semester GPA and Cumulative GPA. The P-values calculated include: 1, 0.55, 0.761 and 0.577. The p-value found from comparing the semester with their maximum and minimum GPA with the semester of most and least physical activity was 0.017. Conclusion: The results show that most students workout at least once a week for over 30 minutes and the majority of students obtain a GPA higher than 3.5. There was little to no evidence that exercise frequency or duration effected GPA. Evidence showed that students highest semester GPA was more frequently associated with the most active semester than the least active.

49C. Alyson Mathis

Mentor(s): Jessica Houlighan

The Correlation Between Physical Activity and Academic Success

Background: When you first move off to college, everyone warns you of the freshman fifteen and how challenging college courses are. You are told time and time again that you will now need to balance your time between both. However, the correlation between GPA and one's fitness level has not thoroughly been studied, so there is little to no information on it. Methods: Data was collected from 111 college students; 100 females and 11 males. The students ranged from freshman to seniors at the University of Kentucky. The survey reported the student's study habits, as well as their fitness habits including how much and how often they exercise. The surveys were self-reporting surveys that were distributed randomly to students within a few different class. Results: The results concluded that 29.7% of the participants either were not satisfied with their GPA at all or were neither satisfied nor dissatisfied. The results also showed that 56.8% of the

participants either were not satisfied with their fitness at all or were neither satisfied nor dissatisfied. The studying frequency and exercise frequency of students was not proven to be statistically significant. Conclusion: The results do not suggest that those college students who exercise more frequently tend to have a higher GPA. This could be due to the fact that those who are not spending their time exercising could be doing other activities causing most students to spend approximately the same amount of time each day on their academics. Future studies should include a larger sample size, a more diverse sample group and more specific survey questions.

50A. Spencer McLaren

Mentor(s): Jessica Houlihan

Aerobic vs Anaerobic Physical Activity Effect on GPA

Fitness and increased cognitive function have been a major focus in recent years to determine the correlation between the two. Many studies have been done and have proven that there is a significance to this claim, but few have been done on the specific types of workouts and how they affect cognitive function. This study is necessary to help determine if there is in fact a difference between aerobic fitness or anaerobic fitness and student GPA. This study will help determine if there is a greater positive correlation between aerobic physical activity and academic performance as opposed to anaerobic activity. I hypothesize that students that engage in aerobic activity tend to have a higher GPA than students who only engage in anaerobic activity. The methods used in this study was a cross-sectional survey of 50 randomly selected college students at the University of Kentucky answered eight questions based on demographics, exercise preference, duration of exercise, and grade point average. A Fischers test was calculated between aerobic fitness and GPA to anaerobic fitness and GPA. Another Fischers test was calculated between individuals that met weekly recommended exercise and individuals that did not meet weekly recommended exercise to their GPA. The p-values for these tests were .24 and .413 respectively, meaning neither test had significance. Since both tests were not significant we cannot correctly determine if there is in fact a correlation between one specific type of exercise and student grade point average. The small sample size could be a cause for error in the study showing that there is not significance in fitness and GPA. Another source of error could be sampling multiple different majors, since each major has its own core of classes the average GPA for each major varies, engineering majors were seen to have a lower average as opposed to Nutrition or Biology majors. Recommendations for future studies would be to sample a larger population as well as sampling one specific major as opposed to multiple majors.

50B. Tayler McMurtrey

Mentor(s): Jessica Houlihan

Association Between Promotional Fitness Material and Physical Activity

Background: Throughout the last decade, smartphone use has exponentially increased along with the population of overweight and obese individuals in America. One way to combat the obesity crisis is through physical activity, which has been shown to decrease with smartphone use. Few to no studies have been done to investigate the direct impact of smartphone or social media use on physical activity. Methods: Data was collected using a self-reporting cross-sectional survey that was distributed randomly among students. There

were 67 participants (20 males, 45 females) from various academic backgrounds. The survey reported students' physical activity frequency, viewing frequency of fitness promotional material, motivations for using social media and exercise, and the most used social network. Descriptive statistics, a Pearson test, and T-test were used. Results: The data concluded that there was not a significant correlation between the viewing frequency of fitness promotional material and frequency of physical activity (r=0.30) (p=0.93). 65% of participants reported that their primary motivation for physical activity was for health improvement or maintenance. Also found was the main motivations for social network use were communicating with family/friends (22%), to occupy time (20%), and to stay informed (18%). The most followed social network accounts by the participants were non-profit organizations (23%), local events (20%), and musical groups (14%). Conclusion: The results indicate that while there was not a significant correlation found between viewing frequency of fitness promotional material and frequency of physical activity, it does warrant the need for future studies to examine the relationship further in hopes of utilizing technology to increase physical activity. There are several confounding factors that played a role in this study, but some insight could be gleaned from the motivations for social network use and physical activity.

50C. Jessica Molnar

Mentor(s): Jessica Houlihan

Association between the Quantity of Fruit and Vegetable Consumption when at Home versus Away at College.

Association between the quantity of fruit and vegetable consumption when at home versus at college. Investigator: Jessica Molnar Background: While growing up, many have heard the phrase "Gaining the Freshman 15". A decrease in fruit and vegetable consumption while away at college may play a huge part in that statement. However, despite this being a common issue with results indicating that there is a correlation between a fruit and vegetable consumption and going away to college, there is little progress made in finding a solution to this problem along with feedback from students themselves as to what would help increase consumption. Methods: Data from 40 college students (34 female and 6 male). Online surveys were distributed to students of various academic backgrounds. The survey recorded the students living arrangements, the amount of fruit and vegetable servings per week, if their consumption had increased or decreased since leaving for college and how UK could help increase consumption. Results: The data collected concluded that (42.5%) of students consume more at home, (12.5%) consume more at school and (40%) reported no change in the amount of consumption. Also, it was found that (97%) of these students lived in apartments or houses where they were able to cook for themselves unlike living in dorms and Greek housing on campus where food is prepared for you. Conclusion: The results suggested that the majority of student's consumption remained the same or they were greater while at home and decreased at school. This is most likely due to parents purchasing more fruits and vegetables than a college student typically would. This decrease could be avoided by offering healthier food options on campus that are apart of meal plans. If college students had healthier options available, I believe they would choose them over processed, unhealthy fast food options.

51A. Eva Nunnally

Mentor(s): Jessica Houlihan

Association between body mass index and oral health of college students

Association between body mass index and oral health of college students Investigator: Eva Nunnally Background: Obesity, a multidimensional disease, can lead to many health problems. Having an excess amount of body weight is known to be a major contributor to the development of many health problems. There have been few studies on the relationship between obesity and oral diseases. There is minimal research on the specific population of the BMI of college students and their oral health. My research aim will investigate the relationship between a college student's current BMI and their dental history up-to-date. I hypothesize that the higher a person's body mass index is, the occurrence of more oral issues in their dental health history. Methods: Self-reporting surveys were distributed randomly to students from various academic backgrounds. The survey recorded the participants' height and weight, number of cavities, how often they visit the dentist, and excess dental work exceeding a cavity. Results: The data concluded that 30% of participants had a BMI in the overweight category with 66% in the normal category. Also, it was found that 74% of participants visited the dentist once every 6 months. Data also found that 83% of participants had at least one cavity and 32% of participant's having exceeded a cavity; with females being more likely to exceed a cavity (59.3%) than males (40.6%). Those who were ages 16-23 had a higher BMI than those aged 24 and older (P=.0005). Conclusion: The results suggest that college students who are 18-23 years old have a higher BMI than those who are 24 and older. It was also found that a higher Body Mass Index (BMI) was associated with dental visits once every two years. The results also suggest that a higher BMI was associated with more cavities and procedures exceeding a cavity.

51B. The Nu Sandar (Kendra) Oo

Mentor(s): Tammy Stephenson

Sustainable Approaches to Fighting Hunger: Development and Evaluation of an Innovative Gleaning and Nutrition Education Program Among Food Insecure Children in Lexington, Kentucky

In Kentucky, 22% of children are food insecure. Consumption of fruits and vegetables among food insecure children is low, including during the summer months, a time when fresh produce is readily available but children are not in school. Meanwhile, 40% of edible food goes uneaten every year in the United States, which is equivalent to approximately $165 billion in waste. The Campus Kitchen at the University of Kentucky (CKUK) provides a sustainable approach to reducing food waste and providing healthy meals to those struggling with hunger. The objectives of this project were to evaluate (1.) the amount, types, and nutritional quality of gleaned produce, (2.) if serving snacks using gleaned produce would increase fruit and vegetable consumption of food insecure children participating in the Building Blocks for Healthy Kids Program in Lexington, Kentucky, and (3.) if a six-week nutrition education intervention would increase participants' nutrition knowledge. Twenty-six children between the ages of 6 and 11 years participated in the program, and twenty-four children completed the pre- and post- evaluation surveys and the plate waste study. The CKUK summer gleaning program recovered 1,755 pounds of produce that would have otherwise gone to waste, including 57 different types of fruits and vegetables. The six-week nutrition education intervention resulted in an overall increase in knowledge related to nutrition and food systems. As well, plate waste data showed that, on average, over half of the gleaned fruits and/or vegetables provided as snacks to the children

was consumed. Since the project results indicate that this sustainable approach to reducing food waste and providing healthy snacks to food insecure children during the summer months was effective, this pilot study serves as a model in the fight against childhood hunger. However, further larger scale behavioral and social research projects involving food insecure children in Kentucky are necessary.

51C. Bryan Payne

Mentor(s): Jessica Houlihan

Pre- and Post- Workout Supplementation in Nutrition and Non-Nutrition Students

Pre- and post-workout supplementation, a topic that has been covered sparsely in scientific literature, is important to understand for a variety of reasons. The number of products on the market has increased significantly in the past decade, and many people are using these products with minimal knowledge of their potential benefits and drawbacks. One population that has not been duly discussed in the research related to this topic is college students. The aim of this research is determine if a specific population (nutrition students) is more aware of supplements that may promote weight loss and muscle gain than a larger population (non-nutrition students). Prior to conducting research, the hypothesis was that that university nutrition students are more aware of a larger variety of workout supplements. The sample population outlined in this research includes 48 undergraduate or graduate level college students. Of the 48 participants, 16 were currently pursuing or graduated with a degree in the field of nutrition, and the remaining 32 participants had not. This data was collected through a short survey distributed online. Since the participants of this study represent a much larger population, this study can be categorized as a cross-sectional study. Two tests that were conducted during data analysis were Pearson's correlation tests and t-tests. The correlation tests related to various supplement use (protein powder, creatine, amino acids, and thermogenics) and student (nutrition vs. non-nutrition) produced r-values of 0.0392, -0.0472, 0.132, and -0.139. These r-values all indicate no correlation between the variable. The t-tests between supplement use and student produced p-values of 0.759, 0.747, 0.362, and 0.183. These p-values are all well above an alpha of 0.05, indicating no statistical significance. Therefore, the predicted hypothesis that there would be significant statistical difference between the two populations was incorrect.

52A. Callie Pendleton

Mentor(s): Jessica Houlihan

Factors Contributing to Health Changes Among First Year College Students

Background: It has been found that students gain on average 3-5 pounds during their first year in college. Establishing healthy eating habits as young adults is vitally important in preventing obesity and other chronic diseases. Current research on this topic has focused on the fruit and vegetable intake of college students, but lacks in exploring the effect of portion size consumed on BMI of college students and whether this is influenced by college campus meal plans, which are required for almost all first-year students choosing to live in university housing. Methods: A cross-sectional self-reporting survey was distributed to 40 freshmen via residence life and off-campus living. The survey reported the participants' average frequency of meals, portion sizes consumed at meals, weight gain/loss they've experienced over the last semester, and whether they utilize a

meal plan. Results: Of the students surveyed, 48.5% with meal plans experienced weight gain in the first semester of college, compared to 0% without meal plans. Students with meal plans reported higher average portion sizes consumed at meals, with 57% of them consuming more than 1-2 portions of food per meal compared to the 42.9% of students without meal plans. The two groups reported similar frequencies of meals, with each group averaging 2 meals per day with snacks throughout the rest of the day. A Fishers test was performed on the change of weight data (p-value <.001) indicating strong evidence against the null hypothesis. Conclusion: The results suggest that college students using a university meal plan consume on average greater portions than those who do not and experience resulting weight gain, however no significant difference was found in meal frequency. Future reproductions of this study will require a greater sample size to ensure reliability of this conclusion.

52B. Norella Reyes

Mentor(s): Jessica Houlihan

The Relationship between Oral Hygiene Health and BMI measurement

Norella Reyes, Mentor: Jessica Houlihan Background: Oral Hygiene tends to be overlooked and doesn't seem quite as important to people as other health issues. But, research has found many diseases have been linked to poor oral health. There is evidence that higher BMI's are associated with chronic diseases, but there is limited research in correlating oral hygiene and BMI. HYPOTHESIS: College students at the University of Kentucky who practice the recommended oral hygiene habits will tend to have lower BMI's than those who do not practice recommended oral hygiene habits. Methods: Data was collected from 70 college students (19 males, 51 females) at the University of Kentucky. A cross-sectional online survey was distributed randomly to various students of different backgrounds. The survey took note of the number of times a student brushed their teeth, eating patterns, tobacco use, and the frequency of flossing and seeing a dentist. A Pearson's correlation and T-test were used with Excel after the collection of data. Results: After tests were performed it was concluded that from the 70 students that were surveyed, the frequency of brushing teeth was not strongly correlated to BMI (R-value=0.113611538). It was also found that the frequency of flossing (R-value=-0.107002519) and seeing the dentist did not correlate with BMI as well (R-value= -0.007161845). From the data collected 69% of students brushed their teeth twice a day, and the average BMI was 24.6, which falls under the normal category. Overall, no association was found between the frequency of brushing teeth and BMI (P-value= <0.0001). Conclusion: The results show no association between students who practice the recommended oral hygiene habits and BMI. This is mostly likely due to other factors playing a role in BMI such as exercise and diet. Future studies should include a larger and more diverse backgrounds.

52C. Beau Ruddell

Mentor(s): Jessica Houlihan

Association Between the Quantities of Alcohol Consumed and How it Affects GPA, Weight gain, and Eating Habits in College Students.

Association between the quantities of alcohol consumed and how it affects GPA, weight gain, and eating habits in college students. Investigator: Beau Ruddell Mentor: Jessica Houlihan Background: Binge drinking

among college students is prevalent, with up to 44% of students reporting that they partake in the activity. Alcohol consumption can be a huge factor to weight gain among students as well as the food they consume while drinking. However, little is known about the association between alcohol intake and how it affects their GPA, weight gain, and eating habits. Methods: Data was collected from 42 college students (26 males and 16 females) ranging between the ages of 18-22 at the University of Kentucky. Self-reporting surveys were distributed to students from various academic backgrounds and recorded participants alcohol consumption and frequency, their eating habits, and how it affected their academics. Results: The data concluded that 50% of participants only drank on weekends, 71% said they drank 6 or more drinks every time they drank, and 88% ordered greasy fast food while drunk. The T-test for binge drinking and GPA came out to be a P-value of 1.27. Conclusion: The results suggest that binge drinking doesn't have a big impact on GPA with the mean GPA being a 3.32 but does cause weight gain and contributes to unhealthy eating habits. 79% of the participants said that binge drinking contributed to 5-10 pounds of weight gain throughout their college careers while 18% said that binge drinking contributed to 10-15 pounds of weight gain.

53A. Emily Smith

Mentor(s): Jessica Houlihan

Association Between Mealtime Structure and College BMI and GPA

Association between mealtime structure and college BMI and GPA Investigator: Emily Smith Background: It is well known that obesity and academic success correlate. However, could there be an underlying cause that aids in the correlation? Mealtime structure is one underlying cause that could influence BMI and GPA in children and young adults. When looking at the influence of mealtime structure, there is little research done on the young adult population. During these young adult years the individual's family mealtime structure will most likely change to mealtime with friends. Methods: A self-reporting survey was distributed to 101 (11 male and 90 female) undergraduate students taking Introduction to Nutrition at the University of Kentucky. The students ranged in age from 18-48, as well as various academic backgrounds. The survey recorded BMI, peer mealtime participation and frequency, GPA, and demographic data. T-tests and Fishers Exact tests were used in excel. Results: The data revealed that 1% were underweight, 69% normal weight, 22% overweight, and 8% obese. The data also indicated that 32% of the students did not participate in meals with friends. The t-test depicted a p-value of 0.0916 for participation of mealtime with peers and GPA, and 0.595 with BMI. This test exhibited no significant correlation between the variables. Although significance was not met, the value depicting mealtime with peers and GPA was approaching significance. The Fishers Exact test exposed a p-value of 0.759 for the frequency of mealtime with company in college and BMI. This also revealed no significant correlation between the variables. Conclusion: The results suggest that company mealtime in college does not significantly impact BMI and GPA. However, with the time and resources to conduct a longitudinal study of students, varying in majors could address the gaps of this topic.

53B. Danielle Stahl

Mentor(s): Jessica Houlihan

Assessing the Need for Adolescent Obesity Interventions in Fayette County

Background: Overweight and obese adolescents are more likely to experience negative emotional consequences along with adverse health effects. Even though negative effects of adolescent obesity are known, adolescents have experienced the least improvement in health status of any age group in the last 50 years. Therefore, further research is necessary to gain information that can be used to target adolescent obesity. Methods: Data was collected from 55 high school students (43.64% male and 56.36% female) ranging between the ages 14 to 18 at Paul Laurence Dunbar High School. Self-reporting surveys were distributed randomly to students. The surveys recorded the participants' demographics, height, weight, breakfast and lunch consumption, as well as diet and weight perception. The data was analyzed using Fishers Exact Test to determine statistical significance. Results: The data showed that the majority of students had a normal BMI: 21.43% underweight, 61.9% normal, 14.29% overweight, and 2.38% obese. There was no statistical significance concerning BMI and diet perception (P-value:>0.05). There was significance in the relationship between BMI and weight perception of the students (P-value: 0.036). The majority of students (64.26%) that were underweight or normal perceived their weight correctly. However, 0% of the students with overweight or obese BMIs perceived themselves as overweight. Conversely, 19.05% of the students with underweight or normal BMIs perceived themselves as overweight. Conclusion: The research suggests that many high school students have an accurate perception of their body weight. However, since none of the students who were classified as overweight or obese considered themselves to be so, there may be a need for better health education. This could also benefit the 19% of students with a normal or underweight BMI that consider themselves overweight. Adolescents develop habits that continue into adulthood; therefore, it is critical to continue research of obesity in this age group.

53C. Cassidy Teager

Mentor(s): Jessica Houlihan

Academic Major and the Influence Over Health Outcomes in University Students.

Background: A student's nutrition during college can have a significant impact beyond years spent at school. Learning how to execute and sustain a healthy lifestyle during this time could allow for a lasting impact on the health of our population. Consequently, the material students are taught in classes can have a large influence on their nutritional status. However, many studies solely focus on students in fields of nutrition. Examining differences between students in various fields of study can allow for more successful interventions for this population in the future. Methods: For this cross sectional study, data were collected from 31 business students and 28 pre-professional health students ranging from 19-23 years of age at the University of Kentucky. Surveys were randomly distributed, and the participants self-reported various demographics as well as nutritional habits including body mass index (BMI), fruit intake, vegetable intake, and exercise habits. Descriptive statistics, Pearson correlations, and Fisher's exact tests were performed using Excel. Results: No significant differences were found between groups. Fisher's exact test found no association between groups in regards to BMI classifications (p=0.784), fruit intake (p=0.317), vegetable intake (p=0.440), and exercise frequency (0.879). The Pearson correlation found no strong trend between BMI and fruit intake (r=0.11), BMI and vegetable intake (r=0.04) or BMI and exercise frequency (r=-0.06). Conclusion: These data suggest

no difference between students in business and pre-professional health in regards to their nutritional habits. This provides minimal insight for recommending interventions for this age group. Future studies should use a larger sample size including more majors to determine subtle differences between groups, as this may provide a pathway to improving the health of college students across the nation.

54A. Colyn True

Mentor(s): Jessica Houlihan

Association Between Binge Drinking and Body Mass Index of College Students

Background: It is hypothesized that alcohol consumption, especially binge drinking, is a contributing factors to weight gain and consequent increase in BMI in college. However, little is known regarding the association between binge drinking and body mass index among college students. This study aims to analyze the effect of excess alcohol consumption on college students' body mass index by distributing a cross-sectional survey to University of Kentucky students. Methods: Data was collected from 122 college students enrolled at the University of Kentucky (107 females and 15 males). Self-reporting surveys were distributed to students via various social media outlets. The survey recorded alcohol consumption, frequency of both general and binge drinking behavior, alcohol knowledge and awareness, weekly amount of physical activity, and prevalence of weight gain in college. A t-test and Fischers exact test were conducted. Results: 87.70% of participants consumed alcohol regularly, while 42.62% engage in binge alcohol consumption. Females (89.72%) were more likely than males (73.33%) to exhibit normal consumption of alcohol, but males (53.33%) were more likely than females (41.12%) to exhibit binge drinking. A t-test indicated there was not a statistically significant (p=.61) difference between the BMI of students who engaged in binge drinking and those who did not. A Fischer's exact test (1.0) indicated that there was no difference in alcohol awareness between genders. However 97.54% of participants inaccurately quantified the amount of beer, liquor, or wine equating to one alcoholic beverage. Conclusion: The results suggest that binge drinking does not affect the BMI of college students. However, due to widespread lack of accuracy in quantifying alcohol servings the self-reporting of binge drinking is likely inaccurate.

54B. Lucas Whittle

Mentor(s): Jessica Houlihan

Association Between Persistent Nutrition Counsel and the Increase in Performance in the Weight Room of High School Football Players in a Rural Community

RESEARCH QUESTION Does formal nutrition counsel lead to an increase in athletic performance of rural high school football players? ABSTRACT Background: Prior research has proved that nutritional counsel to athletes can lead to an improvement of athletic performance when accompanied by athletes who are willing to use the advice given to them. The majority of studies have been conducted at the collegiate and professional levels. Methods: Data was collected from 50 males ages 13-18. All of the athletes were a member of a rural high school football program and were participating in spring workouts. Self-report surveys were given to the athletes that questioned their lifts before nutritional counsel, after nutritional counsel, and percent increases were analyzed in three core lifts. Results: Of the 50 athletes surveyed, 30 did not receive nutritional

counseling and 20 did. The mean age of the athletes who did receive nutritional counseling was 15.91. The average percent increase of parallel squats for athletes in this group was 21.58 with a standard deviation of 24.15. The average percent increase for power-cleans was 29.54 with a standard deviation of 39.3. The average percent increase of deadlifts was 30.779 with a standard deviation of 16.297. The mean age of those athletes who did not receive nutrition counseling was 15.74. The average percent increase of parallel squats for athletes in this group was 27.45 with a standard deviation of 68.77. The average percent increase for power-cleans was 32.198 with a standard deviation of 27.82. The average percent increase of deadlifts was 32.71 with a standard deviation of 38.87. Conclusion: The results suggest no relationship between nutritional counsel and an increase in athletic performance. However, it does suggest there is a correlation between age and the increase in athletic performance. In athletes ages 13-15, percent increase was significantly higher (p-value=.000000171).

54C. Angelica Yun

Mentor(s): Jessica Houlihan

The Correlation of Night-Eating and Academic Performance in College Students

Background: In the past few decades, the prevalence of eating disorders and disordered eating has been rising in college-aged students. A common eating habit formed in college students is the consumption of food at night after dinner. While minimal literature on night eating in college aged students have been published, there has not been any on the correlation between night eating in college-aged students and academic performance. Thus, it is hypothesized that due to frequent night-eating behaviors, the student's academic performance will reflect slightly negatively. Methods: A cross-sectional study was conducted on 82 students (31 Males, 51 Females) at the University of Kentucky. The survey, distributed on social media, recorded frequency of night-eating behaviors, emotions and activities during and after night-eating, academic performance (GPA & Attendance) as well as sleep quality. A Pearson Correlation Test and a t-test were conducted to analyze the data. Results: Statistical analysis of the data showed a very slight or weak negative Pearson correlation between cumulative GPA and frequency of night at approximately R=-0.11. A T-Test was conducted between the night eating frequency of students with a GPA less than a 3.49 and greater than 3.50. The resulting p-value was approximately p=0.749 which did not display statistical significance. The average frequency of night eating behaviors was 4.25 days out of the week and the average cumulative GPA was 3.52. The most common activities during night-eating were studying/working on assignments, watching TV, and drinking alcohol. Conclusion: The cross-sectional study showed a slight negative correlation between night-eating frequency and academic performance. It would have been more ideal to conduct a longitudinal study that looked closer into frequency, individual grades and classroom attendance. More research can be done and this study provides a closer look into student night-eating habits.

55A. Robert Chadwick

Mentor(s): Jessica Houlihan

Association of dinner time shift from high school to college in relation to BMI

Background: The topic of the “freshman fifteen” is an issue that has been occurring for many years. While there can be many factors that play a role in weight gain when an individual come to college many of those factors have been investigated. One factor that has not is the time of day in which an individual consumes dinner and the relation to BMI. Methods: Data was collected from 80 freshman level college students (29 males 51 females) ranging from the ages of 17 to 22. A self-report study was distributed randomly through an online survey. This survey recorded the average time in which that individual ate dinner in high school and the concurrent information to calculate BMI as well as the current time they eat dinner in college and their information to calculate their current BMI. Statistical analysis was conducted through the use of Excel. Results: The data showed that that the average time that dinner was consumed in high school was the time block of 6:00-7:00PM and the average time dinner was consumed in college was from 7:00-8:00PM. As well as the average BMI in high school being 23.1 and in college the average BMI was 24.4. Despite seeing and increase in both variables they showed an insignificant correlation (r = -0.0137). Conclusion: The results show that when individual data points are compared there is an insignificant correlation between the time dinner is consumed and the individual's BMI. Although there were increases in both the average dinnertime and the average BMIs. This insignificant correlation is most likely due to most students showing a weight gain even if their dinnertime did not change or had become earlier in the day.

55B. Aqeel Jawahir

Mentor(s): Jessica Houlihan

Effects of Sources of Caffeine on Sleep Quality Among College Students

Effects of Sources of Caffeine on Sleep Quality Among College Students Aqeel Jawahir Mentor: Jessica Houlihan Background: It is known that caffeine has negative effects on sleep quality, and there are many different types of caffeinated beverages. College students typically exhibit a relatively high level of caffeine consumption as well as poor sleep quality, but the ways in which different sources of caffeine affect their sleep quality has not been thoroughly explored. This study aims to answer this question. Methods: The sample population of this study consists of 56 students at the University of Kentucky. Data was collected both electronically and physically by means of a cross-sectional survey. The survey primarily accounted for demographics, sleep quality (measured by variables of difficulty falling asleep, difficulty staying asleep and daytime fatigue) and consumption of coffee, soft drinks and energy drinks. Data analysis consisted of descriptive statistics and evaluation of correlations for the sleep quality measures versus each caffeine source. Results: Individuals ages 20-22 accounted for 76.79% of respondents, with 42.86% of respondents being male and 55.36% being female. Correlation tests based on linear regression showed that coffee had the greatest correlation for difficulty falling asleep (R2 = 0.03384) and difficulty staying asleep (R2 = 0.11958), while soft drinks had the greatest correlation for daytime fatigue (R2 = 0.05738). Conclusion: The results showed that there are only slight correlations between the sleep quality variables and the various caffeine sources, but the data does show that among college students, coffee appears to have the greatest impact on two of the sleep quality variables, difficulty falling asleep and staying asleep, while soft drinks appear to have

the greatest impact on daytime fatigue. This research could be further improved with a larger sample size and greater variety of ages.

55C. Varun Ramakrishnan

Mentor(s): Jessica Houlihan

Characterizing Mainstream Supplement Use in Undergraduate Nutrition Majors

Investigator: Varun G. Ramakrishnan, Human Nutrition, School of Human Environmental Sciences, University of Kentucky Research Question: What percentage of Human Nutrition students are comfortable with how to properly use the most common fitness supplements? Research Hypothesis: I hypothesize that majority of Nutrition students (>50%) will be unfamiliar and uncomfortable with how to properly use the most common fitness supplements. Research Aim: To characterize the percentage of undergraduate students in the human nutrition program that understand the proper utilization of fitness supplements through a cross-sectional study. ABSTRACT Background: Over the past decade, fitness supplements have increased in popularity. Although the Human Nutrition curriculum at the University of Kentucky covers many topics related to fitness, supplement education is largely overlooked. Limited information exists on the association between students who are Nutrition majors and their understanding of fitness supplements. Methods: Data was collected from 50 college students (17 Nutrition majors, 33 non-majors). All students were within the 18-24 age range and enrolled at the University of Kentucky. Self-reporting surveys were included in a link which was posted online for students to access. The survey recorded various demographic characteristics of the respondents in addition to their comfort level, degree of understanding, and education about fitness supplements. Descriptive statistics and a Fishers exact test were conducted. Results: The data concluded that 0% of nutrition majors vs. 18.75% of non-majors reported having a poor understanding of supplement use. The Fishers exact test revealed a p-value of .0798, indicating statistical insignificance at an alpha of .05. Conclusion: The results suggest that Human Nutrition students understand supplement use more than their non-major counterparts. This is understandable, as Nutrition students are exposed to fitness related topics more often than non-major students. However, modifications must be made to the experimental methods in order to validate this finding.

56A. Joel Rose

Mentor(s): Jessica Houlihan

The Effects of Living On or Off-Campus on Student BMI

Background: College is the first time that a person will be solely in charge of their own eating habits. Typically students are at a relatively “normal” BMI coming out of high school and must learn the proper ways of health eating. This time in life is very important as these eating habits set the stage for the rest of students’ lives. Methods: sample population was UK college students in Nutrition classes with 110 students. Students participated in a cross-sectional survey. A t-test was conducted on the averages of living on-campus BMI students and living off-campus BMI students. Various averages of demographics were also conducted. A Pearson correlation test was conducted on the frequency of eating out and student BMI. Results: This sample (n=110) contained predominantly female students (86.4%) and mainly lived off-campus (62.7%). Of the

students that lived on-campus, 80.5% of them primarily obtained their food on campus (19.5% off-campus). Of the 62.7% of students that lived off campus, 100% of them primarily obtained their food off-campus. The Pearson correlation resulted in an r-value of 0.0715. The t-resulted in a p-value of 0.0934 with the average BMI of students on-campus 23.09 (s.d. =3.59) and off-campus 24.39 (s.d. = 4.07). Conclusion: The results suggest that students living on-campus will primarily eat on-campus and students eating off-campus will primarily eat off-campus. Students living off-campus did have a higher BMI (p=0.093). There was no correlation between eating out and BMI for this particular sample (r=0.0715). This data can show that living accommodations can effect eating habits that effect BMI. More research should be done in this area focusing on reasons why and how students eat out often, cook for themselves regardless of living on or off-campus, and the nutritional information of cafeteria type foods on-campus locations.

56B. Robert Trimble

Mentor(s): Jessica Houlihan

Are Romantic Relationships a Potential Cause of Weight Gain Among College Students?

Background Obesity is very prevalent among college students and can set students up to be overweight for years to come. Alcohol and fast food can be contributing factors, but those could also be influenced by other factors as well such as relationships. There currently is a lack of data analyzing the association between romantic relationships and weight gain. Methods Data was collected from a sample of 50 college students (29 male & 21 female), which ranged from freshman year to graduate level students. Self-reporting surveys were distributed through text and email to students of various academic and ethnic backgrounds. The surveys recorded the presence and length of any romantic relationship they were in, as well as increased fast food and alcohol consumption, BMI increases, and exercise per week. Results The data revealed that 78% of the participants were in a romantic relationship and 46% of those were in a romantic relationship of over one year. 62% of participants reported an increased BMI, and 58% reported some sort of weight gain. The p-value for length of relationship and exercise equaled 0.84, while the p-value for length of relationship and increased BMI was 0.824. Both were calculated using a Fisher's exact test. Conclusion The results suggest that being in a romantic relationship cannot be associated with increased BMI or alcohol consumption. The data showed a greater percentage of those in a relationship reported both BMI and weight increases, but the p-value was not significant enough to justify any sort of association. Further research needs to be done on a broader scale across America to determine if relationships can attribute to weight gain after college.

56C. Alexandria Carter

Mentor(s): Jessica Houlihan

Analyzing How the Common Cold Affects Performance of Female Collegiate Soccer Players

Studies have shown that on average, adults come down with a cold four to six times per year, while children get six to eight cases a year (Worrall, 2011). However, it is not rare for a college athlete to have well over this number of cases in a year. In this study, the University of Kentucky Women's Soccer Team was observed for the effect common colds had on their team. Several girls reported that it is typical for them to experience a cold four to six times just in their four-month fall season. Assuming the athletes are eating healthier and are

more physically fit than the average person, why are they getting sick more often? Exercise is considered an environmental stressor. When the body is exposed to environmental stressors such as intense exercise, emotional stress, lack of sleep, a cold environment, etc., the body's ability to fight off threatening cells becomes less effective (Lavoy, 2011), therefore becoming more vulnerable to pathogens. In a typical collegiate season, players face stressors from all directions as they have to make sure their performance is great on the field, in the class room, in their personal relationships, and in their recovery. Because college athletes tend to be getting the cold so often, it is important to understand the effect a cold has on the performance of the players, as to insure maximum success from the team. In this study, the girls on the soccer team were evaluated subjectively and objectively on how their bodies responded to a cold. In the first part of the study, the girls were surveyed to find out how they feel their performance on the field was affected by a cold. In the second part of the survey, the heart rate data from their training sessions were analyzed to find out how their physical loads from a given drill were affected by a cold.

57A. Christian Hardy

Mentor(s): Jessica Houlihan

Impact of Marijuana Use and Alcohol Consumption on GPA

Background: The use of alcohol and marijuana by college students can take time away from their focus on academics. Past research has shown the effects of alcohol on academic performance, but there are not studies concerning the effects of marijuana on GPA. Methods and Results: This study aims to determine the effect that marijuana use and alcohol consumption have on the GPA of full-time students from the University of Kentucky. This study surveyed 31 male and 27 female students with the mean age of 21 years with a standard deviation of 2.97 years. Four (6.9%) students reported never having consumed alcohol, 18 students (31.0%) reported never have used marijuana, 36 students (62.1%) reported drinking alcohol on a weekly basis, and 25 students (43.1%) reported using marijuana on a weekly basis. Although results did not show a large correlation between GPA and frequency of alcohol consumption (r value = -0.0745), a negative correlation (r value = -0.402) was shown between college GPA and frequency of marijuana use. The average starting age ranges of alcohol consumption and marijuana use were shown to be 17-18 years and 19-20 years, respectively. A relatively strong correlation was found between the starting age of alcohol consumption and current frequency of alcohol consumption (r value = 0.398) as well as starting age of marijuana use and current frequency of marijuana use (r value = 0.715). Conclusion: The results of this research show that marijuana use could have a much greater effect on college GPA than alcohol consumption. The research also shows that there is a positive correlation between starting age of both alcohol consumption/marijuana use and frequency of use. Further research needs to be completed on a larger sample in order to further explore these findings.

Education

57B. Courtland Stephens

Mentor(s): Jane Jensen

General Education Research Lab

Our Research lab will be identifying how diversity and inclusion is addressed within approved UK Core courses. All currently approved UK Core classes will be included regardless of how often they are offered. The initial applications will be examined with regard to how diversity and inclusivity are defined in the course materials, what kinds of learning activities related to that curriculum are provided, and in what ways that aspect of the curriculum is assessed. Document analysis using grounded theory will be conducted. Course materials including the initial UK Core application and syllabus will be coded. Although course topics are often found in the course learning objectives, the analysis will also include descriptions of course assignments, readings, and activities. Initial coding of documents will be conducted using: external codes applied from commonly used phrases and vocabulary related to diversity and inclusion discourse (e.g. race, gender, power, etc.). internal codes derived from the interpretation of the instructor's language (e.g. constructions of difference) in vivo codes derived from the language of the course (e.g. Black Lives Matter). The team will then negotiate the development of a coding structure into which all codes will be placed and the documents reexamined until the team is satisfied with set of axial categories and definitions that best defines the data set as a whole. The team will create a summary description of the types of diversity and inclusion education found within the UK Core curriculum. The database of courses will be tagged for further research into teaching and learning outcomes relative to course objectives.

57C. Amanda Campbell

Additional Authors: Natalie Malone

Mentor(s): Ellen Usher

Am I Prepared? College-Navigation Self-Efficacy in First-and Continuing-Generation Students

First-generation students have lower self-efficacy for transitioning to college than their continuing-generation peers and are less likely to complete college successfully (Mega, Ronconi, & de Beni, 2013). Because self-efficacy affects many student behaviors, such as persistence, choice of task difficulty, and response to failures, this difference in self-efficacy may affect students' college experience and likelihood of graduating (Bui, 2002; Chen & Carroll, 2005). The purpose of this study was to compare first- and continuing-generation students' self-efficacy for navigating college, enrollment in a college orientation course, and final GPA after one semester. Freshmen (n = 230 first-generation, n = 1592 continuing-generation) from a large, southeastern university completed a survey including the College Navigation Self-Efficacy Scale and the Academic Capital Scale. Final semester GPA, class enrollment, and first-generation status were obtained from the university records. Contrary to previous findings, there were no significant differences in students' college navigation self-efficacy based on first-generation status. There was a significant, positive relationship between college-navigation self-efficacy and academic capital. There were no significant differences in GPA for students who completed a university orientation course and those who did not. However, of the students who did complete a university orientation course, first-generation students had significantly lower GPAs at the end of the

semester. This could suggest college orientation courses are not improving students' chances and another form of intervention is needed. Pre- and post-tests for self-efficacy among both samples might help researchers to understand more fully how efficacy beliefs change throughout the semester.

58A. Xiao-Yin Chen

Additional Authors: Madelyn Roeder, Alecia Johnson

Mentor(s): Ellen Usher

The Roots of Self-Efficacy in Undergraduate Engineering

The purpose of this study was to examine the types of experiences that affect undergraduate engineering students' self-efficacy and to examine gender and year-level differences. Self-efficacy, the perception of one's ability to accomplish a task, has been shown to be a strong predictor of student effort and achievement in various educational settings (Honicke & Broadbent, 2016; Richardson et al., 2012). Few studies have extensively investigated the types of experiences (e.g., teacher encouragement, role models, grades) that influence the self-efficacy of students studying engineering. Undergraduate engineering students (N = 654; 26.8% women) attending two large, public universities answered the open-ended questions: What events have affected your confidence in your engineering skills? How did the event(s) affect your confidence? Using Bandura's four hypothesized sources of self-efficacy and previous coding schemes (i.e., Butz & Usher, 2015) as guides, researchers developed 27 codes to evaluate students' responses. Each response also received a code for its valence (i.e., whether it raised or lowered self-efficacy). Two raters coded each response with high level of agreement. Students most frequently reported academic mastery experiences (40.2%) followed by cooperative/internship mastery experiences (7.0%) as sources of their self-efficacy. Women (7.2%) were more likely than men (4.1%) to describe comparing themselves to others when judging their self-efficacy. Difficulties with coursework lowered students' self-efficacy. Student responses identified numerous ways in which instructors and universities can better support students' self-efficacy, learning, and persistence in engineering.

58B. Kaitlin O'Neill

Mentor(s): Sally Shepley

Increasing Employability: Developing Employment Skills for Young Adults with Autism

Kaitlin O'Neill Mentor: Dr. Sally Shepley Increasing Employability: Developing Employment Skills for Young Adults with Autism With employment outcomes dragging far behind that of their peers without disabilities, young adults with autism spectrum disorder (ASD) face disheartening challenges in today's American workforce. Only 35% of young adults who have autism or intellectual disability receive paid employment within eight years of finishing high school. Furthermore, the competitive employment rate for working-age adults with autism ranges from 4.1% to 11.8%. Currently, the population of adults with autism is growing and vocational rehabilitation programs are battling significant challenges in responding to their needs. Thus, it is crucial for new, more effective employment service options to be utilized for individuals with autism. Teaching with an "increased focus on pivotal skills, such as problem solving and self-instruction, has the potential for increasing the number of skills individuals can learn on their own and the number and

types of environments they can access without constant adult support." Three recent studies have revealed effective methods for improving the employability of individuals with autism. One study found that a social-focused, job-coaching model involving a bug-in-the-ear device increases the social interactions of young adults with autism and intellectual disability in jobsites. Another study effectively taught participants to initiate self-instruction using video models on an iPhone. A third study revealed that using an iPod Touch as a vocational support for adult workers with autism would reduce the amount of personal supports required for the individuals to complete the job tasks. The implications of these studies can be utilized by teachers in an effort to create a link between assistive technology and personal supports, which will contribute to more successful vocational outcomes by preparing students with autism to use technological devices as vocational supports upon exiting school.

58C. Stephanie Smith

Mentor(s): Joseph Ferrare

Policy Network Convergence and Innovation Among Education Advocacy Organizations: An Analysis of the PIE Network

Groups from across the political spectrum, community leaders, and the public have grown frustrated with the persistent inequities that plague the public education system in America. In response to the common criticism that bureaucratic structures limit policy innovation in the education space, public and private organizations have formed networks in which policy ideas are spread. Scholars seek to analyze the policy discourse that occurs in these networks in order to determine how these groups and networks are influencing policy decisions. One essential finding is that, while the networks have a stated innovative nature, the policy ideas and preferences tend to converge over time. Recent work has begun to analyze the processes through which this convergence occurs. This project builds on this work by investigating the political, legal, and evidentiary conditions within states that give rise to policy convergence and innovation among advocacy organizations participating in the Policy Innovators in Education (PIE) Network. The analysis draws on data collected from the n=77 member organizations of the PIE network (January 2017) that include organizations from 35 states and the District of Columbia. Data collection consisted of policy ideas and solutions found in reports, briefs, and press releases gathered from member websites. These documents were then concept coded to create a two-mode member-by-policy solution matrix that served as the basis for identifying patterns of policy convergence and innovation. Additional data collection consisted of state-level attributes related to partisan make-up of legislative and executive bodies, laws pertaining to educational reform, and the evidentiary basis for specific policy proposals in each state. These attributes where used to create additional matrices to perform QAP regression analysis of policy convergence and innovation. Preliminary results point to the significance of state context in shaping the policy discourse in networks.

Engineering

59A. Hannah Dvorak

Mentor(s): Tom Dziubla, Zach Hilt

Utilizing Poly(Beta-amino-ester) Chemistry for the Facile Synthesis of Drug Eluting Gauzes

With the advent of "smart" technology comes the increased motivation to make materials do more for us. This is particularly true in the area of wound dressings – where innovations continue to emerge, ensuring patient safety and well-being. One compound particularly adept for these applications is chitosan: a natural polysaccharide derived from chitin that has antibacterial and hemostatic properties. Chitosan is only soluble in dilute acid; this presents a challenge in drug conjugation. This work exploits the free amino group found in the D-glucosamine monomer of chitosan and continues the work of our laboratory in fostering innovative and replicable poly(β-amino-ester) chemistry. There are many potential analgesic and anti-inflammatory drugs with a free phenol group that have the potential to first be acrylated and then undergo Michael addition to the free amine. After conjugation with the material, simple exposure to water would prompt hydrolysis of the ester bond, prompting release. To undergo this task, chitosan films of controlled thickness and density were formed via spin-coating and hydrogel crosslinking. As a test compound, curcumin was chosen given its antioxidant and colorimetric properties, increasing its ease of use. Drug conjugation and release was performed using UV spectroscopy and HPLC. Data suggest conjugation occurred and that drug release was observed over 24 hours. Future investigation will focus on the replicability of this data and the incorporation of potential drugs to be used in wound dressing applications.

59B. Stuart Ross

Mentor(s): Martha Grady

Adhesion of Biofilm Matrix-Mimicking Polymers

Subgingival biofilms developed from bacteria aggregation between the surfaces of a dental implant and the surrounding tissues can lead to peri-implantitis. This disease inflames soft tissue in the gum and mandible, potentially leading to implant loss. Biofilms are a collection of bacteria that secrete a matrix of extracellular polymeric substances (EPS) which influences a number of processes: attachment between the bacteria and a surface, transport of cellular material, protection, and a pathway for communication between bacteria. Uncontrolled growth between implant and surrounding tissue increases the risk of pathogenesis. Addressing oral biofilm proliferation requires access to the infected site involving undesirable dental or surgical operations. One prophylactic approach is to develop surfaces that prevent strong adhesion strength, reducing the duration of bacterial presence to minimize harmful outcomes. To prevent such adhesion, an appropriate adhesion strength measurement technique must be established. The laser spallation technique is one such method that will quantify adhesion strength in a non-contact manner at high strain rates and is appropriate for low cohesive strength films such as biofilms. Our two polymer films of interest are dextran and chitosan, which are polysaccharides abundant within the EPS of streptococci, a major constituent in deleterious oral biofilms. Films of dextran and chitosan are prepared on titanium-coated SiO_2 substrates to mimic the adhesion of biofilms to titanium implant surfaces. By exercising the laser spallation technique, we will develop a quantitative evaluation and comparison of biofilm matrix-mimicking polymers and their adhering strengths to an implant surface.

59C. Patrick Ryan

Mentor(s): Dibakar Bhattacharyya, Ashish Aher, Michael Detisch

Graphene Oxide and Iron-Palladium Composite Membranes

Graphene Oxide and Iron-Palladium Composite Membranes By: Patrick Ryan Nano-porous composite membranes (CMs) have become a popular topic of scholarly research due to their unique, desirable properties and potential for use in nanoscale separation and harmful-substance degradation. However, there are several obstacles that must be overcome before these membranes can become commercially available. Most CM production methods are inefficient and expensive, and some CMs face problems with adhesion, stability, and fouling. So, significant research has gone into developing CMs cheap and stable enough to be produced and used on an industrial scale. Two commonly studied CMs are graphene-oxide (GO) and iron-palladium coated membranes. In order to decide which of these membranes would be best to scale-up, their properties are investigated and compared. Three GO membranes (GO concentrations of 10 mg/m^2, 20 mg/m^2, and 30 mg/m^2) were created using a pressure assisted filtration method to deposit GO on PVDF-400B. The permeability of the control and three GO membranes were determined by measuring the flux of water at different pressures in a metal pressure cell. The permeability of four samples of Fe-Pd composite membranes were also determined. These included two polystyrens-35 (PS35) membranes with a metallic layer of Fe-Pd, one of which was bathed in hydrochloric acid to dissolve the iron in the metallic layer. A control sample of plain PS35 and a sample of PS35 bathed in hydrochloric acid were included in the study as well. The permeability of the GO membrane and Fe-Pd membrane were reported along with the results from several other characterization tests. These results provide information about the properties and scale-up potential of the GO and Fe-Pd membranes. This work could help determine the direction of future research to find the most practical commercial nano-porous composite membranes.

60A. James Sparks

Mentor(s): Alexandre Martin

Process of Providing a Small-Payload Return from International Space Station

The design of an efficient Thermal Protection System (TPS) remains one of the most challenging tasks of planetary exploration missions. Because of the harshness of re-entry environments, no ground tests can replicate these conditions, and engineers must rely on numerical models, which often lack validation data. To provide a path toward inexpensive validation, the KRUPS spacecraft is being designed at the University of Kentucky. The current project intends to release a KRUPS spacecraft from two separate rockets at high altitudes, and obtain data for the TPS. These launches consist of an important step toward the next phase, releasing the spacecraft from the International Space Station (ISS). These launches will raise the Technical Readiness Level (TRL) to a TRL 6 by demonstrating data acquisition, communication and TPS designs, which is required to release from the ISS.

60B. Sam Thompson

Mentor(s): Dibakar Bhattacharyya

pH Responsive Behavior of Laccase Immobilized Membrane

Polymers and polymer dispersions with different functional groups find their application as templates for ion exchange, layer-by-layer deposition, and for incorporation of different metal nanoparticles and enzyme immobilization. Cross-linked hydrophilic polymers are studied in different functionalization approaches, especially in preparation of responsive membranes. Membrane functionalization by surface modification with functional groups provides an opportunity to incorporate catalytic nanoparticles or immobilized enzyme in the membrane pores for surface reaction. In this study, commercially available Poly (vinylidene fluoride) (PVDF) membrane was functionalized using poly acrylic acid (PAA) to make a pH responsive membranes. The functionalization is confirmed by weight gain and water flux data, as the functionalized membrane will have a much lower flux. Due to the presence of carboxylic acids within the acrylic acid polymer in the membrane, the polymer changes in response to changes in pH of the permeate. This can be seen by measuring the flux of the membrane while varying the pH of permeate used. The flux was measured at pH levels of 4, 5.4 and 8.5, and the responsive behavior was fit to a model to show how it changes with the pH. The functionalized membrane is further characterized by measurement of contact angle, which changed from around 80° to 68° after functionalization, and surface zeta potential. This functionalized membrane has the potential application for further immobilization of enzymes, in this case laccase. A functioning enzyme can be attached to the membrane and, once immobilized, can interact with permeates to achieve degradation of a variety of toxic pollutants, such as Tri-choloro phenol (TCP). Approximately 4mg of Laccase was deposited onto the PVDF membrane. The flux of the membrane with the immobilized enzyme is measured at various pH levels to show responsive behavior and reaction aspects. This project is funded by NSF EPSCOR program and by NI-NIEHS-SRP.

English

60C. MiKayla Carter

Mentor(s): Peter Kalliney

The War Down South: How the Spanish Civil War Shaped George Orwell's Commentary on Propaganda

George Orwell, also known as Eric Arthur Blair, is known as a writer, a political commentator, a Brit, an Etonian, a member of the upper-middle class, a member of the Indian Imperial police force, a Spanish Civil War fighter, a traveler, and even a tramp. Above all, however, Orwell is known as the poster boy for anti-Communism, a sentiment that became prominent in the period following the second world war. Upon further inspection of Orwell's works, however, one must note that the writer does not simply idolize one side while antagonizing the other in his political commentary; instead, he provides an in-depth and often thought-provoking analysis of the political, economic, and social climates in which he lived. Most striking of Orwell's commentaries are the ones surrounding his ideas on propaganda, especially in the context of the Spanish Civil War. Orwell widely speculates on the treatment of propaganda, denouncing its cultural effects, applying it to the context of war as both a glorification of war and validation of propaganda, and recognizing the audience as a key player in propaganda's dissemination. By fully grasping Orwell's speculations, one can not only observe his ideas on propaganda as they relate to other ideas showcased in his work, but one can also examine

how Orwell's arguments surrounding propaganda evolve with the ending of the Spanish Civil War and the onset of World War II.

61A. Haley Latta

Mentor(s): Janet Eldred

Her Bed is India: The Making and Unmaking of The New Yorker Writer Christine Weston's Reputation

The purpose of this study is to place New Yorker writer Christine Weston in the curriculum alongside E.M. Forster and George Orwell and to provide further evidence of the dynamics of gender and transnationalism in the making – or unmaking – of literary reputations. Weston has remained virtually unknown in modern-day literary canons. Her novels, such as Indigo and The World is a Bridge, remain a testament to her sensitivity toward the British Raj government and the struggle for India's independence. Indigo is often compared to A Passage to India by E.M. Forster, and because of this association, Weston's absence from the public eye begs several questions. What prevented her from becoming an author associated with modern-day issues such as feminism and orientalism, especially considering the popularity of Orwell and Forster – authors who addressed similar issues? How was Weston's reputation influenced by her publications in The New Yorker magazine, and how were her works edited? Additionally, Weston's personal life is of particular interest. Was her position as a female author writing about India an explanation for her absence from the public eye? Why was there a ten-year gap in her fictional publications, and why did she cease writing during the last twenty years of her life? Through exploring her correspondence with long-time New Yorker editor, Katharine S. White, details regarding Weston's later years will become clear.

61B. Alyssa Mertka

Mentor(s): Matthew Giancarlo

De Sphera: Circle Diagrams, "Scientific" Knowledge, and Popular Culture in Five Medieval Manuscripts

Throughout the Middle Ages, scholars, clerics, and the common people struggled to understand the nature of the universe and their place in it. They preserved their search in manuscripts, many of which survive today in libraries across the world. The study of such manuscripts provides an intimate look into the ideas that permeated medieval society. My research examines five manuscripts from the British Library, Oxford Bodleian Library, and Oxford Corpus Christi Library, with an emphasis on the circular diagrams that accompany the scientific and pseudo-scientific texts they contain. Among the texts studied are Johannes de Sacrobosco's Tractatus de Sphaera (Treatise on the Spheres) and De Anni Ratione (On the Reckoning of Years), the Secretum Secretorum (The Secret of Secrets), and De Lapide Philosophorum (On the Philosopher's Stone) attributed to 14th-century alchemist John Dastin. These works cover the fields of astronomy and astrology, alchemy, geomancy and physiognomy, as well as politics. The diagrams accompanying these texts, transcribed and translated from Latin, are visual representations of the medieval zeitgeist reflected by these various "sciences". Though different, each circle tells the same story: all aspects of reality—from the movements of the heavenly bodies, to the the elements of the earth, to the human body and human personality—are governed by orderly, unseen forces. If one can unlock the secret knowledge of these forces, he will become master of his own fate, able to tell the future, and indeed even control the elements

themselves. Medieval opinions on these "sciences" were mixed, ranging from devoted belief to skeptical dismissal. Still, understanding pursuits such as astronomy and alchemy, as presented in these diagrams, provides a new and important context for contemporaneous literary works such as the pseudo-Aristotelian Secretum Secretorum and Chaucer's Canterbury Tales.

Entomology

61C. Seth Biedenbender

Mentor(s): Clare Rittschof

Downregulation of the aggression-correlated brain metabolism gene OXPhos may provide differentiation between robbing and normal foragers in the honeybee Apis mellifera

Honey bee colonies (Apis mellifera linguistica) are known to engage in kleptobiotic (robbing) behaviors against other colonies of the same species. Though hypothesized to belong within a subset of the forager caste, methods of differentiating robbing bees from typical foragers outside of a robbing context remain unknown, if a difference indeed exists. One notable difference between typical foragers and robbing bees is an intensified level of aggression. Downregulated expression of the brain metabolism gene OXPhos reduces oxidative phosphorylation processes in favor of increased aerobic glycolysis despite the presence of oxygen, and is a good indicator of bees in heightened aggressive states as a result of behaviorally plastic responses to varying stressors. To determine if robbers are in a differential state of plastic aggressive response differential from non-robbing nestmates, quantitative PCR analysis is used to measure brain OXPhos transcription rates in robbers and non-robbing nestmates collected before, during, and after a robbing event, as well as non-robbing foragers from an unrelated colony. Strong contrast in downregulation of the OXPhos gene between robbing and non-robbing nestmates may suggest differences in brain metabolism play a role in defining robbers as a unique subcaste within the hive demographic architecture.

Environmental Science

62A. Julianna Dantzer

Mentor(s): Shannon Bell

Creating a Community Guide Through Analysis of Successful Hydraulic Fracturing Pipeline Resistance Movements

This project analyzes how communities can join across a wide range of constituents to resist hydraulic fracturing pipelines, and identifies the barriers to organizing, particularly focusing on the industry's tactics to inhibit organization. The purpose is to use this information to provide a community guide for those resisting pipelines, or, more broadly, environmental injustices. Data was collected through conducting interviews with leaders in the successful resistance movement against the Bluegrass Pipeline, those currently facing the Kinder-Morgan natural gas liquids pipeline, and reviewing other literature focused on activism and organizing. Hopefully, this guide provides information to communities facing proposed pipelines detailing what forces they may be combating and how they may go about fighting the pipeline.

Forestry

62B. Grace Coy

Mentor(s): Mary Arthur

UK Tree Corps: A Pilot Study to Assess Attitudes and Sustainability of Lexington's Urban Forests

The expanding reach of citizen science represents a fundamental addition to understanding the status of Lexington's urban forests and provides a pathway for engagement of the community in elevating and managing it in sustainable ways. It is clear that Lexington's tree canopy exists in relatively poor condition, with low canopy cover, poor management, improper planting, and increased vulnerability to invasive pests. Ultimately, this depletes the potential ecological, social, and economic benefits the urban forest can provide. These ecosystem services include cleaner air, temperature regulation, reduced runoff, and aesthetic value. The Lexington community remains largely unfamiliar with these useful assets, thus creating a need to introduce knowledge and values that could effectively establish renewed perceptions of environmental values. In a pilot attempt to address this necessity, this 12-week pilot study was developed with the support of Dr. Mary Arthur and Dr. Ellen Crocker to test the potential for engaging citizens through tree health assessment and management training, data collection, and participant evaluation. As a result, these evaluations provided a means for the analysis of the effectiveness of this form of engagement on the evolution of the respondents' knowledge and attitudes towards Lexington's urban forests. The broader implications of this research sought to influence civil and ecological integrity by instilling a sense of responsibility within members of the community in regards to their interactions with the natural components of their dominantly urban environment.

62C. Willie Graas

Mentor(s): Matthew Springer

A Socioeconomic Assessment of Reintroduced Elk Species in Kentucky

Wildlife management success relies heavily on citizens' willingness to comply with regulations. Therefore, in order to create effective policies, the use of socioeconomic data is becoming increasingly important for state and federal wildlife management agencies. In 1997, western elk were introduced into eastern Kentucky to restore the commonwealth's elk population. Since reintroduction, the public opinion of the species has not been reassessed. The purpose of this research is to assess the statewide public value of Kentucky elk for the sake of providing relevant socioeconomic information to policy and decision makers in wildlife management. We will focus on the level of personal interactions with the species and its economic impact upon the individual. One thousand (1000) surveys will be distributed to split among Kentucky citizens living within the Kentucky Department of Fish and Wildlife Resources "Elk Zone", the other outside the "Elk Zone". The five hundred (500) surveys within the elk zone will be split among three subgroups: individuals producing agricultural commodities, individuals in the hunting and outfitting industry, and regular residents. The remaining half of the surveys will be distributed to other areas of the commonwealth. In the survey, individuals will be asked to answer questions indicating the nature of their interactions with Kentucky elk. We hypothesize that those drawing profit or enjoyment from the elk, (i.e., outfitters, hunters, outdoor enthusiasts) will have a positive intrinsic and monetary value of the species. Conversely, we believe those possibly sustaining damage or interference from the elk (i.e., farmers) will have a neutral or even negative

intrinsic and monetary value of the species. This data will help inform wildlife management personnel in creating effective policies and practices concerning elk in the commonwealth of Kentucky.

63A. Michaela Lambert

Mentor(s): Steven Price

Improving Detection of a Threatened Anuran Species (Lithobates areolatus) in Western Kentucky

The Crawfish Frog (Lithobates areolatus), a native Kentucky species, is classified as an IUCN Red List near threatened species and a Species of Greatest Conservation Need. Because of their secretive nature, estimating the population of this species is difficult outside of the breeding season. One method of estimating frog population numbers is through frog call surveys when frogs are calling at breeding sites. The peak-breeding season for this species often only lasts a few nights, sometimes even a single night, making the timing of these surveys critical. We deployed Frogloggers at seven wetlands in the West Kentucky Wildlife Management Area from 27 February to 21 April, 2016. The loggers recorded five minutes of every hour of every day. One minute of every recording was listened to in order to determine type of frogs calling and the calling frequency. Frequency was estimated using the National Amphibian Monitoring Program's 0 to 3 scale. Crawfish Frogs called from February 27th to March 17th with most of the calling activity occurring between the hours of 12am and 6am and 6pm and 11pm. Upland Chorus Frogs and Southern Leopard Frogs called from February 27th until April 21st. The Upland Chorus Frogs called mostly between the hours of 12am and 6am and 7pm and 11pm. Southern Leopard Frogs called primarily between the hours of 12am and 6am and 7pm and 11pm. Under the conditions which this study was performed, the best time for wildlife managers to conduct surveys for Crawfish Frogs in Western Kentucky is between the hours of 12am to 6am or 6pm to 11pm in late February to mid-March. Future analyses will use environmental factors to create a predictive model that will allow managers to better predict the conditions under which Crawfish Frogs are likely to begin their vocalization for the breeding season.

Health Management and Policy

63B. Michael Regard

Mentor(s): Julia Costich

Policy Initiatives that can be Taken by the State of Kentucky to Address the Growing Prescription Opioid and Heroin Epidemic

Background: The opioid epidemic is one that is sweeping across the nation, and its effects are especially profound in Kentucky, as we have the second highest number of opioid and heroin related overdoses per year in the United States. While Kentucky has taken some initiatives to address the crisis, there is still much to be done. Methods: We reviewed numerous articles on the successes and failures of the steps other states have taken to address the crisis. After analyzing their initiatives, we then reviewed the current legislation and guidelines in the state that pertain to prescribing opioid analgesics for the treatment of non-cancer pain. The current policies in place were then compared to the guidelines put forward by the Center for Disease Control and Prevention. Meetings were also held with experts in community awareness campaigns in order to better

understand the roles of various stakeholders in increasing public support and awareness. Results: A widespread public awareness campaign from the state government, increased reimbursement for non-prescription pain treatment, increasing access to, and education about, buprenorphine, and a revision of state prescribing guidelines relating to the prescription of opioid analgesics have been found to be the most successful actions that can be taken by the state. Conclusions: Preliminary data shows that when implemented with the full support and weight of the state government, significant decreases in deaths associated with heroin and opioid analgesics will occur due to these actions.

63C. Julie Crawford

Mentor(s): Rachel Hogg, Amanda Sokan

High School and College Student Knowledge on Aging Based on School Curriculum

Previous studies have shown how the increasing number of aging adults will affect our society and the need for people to enter careers in aging, such as geriatrics and gerontology. At the same time, there is an emphasis on generating greater understanding of the aging process to help those individuals moving across the lifespan and fight against ageism. This study seeks to understand high school and college student knowledge and attitude towards aging. The curriculum of Corbin High School was examined and students were interviewed about aging and older adults. Qualitative data about students' thoughts on aging and the knowledge they have learned in school about aging was obtained during focus group interviews. Our findings indicate that the students lacked adequate knowledge about aging and showed both positive and negative opinions on older adults. The high school students did not have any classes with curriculum on aging. University of Kentucky undergraduate students were emailed a survey containing the same questions asked in the focus groups with high school students. Based on the undergraduate answers, they have a better understanding on aging and more opportunities for curriculum on aging compared to high school students. However, results indicated there is room for improvement. By receiving a more inclusive education that discusses aging, students gain an appreciation of what happens when people age and a greater understanding of the opportunities in the field of geriatrics, such as research and medicine.

Health Sciences

64A. Zalak Patel

Mentor(s): Jessica Houlihan

Amount of Caffeine Consumed by University Of Kentucky Students and Its Effect On Their Sleep Quality.

Investigator: Zalak Patel Mentor: Jessica Houlihan Background: Caffeine consumption on college campuses has increased over the years due to the easy availability and more variety of products, causing college students to be sleep deprived. Little research has been done in order to show a relationship between the amount of caffeine consumed by students and its effect on their sleep quality. Methods: Data was collected from 50 college students (23 males and 27 females) ranging between the ages of 18 to 26 years old at UK. Surveys were distributed online and at university's library. The survey recorded the participants' caffeine consumption and how many hours of sleep they get per night. Fisher's test was used to analyze the data. Results: The data

concluded that 38% of students who consume the recommended amount of caffeine get adequate sleep compared to the 4% who consume more than the recommendation. 36% of the students who consumed caffeine above the recommended amount get inadequate sleep compared to the 20% of the students who consume the recommended amount. Fischer's test's p-value was calculated to be <0.001. Conclusion: The results suggest that students who consume caffeine above the recommended amount get an inadequate amount of sleep compared to the students who consume the recommended amount of caffeine. This could also be due to different factors like gender, age, and year in school.

64B. Parisa ShamaeiZadeh

Additional Authors: Kendall Mooney

Mentor(s): Ming Chih-Yuan

Experiences of Bone Marrow Transplant Patients and Their Family Caregivers in Kentucky: An Interview Study

Bone Marrow Transplant (BMT) is the second most frequent transplant in the US with the number of transplants occurring each year rapidly increasing. When BMT patients, their family members, and caregivers journey through transplant to survivorship, they often experience isolation and huge physical and emotional trauma due to changing health and caregiving needs. The purpose of this study is to observe themes that exist in the experiences, support, and care received by the patients and their caregivers throughout this BMT process. In-depth interviews were conducted with six BMT patients (mean age, 61, 3 female) and five family caregivers (mean age, 58.8, all female) to understand their experiences through the transplant process until 100 days post-transplant. Each reported experience in the interviews was coded based on a socio-technical system coding scheme: person, tasks, tools/technology, organization, physical environment and social context, and categorized into one of the three stages in the cancer continuum: diagnosis, treatment, and survivorship. Although patients and their family caregivers came from diverse backgrounds and reported different experiences, several themes of their experiences emerged: 1.) The journey from transplant to survivorship is a difficult one filled with many obstacles. These include social, technical, organizational, and physical obstacles. 2.) Their needs change over time, from decision and psychosocial support to instrumental and caregiving support; 3.) Formal or informal support team of families and friends is utilized, providing a positive recovery; 4.) A close relationship with providers is developed; 5.) Self-care is needed for caregivers due to their job's high demand; and 6.) Patients strive to regain strength, appetite, and everyday lifestyle pre-diagnosis. Though these themes appear throughout the interviews conducted in this study, limitations exist in respect to their applicability to individuals of other populations. This can particularly be attributed to the small sample size as well as the lack of diversity in the demographics of the patients and caregivers included in this study. These results could also vary depending on the location of treatment and care received by patients. It is important, therefore, to consider these factors when determining the applicability of the results to populations outside the Markey Cancer Center. Despite this limitation, the experiences reported in these in-depth interviews provide us invaluable learning of how these BMT patients and their family caregivers going through bone marrow transplant here in Kentucky.

64C. Mary Dixon

Mentor(s): Karen Skaff

Issues Affecting the Increase in Childhood Dental Decay in Kentucky

Untreated dental decay in Eastern Kentucky has risen from 23 percent in 2001 to 53 percent in 2016, respectively. Previous studies discussed the statistics in Kentucky, which concluded that untreated caries is increasing in children. However, this study addresses why the rate of untreated dental caries is increasing in children. Current methods the Commonwealth of Kentucky are implementing to improve oral health in children are discussed in order to determine their usage and effectiveness. Resources and current programs available to children and families such as KCHIP, Smile Kentucky, and Seal Kentucky are examined. A literature review was completed of previous studies through PubMed to investigate the seriousness of this issue and research the effectiveness of current and past methods to lower this undesirable outcome. Additionally, interviews were conducted via email, phone, and in person of professionals currently involved in the childhood dental caries epidemic such as a dental hygienist, pediatric dentist, elementary school teacher, and University of Kentucky professors in the dental and public health departments. This study concluded that programs that provide care directly to children, for example, school based initiatives, are more effective than programs in which parents must be involved because access to care, coverage, and transportation are eliminated. However, if more dentists are recruited to the Eastern Kentucky area and if the reimbursements through the KCHIP program increase so that more dentists are willing to accept this program, then this outcome should begin improving. To make further recommendations on this topic, more research must be completed specifically focusing on Eastern Kentucky. Each method used to combat this epidemic should be analyzed further so that this region can ensure that effective programs and measures are utilized in order to encourage children and parents to prioritize oral health.

65A. Cannon Hanebuth

Mentor(s): Randa Remer, Michelle Butina

Comparison of Academic Performance Between Rural and Urban Physical Therapy Students

Research suggests that rural education, in elementary and high schools, is associated with lower performance rates when compared to urban schools. Most often, the lower academic performance rates are due to socioeconomic disparities. There is little data on the impact of rural geographical setting on professional level of education. Data was collected from five of the most recent Physical Therapy (PT) graduating classes, spanning from 2010-2014 (300 students) at a research institution in the southeast. The professional program consists of two campuses, rural and urban, which were used in comparison. Approximately 46 students are accepted into the urban campus each year, while only 16 students into the rural campus. Overall participants reported being 65.6% women, 93.4% white, 91% of traditional age, and 37.2% growing up in a rural community when entering the program. Two groups of variables were analyzed: pre-entry statistics (undergraduate college attended, major, degree, graduate records examination, grade point averages) and PT program success (course grades, board pass scores, comprehensive scores, professional grade point average). Multiple linear regression analyses were used to determine if rural campus created any variance. The results indicate that campus location is not statistically significant. However, undergraduate grade point average

(GPA) and graduate records exams (GRE) proved to be influential in predicting professional GPA, as well as Board and Comprehensive scores.

65B. Brock Sigler

Mentor(s): Michelle Butina, Randa Remer

Trends for Success

The purpose of this research is to examine previous physician assistant students in an effort to see what trends in both their demographics and scholastics proved to make for a successful student in the graduate program. For our research success is defined as graduation for the program. The goal is to eventually be able to develop and confirm certain trends that will allow us to form working hypotheses about what demographics and scholastic success has made for successful physician assistant students. The research is carried out with data from physician assistant students from the University of Kentucky and Morehead State University dating from to 2003 to 2016. The demographic data we are examining are students' ages, genders, ethnicity and international statuses as well as city and county of origin. As for scholastics, we are examining students' majors, degrees, GPAs, undergraduate colleges attended, GRE scores as well as letter grades in the physician assistant program courses. An example of a specific area we have focused on is looking at whether students are from rural areas, urban areas or an international student. By looking at these areas we can develop trends about how a students success could be correlated to the area they grew up. Although these trends tend to be very precise, by developing these types of trends we will be able to provide valuable information about exact demographic and scholastic characteristics in a significant amount of students that has led and will continue to lead to student success within these physician assistant programs.

Hispanic Studies

65C. Elizabeth Penava

Mentor(s): Ruth Brown

Immigrants & Immigration Policy: Past, Present, and Future in the United States and Kentucky

Immigration policy, especially as it relates to undocumented immigrants, has long been a subject of controversy, and the 2016 election and new Trump administration have brought it into the spotlight. This project examines current United States immigration policy, changes to policy in 2017, and the effects of these policies on undocumented communities, specifically with regard to the commonwealth of Kentucky. The project also analyzes resistance and advocacy movements among immigrant communities. Local and national periodicals, government-issued data, social media, and immigration-focused scholarship were examined in the research process to generate a holistic, structurally analytical but current-events minded data set. Ultimately the analysis resulted in the conclusion that, under the Trump administration, newly lowered barriers to deportation and a call to action to Immigration and Customs Enforcement has quickly elevated alertness and fear among undocumented immigrants, generated uncertainty for many families and DACA recipients, and ultimately opted for an unjust and ineffective solution to a broad and complex policy problem. The new

administration and future policymakers should broaden the scope of their analysis of immigration policy to craft a policy that better protects immigrants and immigrant families.

Honors

66A. Fiona Foster

Mentor(s): Melissa Stein, Diane Snow

ASH Inc.: Mentoring for Gender Equality in Appalachian STEM

Growing up female in America brings with it challenges that men simply do not face. STEM fields, in particular, are notorious for exacerbating these challenges for women. They are also notorious for having open jobs with high salaries; thus, the absence of women in these fields is a tough blow for gender equality. Appalachian girls face the compounded challenges of being female in America and being Appalachian in America. Thus, support for Appalachian girls and women in STEM is not just a step toward gender equality, but also a brilliant opportunity for Appalachia and the STEM industry. These girls and women will bring the unique strength and character of Appalachia to the STEM industry while building economic opportunity and independence in their region. Most importantly, this pairing will provide a foundation for Appalachian girls to build bright and limitless futures for themselves. This research examines women in STEM and in Appalachia and current non-profit work related to these causes. It utilizes peer-reviewed research, reports on the work of current non-profits in the region and interviews with STEM-facing nonprofit leaders. The result of this research is a comprehensive business plan for a non-profit, ASH Inc., that would seek to equip and empower Appalachian girls and women, through education and mentoring, to achieve STEM success. This non-profit would be the first to focus solely on STEM support for Appalachian women and girls, and support women of all ages through a fully in-house mentoring program. If implemented, ASH Inc. would increase access to STEM careers for Appalachian girls and improve working conditions in STEM for Appalachian women all while respecting and embracing the unique culture and heritage of this region.

Human Environmental Sciences

66B. Paige Lautzenheiser

Mentor(s): Jessica Houlihan

Association between current status of student eating habits and whether the addition of a mandatory cooking class would increase the frequency with which students cook their own healthy meals

Background: While time constraints and stress can lead to poor choices, many college students are not equipped with skills to successfully prepare healthy meals. The UK Core program was designed to teach skills outside a student's department and assist in developing life-long habits. However, little is known about the status of UK student eating habits and whether a cooking class would increase the frequency with which students cook healthy. Methods: Data was collected from 179 students (21 males; 157 females) at the University of Kentucky. Self-reporting surveys were distributed randomly to students from various academic backgrounds, and recorded the participants' cooking frequency, barriers to cooking, interest level in a cooking

class, and whether they feel the cooking class would help them cook healthier. Results: The data concluded 49.16% of participants agreed the cooking class would improve their eating habits (r=-0.016), with females (62.18%) being more likely to agree (but not significantly) than males (61.90%) (p-value 1.0). 45.81% of participants agree to willingly take the course, regardless of whether it was required by the UK Core program. Also, it was found that participants cook on average 2.5 times per week, with 45.25% of participants claiming time prevented them from cooking more. Only 10.06% claimed lack of cooking skills as a prevention to cooking more. Conclusion: The results suggest UK students are open to a UK Core cooking class; however, whether this course would increase the number of students who cook healthy meals should be studied further. Other factors (time, money, etc.) appear to affect why students choose not to eat healthy more significantly than lack of cooking skills.

Human Health Sciences

66C. Hannah Colson

Mentor(s): Randa Remer, Brad Hubbard

Implementation and Findings of Mission Smile: An Oral Health Initiative

In the Lexington area there is a critical need for assistance in promoting education on oral health. Through Mission Smile, a specific curriculum is implemented in an attempt to address the growing need for more easily accessible resources and information on dental hygiene in neighboring communities. Mission Smile is a 4-week program at the William Wells Brown Community Center that provides resources and educational materials for children, adolescents, adults, and seniors. Specifically, Tuesday nights are aimed towards kids and teens while Wednesdays are focused on adults and seniors. The activities and handouts are designed around the age group that they are serving. Each week has a different theme that focuses on a certain subject or topic in the health care field of dentistry. Groups of volunteers including mostly members of the University of Kentucky's Pre-Dental Society are trained on how to be aware of the sensitive subjects and cases that may present themselves at the program nights. Donations were given from various personal donors as well as businesses and dental offices that helped provide materials. In addition to donations, grants were applied for to help cover the necessary dental supplies that were needed to hand out to the community. These free resources included items such as toothbrushes, toothpaste, dental floss, and mouthwash. The purpose of this outreach program was to shed light on the need for more health initiatives and to also help increase cultural competency while further exploring the diversity of the community. Cultural competency helps to not only become more aware of financial or geographical barriers that prevent access to necessary means for health but also helps to become a more sensitive and informed health care provider.

Immunology

67A. Kathryn Perry

Mentor(s): Katie McKenna

Role of Splenic Microenvironment in B-cell Chronic Lymphocytic Leukemia

Chronic Lymphocytic Leukemia (CLL) is characterized by accumulation of clonally expanded CD5+ CD19+ B lymphocytes in the peripheral blood and secondary lymphoid organs. CLL proliferation is activated primarily through the B cell receptor (BCR) that responds to external signals from the microenvironment. It is well known that the microenvironment has a critical role in CLL survival and growth as culturing of CLL cells in vitro leads to cell death. The Eμ-Tcl1 mouse serves as an excellent model to study CLL as they develop a CLL like disease by 9-13 months of age, due to B cell specific overexpression of the oncogene, T cell leukemia 1 (Tcl1). Ultrasonography showed a dramatic enlargement of the spleen, which preceded detection of leukemic cells in the blood and other organs leading us to investigate the role of the spleen niche. Using an adoptive transfer model from Eμ-Tcl1 CLL mice to recipient syngeneic mice we observed that, unlike various genetic modifications, which can only delay or advance the onset of CLL, splenectomy in these models, cures or significantly delays disease development from 30-35 days to 250-270 days. We are currently trying to determine the important stromal cell types in the splenic niche that support the growth of CLL. Cx3Cr1 expression can be found on monocytes and natural killer cells. CD21 expression can be found on transitional and mature B cells and follicular dendritic cells. We have created a model to specifically ablate Cx3Cr1+ and CD21+ cells using a cell specific cre-recombinase system induced by diphtheria toxin administration. Our results show that it is possible to ablate Cx3Cr1+ and CD21+ cells in these mice. We will next use the Cx3Cr1-cre and CD21-cre mice to determine if the presence of these stromal cells influences the growth of CLL in vivo by administering DTx and adoptively transferring CLL cells.

Journalism

67B. Ally Hicks

Mentor(s): Buck Ryan

The Maggie Lu Method: A Novel Approach to Teaching Chinese Language and Culture

Teaching English as a second language has a long history of theory and practice (Richards, 2001), but in China the rapid growth in economic activity and population over the past few decades appears to be matched with a soaring enthusiasm for teaching and learning English (Feng, 2011). Instruction geared to standardized testing—the zhongkao for middle school students aspiring to an honors high school and the gaokao for high school students hoping to attend a top university in China or the West—focuses on reading and writing with an emphasis on reading and little writing and speaking and listening with an emphasis on listening with little speaking. A case study based on experiences at the Little London English School, a private school to enhance instruction of public school students in Hohhot, capital of Inner Mongolia, in summer 2016 revealed shortcomings in traditional teaching methods and the promise for more effective approaches using "The Maggie Lu Method."

Kinesiology

67C. Marley Foertsch

Mentor(s): Shelly Krajny

Sleep and Stress in Kentucky Honors Student

The purpose of this project was to assess the influence of sleep on stress level. The onset and quantity of sleep in a Kentucky Honors student was tracked every day for 30 days. Stress was evaluated qualitatively using a scale adapted from Stanton et. al. (http://journals.sagepub.com/doi/pdf/10.1177/00131640121971455) and quantitatively using blood pressure and heart rate measurements taken around the same time each day. Extraneous factors including diet, exercise, and water intake were also recorded. This project is intended to increase knowledge and understanding of personal health and wellness through the compiling and analyzing of personal health data and by evaluating sleep's effect on stress. It is also intended to increase understanding of what influences behavior through the tracking and subsequent review of factors that affect sleep and stress. Reliable sources of health information were recognized and compared to experimental findings.

68A. James Morelli

Mentor(s): Brian Noehren

Using Cortex and LabView to Generate 3D Skeletons of Subjects with a history of Knee Surgery

For Physical Therapy and Biosystems Engineering students alike, data plays a large part in the progress of a subject's recovery. It can help depict if future injuries may arise, as well as show whether their current surgery and therapy process worked. We get this data from markers placed on the subject's body and them running on a force plated treadmill. And with this data, we can use Cortex and LabView to create a 3D model of the subject while they are walking or running on the treadmill. This 3D model depicts for us certain forces and moments that the subject is going under as a whole, to even being able to show the forces specific limbs or joints are under. Then, we can look at the data and compare it to a control to check for any abnormalities in the walking or running of the subject that may have been a result of their injury, as well as to see the stress and strain that the knee and surrounding limbs may be under to see how effective the surgery and therapy is. In the end, Cortex and LabView are very useful tools for students and researchers alike that need real life data to help improve peoples' lives post-injury.

Landscape Architecture

68B. Morgan Dunay

Mentor(s): Chris Sass

Aesthetic Preference of Bio-Infiltration System in Kentucky Study

The Aesthetic Preference of Bio-infiltration System study assessed aesthetic values of water management solutions in Kentucky. This study was developed based off the idea of creating a set of research based findings to support the aesthetic design of bio-infiltration systems. This study is comprised of a three part survey

looking at background knowledge, participant social and regional background, and an aesthetic preference portion. This study has been distributed to the students at the University of Kentucky and will be distributed to community members of Lexington. This study is designed to help professionals and students alike in the profession of Landscape Architecture to develop an aesthetically preferred water management solution based on regional and community context. This tool ideally will help give ownership back to the community members who will interact with these systems and to allow for designing more sustainable solutions.

68C. Azar Daneshvarnejad

Mentor(s): Jayoung Koo, Brian Lee,

Sustainable Educational Garden Planning & Design: With Emphasis on Renewable Energy and STEM

This study investigates the opportunities for the best locations for using photovoltaic panels in places to maximum the use of solar energy. Standard landscape architectural methods were used including site inventory & analysis, case studies of similar projects, and an iterative design process for two physical campus locations, one at Morehead State University (MSU), and a second on the UK Campus. This study investigates the hypothesis that the best points for using photovoltaic panels is places regards with maximum solar radiation. Since solar energy is particularly important for this project, specialized analysis methods were applied to examine sun exposure and shade in the field to inform the potential design solutions. The first project is a re-design and update a public space as a sustainable educational garden planning & design with emphasis on renewable energy and STEM on Morehead State University Campus located in Morehead, KY. This public space is located between Lappin Hall and 140 3rd Street (temporary building), between E2nd and E3rd Streets. This location has an existing solar panel in a public space that was determined by campus leaders and Center for Environment Education (CEE) to be underutilized as an element of outdoor classrooms too. The second project is a similar to first one, located in front of Chemistry-Physics Building, and near the Einstein Bros Bagels entrance located in 505 Rose Street Lexington, KY 40508.The project is focused on a highly visible public intersection. These design projects will highlight further support STEM educational opportunities. Science, Technology, Engineering, and Mathematics/STEM academic projects will support future opportunities for installation photovoltaic solar panels that might be designed in different types: movable, aesthetic, or small structure.

Marketing

69A. Brooke Hamilton

Mentor(s): Holly Hapke

The Impact that Cause-Related Marketing has on Consumer Buying Behavior

This research will explore the underlying reasons why consumers engage in cause-related buying behavior, how businesses facilitate cause-related marketing campaigns, and will examine specific examples of cause related-marketing and the financial benefits of including a philanthropic facet to a brand.

Mathematics

69B. Ethan Reed

Mentor(s): Carolyn Yarnall

Finding counterexamples for fair division of multiple goods

An envy free division of a single good for some number of players occurs when the good is divided such that each player would prefer a different piece. Sperner's Lemma, a result in combinatorics, yields envy free divisions of a single good cleanly. However, for division of multiple goods, where the piece selection is dependent between each good, it can be shown that, for certain player preferences, it is impossible to create an envy free division. For example, consider an employer attempting to divide payment for two afternoon shifts and two morning shifts for two employees, on two different days. The employees have to work one afternoon shift and one morning shift, and the employer would like to find a salary division such that the employees would prefer entirely different shifts. Now, suppose that the first employee prefers to work double shifts, while the second prefers to work on separate days. There is certainly an amount of money for which either would change their preference, but then they would both prefer exactly the same shift, making the employer's task impossible. By a similar argument it can be shown that an envy free division of two goods, into two pieces, for two players is never possible. It is hypothesized that that an envy free division of n goods, into n pieces, for two players is also never possible. The first several cases can be shown easily, but a complete general proof has thus far remained elusive. Techniques in linear algebra, graph theory, combinatorics, and geometry have been used to work towards such a proof.

Medicine

69C. Cassidy Dietz

Mentor(s): Joe Abisambra

Drug Discovery for Tauopathies by Monitoring PERK-Regulated RNA Translation

Tauopathies are neurodegenerative diseases associated with misfolding of the tau protein, which aggregates into neurofibrillary tangles in the brain. Misfolded tau induces the unfolded protein response (UPR), which is characterized by activation of a kinase called PERK. The first step in PERK activation is dissociation from BiP, then dimerization, and autophosphorylation. Then, pPERK phosphorylates the eukaryotic initiation factor 2 subunit alpha (eIF2α) thereby reducing the rate of translation. Chronic PERK activation is linked to tauopathies, and recent work from our laboratory shows that modulation of PERK activity has positive outcomes in animal models of tauopathy. However, a major challenge in the field is the identification of PERK modulating compounds. Dendra2 is a green fluorescent protein with photoswitchable properties. When exposed to a 405 wavelength, Dendra2 will fluoresce red. This conversion is irreversible; therefore, initial readings of GFP and RFP can be taken of cells tagged with Dendra2 protein. Repeat measures can be performed before and after photoconversion. This experiment took advantage of these properties to design a screening method to identify PERK activators. Human Hek cells were tagged with Dendra2. Rates of translation were measured in cells expressing Dendra2 for untreated, DMSO control, and cells treated with doses of a known PERK activator (CCT), an inhibitor of translation (cycloheximide or CHX), and a downstream inhibitor of the PERK pathway (ISRIB) to optimize the control dosage for screens of CCT

compounds. An initial reading of GFP and RFP was taken, then the cells were photoconverted. After the exposure, the cells were monitored for new GFP for 18 hours. A dose of 1 μM was determined for use as a control in screens of CCT compounds based on this method. Utilization of the cell line and Dendra2 has shown to be an effective method for drug discovery related to RNA translation.

70A. Katharine Carter

Mentor(s): John D'Orazio, Stuart Jarrett

Melanocortin 1 Receptor Signaling Axis Accelerates Repair of Cisplatin-induced DNA Damage

The melanocortin 1 receptor (MC1R) is a melanocyte Gs-coupled receptor that signals through cAMP, regulates melanocyte UV responses, and mediates the adaptive pigmentary response. MC1R signaling improves melanocyte genomic stability by accelerating repair of UV photodamage. MC1R-dependent augmentation of nucleotide excision repair (NER) efficiency is mediated through PKA-mediated phosphorylation of ATM and rad3-related (ATR) at Ser435, a post-translational event that promotes interaction between ATR and the Xeroderma pigmentosum A (XPA) protein, a key NER factor. Here, we report that MC1R's effect on melanocyte genomic stability extends to cisplatin-induced DNA damage. We found that cisplatin damage repair is accelerated by cAMP signaling, either through agonistic MC1R ligands or by pharmacologic induction by forskolin (FSK), as measured by clearance of cisplatin-DNA adducts. Activation of cAMP signaling reduces cisplatin-mediated mutagenesis in melanocytes. Together, this data implicates MC1R signaling as a broad regulator of genomic stability in melanocytes, and suggests that MC1R defects may play an important role in melanoma development as a secondary malignancy after cisplatin therapy.

70B. Asir Chishti

Mentor(s): Roberto Gedaly, Lilia Turcios, Francesc Marti

Mentors: Roberto Gedaly, Lilia Turcios, Francesc Marti

Hepatocellular Carcinoma (HCC) is the most common primary malignancy of the liver representing 85-90% of all primary liver cancer cases. Treatment options for patients with advanced HCC are not effective. Therefore, there is an urge for finding novel therapies to treat HCC. Our lab has demonstrated the inhibitory effect of FH535, a B-catenin inhibitor, on HCC cell proliferation in vitro and on tumor growth in vivo. Because of this effect, we synthesized FH535 derivatives to assess their antitumor potential. The treatment of HCC is challenging due to the heterogeneity and complexity of tumors. Current efforts are directed towards combination therapy as a promising alternative for treatment of advanced HCC. In this study, we evaluated the compatibility between B-catenin inhibitor treatment and T cell immunotherapy by determining the effect of FH535/derivatives in T cell responses. Our goal is to find FH535/derivatives that will prevent HCC tumor growth without interfering with the anti-tumor activity of T cells. We first addressed the sensitivity of T cells to FH535 and derivatives in the Jurkat T cell line and demonstrated that FH535 but not one of the new compound tested (LMK-2-285) inhibited the T cell proliferation. This effect correlated with the reduction of B-catenin transcription activity as determined by a reporter assay. We next confirmed the effect of FH535 and LMK-2-285 in primary human T cells. Our results showed the differential sensitivity of primary T cells

to these compounds in activation, IL-2 production, proliferation and differentiation. In addition, we demonstrated the distinct metabolic pattern induced by FH535 and LMK-2-285 as potential mechanism of action. Overall, these results demonstrated that the antitumoral action of LMK-2-285 does not interfere with the activation of T cells. These finding support the rationale for the combination of LMK-2-285 in combination with immunotherapy as a novel strategy for HCC treatment.

70C. Jeremy Jones

Mentor(s): Charles Lutz

Sex-Specific IRF4 Expression in Natural Killer Lymphocytes

Men have a higher incidence of cancer than women, especially in the elderly. This is true even when sex-specific cancers are excluded. Natural killer cells are important immune surveyors which control tumor growth in humans and animal models. In the elderly, women have greater natural killer cell activity than men. In addition, our lab has identified higher mRNA expression of the transcription factor interferon regulatory factor 4 (IRF4) in unstimulated female natural killer cells compared to males. This study aims to investigate the differential activity of IRF4 in natural killer cell activation in males and females of various ages. The role of IRF4 in natural killer cell activation has not been explored despite its importance in other lymphocytes, including the functionally-similar cytotoxic T lymphocytes. We use RT-qPCR to measure the mRNA expression of IRF4 and other factors that are important in NK cell activation or that are known to be induced by IRF4. These factors include the cytokines interferon gamma and tumor necrosis factor alpha, the chemokine MIP-1 beta, and the transcription factors BATF, EOMES, Tbet, and Blimp1. We examined the expression levels in unstimulated NK cells and cells stimulated by the presence of IL-12 and either crosslinking CD16 or NKp46. We continue to compare sex differences in both young and elderly adults and we will report our findings in the poster.

71A. Christina Pistilli

Additional Authors: Madison Sands, Kavi Dayaram

Mentor(s): James Geddes, Chen-Guang Yu

Flubendazole Improves Recovery Following Spinal Cord Injury in Rats

Neurodegeneration following spinal cord injury (SCI) is due, in part, to inflammation and immune responses. Flubendazole is a benzimidazole anthelmintic used to attack parasitic worm infections, and approved for human use. It binds to tubulin and impairs microtubule-dependent mechanisms, including the proliferation of rapidly dividing cells such as B lymphocytes. Activation of B lymphocytes and production of autoantibodies contributes to neurodegeneration subsequent to traumatic SCI in humans and in animal models. The aim of this research was to determine whether post-SCI treatment with Flubendazole decreases neurodegeneration and improves functional outcomes when administered post-SCI. Spinal cord injury was modeled in rats (female, Sprague-Dawley) at thoracic level T10 using a computer controlled impactor at the 180 kdyn force setting. Flubendazole was administered at a dose of 10 mg/kg/day via intraperitoneal injection beginning 3h postinjury and then daily for four weeks. Locomotor behavior was evaluated using an open field test and kinematic analysis. The extent of neurodegeneration was estimated by measuring tissue sparing and

lesion volume. Flubendazole improved open field locomotion, specifically the coordinated pattern index, and the reflex index (p<0.05). The increase in tissue sparing did not reach statistical significance with the small sample size (n=6/group) utilized in this study. Overall, the results support the hypothesis that post-SCI administration of Flubendazole is neuroprotective and improves locomotor function. Flubendazole is well–tolerated at therapeutic doses and represents a potential therapeutic to limit the neurodegeneration and improve outcomes following SCI.

71B. Angela Wei

Mentor(s): David Fardo

Exploring Bioinformatics Methods

The purpose of this project is to explore bioinformatics methods that can be later used for a more advanced and directed project. The first task completed was to understand basic commands in R, a statistical programming language. This goal was completed by completing a tutorial based on the R swirl package and exploring Braineac, a database that contains eQTL (expression quantitative trait loci) analysis of brain tissue from 134 patients. From this process, various skills were learned, such as uploading data into R and utilizing the range of libraries available in R. The second task was to work with eQTL analysis of one single nucleotide polymorphism (SNP), rs10815376, from the Genotype-Tissue Expression (GTEx) Portal. The GTEx Portal is a database that contains eQTL analysis of multiple tissues from human patients. After learning how to extract data from a multi-tissue eQTL of this SNP, the data will be used to test the distribution of the SNP in brain tissue compared to other tissues.

Merchandising, Apparel, and Textiles

71C. Katherine Dale

Mentor(s): Scarlett Wesley

Small Group Dynamics: Transitioning from the Classroom to Studying Abroad

Research has been conducted on group dynamics, but a miniscule amount focuses on college study abroad tours. Providing more insight into the formation of student groups and how student groups effect student work abroad, could allow for professors to better organize student interactions that foster a growth in group dynamic. For this reason, the purpose of the research was to show the formation of a group throughout the study abroad experience by utilizing the five stages in the Tuckman model of group dynamic progression. The five stages of the Tuckman model are forming, storming, norming, performing, and adjourning. Research was achieved through observation of small group activities in the classroom and outside of the classroom so that group dynamic would be enhanced to utilize the 11 days abroad in Italy. Based on observation, the study abroad group advanced through all the stages of Tuckman's theory and did revert to some stages. Students that had gone on previous trips with Dr. Wesley commented that this group seemed much more advanced in their group interactions overall as compared to others. Even after returning from the study abroad tour students spent free time together and interacted in other classes. Overall, the successful group dynamic could be attributed to the extra effort made to give students group interaction. More communication and beginning

the meetings earlier in the school year would have improved group dynamic even more. To validate the research, it would be beneficial to supply more cases to compare with the original study and allow professors to test multiple group dynamic strategies.

Microbiology

72A. Kirsten Canini

Mentor(s): Erin Richard

Investigation of Best Practices in Contact Lens Hygiene: Microbial Growth in Lens Storage Solutions and on the Contact Lens Surface

There are more than 30 million contact lens users in the United States. Although proper hygiene practices for lenses are important for reducing the risk of eye infections, the recommended practices for the care of contact lenses varies widely. The purpose of this study was to determine the contact lens solution that best prevents growth of normal eye microbiota and how well eye microbes adhere to contact lenses by forming biofilms. Human eye microbiota were isolated and grown on blood agar and identified as Staphylococcus aureus based on staining and morphology. Isolated S. aureus was cultured and diluted in hydrogen peroxide, multipurpose, and saline contact lens solutions. Bacterial growth following 24-hour incubation was assessed by the number of colony-forming units (CFU) of S. aureus in each culture. The hydrogen peroxide-based solution was the most effective in inhibiting S. aureus growth, yielding no growth from the cell cultures, and the saline solution was the least effective yielding 6.05*10^6 bacterial colonies. The ability of isolated S. aureus and two purchased common eye microbes, S. aureus and Psuedomonas aeruginosa, to adhere and form biofilms on the surface of contact lenses was determined by inoculating bacteria cultures with a soft hydrogel based contact lens for 24 hours. After rinsing lenses in PBS, adherent bacteria were removed from lenses with stirring, and the CFU of each culture was quantified. P. aeruginosa adhered the most to the contact lenses with an average CFU of 4.10*10^6 for three trials. The isolated eye bacteria and S. aureus adhered less, averaging approximately 1.0*10^5 CFU. Overall this study is useful for establishing standardized best practices for the care and use of contact lenses in order to prevent eye infections.

Neuroscience

72B. Bhavik Patel

Mentor(s): Jose Abisambra

Analyzing Neuronal Activity in the Amygdala after Traumatic Brain Injury

After traumatic brain injury, damage to the brain tissue is noticed due to a blow to the head of an organism. With the brain areas being damaged, there tends to be decreased activity of specialized functions that are performed by certain regions of the brain. To investigate what areas have been damaged, a MRI analysis is performed. Checking specifically for responses in the amygdala region of the brain, where response to fear and emotion is controlled, was the focus of this project. A mouse model is used to compare the differences of a normal brain to that of a brain that has suffered traumatic brain injury. The injury is induced by striking the

head with either the skull closed or by removing a certain area of the skull off, then striking the exposed area there (superficial injury). The mice being observed are either non-transgenic or transgenic (rTg4510 – tau protein), to see if there is a possible link between brain injury to tauopathies. After the injury has been induced, a dose of 414 or vehicle is give once per day at 100 mg for 30 days. In between, observation of the behavior of the mice through tests like radial arm water test, novel object recognition test, and open field test are conducted. A base scan of the mice brains is completed to see the damage and activity, proceeding with an intraperitoneal injection of manganese chloride. The ME-MRI analysis is done to see the neuronal activity in the brain, by noting the amount of manganese uptake the neurons do as it behaves similar to calcium uptake. A 6 hour scan is performed after to see levels of manganese uptake, then quantitative values are outputted through brain mapping and ROI analysis.

72C. Katherine Clowes

Mentor(s): Luke Bradley

Developing a High-Quality Screen for Understanding Pervasive Binding Proteins

Phage display is a high-throughput technique used to screen large combinatorial peptide and protein libraries for identifying individual sequences that interact with a defined target. While this technology has been useful in many bioapplications, including identifying cell interactomes, a common problem with screening random sequence libraries is the high incidence of false positives in which many of the sequences are not biologically relevant. Thus, to productively screen libraries, strategies to minimize false positives are needed to streamline this technology for use in downstream applications. The goal of this long-term project is to test the hypothesis that displaying high-quality combinatorial libraries of on a pervasive-binding scaffold will minimize false positive interactions. Utilizing the central calcium signaling protein calmodulin (CaM) as a library scaffold, the Bradley Laboratory has constructed and characterized diverse combinatorial protein libraries that were free of truncated sequences, able to be overexpressed, and rich in novel binding specificities. To determine if CaM would serve as a suitable display scaffold for phage display, this project will involve subcloning large combinatorial CaM gene libraries into the gIII gene on a M13 bacteriophage phagemid. Following library subcloning, the libraries would be screened for binders to a well-characterized pervasive binding proteins. Isolated sequences will be identified and compared to those known interactors, as well as isolated sequences from a random phage display library. Preliminary data supports this rationale as the random library yields mostly false positive binding sequences to define pervasive binding target glyceraldehyde-3-phosphate dehydrogenase.

73A. Aaron Silverstein

Mentor(s): Warren Alilain

Reversing Breathing Paralysis after Traumatic Spinal Cord Injury

Most spinal cord injuries (SCI) occur in the cervical spinal cord. At this level are the pathways to the phrenic motor neurons which innervate the diaphragm. The resulting effects of injury here can be devastating, leading to deficits in respiratory motor function which often necessitate the permanent use of ventilators in human patients. This leads to a decreased quality of life. Our laboratory is focused on the development of effective

therapeutic strategies to restore breathing after injury, using the lateral C2 hemisection model (C2H) of SCI in animals. This pre-clinical model severs the descending ipsilateral bulbospinal pathway and paralyses the ipsilateral hemidiaphragm, thereby eliminating the animal's ability to breathe on the side ipsilateral to the C2H. This injury leaves spared pathways which include the crossed phrenic pathway (CPP) which bypasses the lesion. Activation of the CPP by increasing respiratory drive can effect a mild recovery of function on the side ipsilateral to the C2H. One strategy to increase respiratory drive is the exposure of injured animals to intermittent hypoxia (IH). Additionally, pharmacological approaches involving increasing the production or proliferation of certain chemical messengers involved in the recovery process results in further recovery of respiratory motor functionality. Our research is ongoing, and is focused on IH, pharmacological approaches, and the combination of the two.

Nutrition

73B. Alison Shuff

Mentor(s): Jessica Houlihan

Association Between the Time Spent in Class or Work and the Frequency of Stimulant Use Among College Students

College students juggling classes and jobs are experiencing increased stress for, mostly. To deal with stress, college students are increasingly turning to stimulants to aid in their daily and weekly tasks. The incidence of stimulant abuse as well as the higher stress levels have been studied respectively, however very little has been done to find the relationship between them. Data was collected from 95 college students (80 females and 16 males at the University of Kentucky. Participants were selected randomly through an e-mail of a self-reporting survey to various listserv's. The survey recorded the participant's hours worked per week and the frequency of their stimulatory use, and whether the stimulant aided them in completing their daily or weekly tasks. Fischer's Exact Tests were done to determine significance of results. The data concluded that 82.29% of participants have taken a stimulatory substance to complete daily or weekly tasks, with 17.28% choosing prescription medication as their substance of choice. It was also found that 12.45% of participants work 15 or more hours per week and 50% taking more than 15 credit hours. However, the Fischer's exact test did not find statistical significance those taking 0 – 11 hours and those taking 12 – 15 hours (p-value 0.383), nor those taking 16 – 19 hours and those taking 19 or more (p-value 0.63), nor those taking 12 – 15 hours and those taking 16 – 18 hours (p-value 0.5598). The results suggest that students do rely on stimulants to complete tasks, however it was not shown that credit hours are a significant way to determine the frequency of stimulant use. Further research with more participants is needed to determine a relationship between hours spent in class or work per week and frequency of stimulatory abuse.

73C. Zachary Vo

Mentor(s): Jessica Houlihan

Association Between the Frequency of Smoking an Excess Amount of Marijuana and its Effects of a College Student's Body Mass Index (BMI)

Throughout today's society, the rise of smoking marijuana has increased and many states have legalized the use of it. Based on the side effects of smoking marijuana, it can be a contributing factor to an individual's weight and eating habits. Although research has been done on the effects of smoking marijuana, not much research has been shown explaining the association between smoking an excess amount of marijuana and its effects on an individual's BMI. Data was collected from 88 college students. (62 males and 26 females) Cross sectional surveys were distributed randomly to students from various academic and cultural backgrounds. The survey recorded the participant's use of marijuana, frequency, the amount of physical activity they engaged in and lastly the average amount of calories consume per day. Descriptive statistics and a simple regression test were used with excel. The data concluded that students who smoked marijuana had a lower BMI (23.35) than students who did not smoke marijuana. (24.29) The two variables were statistically significant with each other, meaning their p value was less than 0.001. (0.00040398) Also, it was found that students who smoked marijuana consumed fewer calories than students who did not smoke marijuana. (Pearson Correlation: 0.00204) Lastly, people that did not smoke marijuana exercised 4 times more (50%) than those who did smoke marijuana. (11.36%) The results suggest that college students who smoke marijuana do in fact have lower average BMIs than students who do not smoke marijuana. In addition, students who smoke marijuana also consumed fewer calories than students who did not smoke marijuana. Although the study does not prove that smoking marijuana will cause people to lose or gain weight, there may be a relationship between marijuana use and lower

Pharmacology

74A. Morgan Kelly

Mentor(s): Ryan Temel

Association between Atherosclerosis Severity and Xanthomas, Malaise, and Inappetance in Cynomlgus Monkeys

Cardiovascular disease is the leading cause of death in the United States. There is a positive correlation between coronary heart disease (CHD) and LDL cholesterol (LDL-C) levels. Statins are used to lower LDL-C and CHD risk, but do not completely eliminate atherosclerotic lesion rupture. Therefore, finding a therapy capable of stabilizing atherosclerotic lesions is a priority for medical professionals. microRNA-33 (miR-33) antagonism can reduce atherosclerosis in mice, but mice only have miR-33a, while humans have miR-33a and miR-33b. Nonhuman primates (NHPs), like humans, have miR-33a/b and are therefore a good model to predict the therapeutic potential of miR-33 antgonism in humans. NHPs also develop coronary artery atherosclerosis as do humans. In order to determine whether miR-33a/b antagonism can stabilize atherosclerotic lesions, a group of 36 male cynomolgus monkeys were fed for 20 months a diet high in fat and cholesterol, which increased LDL-C and drove atherosclerosis formation. During this period, the animals developed xanthomas and callosities due to cholesterol desposition in the skin. In addition, some of the monkeys went through prolonged periods of malaise and inappetance. The objectives of my project are to review the veterinary records and determine 1) the number of days on atherogenic diet needed to first observe

xanthomas and callosities and 2) the number of incidences of malaise and prolonged inappetance per monkey. This data will then be correlated to LDL-C concentration and atherosclerosis lesion size and composition. We are in the process of data collection and correlation analysis but hypothesize that atherosclerosis plaques will be more severe in animals that went through periods of malaise and inappetance. In addition, we also hypothesize that the days for xanthoma/callosity formation will be inversely associated with atherosclerotic lesion size. This information will allow our lab in the future to predict using clinical observations atherosclerosis severity in monkeys.

74B. Marissa McDowell

Mentor(s): Kevin Pearson, Leryn Reynolds

Smoking during Pregnancy May Alter Offspring Skeletal Muscle Insulin Signaling

Previous experimental data has indicated that maternal smoking during pregnancy increases the risk of Type 2 Diabetes in offspring. Work by our lab has demonstrated that offspring born to dams exposed to tobacco smoke in utero have impaired glucose tolerance. However, the mechanisms that cause this impairment are unknown. Protein kinase B (AKT) and phosphorylation of AKT (pAKT) are central to insulin receptor signaling and resultant glucose uptake in skeletal muscle and adipose tissue. The purpose of this study was to examine whether there was reduced pAKT signaling in the offspring from smoking dams compared to the offspring from non-smoking dams. Soleus tissue was collected from male offspring exposed to tobacco smoke in utero (S, n=8) or controls not exposed (NS, n=6). Soleus tissues from both limbs were dissected and exposed to either insulin or Krebs-Ringer phosphate buffer for 15 minutes before freezing. AKT and pAKT were assessed via Western Blotting. The pAKT/AKT ratio did not significantly differ when comparing basal or insulin stimulated soleus from male offspring born to S vs NS ($p = 0.52$ for basal and 0.25 insulin-stimulated, respectively). However, the fold change of the pAKT/AKT ratio comparing insulin-stimulated to basal tissue from offspring of smoking dams showed a strong trend toward decreased insulin signaling compared to those from offspring born to non-smoking dams ($p = 0.075$). These preliminary data suggest impaired phosphorylation of AKT in response to insulin may play a role in the impaired glucose tolerance, but additional samples need to be analyzed. Future experiments will investigate pAKT/AKT levels in adipose tissue in male offspring as well as both soleus and fat in female offspring.

74C. Parth Patel

Mentor(s): Kevin Pearson

Optimization of Mouse Embryonic Fibroblast Isolation after Maternal Treatment with Polychlorinated Biphenyls

Polychlorinated biphenyls (PCBs) are environmental toxins that are a byproduct of industrial activity and remain in the environment for long periods of time. Offspring born to mothers exposed to PCBs have been shown to have greater rates of obesity later in life. However, the mechanisms driving increased offspring risk of obesity remains unclear. We sought to optimize a procedure to isolate mouse embryonic fibroblasts (MEFs) from dams exposed to PCBs during pregnancy. Pregnant ICR mice were orally gavaged with no treatment (n=3), vehicle safflower oil (n=3), or 100 mmol/kg PCB126 (n=3), 24 hours prior to embryo extraction at day 14 of gestation. The MEFs were successfully isolated immediately post extraction, frozen, and then brought

back for analyses. Our goal is to grow the cells from all 3 groups, collect RNA, and quantify mRNA with real-time PCR. My hypothesis is that several detoxification and stress response genes will be increased in the MEFs that were isolated from the PCB-exposed dams similar to what we observed in the fetal livers from previous experiments. I will also take the cells through an adipogenesis protocol to determine whether cells that are collected from embryos of PCB-exposed dams will be more apt to differentiate into lipid-loaded cells. Thus, we would have an in vitro system to study mechanisms predisposing prenatally exposed offspring to obesity. The collection of data and results is currently ongoing. This is a small pilot study for optimization purposes, and our future work will increase sample size and determine the sex of the embryos from which the MEFs originated.

75A. Josephine Kim

Mentor(s): Sylvie Garneau-Tsodikova

Investigating the Synergistic Potential of Grape Powder Against Antibiotic Resistance

The necessity for novel approaches to combatting antibacterial resistance is underscored by the existence of resistance to every known antibiotic. Resveratrol, catechin, and quercetin extracted from grapes have displayed antibacterial activity. Thus, powdered grape shows promise as treatment that could be coupled with current FDA-approved antibiotics. In order to investigate the synergistic potential of grape powder, the MIC values of grape powder, resveratrol, catechin, and quercetin were determined against drug-resistant and drug-sensitive strains of ESKAPE pathogens. Combinations of grape powder with its promising individual components and combinations of grape powder with medicinal antibiotics were examined next. Experiments are still in progress to determine the antibiotic potential of grape powder. The potential for grape powder as a synergistic treatment could result in a cost-effective and natural boost to current antibiotic regimens.

75B. Esther Putman

Mentor(s): Chris Norris

NFAT 4 up-regulated in astrocytes in traumatic brain injury model

Astrocytes are the most abundant cell type in the brain and are physically associated with nearly every blood vessel and encapsulate nearly all the synaptic connections between neurons, supporting the brain through transport of nutrients as well as elimination of wastes. Many astrocytes show a change in both structure and function following injury or disease in an attempt to provide more protection to neurons. However, chronic activation of astrocytes can lead to loss of many of their protective functions and potentially promote detrimental neuroinflammatory processes.The protein phosphatase calcineurin is responsible for a change in astrocyte structure and function by activating a class of proteins called NFATs, which directly bind to specific DNA elements and turn the expression of certain genes on or off. There are four different types of NFATs that are dependent on calcineurin and each one may activate/inactivate different sets of genes when calcineurin is present. It is suspected that different NFAT pathways contribute to astrocyte activation and provide potential targets for modifying neuroinflammatory processes linked to neurodegeneration and disease.This project tested the hypothesis that specific NFAT pathways are present in astrocytes after TBI and exhibit elevated activity. To test this hypothesis, a rat model of TBI involving a cortical contusion to one side

of the brain was used. Brain sections were then prepared from these rats and confocal microscopy was used to determine if NFAT proteins were specifically associated with astrocytes. NFAT1 appeared to be associated with neurons and other cell types, while NFAT4 showed a large increase in expression that was specific for astrocytes. These results suggest that the NFAT4 subtype may be involved in regulating how astrocytes respond and function after brain injury.

75C. Marygrace Duggar

Mentor(s): Hollie Swanson

Determining the Effects of E-Cigarette Vapor on Oral Keratinocytes and Macrophages in a Cultured Cell Model

E-cigarette usage is growing, especially among adolescents and young adults. This trend is especially concerning due to the lack of regulations governing the e-cigarette industry and scientific data on the effects of e-cigarettes on human health. Using a cultured cell model, the researchers hypothesized that exposure to e-cigarette vapor would adversely affect the growth of cells that reside in the oral cavity, such as oral keratinocytes and macrophages. As a first step towards testing this hypothesis, condensate was prepared from the vapors of e-cigarette fluids (grape flavored), both with and without nicotine. Here, the e-cigarette vapor was bubbled into cell media and the amount of condensate within the media determined spectrophotometrically. The cultured oral keratinocytes and macrophages were treated with decreasing concentrations of the condensate. After three days of treatment, cell numbers were determined using a colorimetric assay. Initial results indicate that the e-cigarette condensate adversely affects cell growth, regardless of the absence or presence of nicotine. Future experiments will focus on determining the mechanisms by which cell growth is affected and identifying the constituents within the condensates that exert the growth-inhibiting effect.

76A. Jourdan Owens

Mentor(s): Elizabeth Head

Down Syndrome: Age-Dependence of PiB Binding in Postmortem Striatum Across the Lifespan

Beta-amyloid (Aβ) plaques accumulate as a function of age in the brains of people with Down syndrome (DS). By 40 years of age, those with DS typically develop Alzheimer disease (AD) neuropathology. The linkage of Aβ, cognition, and dementia in DS has been substantiated by studies including in vivo imaging using the Pittsburgh Compound B (PiB) ligand. The earliest site of binding by PET PiB with age in people with DS is found in striatum. We hypothesized that there will be an age-dependent increase in striatal PiB binding with advancing age in autopsy specimens. We quantified cerebral amyloid angiopathy (CAA) and amyloid plaques using Pittsburgh compound B (PiB) and neurofibrillary tangles (NFT) in striatum using Thioflavin-S in 19 autopsy cases. We also quantified PiB binding in the white matter (WM). Cases were classified as young DS (<40 years) and old DS (>40 years). Sections were first incubated in 100 nM Cyano(CN)-PiB and then in 0.5% thioflavin-S. The degree of CAA, plaques, NFT and WM staining was categorized as mild, moderate or severe. As expected, older cases with DS (>40 years) had more extensive labeling of thioflavin S positive plaques (p<.067), and significantly more NFT (p<.025) but not more CAA (P<.443). PiB binding was also significantly higher in older DS cases for plaques (p<.012) but not

CAA (p<.443). The most interesting finding was that there was an age-dependent increase in WM binding of PiB in DS that approached significant levels (p<.056). Our results suggest that PET imaging studies using PiB in DS that show early age of onset of striatal binding may be due predominantly to WM binding and not that of plaques or CAA. This shows that WM binding of PiB may be nonspecific or be unique to DS.

76B. Alexis Priddy

Mentor(s): Eric Blalock

Isolating and Evaluating Quality and Quantity of Exosomes from Rodent Brain Tissue

Exosomes are recently-discovered microvesicles that make up an intercellular signaling system that can transport products, including RNA, enzymes, and metabolic products, from one cell to another. They are known to play a role in cancer biology and blood chemistry, and may play a part in immune function. Recent studies have shown that they may also be involved in brain function, and may be perturbed in aging and Alzheimer's disease. We worked to investigate this change in signaling by examining the RNA and microRNA content of exosomes in neuronal cells as an organism ages. However, isolating exosomes for analysis is difficult and few studies have actually examined exosomes in aged brain tissue. To address this, we modified a protocol to isolate exosomes from aged rodent brain tissue and used Western blotting to evaluate the quality and quantity of exosomes from the isolation protocol. Using hemisected cortex removed from young and aged rats that had been behaviorally examined with the Morris water maze, we modified a centrifugation-based protocol to isolate the exosomes. CD63 and TSG101 antibodies were used in Western blots to quantify the exosomes extracted. This produced an extraction protocol that was effective and produced high-quality exosomes. This procedure can be used to determine if RNA and microRNA content changes as an organism ages, and if these changes specifically contribute to declining cognitive function and developing Alzheimer's disease.

76C. Meghan Turner

Mentor(s): Elizabeth Head

The role of inflammation in the Posterior Cingulate Cortex of individuals with Alzheimer Disease and Down Syndrome

Alzheimer Disease (AD) neuropathology is found in people with Down Syndrome (DS) over the age of 40 years due, at least in part, to the increased expression of amyloid precursor protein on chromosome 21. Little is currently known about the progression of AD in DS individuals, however higher astrocyte and microglial loads were expected in DS with increased age, consistent with known AD pathology. Tissue samples from the Posterior Cingulate Cortex of six groups of interest [Down Syndrome (<40 years; n=10, DS); DS with AD (>40 years; n=5, DSAD); Young healthy controls (<40 years; n=10, YC); Middle-aged healthy controls (45-65 years; n=10, MC); Sporadic AD (75+ years; n=5, AD); Advanced age controls (75+ years; n=6, OC)] were single-labeled using immunostaining with anti-IBA-1 and anti-GFAP antibodies. Anti-IBA-1 antibody identifies microglia, and anti-GFAP identifies astrocytes, both of which will become activated in the presence of AD pathology. Protein load was quantified for each set of stains and then analyzed. A two-way ANOVA (age group, genotype) suggests that there are no main effects of age or genotype on IBA loads, however

morphological differences were observed in the microglia across groups, generally indicating microglial senescence with advanced age, and occurring earlier in DS individuals. WM GFAP loads ($F(1,35)=4.37$ $p=0.045$) increased with age in both DS and control cases, independently of genotype ($F(1,35)=0.484$ $p=0.492$). DS cases were similar to age matched controls overall and there was no interaction ($F(1,35)=1.008$ $p=0.323$). Thus, there appears to be increased astrogliosis with age that is independent of the presence of DS. Interestingly, there may be more rapid microglial senescence in DS that merits further study. Funded by NIH/NICH R01HD064993

Physics and Astronomy

77A. Henry Colburn

Additional Authors: Alex Blose, Joseph Feliciano, Ben Riley

Mentor(s): Christopher Crawford

Refining Methods for Precise Magnet Construction to be Used in nEDM Experiments

The goal of this project was to improve techniques used in the construction of magnets with as constant and uniform of a field as possible. The primary tool in the construction of these magnet models is a precision robotic arm with six joints, equipped with a laser tool. The laser sensitizes photoresist on the surface of copper plating on the model. We constructed a new stand which was less bulky, not to get in the way of the robotic arm. It was designed to be adaptable so that it could accommodate different sized models. In addition, we upgraded the MATLAB code to improve the accuracy of the traces.

77B. Rhett Croley

Mentor(s): Chris Crawford

Redesigned Tapered Magnetic Field for Newly Optimized Helium-3 Injection

The electric dipole moment of the neutron, a property that has never been observed, would predict the violation of time reversal symmetry necessary to explain the existence of matter in our universe. A vital component of our experiment measuring this exotic property is an atomic beam of polarized Helium-3, which serves as a co-magnetometer in the precession chamber. Recent changes to simplify the geometry of our experimental apparatus have affected the magnetics of injecting polarized Helium-3 into the collection volume. We present a redesigned tapered magnetic field for this new optimized design. As the Helium-3 atoms travel ballistically along the tapered B field, they precess at the Larmor frequency and adiabatically follow the direction of the field. Our goal is to taper from high field to low field as quickly as possible, while keeping field distortions low enough to maintain the polarization. We also present our Monte Carlo simulation which tracked the spin precision of individual Helium-3 atoms to optimize the magnetic coil performance.

77C. Mitchell Dennis

Mentor(s): Christopher Crawford

Data Compression for the Nab Experiment

The Nab experiment is a collaborative effort of US universities to further the understanding of the weak interaction, one of the fundamental forces in particle physics. This experiment will measure the correlation coefficient “a” and the Fierz interference term “b” in neutron decay. Data compression for Nab is necessary because the high (12 MB/s) data rate of signal from the experiment. The data is sent through a digital filter to average the sharp data peaks into smooth trapezoids with precise energy resolution. The residual of this fit will then be sent through a combination of different compression algorithms such as delta-encoding, gzip, or bzip, to produce the best lossless compression for archival purposes. Lossy methods will also be used to reduce the volume of data further by averaging signal from random noise. We will report the optimal compression methods for the Nab data stream.

78A. Zachary Flynn

Mentor(s): Christopher Crawford

Double Cosine Theta Field Map

Precision Nuclear Magnetic Resonance (NMR) with neutrons requires an extremely uniform magnetic field. We developed a double cosine theta coil using inner and outer coils to produce a uniform field while canceling fringes outside of the coil and near the end caps. Using a Stabuli RX-130 robotic arm, we manipulated a magnetic probe accurate to 0.1% to map the uniformity of the resulting magnetic field, and the area outside of the coil. By analyzing the field we are able to use resistors to tune the coil to produce a more uniform field.

78B. Grant Forbes

Mentor(s): Brad Plaster

Testing the Weak Equivalence Principle Using Ultracold Neutrons in a Magnetic Field

Einstein’s weak equivalence principle states that an object’s inertial and gravitational masses are equivalent. Extremely accurate tests of the weak equivalence principle have been conducted at the macroscopic scale, but searches for an asymmetry between inertial and gravitational mass at subatomic scales have been much less refined. Here, an innovative new concept for a test of the weak equivalence principle is presented, in which a magnetic field is utilized to exactly oppose the classical gravitational force on a neutron, and variations from the expected acceleration of zero are probed through neutron interferometry. The merits and challenges of this method are discussed, as well as the increased precision such an experiment would be projected to obtain.

78C. David Mullins

Additional Authors: Thomas Shelton

Mentor(s): Christopher Crawford

Using Models to Determine the Effectiveness of Magnetic Shielding

When measuring the effectiveness of magnetic shielding, accurate measurements of the field within the shielded region are necessary. Large sets of data can be expensive and time consuming to collect and analyze. A solution to this problem is to take a smaller data set and extrapolate the field within a larger region. While various techniques exist to extrapolate the field, in our project, we demonstrate the usefulness of generating a model of the shielding to perform a linear fit that results in an accurate representation of the field within the shielding apparatus.

79A. Benjamin Riley

Mentor(s): Christopher Crawford

Magnet Construction for Use in High Precision Neutron Experiments

The magnetic scalar potential can be used to design precision magnetic fields with surface currents in arbitrary geometry. We are using this technique to design holding field coils for spin transport of neutrons and 3He atoms into the measurement cell of the SNS EDM experiment. We construct holding field coils as three-dimensional printed circuits boards using a Staubli RX130 6-axis industrial robotic arm to etch the circuit. While the arm has a 35-micron repeatability position, the absolute accuracy depends on calibration of transformation matrices between each link, characterized by Denavit-Hartenberg parameters. After factors such as coordinate system degeneracies and free parameters are taken into account, there are 29 parameters that must be calibrated. This arm is used in two of three potential magnet construction techniques. The first utilizes drill routing to mill the paths into copper. The second utilizes photolithography techniques to chemically etch the paths into copper. The third method, which does not require the robot arm, utilizes 3D printing to print a durable substrate with grooves to run copper wires that will generate the desired magnetic field. The entire construction process and a comparison of final designs is presented here.

79B. Kevin Royal

Mentor(s): Chris Crawford

Hybrid Magnetic Shielding

The search for the electric dipole moment of the neutron requires the ambient magnetic field to be on the pT scale which is accomplished with large magnetic shielding rooms. These rooms are fitted with large mu-metal sheets to allow for passive cancellation of background magnetic fields. Active shielding technology cannot uniformly cancel background magnetic fields. These issues can be remedied by combining the methods into a hybrid system. The design used is composed of panels that have an active layer of cancellation between two sheets of mu-metal. The panels form a cube and draw in magnetic fields perpendicular to the surface which can then be reduced using active shielding.

80A. Justin Visak

Mentor(s): Lance De Long

Direct Observation of the Equilibrium Ground State of an Artificial Quasicrystal

This study investigated artificial spin ices, which are geometrically frustrated arrays of thin film segments of ferromagnetic material. Using advances in nanofabrication, thin films can be patterned into arrays of submicron features that often behave differently from bulk samples fabricated via traditional chemical and metallurgical techniques. In particular, the substantial shape anisotropy of elongated (e.g., ellipsoidal) film features causes them to behave as binary Ising moments with near-uniform polarizations aligned along their long axis. The geometry of the array (e.g., periodic or quasiperiodic lattice) also strongly affects magnetic reversal, domain formation and cooperative magnetic order among Ising segments. However, the mesoscopic size of the Ising features makes it very difficult for thermal fluctuations to spontaneously reverse their binary moment during a relaxation process towards an equilibrium state. This problem is exacerbated if the Curie temperature TC of the film material is much higher than room temperature. An effort was therefore launched to identify a ferromagnetic material with a reproducible TC around room temperature. Previous work on bulk Ni(1-x)Cu(x) alloys suggested this material had promise, but the behavior of TC in thin-film samples required a new, comprehensive study. Electron beam evaporation of different compositions of Ni(1-x)Cu(x) was unsuccessful because it generated detectable amounts of antiferromagnetic nickel-oxide impurity phase and variable TC's. Alternatively, magnetron sputtering yielded cleaner samples with reproducible film composition and TC. The TC of each film was measured using a Quantum Design SQUID Magnetometer; and the film thickness was verified via x-ray reflectometry using a Bruker D8 Diffractometer. It was found that Ni(0.72)Cu(0.28) deposited on a silicon wafer via magnetron sputtering at 25 Watts of power produced a reproducible TC around 355 K.

Physiology

80B. Emad Chishti

Mentor(s): Joe Abisambra

PERK Inhibition: A Possible Therapeutic Option for Tauopothies

Tau is a microtubule-associated protein predominantly found in axons. Under normal conditions, tau interacts with microtubules to stabilize the structure of the cell's cytoskeleton. In neurodegenerative diseases known as tauopathies, tau becomes abnormally misfolded and aggregates in the somatic compartment of the neuron. One of the most common tauopathies is Alzheimer's disease, where appearance of tau aggregates closely correlates with cognitive decline. It was recently discovered that abnormally folded tau causes stress in the endoplasmic reticulum (ER) and activates the unfolded protein response (UPR). When the UPR is triggered, RNA translation in the cell is diminished by the autophosphorylation and activation of the transmembrane protein PERK, a major mediator of the UPR. Upon activation, PERK phosphorylates the alpha subunit of the eukaryotic initiation factor 2 (eIF2), a protein involved in the initiation of translation. When eIF2α is phosphorylated, it cannot promote translation. The goal of this study is to identify whether PERK affects the rate of RNA translation in tau transgenic mice. To accomplish this goal, four-month-old tau transgenic mice were administered a PERK inhibitor (GSK2606414) or vehicle control for one, two, or four days. The transgenic mice were then injected with puromycin, an antibiotic that allows for quantification of

the rate of RNA translation by using surface sensing of translation (SUnSET) and immuno-fluorescent tags. The cohort treated with the PERK inhibitor for four days showed mild changes in RNA translation rates. These data suggest that at least four days of treatment are necessary to initiate an effective modulation of protein synthesis. Therefore, this work further supports PERK inhibition as a therapeutic strategy and identifies an early therapeutic window for tauopathies.

81A. Gregory Milburn

Additional Authors: Autumn Conger

Mentor(s): Kenneth Campbell

Sex-Specific Differences in Cardiac Fibrosis

Heart disease is the leading cause of death in developed nations and the second leading cause in Kentucky. The etiology of heart disease is complex and dependent on many factors such as age, race, and sex. This knowledge is contradictory to the studies that have been used to determine the effectiveness of most medications currently treating heart disease, where mostly white males were used. This study hopes to aid in bridging this gap by looking at collagen content, a contributor to heart disease, of men and women in both heart conditions, non-failing and failing hearts. The basis of this study comes from previous work that looked for the expression of genes possibly related to heart failure; these genes were measured, in both sexes and heart conditions, using NanoString analysis. There were several genes that showed an interaction between the sex and heart condition, and a portion of these genes are known for having an effect on collagen production. While the data showed sex-specific trends that only proves that the message is being created in the RNA, not that the protein is accumulating. Therefore, this study focuses on observing the amount of collagen that is observed in the tissue. To complete this, samples of human heart were sectioned and stained with picrosirius red. Image analysis software developed in our lab was used to quantify the amount of collagen in each section. Using these data, we were able to measure the levels of cardiac fibrosis in both sexes and heart conditions. We hope to continue collecting data from more samples in order to create a larger sample size from which to run statistical tests. Learning more about sex-specific differences in heart disease could give way to more effective and sex-specific treatments.

81B. Mihir Shah

Mentor(s): Jonathan Satin

Inducing Knockout of Rad Mimics the 'Fight or Flight' Response in the Heart

The L-type calcium channel complex contains regulatory proteins including Rad which governs the calcium channel. Whole body constitutive Rad knockout in mice have higher calcium influx in cardiac myocytes display tonic positive intropy. I tested the hypothesis that positive intropy and increased Ca2+ handling results from Rad knockout specifically in cardiomyocytes. Furthermore, increased cardiomyocyte activity will occur on a relatively short time scale. Cells were dispersed and analyzed on the same day. Fura 2, a calcium indicator, was used to measure cytosolic Ca2+ in live cells paced at 1Hz. The experiment was a 2x2 design testing knockout vs wild type (gene effect), and isoproterenol response. Ca2+-transient baseline level, peak height, and onset and decay kinetics were measured for each cell before and after isoproterenol was

administered. For the non-Rad knockout cell, the baseline level increased from 2.0 to 2.6 after isoproterenol was injected. The onset kinetics increased from 15 to 47ms and the decay time constant (tau) decreased from 108 to 92ms (faster decay). The peak Ca2+-level increased from 2.7 to 4.6. For the induced Rad knockout cell, the baseline level increased from 2.2 to 2.6 after isoproterenol was injected. The onset kinetics increased from 30 to 49ms and the decay tau decreased from 91 to 83ms. The peak level increased from 3.5 to 4.7. The deletion of the Rad protein caused the baseline levels approaching that of ISO-stimulated 'wildtype' cardiomyocytes. Rad may therefore provide a molecular mechanism for mediating catecholaminergic stimulation of the heart (as in the fight or flight response). These results suggest that inducing a Rad knockout is a novel therapeutic mechanism for providing inotropic support to the heart.

82A. Dealla Samadi

Mentor(s): Joe Abisambra

Novel Application of Surface Sensing of Translation (SUnSET) to Detect Protein Synthesis In Vivo

Dysregulation of protein synthesis is a common phenomenon in multiple diseases including cancer and neurodegeneration. Diseases of protein misfolding, such as Alzheimer's disease, poly-glutamine diseases, and amyotrophic lateral sclerosis are characterized by altered protein translation. Thus, techniques to monitor protein translation are crucial for understanding the pathogenic events leading to disease as well as screening novel compounds to modify RNA translation. Current and commonly used methods that monitor protein translation require the use of isotopically labeled amino acids, which present some in vivo application challenges as well as environmental hazard limitations. We adapted the non-radioactive, surface sensing of translation (SUnSET) assay for an easy, accurate, in vivo measurement of translation. SUnSET utilizes the antibiotic puromycin, a tRNA structural analog, to incorporate into newly synthesized proteins. Puromycinylated proteins can then be imaged and quantified using common techniques such as immunohistochemistry and Western blotting. Thus, SUnSET has a distinct advantage over more laborious and hazardous protocols. Here we expand the use of SUnSET as a versatile approach in several experimental setups. Using mass spectroscopy, we identified distinct puromycinylated proteins in M17 neuroblastoma cells under normal and serum-starved conditions. These data support the use of SUnSET for proteimics-based protein identification. For in vivo analysis of brain protein translation, we injected mice with puromycin intraperitoneally. We performed a dose and time curve to determine the conditions required for puromyicin to cross the blood brain barrier. In addition to detecting newly synthesized proteins in the brain, protein synthesis could also be monitored in other tissues, such as liver. Thus, these novel adaptations of SUnSET allows for both direct identification of synthesized proteins as well as in vivo monitoring of protein translation, providing a technical advantage over historical methods. This easily accessible technique will enable greater insight into the role of protein synthesis dysregulation in neurodegenerative diseases as well as other diseases of protein homeostasis dysregulation.

Police Department

82B. Hamza Ashfaq

Mentor(s): Shari Veil, Thomas Matlock

University Emergency Action Plans

Through reviewing the University of Kentucky Emergency Action Plan (EAP), the effectiveness and scope of university action plans have been called into question. EAPs are created for employees to prepare them for emergencies and are required by the Occupational Safety and Health Administration (OSHA). At a university, the coverage of an EAP extends to students and all others who interact with the university. EAPs have minimum requirements but should be expanded in scope to address other pertinent emergency situations. Our goals were to investigate the EAPs of various universities to determine their compliance with minimum requirements set forth by OSHA, as well as to determine the inclusion of additional emergency protocols and useful features. A systematic review of EAPs was conducted with 32 universities selected based on similar student enrollment. While 50 universities were originally selected, 18 were removed due to inaccessibility of the EAP on the university web page, password protected information, or ambiguity of the document. Each of the 32 university EAPs were assessed for adherence to the OSHA 1910.38(c) requirements, emergency protocols as recommended by the OSHA EAP guide, and useful features. Our findings revealed that 66% (n=21) universities met all 6 critical criteria. We also found that 81% (n=26) of EAPs had protocol for fires, 66% (n=21) for severe weather, 75% (n=24) for hazardous materials, 63% (n=20) for utility outages, 41% (n=13) for earthquakes, 59% (n=19) for active shooters, 56% (n=18) for bomb threats, 56% (n=18) for medical emergencies, 41% (n=13) for psychological emergency/civil disturbances and 63% (n=20) for evacuation of disabled individuals. Additionally, 56% (n=18) of EAPs had shelter locations, 44% (n=14) had floor plans, 47% (n=15) had bomb threat checklists, and 100% (n=32) had emergency numbers other than 911. Implications of this study can help guide universities to create more effectual and encompassing EAPs.

83A. Hannah Clendenin

Mentor(s): Nathan Brown, Michele Tindall- Staton

A Data Analysis of Residence Hall Theft Reports on the University of Kentucky's Campus

This research takes a closer look at the impact that security updates to electronic access control have had on theft in University of Kentucky's residence halls. In 2012, the University of Kentucky reviewed security on campus, and determined that this was an area that needed to be improved. In response to the physical security problems that were noticed, UK invested over $4.8 million into creating a fully integrated solution, which would provide a standard solution all across campus. One of the major changes that came with this large project was addressing identity management and electronic access control to buildings and residence halls on campus. "Wildcard" identification cards are issued to students, staff, and faculty upon their hiring or enrollment in the university. As a part of this project, these identification cards have taken the place of keys to improve the standardization of the system. An in depth review of residence hall theft reports from 2008 until the present day, offers trend analysis prior to and after the installation of access control. This research helps determine whether or not this access control project has been effective or not.

Political Science

83B. Hadeel Abdallah

Mentor(s): Clayton Thyne

How Civilian Protests Signal For Military Coups

Recently, the world has seen an increase in the number of mass protest leading to the change of a regime. This is found most obviously in the Arab Spring, but can also be seen in the protests or coups against South Korean President Park Geun-hye, Brazilian President Dilma Rousseff, and Turkish President Recep Tayyip Erdogan. Yet there have been a variety of outcomes after these events, as well as other mass protests and coups. The question that must be asked is what causes their differing conclusions? This research aims to look at the ways in which citizens respond to government repression, and what signals to a military whether or not a coup is necessary, and if it will ultimately be successful. This will be done by examining the effects civilian protests have in regime change, be it violent or peaceful. In studying various cases of regime change from internal pressures, this research looks to determine how the presence of anti-governmental demonstrations influence how the government is dissolved, whether it is through the actions of the state's military or by civilian means, and if it is ultimately successful in the attempted change.

84A. Madison Calhoun

Mentor(s): Stephen Voss

Roll-Call Voting in the State Legislature: A Study of Kentucky and Louisiana

For my undergraduate research thesis, I studied roll-call voting at the state level, with a focus on two states: Kentucky and Louisiana. I investigated the factors that cause state legislators to deviate from their party on roll-call votes. My research question is: to what extent do the factors of constituency, race, and gender cause a state legislator to cast a roll-call vote apart from their party? I studied Kentucky for its history of voting democratically at the state level, but conservatively at the federal level and for the prevalence of Southern Democrats in the state's history. Louisiana was my second choice, because of its diverse political, racial, and religious cultures. Both states lined up with gubernatorial shifts in power. I analyzed two separate periods of two years for each state around the same time period (2004 and 2008), where the party in power shifted initially to Republican control and then to Democratic control in both states. This allowed me to view how ideologically similar administrations affect different state legislatures. To gather information for my research, I collected roll-call data in Excel spreadsheets for both states. I focused on how frequently different groups (women, men, Democrats, and Republicans of different races and constituencies) voted against successful legislation, while keeping track of each individual legislator's vote on each non-unanimous bill per year. My results thus far are showing that women seem to be voting more conservatively, African Americans are voting very closely with their party, and some urban legislators stand out as voting more liberally. My hypotheses so far are both supported in part and rejected in part with my current data analysis.

84B. Katherine Huffman

Mentor(s): Emily Beaulieu

Understanding Political Trauma and How It Can Shape Terrorism

From 1939 to 1975, the Spanish people were forced to live underneath the extremely repressive totalitarian rule of Generalissimo Francisco Franco. They never knew when or who would be killed, tortured, or unfairly imprisoned next. Being exposed to violence of this kind and living in fear for such a prolonged period of time resulted in the Spanish people developing political trauma, a combination of war trauma and social trauma. After Franco's death, Spain became democratic and the new government decided to pass what is called the Pact of Forgetting. This gave the politicians and military leaders who, under Franco, committed crimes against the Spanish people, amnesty for their actions. Even though the transition to democracy was smooth, and was supported by the Spanish population, it is unreasonable to assume that the people were not changed by their experiences. The concept of "space creation" insists that in order to heal from political trauma, the victims must be allowed to openly share their experiences and have them validated in order to heal. If they are not given that chance, violence almost always occurs. However, with the passing of the Pact of Forgetting, the Spanish population was robbed of their opportunity to heal, yet they did not revolt. The only group that seems to have stood up against the pact was ETA, a Spanish organization that is known for being simply terrorists. This research paper will examine the activities of ETA in order to provide support to the theory that ETA is not merely a terrorist organization, but began their attacks in order to get revenge on members of government, who should have been punished because of the crimes they committed against their people, on behalf of the Spanish people.

85A. Anne Klette

Mentor(s): Stephen Voss

Why Does Education Lead to Increased Tolerance for Migrants? A Survey Analysis from Kentucky Before the Trump Years

Education leads to increased tolerance, but it is unclear why. Three possible explanations include that education (1) reduces economic threat, (2) spreads democratic norms and values, and (3) reduces reliance on stereotypes. This research uses predictive statistical models to provide leverage to distinguish among these three possible explanations, applying them to 2012 survey data on immigration attitudes collected in Kentucky. I hypothesize that education will influence migration attitudes more for individuals who are culturally similar to potential migrants, but will have a lesser effect on individuals who are culturally distinct from typical migrants (such as born-again Christians). Rural respondents, who tend to live in culturally uniform communities, will be resistant to the effects of education as well. Because my survey data were collected before anti-immigration sentiment coalesced around presidential candidate Donald Trump, they have not been as contaminated by partisan politics as more-recent data might have, so they offer a valuable insight into the individual-level effects of educational attainment.

85B. Stephanie Obieroma

Mentor(s): Stephen Voss

Republicans & the Art of Gerrymandering: A Match Made in Political Heaven?

Political scholars have noted that Republicans have dominated the gerrymandering of U.S. House districts since the 90s, giving them leverage in congressional elections. The paper discusses where the new congressional maps drawn after the 2010 census, when the GOP gained in state elections, gave the Republicans additional advantages over the old maps. To test this, congressional data from 2002-2016 was collected. The paper also focuses on a subset of six states using congressional maps before and after 2010 to determine how gerrymandering has led to an increase congressional seats for Republicans. Looking at congressional outcomes compared to the presidential vote that each party received, as well as at changes in the seat-vote share for each election starting from 2002, it will be determined whether political geography and incumbency were major factors that helped Republicans even after gerrymandering. The prediction is that the new maps after the 2010 census helped Republicans to gain control of more congressional seats.

86A. Lane Aldridge

Additional Authors: Aylissa Ritterhoff, Elizabeth Caudill, Jessica Gebhardt, Cassidy Souder, Matthew Ray, Madyson Morris

Mentor(s): Mark Prendergast

Effects of Chronic Alcohol Exposure on Glutamatergic Neuroplasticity in the Hippocampus: Drinking in a Dish

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 (100 mM) for seven days in vitro and function of Ca2+-permeable glutamate receptors was assessed by exposing tissue to an N-methyl-D-asparate receptor agonist for 24hr. Uptake of the non-vital fluorescent dye propidium iodide was assessed subsequently. Alcohol pre-exposure significantly enhanced the sensitivity of hippocampal neurons to the agonist, 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. Acknowledgements: STEMCats, The National Institute on Alcohol Abuse and Alcoholism; all authors contributed equally: Lane C. Aldridge, Elizabeth B. Caudill, Jessica E. Gebhardt, Rasha A. Khodeir, Madyson M. Morris*, Matthew C. Ray, Aylissa M. Ritterhoff, Cassidy D. Souder (* STEMCats Mentor)

86B. Tessa Blevins

Mentor(s): Suzanne Segerstrom

Circadian and Circannual Changes in Dispositional Optimism

Most people believe that once personality forms, it remains stable. Research begs to differ. Levels of dispositional optimism, the generalized expectancy of positive outcomes, have been found to vary over the span of years (10 years, Segerstrom, 2007; 1 year, Atienza, Stephens, & Townsend, 2003). Other "traits" such as the Big Five Personality factors vary over shorter time spans, even within a day. This study was conducted to find possible circannual and circadian cycles of optimism. American and Canadian adults aged from 18 to 87 completed the Life Orientation Test-Revised (LOT-R), a 6-item measure of generalized optimism levels, online, between 2008 and 2016. All answers were time and date stamped. No statistically significant effects of time of day on optimism were found; each hour after 3:30 am was associated with a .000777-point decrease in dispositional optimism (on a scale of 1-5 points; t=0.42, p= 0.68). In pairwise comparisons among days of the week, Monday's mean (M=3.61, SD=0.77) was significantly higher (p= 0.02) than Wednesday's mean (M=3.56 , SD=0.77). No main effect for day length was found; each additional hour of daylight was associated with a .003579-point increase in dispositional optimism (on a scale of 1-5 points; t =0.55, p= 0.58). However, a significant interaction between day length and time of day was found (p= 0.008) where on days with more hours of sunlight, participants reported higher optimism in the morning, whereas optimism on the mornings with fewer daylight hours was lower. Adjusting for age, sex, and income, the interaction remained statistically significant (p=0.012). Starting one's day in the dark may contribute to lower optimism, which suggests that optimism, or personality in general, can be affected by the environment. These small but statistically significant effects tell us one thing: personality is, indeed, not stable.

87A. Candace Bone

Mentor(s): Jonathan Golding

The Effect of Victim Resistance on Juror Decisions in Rape Trials

Sexual violence and rape affects more than 320,000 Americans each year (Department of Justice, 2015). With the growing rates of rape and victim blaming in the United States, methods of rape prevention is a topic often studied by researchers and taught in schools. Despite this prevalent issue being the topic of many studies, the question of how and to what extent a victim should resist while attempting to escape a sexual assault is vague and without answer (Krulewitz, 1981). Because little research has investigated the impact of varying types of resistance in rape situations on courtroom verdicts, the purpose of the present study is to examine juror decision-making in these cases. The present experiment is a 2 (Weapon) x 3 (Victim Defense Strategy) x 2 (Participant Gender) between-participants design. Male and female participants read one of six narratives in which a woman was raped by a male acquaintance. The accused rapist was described as either possessing a weapon or not possessing a weapon. The victim was described as either offering no resistance (control), resisting with physical violence (kicking), or resisting with pepper spray. A trial summary was presented, participants rendered a verdict, and then rated the victim's and accused rapist's credibility, honesty, believability, etc. The present study hypothesized that participants would deliver more guilty verdicts in cases where the accused rapist had a weapon, regardless as to whether or not the victim resisted. We also hypothesized that cases in which the victim resisted using pepper spray would deliver significantly more guilty verdicts than the kick and control conditions, with the control condition delivering the fewest guilty verdicts.

Finally, we hypothesized that female participants would render more guilty verdicts overall than male participants, regardless of testing condition, similar to other victimization research (Krulewitz & Nash, 1978).

87B. Alicia Boone

Mentor(s): Ellen Usher

How Do Undergraduates Feel About Exercise? Investigating the Sources of Exercise Self-Efficacy

The purpose of this study was to investigate the relationships among exercise self-efficacy, the four hypothesized sources of self-efficacy, and exercise behavior in undergraduate students. National data demonstrate a significant decline in the amount of regular exercise individuals perform as they transition into young adulthood (Wengreen & Moncur, 2009). One way to understand this decline is to look beyond observable factors. In social cognitive theory, Bandura (1989) explained human functioning as the result of the interaction of internal beliefs (such as self-efficacy), the environment, and behaviors. To understand the decline of exercise behavior in young adults, it is important to investigate individuals' beliefs about their exercise capabilities, or their exercise self-efficacy. The participants (N = 383) were undergraduate students attending a large public university (84% women; 83% White). Following data collection, an ANOVA and correlation analyses were run to examine the relationships among light, moderate, and vigorous exercise self-efficacy, the four sources of self-efficacy, and exercise behavior. Students were categorized based on whether or not they reported at least 30 minutes of moderate exercise 5 days a week (Centers of Disease Control and Prevention, 2015) and comparative analyses were conducted. Results showed that mastery experience and social persuasion were the sources most closely related to overall exercise self-efficacy. Students of racial minority reported significantly lower self-efficacy than White students, however there were no significant racial differences across the four sources of self-efficacy. Individuals who met the recommended amount of exercise reported significantly higher exercise self-efficacy than individuals who did not meet the recommended amount of exercise.

88A. Kellan Coffey

Mentor(s): Richard Milich

Inferential Ability as a Mediator Between Symptoms and Social Issue in Children with ADHD

The project examined the role of inferential ability as a mediator between ADHD symptoms and social issues in children with ADHD. Parents and teachers completed a measure of symptoms, as well as a report of peer problems. Children completed a narrative comprehension measure from which the measure of inferences came, and a playgroup session. Data was collected and examined. Results showed that inferential ability is a mediator for some variables.

88B. Daniel Dopp

Mentor(s): Philipp Kraemer

Development of Virtual Agents Under a Restricted Knowledge Domain in the Second Life Virtual World

Within virtual environments it is often difficult to distinguish human "avatars", which are graphic entities controlled by humans, from virtual agents or "bots", which are controlled by computer programs intended to mimic human behavior. Many bots implemented with rudimentary techniques can be easily identified as such due to a lack of human level conversational sophistication and behavioral traits. In this project, the researcher explores the strengths and limitations of a rudimentary bot designed to overcome this problem within the virtual world environment of Second Life. A bot will be created that combines appropriate domain knowledge and personality traits with a visual appearance that matches those traits. The goal is to achieve a bot that features a high level of behavioral and conversational aptitude. The bot will be programmed to handle conversational topics within a restricted domain and to gracefully redirect conversations to domains it does understand when encountering an unknown subject. The bot will be tested by observing monitored conversation trials with avatars in Second Life. These trials will generate quantitative data that will be used to evaluate how well the bot performs with conversation attributes such as length, diversity, and intelligibility of verbal expressions. From this data, potential improvements in conversational sophistication will be assessed. The goal of the project is to learn more about the viability of bots developed with rudimentary programming techniques that can then be employed in future research on virtual psychology.

89A. Allison French

Mentor(s): Elizabeth Lorch, Richard Milich

Factors that Explain Learning in a Narrative Comprehension Intervention for Children At-Risk for ADHD

Attention Deficit Hyperactivity Disorder (ADHD) is a childhood disorder that impairs narrative comprehension skills including the ability to make causal connections among events in stories and identify goal structure elements. Programs are needed that target these skills specifically for children with high levels of ADHD symptoms. The current study examined how a narrative comprehension intervention that addressed these skills affected comprehension among children at risk for ADHD, and how learning that took place during the intervention was associated with student engagement and symptomatology. Seventy-nine 3rd grade students who were at-risk for ADHD and were in the bottom half of their class in narrative comprehension participated in a 15-lesson after-school intervention in which they were randomly assigned to an experimental group (Narrative Structure [NS] group) that completed the intervention, or a control group (Business As Usual [BAU] group) that completed school curriculum first and later received the intervention. All students completed a storytelling task during pre-test and post-test sessions. During the task, children were prompted to create a story using four picture cues and then were asked goal-based and causal questions about their stories. The stories were coded for goal structure categories and responses to questions were coded for accuracy. Relative to the BAU group, the NS group included a greater number of goal-based story events in their self-generated story narrations and answered more goal-related and causal questions related to their narrations during the post-test. These findings suggest that the narrative structure intervention is promising for improving the identification and use of goal structure elements in narratives among children with elevated ADHD symptoms.

89B. Danielle Galyer

Mentor(s): Jonathan Golding

Jury Perceptions of Emotional Abuse by Coaches: When Is Enough Enough?

Some argue that athletic coaches at all levels may emotionally abuse their athletes. It has often been downplayed, as long as the coach and his team are successful. Emotional abuse can be defined as "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" (Children 1996, p.153-170). Emotional abuse is one of the least researched, because it has been thought to be less damaging than physical abuse and is harder to identify than physical abuse (Kaplan, Pelcovitz, Labruna, 1999). In the realm of sports, emotional abuse can occur between coaches and athletes because coaches hold immense power. Many coaches believe they are pushing their athletes to reach their full potential, and do not feel that they are inflicting any kind of abuse. The present study investigated the perceptions of mock jurors to a case of emotional abuse in civil court. Determining what potential jurors see as emotional abuse helps researchers form a singular definition and develop a sturdy base of knowledge. The present experiment used a 2 (Victim Gender) x 2 (Victim Age) x 2 (Participant Gender) between participants design. Each participant was presented with a civil trial summary, and then rendered a decision for the plaintiff or defendant and rated witnesses for credibility, believability etc. We predicted that female participants should be more pro-victim than males and younger victims will receive more plaintiff decisions than older victims. In addition, we predicted that participants who did not participate in organized sports as a child will be more pro-victim than those who did. Finally, we predicted a main effect of victim gender: there will be more plaintiff decisions when the victim was a female than a male.

90A. Rueben Golyatov

Mentor(s): Jonathan Golding

The Effects of Defendant Courtroom Behavior on Juror Verdicts

Our judicial system strives to give a fair hearing to every accused person. The prosecution and defense are given certain rights based on the 6th Amendment to make their best case before the jurors on the behalf of their clients. One of these rights is the right of the defendant to know their accuser and to know the nature of the charges and evidence against them. Also, because the defendant has the right to sit before a jury, there has been much speculation on the impact of the defendant's non-verbal behavior on the decision of the jury. The present experiment investigates whether crying behavior influences mock jurors rendering a verdict in a murder case. We used a 2 (Crying Behavior) x 2 (Participant Gender) between-participants design. A trial summary was presented to participants that described the death of a man. The prosecution argued that the man's wife murdered him. The defense argued that the man was killed by a loan shark because of gambling debts. After reading the trial, participants rendered a verdict and rated the victim and defendant with regard to various judgments (e.g., credibility, believability, sympathy toward the victim). The participants also rated the credibility of the witnesses.There were two hypotheses. First, we predicted that the jurors would take the crying behavior into consideration and consider the defendant innocent more frequently during when the defendant was crying compared to when she was not crying (see Golding, Fryman, Marsil, & Yozwiak, 2003). Second, we also predicted that females would be more pro-victim (e.g., guilty verdicts) than males, based on other victimization research (Golding, Bradshaw, Dunlap, Hodell, 2007).

90B. Savannah Gray

Mentor(s): Jonathan Golding

The Impact of Victim and Defendant SES on the Perception of Rape Trials

In the courtroom, cases of rape often involve acquaintances. These cases are especially difficult for jurors to render a verdict because they typically end up being "he-said-she-said" cases. That is, the victim states that she was forced to have sex, while the defendant states that the sex was consensual. What can also make rape cases especially difficult for jurors is that the characteristics of the victim and defendant can vary so much. The purpose of the present study was to investigate rape cases in which the victim and defendant varied with regard to socio-economic status (SES); there is no prior research on this issue. We used a 2 (Participant Gender) x 2 (Victim SES: high vs. low) x 2 (Defendant SES: high vs. low) between-participants design. Participants read a trial summary that described the victim and defendant meeting at a public location, and then having sex at the home of the victim. The victim alleged she was forced to have sex, but the defendant said the sex was consensual. After reading the trial, participants rendered a verdict and answered other questions about the witnesses (e.g., victim credibility). It was hypothesized that there would be a main effect of Participant Gender: female participants would render more pro-victim judgments (e.g., guilty verdicts) than male participants. Also, it was hypothesized that there would be a main effect of Perpetrator SES: high SES perpetrators would receive fewer guilty verdicts than low SES defendants. Finally, it was hypothesized that there would be a main effect of Victim SES: high SES victims would lead to more guilty verdicts than low SES victims.

91A. Christopher Greene

Mentor(s): Jonathan Golding

Elder Abuse: How Jurors Perceive Children Accused of Overmedicating Their Parents

Elder abuse cases are becoming more and more prevalent (Pillemer & Finkelhor, 1988), and with this increase in cases of elder abuse, more research needs to be done about how these cases are handled and perceived in a court of law. While there are many different types of elder abuse, the present study investigates juror perceptions of elder abuse cases involving overmedication. The Medical Dictionary Online (2009) defines overmedication as, "side effects, drug interactions, or other potential problems that result from the excessive use or excessive prescription of medications." Specifically, this study looked at how jurors perceive cases of overmedication involving parents and their children. The design of this study was a 2 (Participant Gender) x2 (Victim Gender) x 2 (Defendant Gender) between-participants design. In each condition, there was a mock trial investigating an instance of elder abuse involving a child with their parent. The subject read through a mock trial, and then had to decide whether or not the defendant (the son or daughter) was guilty of overmedicating the victim (the mother or father). The experiment looked at how guilty each subject perceived the defendant (son or daughter) to be. There were three hypotheses. First, it was predicted that there would be a main effect of participant gender; female participants should be more pro-victim (i.e., number of guilty verdicts) compared to male participants. Second, it was hypothesized that there should be a main effect of perpetrator gender; male perpetrators should be found guilty more often than female perpetrators. Third, there should be a main effect victim gender; there should be more guilty verdicts for female victims than male victims.

91B. Abigail Grieff

Mentor(s): Christia Brown

Children's Views on Necessary Traits for a Successful Presidential Candidate

The most recent presidential election was nothing short of historical. This election was the first in which a woman, Hillary Clinton, was on the ballot. Not only was this the first election with a woman in the race for the presidency, but this election also had a well-known name, Donald Trump, running for the presidency as well. Because of the historical significance of 2016 election, we were interested in the traits children think are necessary for a successful president candidate to display. The participants in this study were 185 children in kindergarten through fifth grade across 5 different areas of the United States. Specifically, we examined (a) pro-social traits, such as being kind and working well with others, and (b) traits that were focused on status, such as being wealthy and having power. Because of socialization messages directed at children, we hypothesized that children would value pro-social qualities more than status qualities in a president. The results support this hypothesis. Children were more likely to pick pro-social traits than traits that indicated status and material wealth. There were age differences, however, such that older children were more likely to recognize the importance of status.

92A. Davetta Hatfield

Additional Authors: Purnima Patel

Mentor(s): Will Gervais

Exploring Atheist Stereotypes: A Prototype Analysis

Atheists are often marginalized and disliked in our society (Edgell, Gerteis, & Hartmann, 2006). Despite substantial evidence of widespread moral distrust of atheists (Gervais, Shariff, & Norenzayan, 2011), much remains to be explored regarding attitudes towards this minority group. To broadly examine stereotypes towards atheists, this study strives to uncover the bigger picture of what people believe it means to be an atheist. To do so, we used a prototype analysis approach (Rosch, 1975), as part of a larger prototype project. In this study, participants (N = 347) described features and characteristics they associated with being an atheist. We then coded each response for 45 features reflecting participants' most commonly reported characteristics. While many of these features reflect an absence of belief and religion (e.g., does not believe in god, non-religious, does not attend church), others were overwhelmingly negative (e.g., wears black clothing, closeminded, devil worshipper). Still other features indicate atheists having an intellectual bend (e.g., scientific, intelligent, believes in evolution). Overall, this study provides a more comprehensive description of the complex stereotypes held towards those who do not believe in any particular god, or gods.

92B. Tiffany Johnson

Mentor(s): Christia Brown

The Impact of Gender on The Presidential Election

The 2016 U.S. Presidential election was historic because it was the first time a woman was a major contender for the office. Previous research has shown that children attend to the gender of the previous Presidents and make unique attributions about no women have ever been President (Bigler, Arther, Hughes, & Patterson, 2008). For example, research conducted in 2007 found that approximately 1/3 of elementary-school-aged girls believed it was currently against the law for a woman to be President and ½ of girls believed that men would not vote for a woman. Because of the historic nature of the 2016 election, we examined children's opinions on gender and its impact on the Presidential election, both before and after the election. To do this, we interviewed 185 boys and girls in elementary schools across the country both before and after the election. Specifically, we looked at children's opinions on the possible reasons why no woman has ever been president and how that opinion differed with gender. We predicted that both boys and girls would believe that a woman would want to be President, but are prohibited because of either sexism or laws. Our findings supported this hypothesis. A majority of participants believed that women wanted to run for President. Smaller percentages believed that it was against the law for a woman to be President. Boys more than girls believed that a man would not vote for a woman.

93A. Jonelle Karpen

Mentor(s): Jonathan Golding

Elements Affecting Mock Juror Perceptions of Stalking in Civil vs. Criminal Court

According to the Stalking Resource Center (2012), "Stalking is a course of conduct directed at a specific person that would cause a reasonable person to feel fear." Each year, 6.6 million individuals are stalked in the United States. "The majority of stalking victims are stalked by someone they know. 66% of female victims and 41% of male victims of stalking are stalked by a current or former intimate partner" (Stalking Resource Center, 2012). Usually, stalking cases are heard in criminal court. We investigated mock juror perceptions of stalking in civil court using an ex-intimate stalking case. The present experiment used a 2 (Individual Civil Suit vs. Third Party Civil Suit) x 2 (Participant Gender) between-participants design. There was also a control condition--a criminal court case. In the Individual Civil Suit, the victim sued the defendant (the alleged stalker), and in the Third-Party Civil Suit the victim sued a university where the stalking took place. In the criminal case, the State charged the defendant with Stalking in the Second-Degree, a Class A Misdemeanor. We hypothesized that more pro-victim (e.g., plaintiff decisions/guilty verdicts) would be found in the two civil cases as compared to the criminal case because in criminal court the jury must base their verdict on whether they believe the defendant is guilty beyond reasonable doubt, as compared to civil were it is based on preponderance of evidence in which only 51% or more of the evidence points to in the favor of the plaintiff or in the favor of the defendant. Past research on intimate stalking has shown that male mock jurors render less guilty verdicts than female mock jurors (Dunlap, Hodell, Golding, & Wasarhaley, 2012). Therefore, we hypothesized that more female participants would be more pro-victim than males.

93B. Kristina Kazimir

Additional Authors: Rachel McCoy

Mentor(s): Susan Barron, Logan Fields

The Ability of Solidago Nemoralis to Reduce Learning Deficits in a Rat Model of Fetal Alcohol Spectrum Disorders

Ethanol (ETOH) exposure during prenatal development can result in various behavioral deficits. The purpose of the current experiment was to examine if Solidago Nemoralis (SN) (a flavonoid extract of the Gray Golden Rod) could reduce some of the behavioral deficits in male and female rats exposed to ETOH during a period that overlapped the human "3rd trimester brain growth spurt". SN has anti-oxidant properties and is an agonist of the 7 nicotinic acetylcholine receptor subtype (7nAChR) and has been shown to reduce neuronal death during ETOH withdrawal in a cell culture model. Male and female rat pups were administered either ETOH (6g/kg/day), an isocaloric milk solution designed to nutritionally mimic rat milk, or a non-treated control on postnatal days (PD) 1 – 7 followed by a single injection of SN. At adolescence, the offspring were tested in an attentional set shifting task (ASST). The ASST is a paradigm that assess prefrontal cortex and executive function. This task uses a series of discrimination tasks with increasing levels of difficulty for a food reward and requires response flexibility. ETOH exposed offspring took more trials to reach the learning criterion than controls but those that received ETOH + SN showed significant improvement. There also appeared to be a sex difference with male rats taking more trials to reach criterion than females. These findings provide support that the SD may reduce some of the effects of fetal ETOH exposure and further work is needed to see if this generalizes to other behaviors and/or has potential clinical use. (This work was supported, in part, by a contract from NIAAA to JML)

94A. Ameena Khan

Mentor(s): Jonathan Golding

Juror Perceptions of Elder Financial Abuse in the Courtroom

Abstract Elder abuse is defined as "actions inflicting unnecessary suffering, injury, pain, loss or violation of human rights upon a senior" (Liang, Lovett, Mackey, 2012, 63). Sometimes called "elder mistreatment," elder abuse can include psychological, physical, and sexual abuse, neglect and financial exploitation (Dong, 2015). It is estimated that, for every known case of elder financial abuse, five go unreported (Kemp & Mosqueda, 2005). The purpose of the current study was to investigate how jurors respond to the alleged financial abuse (i.e., property theft) of an elder by an adult child versus the financial abuse of a middle-aged adult by an adult child. The current study utilizes a 2 (Victim Age) x 2 (Type of Defense) x 2 (Participant Gender) between-participants design. A trial summary was presented and participants rendered a verdict and rated the defendant's and elder's credibility, believability, guilt, etc. Given that previous research has indicated that female participants render guilty verdicts than male participants (Golding, Hodell, Dunlap, Wasarhaley, & Keller, 2013), we predicted a main effect of participant gender on pro victim judgments; female participants should have higher pro-victim judgments than male participants. The results did not support this hypothesis. We also predicted that participants should have higher pro victim judgments when the victim was 50 years old than when the victim was 70 years old. While this hypothesis was not supported, results indicate that participants had significantly higher pro victim judgments for the 70-year-old victim than the 50-year-old victim. Our final prediction was that there should be a main effect of type of defense on pro victim

judgments, such that a "could have it" defense was seen as more credible than the "not me" defense. Likewise, our results did not support this hypothesis.

94B. Ashley McGar

Mentor(s): Christal Badour

Stressful or Traumatic Events and Self-Concept Among College Women

The current research builds upon a study conducted by Tiggemann and Boundy (2008) by examining whether violence history and PTSD symptoms are associated with self-disgust and eating-related pathology. Additionally, this study examines whether violence history and PTSD symptoms moderate responses to a laboratory task meant to prompt feelings of self-objectification in participants. Previous research demonstrates a link between a history of interpersonal violence, PTSD symptoms, and eating-related pathology in college students. Individuals with a history of interpersonal trauma tend to report higher levels of disordered eating. Despite a large body of research demonstrating these links, further research is essential to understanding these relations. This experimental study involves two parts. In part one, female undergraduate students complete an online questionnaire consisting of self-report measures assessing trauma history, disordered eating, and symptoms of depression, anxiety, and PTSD. In part two, participants are randomly assigned to one of four environmental manipulations. Participants complete two computer tasks aimed at inducing self-objectification, and additional questionnaires measuring feelings of self-objectification, mood, self-disgust, and body shame. Half of the participants will complete part two in a room with desks, chairs, and computers (control) or in the same room with a bathroom scale, mirror, and a display of fashion magazines (self-objectification condition). Participants are randomized to either receive an appearance compliment (i.e., "I like your top, it looks good on you") or no appearance comment. Participants are unaware of the manipulation until debriefing at the end of the laboratory visit. It is expected that participants assigned to the self-objectification condition will report higher body shame and self-disgust as compared to the control condition. Violence history and PTSD symptoms will likely moderate this relationship, such that the effect of the self-objectification manipulation will be magnified among participants with a history of violence and those with higher PTSD symptoms.

95A. Elaina McPhetridge

Mentor(s): Jonathan Golding

Factors Influencing Civil Rape Cases

Factors Influencing Civil Rape Cases The goal of this study was to look at civil rape cases and the factors that can affect their outcomes. The main issues being studied were (1) the impact of a rape trial in civil court vs. criminal court; and (2) Whether the ability of a defendant to pay damages impacts juror judgments. We set up a 2 (Type of civil case: third party civil case vs. individual civil case) X 2 (Defendant can pay, Defendant cannot pay) X 2 (Participant gender) between-participants experiment, that included a control group (criminal trial). The hypotheses were: 1) Participants would be more pro-victim in civil third party civil cases vs. individual civil cases; 2) Participants would be more pro-victim with a civil trial vs. a criminal trial; 3) Participants would be more pro-victim when the defendant could pay vs. could not pay; and 4) Females

would be more pro-victim than males. In the study, participants were given a scenario where a women claimed that a man forced his way into her hotel room and raped her. The defendant claimed that she invited him into the room. The results showed: 1) More pro-victim judgments in civil third party cases than in individual civil cases, with 61% ruling for the plaintiff in third party cases and 43% for the plaintiff in individual cases; 2) Participants were slightly more pro-victim in criminal cases than in civil cases, with 60% guilty verdicts in the criminal trial and 52% of participants ruling for the plaintiff in the civil trials; 3) No impact of whether or not the defendant could pay, they ruled for the victim about 52% of the time in both scenarios; and 4) Females were more pro-victim than males, with 60% of females siding with the victim versus 31% for males.

95B. Courtney Michael

Mentor(s): Peggy Keller

School Start Times in Mississippi: Associations with Academic Achievement and Behavioral Incidents

School Start Times in Mississippi: Associations with Academic Achievement and Behavioral Incidents Early school start times have been implicated in the sleep restriction of students. Many school districts have started to delay the start times for middle and high schools. However, several gaps in this research remain. Implications of early start times for elementary school students are understudied, and most research focuses on just one or two schools. The purpose of this research project is to examine possible implications of early start times on all public elementary schools within the state of Mississippi, a state that is consistently low performing in education per the US Department of Education. We hypothesize that earlier school start times will be associated with lower standardized test scores and greater behavioral and disciplinary incidents. Including Demographic information about the schools: student teacher ratio, number of students receiving free or reduced lunch, percent of students who are African American and Hispanic, enrollment size, and grade levels will be obtained from the Department of Education website. Start times will be obtained by calling school offices. Data will be analyzed to determine if there is an association between earlier school start times and increased disciplinary incidents, controlling for school demographics. Findings will contribute to the very small number of studies on elementary school start times and will inform policy changes for school start times more broadly.

96A. Jennalee Miracle

Mentor(s): Johnathan Golding

Examination of Juror-Decision Making in Cases of Male Victim Rape

Each year over one million women are raped (Golding, Lynch, & Wasarhaley, 2015). The typical view of rape is that it occurs between a male perpetrator and a female victim. However, data indicates that there are also cases of male victim rape. Each year 110,000 men are raped, however, that number is actually higher since only a third of sexual assaults and rapes are reported (Wakelin & Long, 2003). It is also estimated that the research and support for male rape victims is more than 20 years behind that for female victims (Davies & Rogers, 2006). Given that there has been little research on the perception of male victim rape, the purpose of the present study was to examine juror-decision making in these types of court cases. The experiment is a 5

(Type of Victim) x 2 (Participant Gender) between-subjects design. The levels of Victim are a Heterosexual Female, Heterosexual Male, Homosexual Male, Bisexual Male, Transgender Female (man who identifies as a woman), and a Heterosexual Female. Participants were randomly assigned to one of the five conditions in which a case involving sexual assault was presented. The case for each condition was presented the same way as a real court case, with the Prosecution and Defense making their statements and a verdict rendered at the end. Participants also rated the credibility of the victim and defendant. It was hypothesized that female participants would have more pro-victim judgements (e.g, guilty verdicts) than males. In addition, due to the belief of certain stereotypes in the LGBTQ community (e.g., members have no morals), we predicted that the Homosexual Male, Bisexual Male, and Transgender Female would have the lowest convictions against their assailant.

96B. Simran Nanda

Mentor(s): Jonathan Golding

The Effect of Alcohol on the Perceptions of Victims and Perpetrators of Rape

Fewer than 31% of female rape victims report their assault to the police, and it is no secret that their stories are often trivialized by police officers, the legal system, and juries (RAINN, 2016). When alcohol is involved in an incident, the risk of rape and of accusations of rape may be heightened, due to the fact that vision, memory, and testimony are impaired. In addition, alcohol increases aggression and lowers inhibitions, especially during a sexual encounter (Abbey, 2001). Consequently, the credibility of a victim or perpetrator of rape depends on the setting of the incident, and alcohol plays a key role when a jury is determining whether a guilty verdict should be rendered. The purpose of the present study was to investigate the legal decision making involving a rape case when both the victim and perpetrator were intoxicated. The experiment used a 2 (Victim Intoxication) x 2 (Perpetrator Intoxication) x 2 (Participant Gender) between-participants design. We used a Qualtrics survey to write the case. In the case, the victim and the defendant met at a concert one evening, and they shared a cab on their way home. The victim claimed that the defendant raped her. After they read the case, they were asked if the Defendant was guilty or not. They were then asked questions about how they viewed the victim and the perpetrator, including questions about witness credibility and the responsibility of the victim and defendant for the incident. We hypothesized that (a) female participants would be more pro-victim (e.g., more guilty verdicts) than male participants; (b) pro-victim judgements would be greater when the victim was sober than intoxicated; and (c) pro-victim judgements would be greater when the perpetrator was intoxicated than sober.

97A. Alexandria Nelson

Additional Authors: Madison Yee, Amanda Campbell

Mentor(s): Rachel Farr

Retrospective Feelings of Difference Among Sexual Minority and Heterosexual Adults: Associations with Current Heterosexist Belief

Past research has indicated that feelings of difference (FOD) experienced, often during childhood, impacts the formation and appraisal of an individual's identity (Savin-Williams & Cohen, 2015; Troiden, 1989).

Individuals who express non-conforming genders (e.g., tomboys) and sexual minority identities can often trace their first gender-sexuality based FOD from peers as a first step in identity development (Savin-Williams & Cohen, 2015). This study examined the ways in which emerging adults retroactively report and appraise their first FOD, and explored whether this experience was gender-sexuality based or otherwise (e.g., race-based). A university student sample, along with voluntary members recruited online, of emerging adults were invited to participate in an online survey. Participants were asked to recount, open-endedly, their first negative FOD from peers or family as it related to gender or sexuality. Participants were asked to report the age in which this occurred, and to then appraise the perceived impact of this experience on a Likert scale. The majority of participants identified as heterosexual (n=703), with a subsample of lesbian, gay, and bisexual individuals. No significant difference was found between the frequency of heterosexual FOD versus gender-sexuality FOD from LGB participants, chi-square(1,N=787)=20.707, p=.294, nor were differences found with reported age of incidence of FOD, t(785)=.465, p=.642, or whether this was the first FOD experienced, t(784)=-.247, p=.805. However, perceptions of the impact of first gender-sexuality based FOD differed by sexual identity, with LGB participants indicating greater impact, t(785)=5.592, p<.001, than heterosexual participants. The impact of first gender-sexuality based FOD also varied by gender, with women experiencing greater impact, t(774)=3.811, p<.001. In conclusion, early exploration of these data indicates that FOD are not an exclusive experience of minority individuals but the evaluation of these events may be more powerful for those who are women or LGB-identified.

97B. Jamey Popham

Mentor(s): C. Melody Carswell

Graphic vs. Text-Only Résumés: Effects of Design Elements on Simulated Employment Decisions

Résumés sometimes contain graphical elements, and the use of such “graphical résumés” may be increasing. The purpose of this study was to compare the effect of including different types of graphical elements in a résumé on the most important outcome measure from the perspective of the applicant – the probability of a positive selection decision by the evaluator. There was a reliable preference for a textual résumé when participants asked which design they thought would be most effective. However, there was no reliable effect of résumé design on evaluator’s decisions about the applicant whose qualifications were represented.

98A. Madalyn Ruble

Mentor(s): Christia Brown

Children's Knowledge About Presidential Candidates and the Impact of the Media

Although they do not vote in elections, children are active consumers of the world around them. This includes witnessing the heavy presence of politics in the media. Because of the enormous coverage of the 2016 Presidential election in media and public dialogue, we were interested in children’s general knowledge about the Presidential candidates and whether this knowledge was consistent with what they had heard in the media (television, radio, etc.). Across multiple sites in the United States, 185 children in kindergarten through fifth grade were individually interviewed both prior to and following the Presidential election. Participants were asked what they knew about Hillary Clinton and Donald Trump and what they had learned about their plans

for changing laws in the United States. It was expected that participants would be extremely aware of the presence of both candidates in the media, but would have limited knowledge of specific plans for changes in law and policy. Any knowledge that they did report would have been topics related to things heavily reported in the media. Results showed that participants reported knowing far more policy information about Donald Trump versus Hillary Clinton. It is also interesting to note that the majority of children who knew policy information about the candidates reported (a) Trump discussing "the wall" he plans to build and (b) contained very dividing rhetoric concerning various groups of people, such as immigrants. Connections with children's cognitive development will be discussed.

98B. Matthew Sirrine

Additional Authors: Amanda Campbell

Mentor(s): Will Gervais, Rachel Farr

"They wear rainbows and bright colors to symbolize their flag just as we do for Fourth of July": A Prototype Analysis of Queer Attributes

The term queer has, historically, been used as a homophobic slur. Yet, LGBT+ individuals began reclaiming this slur so as to reclaim the term and reframe it in a positive manner during the late 1960's. Although it is clear that not all gender and sexual minority individuals identify as queer, the reclaimed version of this term is often used to describe someone whose sexual or gender identity does not conform to societal norms (Halperin, 1997). With a growing focus on LGBTQ-oriented research, it is important for any future scientific study to understand precisely what "queer" means to people. This project investigates common stereotypes associated with being queer by using prototype analysis (Rosch, 1975), an approach used to gain an empirical understanding of words or concepts that do not fit neatly into a simple definition. In our study, participants (N = 347) described features and characteristics they associated with being queer. After obtaining open-ended responses, two coders deconstructed responses to identify the most commonly reported characteristics. Two additional researchers then used this list to code participants' responses, resulting in 45 features frequently associated with being queer. Such features reflect an array of stereotypes, both positive (e.g., happy, unique) and negative (e.g., alone, outcast, bullied). Among those most commonly used to describe being queer include gay, homosexual, different, weird, feminine male, and odd. In all, using prototype analysis to study stereotypes associated with being queer allowed for a more empirical understanding of the popular perceptions associated with the identity. Further, these findings may help identify new methods for expanding LGBTQ-oriented research, encouraging more rigorous future studies.

99A. Audrey Cristin Sullivan

Additional Authors: Tyler Ellison, Sarah Schiavone

Mentor(s): Will Gervais

Preconceived Notions of Scientists: Exploring Stereotypes with Prototype Analysis

The term scientist is used to describe a wide array of individuals representing diverse fields and disciplines. Although scientists are generally well respected, they are also highly stereotyped as nerdy, lab-coating wearing

men, whose obsessive pursuit of knowledge is often seen as potentially dangerous (Chambers, 1983; Fiske & Dupree, 2014; Rutjens & Heine, 2016). Such stereotypes not only deter women from scientific fields (Cheryan, Plaut, Davies & Steele, 2009), but may also have further implications for the public's overall acceptance of science. This study utilizes prototype analysis (Rosch, 1975) to discern the most common generalizations that people make about scientists. Therefore, participants (N = 347) described characteristics that they associated with being a scientist, which allowed for the collection of spontaneous and open-ended stereotypes. These responses were coded by two research assistants, based on a list of 65 characteristics originally parsed by two separate coders. This created a general impression of what participants most commonly associated with the term scientist. Overall, the results reveal a variety of opinions, ranging from high praise of scientists in certain aspects, to negative stereotypes in others. The most prevalent characteristics reflect a belief that scientists have high intelligence, a greater than average education, work in the physical sciences, conduct experiments, wear lab coats, and are involved in research. This study provides a unique look into attitudes and stereotypes held towards those involved in the sciences. More broadly, such insight may be useful in better understanding the general public's trust, or distrust, of the scientific community.

99B. Michelle Tam

Mentor(s): Ramesh Bhatt

Inequality in Early Social Development: The Effects of Income on Infants' Processing of Emotion in Bodies

Socioeconomic status is a significant predictor of academic success, and the effects of poverty on cognitive skills in infancy have been well-documented. However, the link between SES and early socio-emotional skills, which are important in later communication and interpersonal relations with peers and teachers, is yet to be explored. The current study sought to determine whether or not SES predicted differences in emotion knowledge in infants. Three-, 5-, and 7-month-old infants completed an intermodal matching task to measure emotion knowledge, during which they had to match an emotion vocalization to one of two emotion body stimuli. Infants who displayed a higher propensity to match (higher percentages of congruent looking times) were seen as having higher levels of emotion knowledge. SES was measured using the average incomes for the infants' census tracts. Hierarchical regression revealed that neighborhood income was predictive of matching scores above and beyond the effects of age, gender, and race, with infants from higher income neighborhoods having higher percentages of congruent looking time. Age was also a significant predictor of congruent looking with older infants scoring higher, but the interaction between age and income was not significant. Thus, SES was similarly predictive of performance at all ages. These results suggest that differences in socio-emotional skills are associated with SES early within the first year of life, which has implications for the age at which interventions should be targeted.

100A. Jordyn Tipsword

Mentor(s): Jazmin Brown-Iannuzzi

Comparing Mental Images of Immigrants and Americans

Immigration is one of the most highly debated topics in American politics today. Scholars have argued that opposition toward immigration may be driven, in part, by racial prejudice (e.g., Citrin et al., 1997; Kinder, 2003). That is, when people think about immigration, they imagine racial minorities coming into the U.S. However, this psychological leap had never been directly tested. The present experiment investigated whether mental images of immigrants differ from mental images of Americans. We hypothesized that participants would create a "darker" image of an immigrant than they would of an American. To test this hypothesis, a base image was created by morphing faces of men of four racial backgrounds (African American, Hispanic, White, and Asian) and visual distortion masks were applied to the base image to create several variations. On each trial, we presented pairs of images to participants and asked them to select the image that looked most like an immigrant (or an American in a separate condition). The selected images for each condition were then averaged together to create an average image of an immigrant (American). A separate sample rated these images on perceived race. Consistent with our hypothesis, the American image was rated overwhelmingly as White, whereas the immigrant image was seen as not at all White and was perceived as mostly Black, Hispanic, and Asian. This finding raises questions whether attitudes toward immigration are influenced by prejudice toward a specific group, or general xenophobia.

100B. Jennifer Tyras

Mentor(s): Jonathan Golding

The Effect of Jail Informants in Rape Cases

Jail informants, often to referred to as "jailhouse snitches", are used to aid in the prosecution process. In exchange for typically lesser jail time, these informants testify against defendants (Natapoff, 2010). Past research (Wetmore, Neuschatz, & Gronlund, 2014) has shown that jail informants are typically believed and lead to the conviction of defendants. However, studies analyzing the effect of jail informants in rape cases showed the lowest conviction rates by jurors when compared to other crimes such as murder, assault, burglary (Wetmore, Neuschatz, & Gronlund, 2014). The purpose of the present study was to further investigate juror decision making in rape cases that involve jail informants. The study used a 2 (Type of Crime: rape vs. assault) x 2 (Jail Informant: Presence or Not) x 2 (Participant Gender) between-participants design. A trial summary was presented that was more detailed than prior research investigating jail informants in rape cases. Participants rendered a guilty verdict as well as rated the credibility and influence of all witnesses' testimony. Participants were also asked an open-ended question as to what led to their verdict, to account for any variables that may contribute to juror decision making. We will examine whether the type of case impacts whether jail informants are believed or not, given that past research showed that rape cases had the lowest number of guilty verdicts when a jail informant was present. Any differences will be analyzed with regard to the jurors' reason for a particular verdict. It may be that we replicate prior research investigating jail informants being believed, even in rape cases. We also hypothesized that female jurors would have higher guilty verdicts as opposed to males.

101A. Cassandra Vázquez

Mentor(s): Rachel Farr

The Relationship Between Sexuality-Professional Identity Integration and Empathy in the Communal Workplace

In workplace contexts, empathy can be an important tool to mitigate conflict (Adams & Inesi, 2016). Previous literature on more visible identities (e.g., gender; Sacharin, Lee, & Gonzalez, 2009) finds that those who perceive less conflict and distance between two identities and are able to integrate them together (identity integration; II) experience greater psychosocial functioning (Benet-Martínez, & Haritatos, 2005; Chen, Benet-Martínez, Wu, Lam, & Bond, 2013). We were interested in exploring how the integration of sexuality and professional identities, sexuality-professional identity integration (SPII), relates to social relationships. The data presented here are part of a larger study which assessed a new 6-item measure referred to as the SPII Scale, which assesses perceived conflict and distance between sexual and professional identities (Henderson, Simon, & Henicheck, in review). We hypothesized that perspective taking, empathic concern and the personal distress subscales of the Interpersonal Reactivity Index (IRI; Davis, 1980), would be related to SPII. Preliminary correlations supported some of our initial hypotheses; SPII was significantly positively correlated with perspective taking and negatively correlated with personal distress. However, empathic concern was not correlated with SPII. It may be that SPII is related to cognitive rather than affective demands (Bagozzi & Burnkrant, 1985) which has support in other II literature (Mok & Morris, 2012). Simple linear regression tests suggest that SPII is a predictor of perspective taking the workplace. As SPII increased (i.e., lower conflict and distance), perspective taking increased. SPII was also a predictor of personal distress. As SPII decreased personal distress increased. Broadly, it seems that sexual minority individuals can better serve their workplace when their organization promotes a space in which perceived conflict and distance between their sexuality and professional identities are minimized. Organizations may find that by supporting a diverse work environment they in turn also encourage stronger interpersonal work relationships.

101B. Domonick Warner

Additional Authors: Carl Mullins, James Donovan, Patrick Bates, Robert Neeley, Alon Robinson

Mentor(s): Steven Arthur, Andrea Friedrich

"What is Wrong with Googling It?": Reducing Discrepancies Between Faculty and Students' Perceptions Of Academic Dishonesty

Institutions of higher education tend to emphasize the importance of academic integrity. Students are expected to uphold academic honesty, and instructors are expected to make decisions about students' academic conduct. However, academic dishonesty is not always clearly defined. This lack of definition can lead students and instructors to hold different perceptions regarding whether or not academic rules have been violated. Such discrepancies may be exacerbated by new technologies that allow students to collect information from a variety of online sources (e.g., Wikipedia, online test banks) or social media outlets (e.g., Facebook, Twitter), being those media might not be explicitly mentioned by instructors. For example, while students may consider permissible to use online posts from Facebook in order to find resources or citations, an instructor may view this practice as a violation of a policy forbidding collaboration between students (Clark, 2012; Perez-Pena, 2012). This study has two main objectives. The first objective is to identify instances in which discrepancies between faculty and students regarding perspectives of cheating can be

observed. The second is to investigate two possible methods of changing students' perceptions of these behaviors: by priming students with expected academic integrity and by providing explicit definitions of plagiarism.

102A. Zachary Whitt

Mentor(s): Nathan DeWall

Self-Injury and Its Effects Following an Instance of Social Rejection

Self-Injury refers to any act of deliberate self-harm which is not intended as attempted suicide and not for reasons which are socially sanctioned. The behavior has become increasingly prevalent, particularly among adolescents and college-aged individuals, and it commonly explained as a maladaptive strategy for coping with negative emotions. The present study sought to determine experimentally if a proxy task for self-injury would produce any change in participants' subjective mood following an instance of social rejection. To this end, three studies were conducted online in which participants experienced either social rejection or acceptance during a ball-tossing game (Cyberball), and then completed the Voodoo-Doll Self-Injury Task (VDSIT). In this task, participants were shown a picture of a doll, representing themselves, and were then allowed to insert as many pins into the doll as they would like. The task was adapted from a previously established measure of aggression to focus participants' aggression on themselves rather than another person, and was used in this study both as an implicit measure of participants' tendency to self-harm and as a proxy for the act of self-harming itself. Contrary to some findings in the literature, none of these three studies showed any indication that self-injury could serve to stabilize negative emotions. Participants in the rejected condition did not feel significantly different after the VDSIT, while those who were accepted tended to feel worse. These findings call into question the commonly-held belief that self-injury can act as a form of mood repair, suggesting instead that such behaviors are more likely to increase negative emotions than otherwise.

102B. Sai Charaan Yalla

Mentor(s): Joshua Beckmann

Cocaine Choice: Dissociating Preference From Intake

There is mounting evidence that alternative reinforcers, such as food or money, can compete with cocaine. It has been demonstrated that cocaine versus food choice, in rats, is dose-dependent similar to that in humans, where cocaine versus monetary assets are dependent on the relative values of the given options. However, one issue with choice studies is that differential experience with the given options can lead to biases. Furthermore, in cocaine versus food choice procedures, another issue is that intake and preference can be confounded as intake could drive preference. To control for these confounds, we have employed a response-dependent schedule of reinforcement to control for the relative distribution of cocaine to food intake. Furthermore, we examined if intake and preference were correlated under a dependent schedule versus other choice procedures where opportunity costs are incurred. By controlling for the distribution of cocaine to food intake, we demonstrated that dose-dependent preferences are observed like that in choice procedures where the distribution of cocaine to food is uncontrolled and subject determined. Additionally, under the dependent schedule of reinforcement, we demonstrated that intake and preference were not correlated indicating that

choice under this procedure is based on the relative value between the given options, rather than the pharmacokinetic effects of cocaine. Moreover, under a choice procedure where the relative ratio of cocaine to food is uncontrolled, intake and preference were correlated. Overall, the present set of experiments demonstrate that using a dependent schedule we were able to measure preference between cocaine versus food choice while controlling for confounds.

103A. Emily Livingston

Mentor(s): Philipp Kraemer

Second Life: The Impact on Creativity

With technology and Virtual Reality gaming becoming a woven part of society, people are wondering what the psychological effects are in humans. This research project focuses on the impact Virtual World gaming has on creativity. Second Life, a Virtual Reality World game, is used in this project to assess whether participants were more creative after spending time in the game under different game conditions. Participants spent time in Second Life as avatars either engaged in a group scavenger hunt, an individual scavenger hunt, or a guided campus tour of a virtual University of Kentucky. Creativity was assessed with the Alternative Uses Test in which participants were asked to list as many different uses for a basketball, license plate, and mallet. This test was completed as a survey outside of Second Life. The key dependent variable was the number of unique functions listed for each test object. Data were collected from UK undergraduates who were given credit for their participation as part of their requirements for an Introductory Psychology course.

Rehabilitation Sciences

103B. Alexis Axtell

Mentor(s): Tim Uhl, Natalie Myers

Correlating Knee Flexion Angles and Shoulder Range of Motion During the Tennis Serve

Context: Lower extremity stability during the tennis serve is critical to accomplish upper extremity force production and mobility. Previous research has determined that players with effective knee flexion will generate greater degrees of shoulder external rotation (ER) range of motion (ROM) during the serve. Therefore, it is suggested that players with limited knee flexion during the serve may suffer from shoulder mobility deficits. Purpose: To determine if there is a relationship between knee flexion angle during the serve and shoulder ROM. Methods: 57 healthy professional women's tennis players enrolled in this study. Each player served from the deuce court and was video recorded from a posterior lateral view. Knee flexion was visually assessed using a reliable observational tennis serve analysis (OTSA) tool and scored as good (knee flexion > 15 degrees) or bad (knee flexion 15 degrees). Additionally, shoulder internal rotation (IR), ER ROM, and shoulder total arc of motion (TAM) were measured on the dominant arm. A correlation was utilized to determine the relationship between knee flexion and these three shoulder measures. Results: Shoulder IR was correlated with knee bend (rpb=0.34, p=0.01). Players demonstrating bad knee flexion had an average IR of 38 ± 9° compared to those with good knee flexion who demonstrated IR ROM of 49 ± 9°. Shoulder TAM was correlated with knee bend (rpb =0.30, p=0.02). Players with bad knee flexion had an

average shoulder TAM ROM of 134±14° and those with good knee flexion demonstrated TAM ROM of 147±14°. Shoulder ER was not correlated with knee flexion. Conclusion: This study further strengthens previous research that lower extremity stability enhances shoulder mobility. Tennis players should be coached to increase knee flexion during a serve to increase shoulder mobility, thus dispersing stress on the shoulder decelerators and potentially reducing likelihood of shoulder injury.

104A. Parth Patel

Mentor(s): Esther Dupont-Versteegden

Satellite Cell Depletion Does Not Affect the Adaptation to Low Oxygen in Mouse Diaphragm Muscle

Satellite cells, or muscle stem cells, are essential for muscle regeneration of all skeletal muscle, but their role in muscle maintenance and plasticity is still being debated. In addition, whether these cells play a role in diaphragm muscle that is active throughout life has not been determined, particularly under stress conditions. The goal of the study was to investigate whether satellite cells are required for muscle maintenance, particularly under a hypoxic stress. For our study, we used the Pax7-DTA mouse model, which exhibits greater than 90% depletion of Pax7+ satellite cells in diaphragm muscle upon tamoxifen treatment. Mice at 5 (young) and 22 (aged) months of age were randomized to groups exposed to either hypoxic (10% O2) or normoxic environment (20.9% O2) for 4 weeks. Single fibers from diaphragm muscles were analyzed for fiber width, myonuclear domain and nuclear number. Fiber width and myonuclear domain were both lower with hypoxia independent of age, but nuclear number was not changed with hypoxia or age. Interestingly, satellite cell depletion did not influence any of the variables at either age. In conclusion, diaphragm muscle adaptations to hypoxia are independent of the presence of satellite cells.

Social Work

104B. Elizabeth Biggs

Mentor(s): Diane Loeffler

Immigration Policy in the United States

This article focuses on the immigration policy before and after September 9, 2011 beginning with the Immigration Act of 1965. It discusses the pro-immigrant policies and diction used before the terrorist attacks on 9/11 and the anti-immigrant policies following 9/11.

105A. Martha Holtzworth

Mentor(s): Diane Loeffler

Indexing Welfare Restrictiveness: A Quantitative Analysis of Regional Trends in State TANF Regulations

State level analysis of Temporary Assistance to Needy Families (TANF) have been instrumental in helping to understand how the program's restrictions affects the lives of people in poverty. However, research that

quantitatively analyzes the restrictions on a state-by-state or region-by-region basis is very limited. In this paper an index of restrictiveness is created, discussed, and applied to the southeastern and northeastern regions of the United States.Through this application of the index, the paper argues that though both the Northeast and the Southeast have regional trends in TANF policies, they are similar in their restrictiveness. This strengthens arguments that federal policy is more responsible for the restrictions state set on TANF programs than regional differences in attitudes.

105B. Martha Tillson

Mentor(s): Michele Staton, Michele Staton, Justin Strickland

Age of First Arrest, Sex, and Drug Use as Correlates of Adult Risk Behaviors Among Rural Women in Jails

Incarcerated women frequently report initiation of substance use and sexual encounters at an early age, and often engage in high-risk drug use and sexual behaviors as adults. Less is known, however, about the relationship between age of onset of these risk behaviors, as well as the timing of first arrest, and risky behaviors in adulthood. Objectives of the present study were to: 1) profile age of first arrest, age of first illicit drug use, and age of first sex in a sample of rural women drug users (N=400) recruited from jails and screened for high-risk behaviors; 2) to examine the relationships among the age of onset of these risk behaviors; and 3) to examine the unique contributions of these onset variables to adult high-risk drug use and high-risk sexual practices. Ages of initiation were all positively and significantly correlated at the bivariate level, indicating that onset of sex, illicit drug use, and arrest are related among high-risk rural women. In logistic regression models, each onset variable independently increased the likelihood of several specific adult risky substance-using or sexual behaviors; independent effects of demographic covariates were also noted. In describing rural women's initiation of risky behaviors and involvement with the justice system and exploring associated differences in adult trajectories, this study has contributed to an understanding of the development of high-risk rural women. Implications are discussed for screening, intervention, and treatment targeting vulnerable women and girls in rural areas, particularly within criminal justice settings.

Sociology

106A. Kaitlin Henning

Mentor(s): Claire Renzetti

Religiosity, Religious Self-Regulation, and Intimate Partner Violence Perpetration

This study examines how the relationship between religious self-regulation style and intimate partner violence perpetration differs by gender. Data for the study were collected from a national, community-based sample of men and women (n = ~700). Previous analyses of data from male respondents only showed an introjected style of religious self-regulation was a risk factor for IPV perpetration, whereas an identified style of religious self-regulation served as a protective factor for IPV perpetration. Additional analyses of data from male respondents examined the moderating effects of hostile sexism and alcohol use. The present study extends the analysis to include data from the female respondents, so that gender comparisons on these variables may be made. Dr. Claire Renzetti (Department of Sociology, University of Kentucky) is the study PI and serves as the

research mentor. This is an ongoing project that examines various risk and protective factors for IPV perpetration and victimization.

106B. Meghana Kudrimoti

Mentor(s): Mairead Moloney

The Continuum of Medicalization

Medicalization—the process whereby non-medical issues are transformed into medical problems with medical solutions—has been a cornerstone of medical sociology research and theory for half a century. Previous medicalization conceptualizations implied it was akin to a dichotomous variable; a phenomena was either medicalized or it wasn't. But medicalization is not a monolithic force; rather it is a multi-faceted process that occurs on various, inter-related levels and may be partial or incomplete. Recent work has highlighted nuanced processes in the forms of "reluctant" and "ambivalent" medicalization. However, to our knowledge, there is no explanatory framework systematically elucidating why some issues are more likely to be accepted and treated as medical compared to others. In this paper we propose a continuum of medicalization that synthesizes and builds upon current understandings of the process. Locating our analyses at the level of patient-physician interaction, we critically review medicalization literature and highlight key factors that impede or speed the process, including treatment availability, adherence to the biomedical model of health, and the influence of profit-driven healthcare. To illustrate key points of movement from non-medical to medico-pathological, we identify and offer examples for four continuum categories: contestation, ambivalence, reluctance, and acceptance. We also report on findings from physician interviews; these interviews begin to establish clinical, practical implications of the continuum model for physicians. We suggest that the medical field acts as an agent of social control, handing physicians the power to set the tempo of medicalization on the continuum. Although physician interviews are presently ongoing, we expect to present our results on April 26th at the Undergraduate Research Scholars Showcase at the University of Kentucky.

107A. Hannah Latta

Mentor(s): Mairead Moloney

Negative Outcomes of Teen Sexual Activity: A Regional Analysis of Florida, Kentucky, New York, and Tennessee

A recent victory with respect to teen sexual behavior is the reduction of the national teen birth rate. In 1991, there were 61.8 births per 1000 females aged 15-19. By 2014, this rate plummeted to 24.2 births per 1000 adolescent females. Averages, however, do not reflect state-level variation. For example, in 2014, Kentucky reported 35.3 births per 1000 adolescent females, while New York reported a teen birth rates of 16.1 births per 1000 adolescent females. This report asks: are these discrepancies due to regional factors, and are these differences statistically significant? To examine rural and urban differences in outcomes of teen sexual behavior, data from two rural states (Kentucky and Tennessee) and two urban states (New York and Florida) were analyzed using SPSS statistical software. Chi-square, Fisher's Exact, and two-sample independent tests were conducted to determine if significant differences existed. It was hypothesized that rates for all negative sexual behavior outcomes (e.g., chlamydia, sexual violence) would be significantly higher in rural states.

Analyses revealed significantly higher teen birth rates in rural counties compared to urban counties in Kentucky, Tennessee, and Florida from 2006-2014. Teen chlamydia rates in Florida were significantly higher than those in Kentucky for 2006-2009. From 2006-2014, teen gonorrhea rates in Tennessee were significantly higher than those in Kentucky and New York. Teen sexual violence rates in Kentucky were significantly higher than those in New York and Tennessee in 2007 and 2011. Divergent outcomes in teen sexual behavior are likely due to numerous factors including socioeconomic status, educational attainment, and history of abuse. Further research could explore regional differences in these factors; observed differences may help explain discrepancies in teen sexual behavior outcomes. Findings from the present and future studies could potentially impact the attitudes of parents, educators, and policymakers and affect lasting change at the regional level.

107B. Jennifer Rawe

Mentor(s): Janet Stamatel

Understanding the Relationship between Homicide Rates and Gun Control in Highly Developed Countries

In recent times, gun control has become an especially hot topic in the United States. As everyone within the United States seems to have their own opinion on this matter, we can look outward to the international community and compare existing policies with our own in order to find which policies have contributed to overall less gun violence. This project aims to answer three research questions: (1) To what extent are homicide rates driven by gun violence in highly developed countries? (2) How does gun ownership/usage differ between countries with high versus low homicide rates? (3) How do gun control policies differ between countries with high versus low homicide rates? We selected a sample of eight highly developed countries from different regions of the world, with four of them having relatively high homicide rates and four with low homicide rates. We collected data from government agencies about gun deaths, gun types, gun usage, and gun control policies in order to understand how gun issues affect homicide rates. We found that types of gun control policies were most likely to distinguish high- and low-homicide countries.

Veterinary Science

108A. Sandhya Paudel

Mentor(s): David Horohov

The Use of IgG(T) as a Diagnostic Tool in Foals with Naturally Acquired Rhodococcus equi Pneumonia.

While rhodococcal pneumonia is among the leading causes of foal mortality, its diagnosis remains a challenge. Antibodies specific to VapA (virulence-associated protein A) were previously evaluated as a diagnostic tool using foals that had been challenged with R. equi. With the exception of IgG(T), VapA-specific IgG subclasses were poor predictors of disease. The objective of this study was to further investigate the use of IgG(T) as a diagnostic tool under field conditions. Healthy foals on a farm with a history of endemic R. equi infections were enrolled in the study (n=46). A serum sample from each foal was collected monthly at ultrasound screening times or when a trans-tracheal wash was performed. Sample collection was discontinued when antibiotic therapy for rhodococcal pneumonia was begun. Additional positive control serum samples

were obtained from confirmed cases of rhodococcal pneumonia admitted to a local hospital (n=3). All samples were analyzed utilizing a previously validated ELISA for VapA-specific IgG and its subclasses (IgGa, IgGb, and IgG(T)). Foal's were classified into one of the four groups: no respiratory abnormalities, subclinical disease, rhodococcal pneumonia, non-rhodococcal pneumonia. One-way ANOVA was used to compare the concentrations of VapA-specific IgG and its subclasses amongst the four different groups at each time point with significance level established at α=0.05. No statistical differences were identified and only 2/5 foals with rhodococcal pneumonia had elevated IgG(T) at four months of age. No foals without respiratory abnormalities (32), or with non-rhodococcal pneumonia (1) had high IgG(T) concentrations. Thus, IgG(T) was a poor indicator of rhodococcal pneumonia within the studied population. One factor that may have contributed to these results is the high number of subclinical foals that were started on treatment based solely on ultrasonographic abnormalities or on unspecific clinical signs. Therefore, it is possible that the early removal of these foals precluded our detection of a significant IgG(T) response.

The Oswald Research and Creativity Program was established in 1964 by then-President John Oswald as part of the university's Centennial Celebration. While the program's objective has remained the same throughout the years, the number of categories has increased to include biological sciences; design, including architecture, landscape architecture, and interior design; fine arts, including film, photography, painting, sculpture; humanities, from creative and critical-research approaches; physical and engineering sciences; and social science. In the science categories and the Humanities/Critical Research category, students generally submit research papers done for class or on their own. For the Humanities/Creative category, students submit short stories, original plays, or poetry. The Fine Arts category is appropriate for musical compositions, paintings, sculpture, videos/films, or photographic essays. Many fine works of art and serious research papers are recognized by the program each year. This competition is unique to the University and provides an excellent opportunity for undergraduates to test their skills and to see their academic work in a serious, professional light.

Any undergraduate who does not already have a four-year degree is eligible to enter the program. Awards are $350 for first place in each category, and $250 for second place.

Biological Sciences

Grant Bogges, First Place
Mentor: Brian Noehren
Neuromuscular Compensatory Strategies Are Maintained at the Lumbar Joint and Knee Following an ACL Reconstruction

Marie Noel, Second Place
Mentor: Martin Nielsen
Accuracy and precision of Mini-FLOTAC and McMaster techniques for determining equine strongyle egg counts

Design

William Greene, First Place
Mentor: Ned Crankshaw
Walter Bradley Park Design Proposal

Emily Preece, Second Place
Mentor: Rebekah Radtke
Flux

Fine Arts

Amy Hoagland, Frist Place
Mentor: Jim Wade
Synthetic Natural

Jenny Winstead, Second Palce
Mentor: Nancy Jones
The Art of Lewis Carroll: Dramaturgy for Alice in Wonderland

Humanities: Creative

Tiwaladeoluwa Adekunle, First Place
Maybe Home Is a Place That Knows You

Yvonne Johnson, Second Place
Seeking Home

Humanities: Critical Research

Abby Schroering, First Place
Mentor: Mathew Giancarlo
A Heap of Broken Images: T.S. Eliot The Waste Land As A Poetic Drama

Rachel Strange, Second Place
Capote Himself: Style, Self-Construction, & Identity

Physical & Engineering Sciences

Tahnee Qualls, First Place
Mentor: Cameron Agouridis
Development of a Methodology to Determine Antibiotic Concentrations in Runoff Samples

Areej Saeed, Second Place
Mentor: Jian Shi
Will Hemp Become the Next Big Kentucky Crop?

Social Sciences

Martha Tilson, First Place

Mentor: Michele Staton-Tindall

Age of First Arrest, Sex, and Drug Use as Correlates of High Risk Drug Use in Adulthood Among Rural Women in Jails

Jessica Emly, Second Place

Mentor: D.Kay Woods

Fantasy versus Reality: Analyzing the Relationship between Violence in Music, Movies, and Video Games and Violence in Society

Sara Assef
Mentor: Kristin Ashford
An Examination of the Misclassification Rates of Prenatal Smoking Behaviors throughout Each Trimester of Pregnancy.

Brian Bates
Mentor: Andrea Friedrich
Academic Integrity: Effects of the University Pledge on Cheating and Plagiarism

Esias Bedingar
Mentor: Yang Jiang
Brainwave Signatures For Detecting Malingered Neurocognitive Deficit (MNCD)

Colvin Kylie
Mentor: Bruce Webb
Suppression of Heliothine Pest Populations by HZNV-2 Nudivirus

Lina Ghazala
Mentors: Amy Confides & Esther E. Dupont
Elevated Pax3+ cell number potentially compensates for Pax7+ cell-depletion in diaphragm muscle of running mice.

Heather Gosnell
Mentor: Eric Rush
The Emerging Genetics Workforce: A Study of Physician Geneticists' Professional Lives

Whitney Hiner
Mentor: Karen Butle
Lung Cancer Prevention: A Review of the Literature

Joslyn Isaac
Mentor: Kenneth Campbel
Developing New Therapies for Heart Failure

Hillary McLean
Mentor: Travis Thomas
Higher Unsaturated Fatty Acid Intake and Aerobic Training are Related with Lower Intramyocellular Lipid in Older Adults

The Nu Sandar (Kendra) Oo
Mentors: Tammy Stephenson, Dawn Brewer, Amanda Hege, Jessica Houlihan, Luisyana Gamboa, Lauren Serra & Leslie Hildesheim
Sustainable Approaches to Fighting Hunger: Development and Evaluation of an Innovative Gleaning and Nutrition Education Program Among Food Insecure Children in Lexington, Kentucky

Sandhya X
Mentors: Craig S., Fernanda C.,& Horohov D
The Use of IgG(T) as a Diagnostic Tool in Foals with Naturally Acquired Rhodococcus Equi Pneumonia

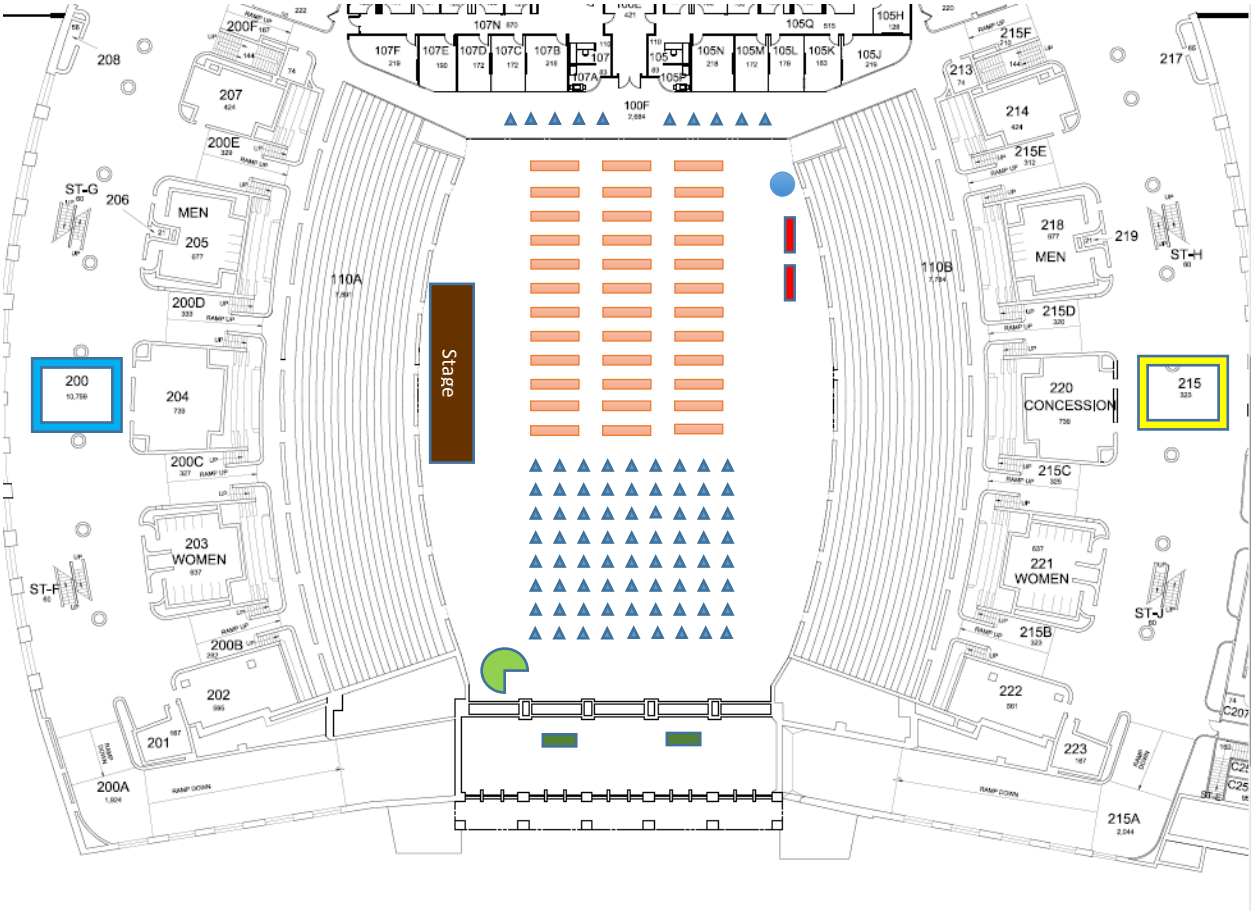
Joshua Preston
Mentors: Kevin J. Pearson & Leryn J. Reynolds
Maternal Nicotine Exposure Prior to and during Pregnancy and Nursing Increases Offspring Obesity Risk

Haley Reichenbach
Mentor: Jeffery Bewley
Comparison of DX613 Copper Sulfate Acidifier Footbath to a 5% Copper Sulfate Footbath for Prevention of Digital Dermatitis Lesions in Dairy Cattle

Martha Tillson
Mentors: Justin C. Strickland & Michele Staton-Tindall
Age of First Arrest, Sex, and Drug Use as Correlates of Adult Risk Behaviors Among Rural Women in Jails

Nathaniel Wilson
Mentor: Kristen Mark
Demographic Correlates of Average, Desired, and Perceived Average Men's IELT in a Global Sexually Diverse Sample

Talavera-Santiago Gabriela D.
Mentor: Melody Danley
Sensory Ablation and Red Swamp Crayfish Burrowing Behavior



Registration

Bag/Coat Check

Poster Displays

Poster Displays

Reception

Tables

Oral Presentations Concourse A

Oral Presentations Concourse B

University of Kentucky

Vice President for Research

Chellgren Center

Nationally Competitive Awards

Undergraduate Research

sour
society for the promotion of undergraduate research

Photography and Graphic Design by:

Barnett Design Co.

Catering by:

Peas in a Pod
Catering • Specialty Foods • Gifts