The Showcase of Undergraduate Scholars

Wednesday, April 25, 2012
University of Kentucky
Thanks to all those involved with planning the 2012 Showcase.

Undergraduate Research Office:
Evie Russell
Danica Kubly

Chellgren Center:
Lynn Hiler
Jennifer Strange

Department of Nutrition and Food Science
Design: Andrew Krebs, Office of Student Involvement
Photography: Bradley Nolan, UK Photography Student
Musical Entertainment: Paws and Listen, Director: Dr. Lori Hetzel

The Office of
UNDERGRADUATE RESEARCH
UK.

Student Government
UNIVERSITY OF KENTUCKY

Chellgren Center
for Undergraduate Excellence
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Seventh Annual Showcase of Undergraduate Scholars

Wednesday, April 25, 2012
Student Center Ballrooms
4:00-7:00pm

4:00pm .............................. Opening Remarks and Moderator
Dr. Diane Snow

4:05pm .............................. Keynote Speaker
Lucky You, Presented By Mr. Sam Nicaise

Sam Nicaise is a graduate student in Electrical Engineering and Computer Science at MIT. He received his BS from the University of Kentucky in Electrical Engineering in 2010. His past work spanned nano templates and structures, gas sensing devices, and organic/inorganic thin films for photovoltaics.

Sam currently investigates nanostuctures through block copolymer templated self-assembly. This work is directed towards harnessing assembly into predicted and complex designs though many chemical and topographical lithography techniques.

4:20pm .............................. Presentation of Fifth Annual Faculty Mentor Awards
Lindsey Smith, President of SPUR

4:30pm .............................. Presentation of Oswald Award Competition
Dr. Diane Snow

4:45pm .............................. Opening Performance
Paws and Listen

5:00pm-7:00pm ...................... Presentation and Viewing (Posters and Orals)

Catering is provided by the Nutritional and Food Science undergraduates enrolled in Dr. Sandra Bastin’s NFS 342 Quantity Food Production class.

Dr. Bastin teaches the capstone course in quantity food production, commonly known as the “Lemon Tree,” to dietetic and hospitality management and tourism students.
Welcome to the 2012 Showcase of Undergraduate Scholars!!

A component of the University of Kentucky Mission, and integral to every research institution, is the embodiment of faculty-mentored research in the undergraduate educational experience. Why is this so important? As this Chinese proverb so eloquently summarizes:

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

Countless studies by education experts indicate participation in research by undergraduate students results in a myriad of benefits – from improved retention, to overall success in future careers and beyond, to increased enjoyment of education.

For this reason, we strive at UK to foster undergraduate research in every way possible – from the Freshman year to graduation. At various points along their research progression, we get the honor of learning in more detail about our students’ methods and discoveries. To this end, as well as to honor the remarkable achievements of our undergraduate students, we bring you the 2012 Showcase of Undergraduate Scholars.

At this year’s Showcase of Undergraduate Scholars students, faculty, staff and guests will hear from administrators associated with research campus-wide, enjoy a “testimonial” about the many benefits of engaging in undergraduate research by UK graduate Sam Nicaise (mentor: Dr. Vijay Singh), now an Engineering graduate student at MIT, witness the unveiling of the Oswald Award winners (see www.uky.edu/UGResearch/Oswald), enjoy a special performance by musical group Paws and Listen, and of course, meet undergraduate researchers, who present their interesting areas of research and scholarly work in both poster and oral formats. We are sure that you, like us, will be amazed and intrigued by the diversity, depth and breadth of research projects, the professional accomplishments and presentation skills of our students, and the superb mentorship provided by our devoted faculty and staff.

While the students are indeed dedicated and talented, we maintain their success is also highly dependent on two other factors: First, the devotion and mastery of their faculty mentors, who work side by side with these gifted undergraduates to prepare them for the rigors of their chosen careers. Congratulations to this year’s recipients of the Excellent Undergraduate Research Mentor Awards, and to ALL mentors, who truly make a difference in the lives of our students. Second, to the hard-working and talented staff of the Office of Undergraduate Research who work tirelessly to promote undergraduates and their research endeavors at UK. My sincere appreciation and admiration for their efforts!

During my graduate training in Neuroscience, I was told by one of my mentors, “You can do the greatest research in the world, but it’s of little value unless you can successfully convey to others what you have learned.” Join me in welcoming and congratulating all the undergraduate student presenters at this year’s Showcase of Undergraduate Scholars, who will highlight for you today what engaging in undergraduate research and scholarly activities is all about!

With admiration and appreciation,

Diane M. Snow, PhD
Director, Office of Undergraduate Research
UK Professor of Neuroscience
Welcome from the Society for the Promotion of Undergraduate Research

Good evening! Welcome to the seventh annual Showcase of Undergraduate Scholars. We appreciate you taking time out of your evening to come and support our undergraduate students here at the University of Kentucky. My hope is that you will leave here with a better understanding of the scholarly work that undergraduates are engaged in here on campus. The number of undergraduates involved in research grows each year, and so does the Showcase of Undergraduate Scholars. These students make new discoveries and find new ways to have an impact on their various fields. There are many disciplines represented here tonight, as well as many types of presentations – poster, table, and oral. As always, I encourage you to take time to learn about the projects going on within your field, as well as fields you are not as familiar with.

Before I began my own research project, I did not fully understand the time and effort that each student puts into their project. Becoming involved in undergraduate research is a difficult journey of ups and downs, yet the triumphs make it worth one’s while. These students have spent countless hours working toward their final results, in addition to attending school, working, and becoming involved with clubs and other activities on campus. This is not a trivial undertaking, and I applaud each and every undergraduate who has had the initiative to participate in research. I would also like to thank all of our faculty mentors who spend hours of their time teaching and encouraging us, including my own mentor Dr. Jonathan Lifshitz, and the entire Lifshitz lab.

I would like to take a moment to recognize the members of SPUR, as well as Evie Russell, Danica Kubly, Lynn Hiler, and the Office of Undergraduate Research. Planning and preparing for the Showcase each year takes months and hours of time and a lot of dedication. Without these individuals, the Showcase of Undergraduate Scholars would not be a success.

Once again, thank you for attending the Showcase of Undergraduate Scholars this evening. Please spend time watching an oral presentation, sampling the wonderful hors d’oeuvres prepared for us by the students of NFS, and talking to students in order to experience what the Showcase is all about. I hope that you leave with a better appreciation for the time and dedication of our undergraduate researchers here at the University of Kentucky.

Sincerely,
Lindsey E. Smith
President, SPUR

2012-2013 Officers
President: Mandy Kaiser
Vice President: Sarah Whelan
Secretary: Shelby Malone
Public Relations: Honglu Liu
2011 Faculty Mentor Award Recipients

Dr. Trevor Creamer

Dr. Trevor Creamer is an Associate Professor in the Department of Molecular and Cellular Biochemistry and is Associate Director of the Center for Structural Biology. He received both his B.Sc. and Ph.D. from the University of Western Australia, and completed postdoctoral training with Professor George Rose at the Johns Hopkins University. Dr. Creamer has received funding from the NSF, NIH, American Chemical Society, Huntington’s Disease Foundation and Kentucky Science and Engineering Foundation. He is director of a NSF REU summer program in the Department of Molecular and Cellular Biochemistry and has worked with undergraduates in his laboratory for about fifteen years. Dr. Creamer’s current research focuses on the molecular details of the regulation of the essential phosphatase calcineurin. Calcineurin is involved in brain development and function, heart growth, kidney function, and activation of the immune system. Dr. Creamer has published in a number of journals, including The Proceedings of the National Academy of Sciences, Biochemistry, Journal of Molecular Biology and Proteins. He is on the editorial boards of Proteins and Biochemistry Research International.

Dr. A. Gwynn Henderson

Dr. Henderson is Staff Archaeologist/Education Coordinator at the Kentucky Archaeological Survey and Adjunct Assistant Professor in the Department of Anthropology. She received her Ph.D. in Anthropology from the University of Kentucky in 1998. She researches the lives and cultures of the Ohio Valley's native farming peoples from prehistoric times (A.D. 1000) to the mid-18th century and how children learn about the past. She has published articles on her archaeological research in Southeastern Archaeology, on her history-social studies education research in International Review of History Education, and on public archaeology in The SAA Archaeological Record. Dr. Henderson and her colleague, Dr. David Pollack, Director of the Kentucky Archaeological Survey and Adjunct Assistant Professor in the Department of Anthropology, directed the UK Summer Field School in Archaeology from 2009-2011, at a prehistoric farming village near Maysville. They have encouraged the involvement of their undergraduate field school students in researching the artifacts recovered from the site, and presenting the results of their research. Dr. Henderson also works with archaeologists, teachers, and museum educators to develop content, lessons, booklets, video programs, and workshops that make information about Kentucky’s rich archaeological heritage accessible to a wide audience. She serves as State Coordinator for Kentucky Project Archaeology; her book for adult literacy students, Kentuckians Before Boone, is used in elementary school classrooms; and she has published several nonfiction articles for children in dig Magazine.

For information about past recipients, visit www.uky.edu/UGResearch.
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Oral Abstracts

Ashlee Anciro, Jingjing Xu
Department of Entomology
Mentor: Subba Reddy Palli

Feeding/Nutrient is not required for the
Male Spermatogenesis in Adult Stage of Tribolium Castaneum

The previous study confirms that there is a certain nutritional requirement for female reproduction. Thus, if the female Tribolium are starved they will not lay eggs and reproduce. Instead, they will save their energy for their own survival. The next logical question is whether there is also a nutritional requirement for male reproduction in the adult stage. The results of this research show that nutrition is not required for male spermatogenesis in the adult stage of Tribolium. In order to come to these results, several experiments were performed to compare fed, fully nourished beetles to starved, malnourished beetles. All experiments required the use of Tribolium day 0 adult males split into two groups—one group given flour for three days and the other group starved for three days. In one experiment, the two groups of males were both mated with fed, fully nourished females. The eggs laid were then counted to compare results. After counting the eggs, no significant difference was found in the number of eggs laid in females mated with fed males versus females mated with starved males. Then the sperm produced by starved versus fed males were compared. The testes of the males were dissected on the fourth day, isolated separately and crushed to release sperm. The sperm number was counted to find no difference of sperm production between the two groups of males. From the results of these experiments it is evident that there is not a nutritional requirement for male spermatogenesis in the adult stage because if adults were fed or starved, the males continued to produce the same amount of sperm and mate to produce the same number of eggs. These results fill the gap of unknown information regarding male reproduction nutrition.

Jessica Anderson
Department of Political Science
Mentor: Daniel Morey

Raising Voices by Degrees: A Case Study on Women, Education, and Cognitive Dissonance at the University of Jordan

The central questions that drive this study are: Does studying women’s rights issues effectively create conflict within or between women, challenging their values, aspirations, and identities in a meaningful way? If so, is this a transformative process? If so, what are the results of such a transformation? Over the course of the Fall 2011 semester, I followed a class of Jordanian women enrolled in a course titled “Contemporary Arab Women Writers,” taught by Dr. Rula Quawas. I observed that women are likely to change their attitudes and identities in the short-term through formal study of women’s rights issues and first-hand exposure to the women’s rights movement. Drawing on weekly interviews, I emphasize areas where the course created cognitive dissonance, by which I mean the students became aware of disharmonious beliefs or ideas in their lives. When cognitive dissonance arises and is acknowledged, it problematizes questions of identity and can potentially prompt a transformative experience for the women involved. This experience is linked not only to the content of the course, but also to social values and physical features of the University of Jordan as a unique movement space.
Oral Abstracts

Sarah Jones
Department of Communications
Mentor: Derek Lane

Parental Influence on Young Adults’ Vocational Choices

The current study sought to investigate the communication between parent and child regarding vocation, in order to answer the following research question: Which parental message type exerts the greatest influence on young adults’ vocational choices? A cross-sectional online survey was designed to answer the research question. Fifty-two young adult participants (N=52) served as the sample. Variables were measured using a series of scales developed by the researcher. Analysis revealed a statistically significant difference between the six parental message types in terms of greatest influence: \(F(5, 45) = 3.97, p = 0.005\). LSD post hoc analyses revealed statistically significant differences between the positive emotional direct (PED) messages and all other messages, such that PED messages were seen as most influential.

Chris Karounos, Deric Miller, Philip Crowley
Department of Biology
Mentor: Nicholas McLetchie

Showing a Tragedy of Commons in Plant Roots using a Clear Growth Medium

While much of the literature on the Tragedy of Commons (ToC) focuses on its prevalence in human economic interactions, it appears in many nonhuman systems as well. In a plant-systems application of ToC, multiple plants compete over shared nutrients and space. Tragically these resources become exhausted due to their availability to multiple plants. Our study focuses on determining whether two competing plants reproduce less due to a ToC. We predict that plants create a ToC and subsequently pay a reproductive cost. We quantify a ToC by measuring a plant’s reproductive mass (an indicator of reproductive success) as well as its total root mass. A ToC lowers reproductive mass and raises total root mass. Our study uses barriers to manipulate interplant competition. Plants are potted in pairs, 40 pairs are grown 1 cm apart to promote root competition and another 40 pairs are split by impermeable barriers to prevent competition. We specifically used ultra-clear growth medium (Gellan Gum with Hoagland’s solution) in order to photograph roots as they grow in vivo. Root imaging at a high resolution makes computational analysis of root architecture achievable. Our platform computes root architecture data linked exclusively to root over-production. These data include distribution, average radius, root volume, and root length. Preliminary results suggest no significant effects from competition. We expect photographic data analysis to show higher root architecture values in competing plants. Empirical photographic analysis could reveal undiscovered facets of root’s response to nutrients and spacing as it relates to reproductive tissue yield. This information is valuable for agricultural applications.
Oral Abstracts

Kristyn L. Mickley, April N. Sigler
College of Nursing
Mentor: Patricia Burkhart

Promoting Normal Development and Self-efficacy
in School-age Children with Chronic Conditions: A Literature Review

Chronic conditions can affect school-age children in more ways than just physically. Normal childhood maturation is critical at this age, yet daily management of chronic symptoms can be challenging. The purpose of the review of this literature is to describe four common childhood chronic illnesses, asthma, seizure disorders, diabetes, and cystic fibrosis, and the impact each condition has on the developing child. Empirical studies support developmental and behavioral models to guide daily management of the disease, so that children with chronic illness can progress adequately in their development. Self-efficacy, the belief that one can effectively perform necessary skills, is essential to the management of chronic conditions and contributes in a positive way to the child’s normal development and quality of life. Implications for clinical practice and future research are discussed.

John T. Rathbun, David J. McLane
Mentor: Braden Lusk

Investigating Planar Propagation of a Shockwave in a Shock Tunnel

The research conducted previously on Shock-Tunnel Waveform Analysis gave a brief insight into the propagation of a shockwave within a shock-tunnel compared to that of an open air arena test. A shock-tunnel is an energy channeling device used to simulate the effects of a large scale detonation with significantly smaller charge weights. The previous analysis, introduced some interesting results of wave propagation, such as the trend of peak impulse down the tunnel. Although the data appeared sporadic, it was found that the test were highly repeatable and accurate. It has been proposed that the point where the propagation of the wave becomes planar is related to the tunnel diameter, and that this is where peak impulse is found. The purpose of this research is to determine the stand-off distance within the shock-tunnel that the shock-front stops propagating radially and becomes planar. From previous tests, peak impulse declines with respect to distance after its peak. This analysis will give insight into how the wave reacts within the tunnel. The same charge weights used in the last experiment were used in order to keep the same control variables. To determine the wave geometry, free-field piezoelectric sensors will be placed down the tunnel at 1 X D to 5 X D at increments of one diameter each time. Because all the sensors are placed on the same cross-sectional plane within the tunnel, when all the sensors measure the same time of arrival at a certain distance, the wave at that point will be planar. Plotting all the data points into a 3-D model will produce a visual of a shock-front propagating down the length of the tunnel.
Oral Abstracts

Laura Shahan
Mentor: Geoffrey Wallace

*International Laws of War and Their Effect on the Efficiency of American Air Power*

The United States, like many other countries, has every incentive to abide by the modern customs of warfare and to preserve human rights during conflicts, at the risk of its international reputation. There exists no foreseeable reason that the U.S. will deemphasize its commitment to upholding these obligations. Since the Vietnam War era it has taken progressive steps to ensure higher rates of compliance, including specific directives and training programs aimed at making American soldiers accustomed to operating within the standards of the Laws of War and customary rules of engagement. As such, the America’s desire to improve its compliance with the Geneva Conventions and similar guidelines will have adverse effects on its ability to use air power to its optimum efficiency. In combination with the United States’ policies of noncombatant immunity, provides an interesting paradox that ultimately indicates that air power will be less effective in asymmetric conflicts. Strong states have no incentive to change the status quo and violate the international system in such a way. This indicates the likely trend of asymmetric wars in the future, which many times rely on nonconventional means to combat the dominant power. This mismatch of American aerial superiority and insurgencies produces disappointing results for air power. The U.S is simply too dedicated to the concept of noncombatant immunity for air power to have a definitive impact in wars where there is no distinction between the combatants and civilians, or when the adversary has utterly no incentive to abide by IHL. Air power when combined with modern technology can produce awe inspiring effects that spare civilians unnecessary hardships unlike any other point in history, but when confronted with an asymmetric war whose participants rely on nonconventional and illegal methods of combatant, even the most advanced air forces succumb to the primitive strategies.
Andrea Clark  
Department of Art  
Mentor: Hunter Stamps

**Figuring Out the Figure:**  
*A Cross-Cultural Study on the Interpretation of Human Form in Clay*

There is a poetic irony to the human figure forged in clay. Man, a living being created from the earth and destined to return to dust, is represented as an inanimate art object through figurative sculpture. It is this fragile, and at the same time concrete, creation that remains the “heightened embodiment” (Patterson Sims) of its living counterpart. Historically, religiously, and scientifically charged as seen in Renaissance works, the sculpted human figure has evolved in both meaning and form; even to the extent of nonhuman forms, as seen in Daisy Youngblood’s animal sculptures. Through the subjective, distorted mirror of art, especially of contemporary art, we are able to see multiple sides of our existence. Direct, cross-cultural observation and the actual creation of a clay figure will allow me to examine the potential cause of said distortion. Throughout my research, I will focus on an individual’s perception of himself, framed and reflected by his social/cultural group-- further still by the art created by each respective group. I will seek to defend the vitality of figurative sculpture in contemporary art, and furthermore as a fundamental approach to the interpretation of humanity.

Dominique Luster  
Mentor: Tony Hardin

**Designing “The Crucible” by Arthur Miller**

*The Crucible* by Arthur Miller is a staple in the American theatre repertoire. The story is an American classic that modern audiences still find interesting because of its perfect mix of fear and lies. Arthur Miller brings to the American stage an intriguing story that consistently questions the direction of our moral compass. What is authority? And whose position is it to question authority? How much power does intimidation have? What is the strength of social convictions? How far will we allow our fears to dictate our actions? My goal was to take all of these questions and implement them into a coherent scenic design. When reading The Crucible, I was initially drawn to the Barbados slave, Tituba, more than any other character. Because of this attraction I decided to invest my design in a warmer Caribbean color palette that would best exploit her heritage and the turning point her traditions caused in this story. From this idea initial reaction, I began researching images on voodoo and seventeenth century witchcraft. Subsequent to developing the initial concept idea, I kept returning to one particular image that stood out as the strongest representation of the accused men and women. I revamped my concept idea to more intimately surround the image of a jailed hand. This idea of ‘hands grasping at jail bars’ became the focal aspect of my design; replacing the forest trees I had originally envisioned in the background. Without knowing any background information, one can sense an oppressive atmosphere in which this prisoner has been subjugated to some level of abuse. This image evokes a dark sense of foreboding; of an animal crudely locked in captivity. *The objective of my design of The Crucible was to impress upon an audience, through scenery, a sense of coercion and intimidation felt by those who died.*
Fan Yang  
Mentor: Jane Hayes

TraceMatrix Analyzer (TMA)

A Traceability Matrix (TM) represents the relationship between software engineering artifacts and is foundational for many requirements assurance techniques. In a large project, a TM might represent the relationships between thousands of elements or dozens of artifacts. In mission- and safety-critical systems, a third party agent may be given the job to assess a TM prepared by the developer. There are currently no techniques to assist such an agent in assessing a sizeable TM. This project aimed to develop a technique for analyzing and visualizing a TM to make it easier, faster, and more efficient to evaluate large TMs. Also, the project aimed to greatly reduce the workload of those performing requirements assurance. By analyzing the relationship between high level requirements and low level requirements, TraceMatrix Analyzer (TMA), found four types of potentially incorrect links in a TM: parents without children (high level requirements without links), children with too many parents (low level requirements with too many links), possible bad links (links with confidence scores which are below a threshold score), and possible missing links (two high level requirements have links that point to more than two of the same low requirements). The TMA tool was informally examined, it was found that these characteristics existed: simple to operate, friendly User Interface (UI), and powerful expandability. The only operation that users performed was entering the path of the input files (high level requirements, low level requirements, and links information). Two different figures were drawn by the program: a figure that displayed the link information and a figure that displayed possible ‘wrong links.’ Users clicked on the figures to switch between them. Different links were shown in different colors, which could be identified easily by users. Also, it was found that more functions could easily be added in the future.
Poster Abstracts

Agricultural Economics

1. Tarrah Dunaway
Mentor: Ani Katchova

Helping Beginning Farmers in Kentucky Transition into Agriculture

The U.S. agriculture will be experiencing a major change – about half of the farmers are expected to retire in the next decade and be replaced by beginning farmers. Currently, only 20% of the farms are beginning farms, therefore there is a need to educate and prepare new farmers to transition into agriculture. The Kentucky Beginning Farmer Program (KyFarmStart) is a federally-funded program led by the University of Kentucky to provide educational programs for beginning farmers. In 2010, over 100 beginning farmers enrolled in the program in four geographic areas representing 22 counties in Kentucky. The goal of this research was to evaluate the effectiveness of KyFarmStart program for training beginning farmers and to provide us with a deeper understanding of their characteristics and needs. Specifically, we use an end-of-program evaluation including pre- and post-program assessment of knowledge gained and behavioral changes. We also included detailed demographic questionnaire on beginning farmer characteristics. Our results show that KyFarmStart has been very effective in training new farmers by increasing their knowledge and involvement with the farm business. We have also developed benchmarks for comparing beginning farmers’ characteristics with the rest of the Kentucky farm population. Specifically, ArcMap from ArcGIS was used to plot the beginning farmer characteristics spatially on a map and compare them with all farmers based on Census of Agriculture data. Our research helps to understand beginning farmer characteristics and their educational needs to prepare them to transition into agriculture and ultimately design more effective educational programs for beginning farmers.

Anatomy and Neurobiology

2. Erin Anderson (High School student), Azita Bahrami, Christopher Calulot, Adrian Centers, Thomas Hering
Mentor: Diane M. Snow

Factors Secreted By Sensory Neurons May Promote Neurite Outgrowth Even In The Presence Of Inhibitory Chondroitin Sulfate Proteoglycans (CSPG) In Vitro

Following spinal cord injury (SCI), chondroitin sulfate proteoglycans (CSPGs) are upregulated by reactive astrocytes. CSPGs, such as aggrecan, are large aggregating molecules of the extracellular matrix, which are expressed in axon-free areas of the embryonic nervous system and inhibit neurite outgrowth in adult’s systems both in vivo and in vitro. This project investigates if there may be factors secreted by embryonic chick dorsal root ganglia neurons that are capable of encouraging neurite outgrowth inhibitory substratum-bound aggrecan. Fluorescent microscopy and image analysis were used to observe the extension of neurites toward and across the aggrecan stripe. Growth across the stripe when explants were across from each other was compared to growth when explants were only present on one side of the aggrecan stripe. If the neurites passed the midpoint of the stripe, it was considered positive for increased outgrowth, and if not, it was considered negative. It was determined that outgrowth was increased when there were two explants as opposed to a single explant. This research has implications for the enhanced understanding of the mechanisms that impede and encourage axon regeneration after SCI.
**Poster Abstracts**

3. **Azita Bahrami**, Chris Calulot, Justin A. Beller, Thomas M. Hering  
Mentor: Diane M. Snow

*Can Sensory Neurons Produce Their Own Anti-inhibitory Factor to Promote Regeneration?*

Following spinal cord injury (SCI), chondroitin sulfate proteoglycans (CSPGs) are up-regulated by reactive astrocytes of the glial scar, leading to failed regeneration and a subsequent loss of motor and/or sensory function. CSPGs consist of a protein core to which glycosaminoglycans (sugar chains) are covalently attached, and represent a large, extracellular matrix barrier to neuronal regeneration. Previous data from our laboratory has shown sensory neuron outgrowth is density dependent. Extrapolating from this observation, we asked, “Might a group of sensory neurons be able to lure other neurons through a region consisting of inhibitory CSPGs?” To test this hypothesis, sensory neurons were cultured (on laminin) on either one side, or both sides, of a strip of adsorbed CSPG (150 ug/ml; 48 hrs). Images were taken of the regions of outgrowth and the CSPG stripe. Neurons were identified with anti-neuron specific beta-III tubulin, and the CSPG stripe was identified using an anti-CSPG antibody. A Merz grid was used to quantify outgrowth under each condition. Results of this study showed that when neurons were plated on only one side of the inhibitory CSPG stripe, the neuronal processes grew to the edge of the CSPG border and turned, i.e. they were inhibited, mimicking the behavior they exhibit at the CSPG-producing glial scar *in vivo* following SCI. However, when sensory neurons were grown on BOTH sides of the CSPG stripe, there was significant outgrowth ACROSS the typically inhibitory CSPG, and toward the adjacent group of sensory neurons. This preliminary data suggests that sensory neurons may secrete a factor(s) that promote their own elongation, and that potentially, strategic placement of such factors may be used to overcome CSPG inhibition and promote regeneration.

4. **Vanya Bistrekova** (High School student), Joyce Achenjang  
Mentor: Andrew Deane

*The ‘Hole’Truth: Collateral Ligament Fossae Size and Shape and Hominoid Locomotor Adaptations*

Locomotion and positional behavior are among the most basic functional parameters defining primate species. Primates represent a greater diversity of locomotor adaptations than any other mammalian order. In particular, hominoids encompass a number of distinct locomotor adaptations, each one associated with a unique hand posture, phalangeal orientation and characteristic pattern of mechanical loading (i.e. knucklewalking, fistwalking, hooked grasping hand postures associated with suspension, bipedalism). While it is widely accepted that phalangeal shaft curvature is an adaptive response to the habitual stresses of locomotion, relatively little is known about the relationship between collateral ligament fossae size and shape and locomotion. Radial (RCL) and ulnar (UCL) collateral ligaments are the primary stabilizers of the MCP and IP joints and are comprised of an accessory ligament proper (dorsally located; taut in extension) and the accessory collateral ligament (volarly located; taut in flexion). This study employs 3D shape analysis to test the hypothesis that collateral ligament fossae size and shape vary according to locomotor adaptation and hand posture. Collateral ligament fossae surface areas were obtained from five hominoid genera (n=49) with diverse locomotor adaptations, and comparisons of fossae area and shape were made between discrete locomotor groups. Results indicate that knuckle-walking apes have deeper and more restricted fossae with steeply sloped margins, while suspensory apes have shallow and broad fossae. Humans have the smallest and shallowest fossae. A more detailed understanding of the relationship between collateral ligament fossae morphology and locomotion will ultimately contribute to research questions addressing the evolution of hominoid locomotor adaptations.
Mentor: Marilyn J. Duncan

*Effects of Age on Bmal1 Gene Expression in the Hamster Brain*

Circadian (24 h) rhythms are driven by molecular oscillations consisting of interacting transcriptional-translational feedback loops, of which *Bmal1* is an essential gene. In mammals, *Bmal1* oscillates not only in the master clock of the suprachiasmatic nucleus (SCN) but in other brain areas, such as the hippocampus, a structure regulating memory. Indeed, circadian rhythms are necessary for memory function. *Bmal1* deletion not only ablates circadian rhythms but also induces an early aging phenotype, including memory deficits (Kondratov et al., 2006). The study objective was to examine effects of normal aging on *Bmal1* in the hippocampus, cingulate cortex, and SCN. Young (3-5 mos) and old (16-18 mos) male hamsters (N=10/age) exposed to a 14:10 light:dark cycle were euthanized at zeitgeber time (ZT) 1, 6, 13, or 19 (ZT12 = lights-off). The brains were dissected and frozen. Sections prepared with a cryostat were processed for in situ hybridization using radioactively-labeled oligonucleotide probes complementary to *Bmal1* mRNA. X-ray films were exposed to the slides and radioactive standards to generate autoradiograms. *Bmal1* mRNA expression in four hippocampal areas (CA1, CA2, CA3, and DG), the cingulate cortex, and SCN was measured by computerized microdensitometry of the autoradiograms. In all regions, results showed time of day variations of *Bmal1* expression (P<0.05) and lower levels of *Bmal1* in old hamsters (P<0.01). An interaction between time and age was observed in CA2 (P<0.05) and an interaction tendency (P<0.07) occurred in CA3 and cingulate cortex. In conclusion, aging decreases *Bmal1* mRNA expression in hippocampus, cingulate cortex, and SCN, and affects rhythm in one of these areas. These findings suggest that age-related attenuation of the clock gene *Bmal1* may contribute to deficits in cognition and memory that occurs with aging.

6. **Julie A. Corkins;** Dexter Reneer; Sarbani Ghoshal; Richard Hisel, GLR Enterprises
Mentor: James W. Geddes

*Blast Induced Brain Injury: Pressure and Head Rotation*

Blast-induced traumatic brain injury (bTBI) is a condition that is becoming more common for soldiers and civilians who are exposed to blasts from explosive devices. Sub-lethal blast injuries can have lasting impacts on the mental status and health of those who are injured. Little is known about the conditions that result in bTBI, thus it is important to thoroughly examine the mechanism of injury. Others have previously shown that rapid head movement lacking physical contact of the head against any solid structure is sufficient to cause brain injury. Though blast waves contain physical features that have been predicted to cause injury in computer models, the component of translational movement of all or some part of the body and/or head cannot be ignored. A study was designed to analyze the pressure and impulse contained within blast waves as it relates to head movement. The head movement of rats during exposure to shockwaves of two different sources was recorded via high-speed video camera. The video was analyzed for maximal degree of deflection and average deflection velocity. Angle and velocity of deflection were compared to various markers of brain injury to determine if a correlation existed. There was no relationship between the amount of peak pressure or impulse to which a rat was exposed and the degree to which or velocity with which their head moved. However, a positive correlation between the actual peak pressure to which the animal was exposed and the level of IgG found in the ventral cerebrum ipsilateral to the injury side was found, indicating that peak pressure of the blast wave plays a role in the mechanism of traumatic brain injury. Understanding the mechanisms of bTBI will be crucial in providing treatment to those who have sustained a bTBI and provides insight into potential protective equipment for soldiers.
Poster Abstracts

7. **Emerson Dick**; Brian Chaffin, Undergraduate, Georgetown University
Mentor: Luke H. Bradley

*A Higher-throughput Platform for Investigating Protein Binding Specificity using Combinatorial Approaches*

Nearly all biological processes are regulated by proteins that specifically recognize and bind to a variety of defined targets to transmit signals necessary for life. Thus it is not surprising that disruptions in these interactions, at the molecular level, generally result in poor cell health, disease, and potentially cell death. In order to better understand the molecular basis of protein binding specificity that regulates cellular processes, combinatorial approaches are an attractive approach towards easily generating a large number of members with altered binding specificity for downstream structure and function studies. However a limitation to this powerful approach is the use of robust screens to successfully identify members with desired specificities. This medium throughput approach, known as differential scanning fluorescence, quickly assesses changes in protein binding specificity of a high-quality synthetic protein library. This technique is shown to be robust, reproducible, and powerful - easily identifying members with altered specificity to physiological target peptides in our libraries. Furthermore, results from this study suggest a unifying theme in our protein library design, which may have broad implications in future designs to engineer novel protein binding activities for numerous biotechnical and biomedical bioapplications.

8. **Marquiana Jusma**
Mentor: Andrew Deane

*What’s for Dinner? A 3D Morphometric Analysis of Hominoid Incisor Crown Surface Area and Apex Angle*

Unlike humans, apes have proportionately larger anterior dentition (i.e. incisors and canines). The relative size of these teeth in apes represents an increased emphasis on the pre-processing of food items prior to mastication with the post-canine dentition (i.e. molars and premolars). A number of studies have demonstrated that incisor morphology is primarily a function of diet. Although the relationship between incisor curvature and diet has been well established, relatively little is known about the relative proportions of the labial and lingual surfaces of incisors or the angles at which these surfaces meet to form the occlusal margin of the incisor crown. This study employs 3D shape analysis to test the hypothesis that the relative surface areas of the lingual and labial surfaces of the incisor crown and apex angles are primarily a function of diet and that apex angles will be greater in more frugivorous taxa. Incisor crown surface areas and apex angle measurements were obtained from five hominoid genera (n=55) with unique dietary adaptations ranging from more folivorous to more frugivorous. Results indicate that more folivorous apes have smaller apex angles and decreased lingual surface areas relative to labial surface area. The more precise our understanding of the incisor morphological variation associated with discrete dietary adaptations among living apes, the greater will be the detail with which we can describe the adaptive ecology of fossil apes and early humans.
Poster Abstracts

9. Harrison Kilgore, Jessica Martin, Chris Calulot, Daisy Ramos, Thomas M. Hering, Stephen M. Onifer
Mentor: Diane M. Snow

Aggrecanase and Chondroitinase-mediated Degradation of CSPG in a Rat Spinal Cord Injury Model

Spinal Cord Injury (SCI) is a devastating condition that results in an increase in reactive astrocytes and the production of chondroitin sulfate proteoglycans (CSPGs). CSPGs inhibit neurite outgrowth and block regeneration. An enzyme that degrades the CSPG sugar chains, chondroitinase, reduces inhibition, and allows short-range regeneration with modest functional recovery in animal models. To improve on this result, we are examining another enzyme, A Disintegrin-like And Metalloprotease with Thrombospondin type I motifs-4, also known as ADAMTS-4, or aggrecanase, which degrades the CSPG protein core, with the goal of using a combinational approach with chondroitinase in vivo. To perform these experiments, a reliable injury model is required. A spinal cord dorsal hemisection was made at C5-C6 in adult male Sprague-Dawley rats, which consistently gave a lesion of the dorsal columns, and a portion of the corticospinal tracts. Both sensory and motor function was hindered in forepaws. A Staircase Test (Onifer et al., 1997) that measures forelimb grasp function was used. Animals were initially trained on the apparatus, then tested just prior to injury and again at 1, 2 or 3 weeks following injury. Results of post injury tests were compared to pre-injury baseline scores. Further, a Sticker Attention Test (Onifer et al., 2005) was done to assess sensory function and recovery. These tests gave an overall assessment of forepaw function, and will now be applied to studies in vivo using chondroitinase + aggrecanase treatments. Ongoing studies are comparing behavioral tests with immunocytochemistry of spinal cord sections taken from injured and non-injured animals. [Support: DOD-W81XWH-10-1-0778].

See also Poster by Ming et al.

10. Hemnishesil K. Marella, Justin A. Beller, Thomas M. Hering
Mentor: Diane M. Snow

Chondroitin Sulfate Proteoglycan Profiles of Activated Versus Quiescent Astrocytes

Following spinal cord injury (SCI) there is an increase in the number of activated (reactive) astrocytes. Although astrocytes perform many functions in normal, healthy tissues, following SCI they form a barrier called the glial scar. Reactive astrocytes of the glial scar upregulate large extracellular matrix molecules called proteoglycans, specifically chondroitin sulfate proteoglycans (CSPGs), which inhibit neurite outgrowth and block successful regeneration. Qualitatively, glial scar astrocytes produce a variety of different CSPGs, such as aggrecan, decorin, neurocan and phosphocan. To understand quantitative differences in CSPGs between activated and quiescent (uninjured) astrocytes, the following methods were used. Astrocytes grown using tissue culture were either untreated, or treated with TGF-beta, which induces astrocytes to become activated. Media from treated or untreated astrocyte cultures were collected and subjected to column chromatography, to separate CSPGs based on size, and DEAE column chromatography to separate CSPGs based on charge. The collected fractions were further analyzed by 1) a Dimethylmethylene Blue (DMMB) assay to identify and quantify all PGs, 2) a Bradford assay to quantify protein content, and 3) a conductivity assay to measure the salt gradient used to elute PGs from the column. On-going studies will analyze qualitative differences between quiescent and reactive astrocytes CSPGs as well as differences in GAG chain sulfation patterns. An understanding of quiescent versus reactive astrocytes profiles may help to identify specific molecular barriers to regeneration and may provide therapeutic targets for SCI treatments. [Support: NIH 53470; KSCHIRT #11-10A]
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11. Michael Miller, Simon Meredith, Ryan Weeks
Mentor: Don Gash

*Ideas and the Concept of Multitasking*

The semester’s research was twofold. First examined was the nature of ideas from the perspective of the Viral Idea Unit Structure concept. From this position, ideas are viewed much in the same way as viruses: that is, as invasive, mutating, self-replicating units which are debatably alive. The VIUS concept was studied in the context of two influential ideas in the field of medicine: antisepsis and the use of surgical anesthesia. It was found that the development and spread of both ideas followed a particular set of steps: stimulation, conception, testing, internal validation, transmission, and external validation. At this point the focus shifted to the second crux of the semester’s study: the idea of multitasking. First studied were the idea’s origins in the computer industry and its transition to the more colloquial definition of the ability to simultaneously perform multiple tasks. It was found that the idea conformed to the VIUS concept and the steps therein. Next, a working definition for multitasking was drafted and a hypothesis and experimental model were formed to test the idea’s viability. A pilot study to test subjects’ performance quality while tasked with multiple objectives on a driving simulator is forthcoming.

12. Anna Ming (High School student)
Mentor: Stephen Onifer

*Perineuronal Nets in the Brain Stem after Spinal Cord Injury and Rehabilitation*

Rehabilitation after spinal cord injury improves sensorimotor function by increasing neural plasticity up to a point. This leveling out may be in part due to perineuronal nets, a developmentally and activity-regulated structure surrounding neurons. They are composed of chondroitin sulfate proteoglycans (CSPGs) that limit neural plasticity. Overall, CSPG levels increase in the adult rat after spinal cord injury, leading to axonal sprouting and regeneration failure and limited neural plasticity. The laboratory has previously shown that aggrecan, a CSPG, decreases at cervical spinal cord injury and denervated target brainstem dorsal column nuclei then returns to normal levels. With Wisteria Floribunda Agglutinin (WFA), which labels perineuronal net CSPG components, staining increased in adult rat cervical spinal cords at a time when forelimb rehabilitation effects reached a plateau. To further investigate the effects of rehabilitation on perineuronal nets in the cervical SCI model, a fluorescent staining technique was developed to see brainstem cuneate nuclei with an antibody against cholera toxin B subunits, a neuroanatomical tracer injected into the forepaw to reveal sensory primary afferents, an antibody against NeuN, a nuclear antigen, and perineuronal nets with WFA. Microscopy will observe perineuronal nets at the spinal cord injury site and denervated brainstem of injured rats that do or do not undergo forelimb rehabilitation. If there is a larger density of perineuronal nets in one or both of these regions of rats undergoing rehabilitation, then this may be limiting the effect of rehabilitation. If there is no change, then other mechanisms may be limiting rehabilitation’s effectiveness. These findings will help guide research aimed at developing rehabilitation techniques focused at improving sensorimotor function after spinal cord injury.
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13. **Sean Mullins**, Collin Rogers  
Mentor: James W. Geddes

**Calpastatin Splice Variants: Expression Levels in the Brain**

Alzheimer’s disease (AD) is characterized by the presence of neurofibrillary tangles and β-amyloid plaques in the brain. It is thought that increases in intracellular calcium levels may be a driving force of these two pathologic features of AD. One way in which calcium could be involved in neurodegeneration is through the activation of calpains. The calpain family consists of at least 15 isoforms that are calcium-activated proteases involved in synaptic transmission, cell motility, and differentiation. Calpains are endogenously inhibited by calpastatin (CAST). CAST consists of four N-terminal splice variants in humans; variants I, II, and III are thought to be expressed ubiquitously, but variant IV is expressed exclusively in the testis and was not examined. The hypothesis is that CAST splice variants are expressed at varying levels in the brain, with lower levels in AD vulnerable areas of the brain. To test this hypothesis, human and rat primers were designed specifically to detect each CAST variant. Primer efficiencies and specificities were tested in mRNA isolated from human or rat samples and reverse transcribed to make complementary (cDNA). Primers for human CAST type I (NM_001042440), human CAST type II (accession NM_001190442), rat CAST I (accession NM_053295), and rat CAST II (accession NM_001033715) were used to perform reverse transcriptase-polymerase chain reaction (RT-PCR), and PCR products were visualized on an agarose gel using an ultra-violet (UV) trans-illuminator. Bands of the appropriate size were detected for rat CAST I and II and human CAST II in rat brain samples or human brain samples, respectively. Currently, Taqman primer/probe mixes for the working CAST variants in rat and human samples are being designed and will be used for quantitative RT-PCR. These studies will provide insight into acquiring a better therapeutic target against the pathological calpains through better understanding calpain regulation by individual CAST splice variants.

**Animal and Food Sciences**

14. **Brandy Collins**  
Mentor: Jeffrey Bewley

**Viable Alternative Bedding Materials for Compost Bedded Pack Barns**

Compost bedded pack barn use in the dairy industry is increasing in popularity throughout Kentucky and the southeastern United States. The key component for successful composting in these barns is a large open resting area that is generally bedded with sawdust. Previous research suggested sawdust or wood shavings to be the ideal bedding material due to particle size properties that enable the compost to optimally perform. These barns require three to four times the amount of bedding material that traditional free stall barns require. Therefore a limiting factor to barn success has become sawdust availability. This research aimed to find alternative bedding materials for use in these barns by looking at biomass byproducts of other agricultural industries. As a comparison, three popular sawdust choices were analyzed to determine benchmark goals for other materials. Materials selected were analyzed for initial moisture content, water holding capacity, drying rate and equilibrium moisture content. These characteristics were selected for their ability to provide information about the material particle size.
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15. Taylor A. Reiter, B.A. Beavers, F. R. Moreira, K.J. McQueery, C.L. Wood
Mentor: Jeffrey Bewley

Effect of PediCuRx Prevent A on Digital Dermatitis in Dairy Cattle

Digital dermatitis (DD) is a highly infectious, painful dairy cow disease that impacts animal welfare, production, and farm profitability. This study was conducted at a commercial dairy farm for four months to evaluate the performance of PediCuRx Prevent A (GEA Westfalia-Surge, Naperville, IL) footbath and pre-bath systems. The size and shape of each DD lesion were scored at 30 day intervals using a 0 to 3 scale (0 being no wart or no pain and 3 being the largest or most painful). The percentage of hooves with active DD decreased as the study progressed from 20.7% in November to 7.7% in December, 8.9% in January, and 5.5% in February. The GENMOD Procedure of SAS (Cary, NC) was used to compare frequencies of size and pain scores across observation periods. The odds of a cow having a higher locomotion score were 1.51 times higher in December than in February (p<0.05). Other non-infectious locomotion issues were observed in December. Across all hooves, the odds of a cow having a higher wart size score were 2.98 times higher in November than in December, January or February (p<0.05). Across all hooves, the odds of a cow having a higher pain score were 3.08 times higher in November than in December, January, or February (p<0.05). PediCuRx Prevent A appears to be effective at reducing the incidence and severity of DD.

Anthropology

16. Arlis Johnson
Mentor: Richard Jeffries

Optically Stimulated Luminescence (OSL) Sheds Light on Dates of Construction and Destruction of Stone Structures Built Atop Sediment and Rockshelter Roof Collapse

Optically stimulated luminescence (OSL) has been used in numerous scientific fields for various applications. This research explores the potential for its archaeological application in two respects: 1. The ability to provide an absolute date of construction and destruction of archaeological sites which will help identify those responsible for both events. This absolute date will place each event into an historical or paleoclimate context in which these events occurred. 2. There is potential for this method to also provide an absolute date of a rockshelter roof collapse. This will not only provide a date of collapse, but will also provide a terminal date for the underlying artifacts, as well as confirm or deny theories such as the 1811 hypothesis.

17. Samantha Lunger
Mentor: Kristin Monroe

Performance and Interpretation of Straightedge Identity: The Intricacies and Variances within a Subcultural Community

By conducting research within the straightedge community, the goal was to portray the construction and performance of identity of participating individuals who self-identified as ‘straightedge’, and to illuminate the dynamics of the individuals performing within the straightedge subculture. In doing so, commentary on the importance of understanding that different individuals have correspondingly different understandings of what exactly it means to be an authentic straightedger was created by examining the
various degrees of straightedge identity, along with the levels of abstaining enacted by the straightedgers themselves. The ways in which the straightedge identity has evolved temporally and spatially, what it means for straightedgers to ‘fall in and out’ of their identity, and questions of interpretation of non-community members and their lifestyles were also addressed and utilized in order to further understand contemporary straightedge identity, along with how the identity is performed and interpreted by its own participants. To achieve these ends, in terms of research procedures, a variety of anthropological tools were employed based in participant observation, interviews rooted in life histories, and the analysis of photographs, music, and symbolism within the straightedge community. These methodological approaches were appropriate primarily because they allowed for immersion within the community in order to understand how the straightedge identity itself carries monumental value to the individuals who identify as such, and allowed us to understand that this meaning is echoed and vocalized in the music and symbols utilized by the members. As a result of completing the research, it is understood that interviewed and observed individuals that self-identify as straightedge do so of their own accord, for reasons based both in moral belief and life history experiences. Although the sense of identification did not vary, the degree of abstinence did, and this degree was determined by each individual’s personal morals and beliefs.

18. Cara Mosier  
Mentor: David Pollack

*Pointing in the Right Direction: A spatial and temporal analysis of Type 3 projectile points at Fox Farm (15MS1)*

Mason County, Kentucky, is home to a Fort Ancient site known as Fox Farm (15MS1). During three University of Kentucky field schools, archaeologists documented three circular Middle Fort Ancient (A.D. 1200-1400) midden rings (A-C). To determine the temporal relationship of the three midden rings, all of the triangular projectile points recovered from the site were analyzed, with particular attention paid to Type 3 Coarsely Serrated Fine Triangular points. This distinctive point type accounts for 47.3 percent of the triangular points recovered from Fox Farm. The triangular point collections from each midden ring were compared and contrasted, as were a set of attributes recorded for the Type 3 projectile points. Attributes recorded included length, width, thickness, basal shape, and material type. Through examination of the spatial distribution of the types and attributes, it should be possible to identify temporal trends in projectile point manufacture and assess the degree to which these trends reflect stylistic or functional differences. This research is part of a larger study, with other researchers comparing and contrasting ceramic decorative motifs and discoidals. Together these projects have the potential to contribute to our understanding of the occupational history of Fox Farm.

19. Lena Reich  
Mentor: Sarah Lyon

*Spray-Paint Speech in a Tropical Paradise: Political Graffiti in Costa Rica*

This research project involved documenting political graffiti in Costa Rica and analyzing its contents. The objective is to prove the use of graffiti as political discourse and its validity and importance in popular history. This argument has often been made for countries in which a repressive regime was in place at the time or in recent years, but not as often for a country like Costa Rica where citizens exercise their right to protest daily with minimal reprehension from the government. Using photographs of political graffiti in Costa Rica and newspaper articles that describe the issues and positions mentioned in
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the graffiti pieces, as well as literature on political graffiti and its significance, this research highlights the use of graffiti in Costa Rica as a form of political communication and the significance of this graffiti.

20. Brandon Ritchison
Mentor: George Crothers

*Petroglyphs in Cave 15Ht53, Mammoth Cave National Park, Kentucky: Rock Art and Ritual in Karstic Kentucky*

Rock art studies have gained popularity amongst archaeologists in the past decades. Rock art in cave contexts has been of particular interest to researchers in the Southeastern United States. This paper documents a preliminary survey undertaken at cave site 15Ht53, a cave that is a part of the Mammoth Cave System (MCS) in West-Central Kentucky. Petroglyphic forms at 15Ht53 resemble many other Early Woodland motifs from other cave sites within the MCS. These other examples of rock art are often associated with prehistoric mining activity, but there is no evidence of this at 15Ht53. Instead, the author argues that examples of rock art in 15Ht53, and elsewhere in the MCS, may have been observed in a ritualistic manner as a part of rites of passage, not simply created as has been elsewhere proposed. This is following the example of the Writing-on-Stone site. A brief discussion of historic cave use at 15Ht53 follows.

21. Caitlin Rogers
Mentor: David Pollack

*Reading between the Lines: An Analysis of the Temporal-Spatial Relationship of Ceramic Motifs at Fox Farm (15MS1)*

The Fox Farm site (15MS1) is situated on an upland ridge top north of Mayslick, Kentucky in Mason County. The site was occupied during the Middle (1200-1400 AD) and Late Fort Ancient (A.D. 1400-1750) subperiods. Fox Farm is considered to be an anomaly of sorts because it is one of the most intensively occupied and largest Fort Ancient settlements in Kentucky. The site has confounded many and continues to offer more questions than answers about the people who once lived there. The cultural significance that Fox Farm offers archaeologists is a better understanding of Fort Ancient settlement patterns and socio-political organization. My research is part of a larger project that seeks to determine the temporal relationship of the three Middle Fort Ancient midden rings at Fox Farm. The focus of my project was an examination of the temporal and spatial relationship of decorative motifs on ceramic jar necks recovered from midden rings A, B, and C. Other researchers are looking at the distribution of projectile points and discoidals. The motifs I examined consist of incised/trailed lines and punctations consisting of line-filled triangles, interlocking lines creating curvilinear or rectilinear guilloches, or rows of punctations. At times punctations were used as a border or to fill incised/trailed motifs. After I identified the types of motifs present within each midden ring, I compared and contrasted those recovered from each midden ring to determine if they represented temporal trends or cultural differences between occupations or midden rings.
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22. Jacob Welch
Mentor: Scott Hutson

Measuring Maya Politics: Demographic Research on Ancient Community

Archaeologists have utilized pedestrian survey to observe settlement patterns at multiple Maya sites. It was through this strategy that the perception of the Maya center changed from a ceremonial hub to a vast urban municipality encompassing both monumental architecture and smaller residential structures. Due to time commitments and rigor, only a few projects have carried out a systematic survey of an entire Maya site; however, many have utilized the fishbone transect method developed at Tikal to determine the size of a Maya center without mapping its entirety. The Ucï-Cansahcab Regional Integration Project has adopted this survey method to locate the northern, southern and western borders of Kancab. Furthermore, the project has identified a diverse and extensive data set of structures at this minor Maya site, located on the 18-kilometer causeway connecting the ruins of Ucï and Cansahcab. Using this data, UCRIP has determined Kancab’s projected size, enabling the project to answer numerous questions regarding the integration of the site during and after the construction of Kancab. Using the analysis of the ceramics found during excavation at Kancab in the 2011 field season, UCRIP asserts that Ucï controlled Kancab at the beginning of the Classic period (app. 200 AD). However, Kancab experienced a rebirth at the end of the first millennium, well after Ucï itself had gone into decline.

23. V. Camille Westmont
Mentor: Scott Hutson

Identifying and Analyzing the Use of Space in Ancient Mayan House Mounds in Kancab, Yucatan, Mexico

My research will involve collecting, examining, analyzing, and interpreting the material remains associated with an ancient Mayan house mound located on the Yucatan Peninsula, Mexico. My faculty mentor, Dr. Scott Hutson, is currently doing research on a sacbe (road) that stretches from Ucï to several smaller sites believed to be under its social control. His research questions involve the effect of the process of integration on local communities, and how the process was shaped by the actions of those communities. By examining two house mounds, I will be able to look at how social control and integration is reflected through spacial use in rural versus urban areas.

Appalachian Studies

24. Megan Henderson, Charlene Powell, Ann Kingsolver, Shane Barton, Lisa Conley
Mentor: Jeff Spradling

The Post Office Project

The Post Office Project is a multi-disciplinary study of the proposed closings of rural post offices in 32 Appalachian Kentucky counties. The on-going project, started in Fall 2011, uses oral histories, geographic information systems, economic analysis, literature reviews, photography, and personal essays to assess the impact of proposed closings on communities and individuals. Results and documents of this project will be available on a Web site hosted by the University of Kentucky Appalachian Center. Specific research looked at broadband access in the affected locations, since electronic communication is a major factor in the financial problems of the U.S. Postal Service. It is clear that rural areas in
Appalachian Kentucky have issues with broadband access. The Post Office Project was presented at the recent Appalachian Studies Conference.

**Behavioral Science**

25. **McKinley Heflin**, Lucas S. Broster, Shonna Jenkins, Anne Shandera-Ochsner, Maryanne Edmundson, David Powell, Walter High
Mentor: Jiang Yang

*Alterations of Brain Function during Working Memory in Military Veterans with Mild Brain Injury or Post Traumatic Stress Disorder*

Differentiating symptoms of post-traumatic stress disorder (PTSD) from sequelae of mild traumatic brain injury (mTBI) is a significant challenge in the clinical setting. Veterans with both disorders may show similar cognitive impairment (e.g. memory loss). We investigated the possible differential brain responses underlying PTSD and mTBI groups. In this pilot study, four clinical groups of military veterans including mTBI (6), PTSD (4), both mTBI and PTSD (6), and neither mTBI nor PTSD (i.e. “combat control”) (5) performed a working memory task (delayed match-to-sample) under functional Magnetic Resonance Imaging (fMRI). Event-related fMRI data were collected by using a 3 Tesla Siemens Trio MRI scanner. Multiple regression analyses of fMRI blood-oxygen-level dependent (BOLD) signals were analyzed in several regions of interest critical to cognitive functions. The combat control group significantly differed from patient groups at the anterior cingulate cortex, known for cognitive control (uncorrected p = 0.003). The mTBI group shows a significant difference in amygdala activation (p = .016), whereas the PTSD group showed no significant difference (p > 0.2). Significant repetition effects were found in the frontal BA10 region between the combat control and the PTSD and mTBI groups (p < 0.01). In the PTSD group, in frontal BA10 brain activity decreased with repeated repetitions, whereas the other three groups displayed a positive trend. Functional BOLD changes that are associated with repetition priming may clinically differentiate PTSD and mTBI. The pilot results suggest that PTSD and mTBI affected differential as well as overlapping neural mechanisms during a cognitive task.

**Biology**

26. **Sarah K. Barney**, Daniel P. Wetzel
Mentor: David F. Westneat

*Individual Variation in Cognitive Foraging Ability and Parenting in House Sparrows*

Foraging ability is a multifaceted concept involving an organism’s ability to collect food in an efficient manner using adaptive foraging strategies, spatial memory, and learning. The ability to find and collect ample amounts of food is critical to survival and successful reproduction, particularly in organisms that must supply food to their offspring. Individual variation in “cognitive foraging ability” could be a key factor in explaining consistent differences in the parenting ability among individuals. We sought to investigate this novel idea by testing the ability of individual house sparrow (*Passer domesticus*) parents to solve a novel foraging task. To perform the test, we placed foraging puzzles, which were composed of a platform containing nine small cups, near 25 inhabited nest boxes. Over several days sparrows were trained to find mealworms in these cups. Foraging trials were performed by placing mealworms in the cups, then covering them with metal washers. Parents then had one hour to “solve” the puzzle by removing a washer to obtain the food. Measurements including times on board, amount of time on board
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and learning curve were analyzed to determine the cognitive foraging ability of the birds. This data was then compared to parental care data collected from the same birds, which included the rate and size of food items brought to nestlings. We found that the ability to solve the puzzle did not predict any measure of nestling provisioning. This may have been due to the relatively small number of birds that solved the puzzle (nine birds). We did find that for those birds that performed the task, females took significantly longer to solve the puzzle than males. Individual variation in cognitive foraging ability did not explain variation in parental care; however, further refinement of this experiment to increase the number of parents performing the test could provide more conclusive results.

27. Ariel Blythe Reske
Mentor: Doug Harrison

The SERF Gene and its Potential Role in Neurodegeneration

Protein aggregation has been discovered to be associated with a wide spectrum of neurodegenerative diseases. In Parkinson’s, inordinate aggregate formation of the protein α-synuclein is highly correlated with the disease state. A Drosophila model of Parkinson’s was developed by Feany et al (2000), who generated transgenic flies that express point mutation forms of the human protein α-synuclein gene known to cause Parkinson’s disease. An investigation of the function of the SERF/MOAG-4 gene in C. elegans explains the relationship between the SERF gene and protein aggregation. It was shown that a deletion of this small gene suppresses aggregate formation. It is hypothesized that a deletion of the SERF gene in a Drosophila Parkinson’s model will suppress the formation of α-synuclein aggregates.

The human protein α-synuclein is being expressed through a GAL4 system using genes specific to particular tissues: elav-Gal to express α-synuclein in the neurons, mef2 to express it in the muscles, and GMR-Gal to express it in the eyes. The mutant flies were assayed using three different tests: 1) a climbing assay to assess motor function, 2) a deep-pseudopupil observation to note possible tissue degeneration in the GMR flies, and 3) a brain sectioning involving immunohistochemical detection of aggregates to check for α-synuclein aggregation. These α-synuclein misexpressers were crossed with flies with a SERF deletion, and the progeny of those flies were assayed using the same tests. The results of the SERF/α-syn assays were compared to those of the α-synuclein misexpressers alone to determine the effect that the SERF gene deletion has on the phenotypic neurodegenerative patterns in aging flies. Drawing conclusions from previous investigations, the relationship between the SERF gene, aggregation formation, and the severity of disease symptoms is explored.

28. Richard Scott Bradford, Jason Collet
Mentor: Jeffrey Osborn

The Effects of 2,4 Dinitrophenol on Sodium and Osmolar Excretion and Reabsorption Rates in the GI tract of Procambarus clarkia

The freshwater crayfish Procambarus clarkii is subjected to a wide range of salinities, and therefore must regulate the intake and output of the salt and water with respect to the constantly changing external environment. Some marine organisms are known to possess sodium chloride transporters in the lower digestive tract that mimic the actions of vertebrate kidneys. It is known that some of these transporters are involved in the active transport of sodium in the GI tract. 2,4 Dinitrophenol (DNP) is a cellular metabolic poison. It uncouples oxidative phosphorylation by carrying protons across the mitochondrial membrane, leading to a rapid consumption of energy without generation of ATP. This study hypothesized that the infusion of DNP into the GI tract of crayfish will inhibit the active transport of sodium, thereby lowering the reabsorption rate of sodium in the GI tract. This hypothesis was
examined by evaluating the osmolar and sodium excretion and reabsorption rates of the GI tract of the crayfish Procambarus clarkii while perfusing the GI tract with normal crayfish saline, along with the metabolic poison DNP. There were a total of eight collection periods and four acclimation periods (1 acclimation period for every 2 collection periods). After conducting the experiments, it was found that the metabolic poison 2,4 Dinitrophenol did have a significant result in lowering the overall reabsorption rate, but not on the sodium or osmolar excretion rates. These results indicate that 2,4 Dinitrophenol has an effect on the overall reabsorption rate but not on the sodium and osmolar excretion rate. This means that the 2,4 Dinitrophenol is actually lowering the overall water reabsorption while still allowing the same amount of sodium and osmoles to be excreted.

29. Ellen Burns; Potenza, J.B., Transylvania University; Holsinger, R.C., University of Kentucky; LeBlancq, M.J. and Maslink, C., Brock University, Canada
Mentor: Robin L. Cooper

Crayfish hindgut: A Model System for examining Central and Peripheral Control Mechanisms

Although the crayfish hindgut has been a research model for over a century, it is still an excellent model for investigating the generation and regulation of peristaltic rhythms and for describing the mechanisms underlying their modulation, both at the level of neural circuitry and at the level of ion channels within the neurons and muscles. The crayfish hindgut is unique when compared to the smooth muscle in the GI tract of vertebrates, as this invertebrate system not only contains striated muscle with gap junctions but also has the ability to generate intrinsic pacemaker activity. We first investigated the influence of the ventral nerve cord (VNC) and, in particular, the sixth abdominal ganglion on the activity of the hindgut of Procambarus clarkia by measuring the force and frequency of GI contractions. Then, the influence of neuromodulators selectively on the drive to the hindgut from sixth abdominal ganglion as well as the whole chain of abdominal ganglia (A1-A6) was examined. In addition, the effects of applying neuromodulators directly to the brain (cerebral ganglia) on descending drive of the hindgut and effects of direct application to the hindgut were assessed. Serotonin, octopamine, and dopamine (1 uM) all enhance the rate of contractions when the VNC or the GI is directly exposed. Direct application of neuromodulators to the GI produced more forceful contractions and a faster rate than exposure only to the VNC. Dose-response curves of the various modulators are being examined.

30. Katherine Carter, Jason Collett, Brandon Franklin
Mentor: Jeffrey Osborn

An Old World Primate Biomedical Model for Stress Induced Hypertension

The African Green Monkey, (Chlorocebus aethiops; common name, Vervet), is an old world primate used as a biomedical model for many diseases. The Vervet has research advantages including accessibility, body size, lack of natural predators and evolutionary similarity to humans. Vervet monkeys from an established colony on St. Kitts have been characterized with medical conditions including Simian immunodeficiency virus, obesity, metabolic syndrome and hypertension. The c. aethiops genome has been sequenced (2007) so that existing data can now be studied as the hypertensive phenotype with targeted loci for chromosomal genotypes. This research investigated the scientific approach to using c. aethiops as a viable model for the assessment of genomic regions responsible for the development of hypertension. An in depth literature analysis was performed and followed by filtration for blood pressure measurements and hypertension research. Additional chronological filtering provided material organization for hypertension studies. Literature findings suggest that Vervets develop stress-induced
hypertension associated with environmental manipulations including placement rearrangement, environmental heat stress, and 6% (high) sodium intake. Relationships between hypertension and dexamethasone, endotoxins, and angiotensin II have been reported. The St. Kitts Vervet colony exhibits a stress induced hypertension phenotype and available tissue samples for genetic analysis. Alternatively, a Wake Forest University Vervet Research Colony (derived from St. Kitts descendants) may also provide tissue for genotyping and hypertension phenotypes to yield an internal comparative analysis and an 8 generation matrilineral pedigree for heritability. In conclusion, data collected from both the St. Kitts and Wake Forest University Vervet research colonies will be used to isolate genomic regions associated with phenotypically expressed spontaneous hypertension. Further comparative analysis of identified genomic patterns will reveal the expediency of the Vervet monkey as a biomedical model for future genomic study of sympathetic nerve activity, renal function and the development of arterial hypertension.

31. Ann S. Cooper  
Mentor: Robin L. Cooper

*Transection of a Motor Nerve Results in a Rapid Synaptic Depression*

For a number of years it has been suggested that motor nerve terminals in vertebrates might release ACh spontaneously in a non-quantal and non-evoked manner (Katz and Miledi, 1981). It has also been reported that the non-quantal release of ACh decreases after the motor nerve is severed while evoked and quantal release can still occur. In vertebrate preparations examined, shortly before a severed nerve terminal fails to be evoked altogether, there is an increase in the spontaneous quantal release. Recently, it was shown in Drosophila larva that evoked synaptic efficacy decreases over 50% in severed motor neurons within 2 hours. Such reports indicate that severed motor neurons show altered behavior in a short period of time. Despite these reported phenomena, information is scant on the underlying mechanism to account for the alterations. To address if there is a joint pre- and post- synaptic contribution to the decrease in synaptic efficacy as well as the time domain in the acute run down in evoked release, intra- and inter-animal comparisons were used while monitoring evoked synaptic function and spontaneous quantal responses. The genetic attractable model Drosophila melanogaster was used for this study since it is being used more often today to address disease states and pathologies common to man. Preliminary studies demonstrate the release is depressed in a time dependent manner to exposure of the severed axon to the bathing saline, whereas intact axons do not depress. It was postulated that the axoplasm may be compromised by the diffusion of ions in and out of the terminal though the severed axon to account for the acute changes.

32. Michael Crum, M.M. Robinson, A.D. Robinson  
Mentor: Robin L. Cooper

*Pathophysiological Conditions with Hypercalcemia: Neuron, CNS, Intestine, and Behavior*

It is a well-known phenomenon that hypercalcemia results in a loss of deep-tendon reflexes in humans. However, there is no readily substantiated mechanistic explanation for this occurrence. If left untreated, hypercalcemia can progress to a loss of consciousness and to coma. Therefore, understanding how to detect hypercalcemia via physical assessment and laboratory evaluation is essential.

Acute treatment for urgent conditions presently entails a standard IV infusion. Yet, the phenomenon of a loss of neuronal induced reflexes with high calcium is paradoxical in the sense that ionized calcium is known to enhance synaptic efficacy at neuromuscular junctions and at synapses connecting sensory nerves to interneurons and interneurons to motor neurons. Thus, the question remains: Why in the intact
CNS is there a reduction in sensory-evoked motor responses? Determining the mechanism(s) for the loss of deep tendon reflexes associated with hypercalcemia in humans is being addressed through literature searches and discussions with neurologists and other health care providers. The compilation of information will be presented. The crayfish nervous system is feasible to use to study sensory-CNS-motor nerve-muscle circuits. Therein provided are well-defined musculatures which are readily exposed in relatively intact preparations, as well as in the whole animal. The crayfish circuits used in our studies were a superficial flexor muscle circuit comprised of a ‘sensory nerve root – ganglia – motor nerve root’ and the well-established Telson induced tail flip response. The whole animal responses were examined as well as in situ preparations with exposure to various ionized calcium concentrations.

Mentor: Robin L. Cooper

**STEM & Health: Stressors on the Circulatory System**

The circulatory system's role in maintaining perfusion to tissues for delivery of oxygen and nutrients, as well as removing wastes, requires dynamic regulatory processes. There are regional differences in the blood flow and pressure to vital organs and tissues. In order to maintain the blood flow there are pressure check points as well as check points for monitoring pH/CO2. With bodily tissue changes, such as with increasing obesity, the excess adipose tissue requires additional perfusion. However, the small network of blood vessels is high in resistance to the blood flow. This requires the heart to pump harder to overcome the resistance in extant of tissue to perfuse. As a result, blood pressure rises systemically and to tissues not requiring a higher pressure, such as the brain. In this activity, the alteration in the extant of circulatory “tubing” to flow and the effect of resistance on blood pressure can be modeled and experimented with inquiry learning. This model teaches physics, physiology and why a healthier lifestyle is advantageous.

**34. Rachel L. Evans**, Tom R. Gawriluk, Amber N. Hale, Dan J. Ledbetter
Mentor: Edmund B. Rucker III

**Generation of a Transgenic Cell Line to Monitor Autophagic Flux**

Programmed cell death (PCD) is an essential series of developmental events that are utilized by plants and animals. Apoptosis (PCD type I) and autophagy (PCD type II) are the two major types found in cells. During environmental stress such as starvation, autophagy is induced as a cell survival mechanism to maintain energy homeostasis from the targeted degradation of organelles and long-lived proteins. Once autophagy is triggered, an autophagosome is formed by recruiting lipid membranes from the endoplasmic reticulum that engulf the cellular material. These autophagosomes ultimately fuse with lysosomes to cause the degradation of the enveloped cargo. Autophagy is intimately linked to normal development of the organism, and mutations within genes encoding for autophagy proteins are associated with various human diseases including: heart disease, neurological disorders, and cancer. Monitoring the progression of autophagy within cells is important in understanding the role of autophagy in the manifestation of these human diseases. The current gold standard model to detect autophagy is through the use of the LC3-eGFP fusion reporter. This uses an autophagy protein, myosin light chain LC3 that is fused to the enhanced green fluorescent protein. This model is only useful for the quantitation of autophagosome, and does not detect the end result of this process, the fusion event with the lysosomes. Autophagic flux is a term that encompasses the formation and fusion events during autophagy. The lab was generating a newer reporter model that allows for the detection of autophagic flux within cells and during murine development based on a dual fluorescent reporter, the mRFP-Venus-LC3. This project was based on the
initial characterization of this ‘red-yellow’ dual tagged LC3 protein in NIH3T3 fibroblast cells to monitor autophagic flux.

35. Zainab Farooqui, Amber Hale
Mentor: Edmund Rucker

The Effects that the Deletion of Beclin1 has on Mammary Gland Development

The protein BECLIN1 (BECN1) serves an important role in many biological pathways, such as autophagy, normal tissue homeostasis, and embryogenesis. Deletions of the becn1 gene result in early embryonic lethality. The critical roles of beclin during growth, development and tumor suppression make this protein an important topic to research. This project studies the effects of loss of BECN1 on the growth and development of mammary glands in a mouse model. This study was set up by breeding mice with genotypes Bec flox/flox and Bec flox;MMTV-Cre-D to have offspring with two possible genotypes: one that appears normal (Bec fl/fl) and one carrying the deletion of the becn1 gene in the mammary gland (Bec fl/fl;MMTV-Cre-D). The presence of the MMTV-Cre-D transgene determines the deletion status of the beclin gene. If MMTV-Cre-D is present, its role would be to bind to the LoxP sites flanking exons 1 and 2 of the Beclin1 gene and delete them, causing ablation of the beclin protein in the mammary glands. Deletion of BECN1 could potentially affect the development of the mammary glands. The methods to obtainin this information include extracting genomic DNA from ear snips of control and mutant animals, determining genotypes by PCR (polymerase chain reaction), and analyzing the results through gel electrophoresis. The sizes of the PCR products in the gel will allow us to determine the genotypes of the experimental animals, and with this information study the effects that the deletion of Beclin1 has on mammary gland development.

36. Fatima Saeed
Mentor: Jeffrey Osborn

An Educational Research Study Comparing Traditional Style Teaching to Problem Based Learning

An educational research study was conducted during the 2012 spring semester. The study sought to compare teaching methods for a large, traditional lecture course for upper tier biology majors. The purpose of this study was to determine what style of teaching would be more effective based on the higher test scores throughout the semester. Three of the six sections were traditional lecture based while the other three were problem based focused in their instruction. The problem-based sections were taught with significantly lower student to teacher ratios. The courses met twice a week for 75 minutes each. Student comprehension was measured through multiple choice and short answer essays style questions. Significant changes in the responses on specific test items provide insight into methods of instruction that likely facilitate deeper levels of conceptual understanding of difficult scientific concepts for students.
Poster Abstracts

Mentor: Robin Cooper

Classroom Activity on Buffering Related to Respiration for High School and Introductory College Courses in Biological Sciences

Given that many ADN and LPN programs do not require an introductory chemistry course as a prerequisite, students only have a brief introduction to acid/base concepts. Such a cursory overview may occur without any hands on laboratory exercise or classroom activity. In addition, a visual demonstration can be very important to teach clients with little understanding in the nature of biological chemistry to help them understand their own physiology. We designed a rapid hands-on chemical buffering activity with minimal cost and preparation for which course and/or client educators can implement within a lecture room or in a health care environment. This would be suitable for a course in a nursing curriculum as well as within anatomy and physiology courses or for the general public with little understanding of basic chemistry. This demonstration and educational content was performed for a ADN nursing program (30 students), physiology class (125 students), public schools (middle and high) (100 students), a few clients and is to be implemented within a health education program at a senior citizens center (80 participants). Participant feedback on the activity and content supports the notion that the hands-on activity was more informative than reading a textbook or brochure in regards to understanding the concepts and practical implications to one’s physiology. Such demonstrations could take on a new term to advocate health care education: “hands-on minds-on health-on”. Participants with little or no chemistry background have been able to understand the learning objectives by verbally stating: (1) the correlation of CO2 in the blood to the acidic nature when there is build-up of CO2 in the blood; (2) the effect of buffers on a change in pH; (3) the relationship of breathing and kidney function in regards to CO2 and pH balance.

38. Wade Taylor
Mentor: Jessica Brzyski

Genetic Diversity in Roadside and River Populations of M. inflexa

Marchantia inflexa is a species of liverworts found primarily in Trinidad and the southern United states. Populations exist along rivers where it tends to be more shady and wet, and also along roadsides where they are exposed to more sunlight and harsher, dry conditions. This presents us with the questions of whether or not these two primary populations are genetically different from one another or simply exhibit different morphological traits due to environmental differences. To determine if there is significant variation in the genotypes of the two population types (river/roadside), I have extracted DNA from M. inflexa and used fragment analysis to genotype individuals at various polymorphic microsatellite markers. I hypothesize that there is less genetic variation in the roadside population than in the river population, possibly the result of a founder event that displaced the M. inflexa to the roadsides where genetic drift has since occurred. If genetic divergence exists this could be due to different environmental stressors, with the long-term effect of speciation being a possibility. In addition, if the roadside populations exhibit low genetic variation, then this could inhibit their ability to adapt to new stressors in their ever changing habitat.
**Poster Abstracts**

39. Skylar Trott  
Mentor: Nicholas McLetchie

*Small Male Advantage in a Sexually Dimorphic Species*

Sexual dimorphism is common in nature especially among animals including vertebrates and invertebrates. In many non-vascular plant species, there is a tendency for males to be smaller than females. In the winter ephemeral plant, *Sphaerocarpos texanus*, males and females are the same size at germination but by season’s end, males are less than half the size of females and there are fewer males than females. The goals are to test for genotypic variation in growth rates among males and to test for a trade-off between growth rate and sexual reproductive investment/success. We examined 23 males to detect these relationships. To determine growth rate and reproductive investment (number of reproductive structures [antheridia] and time for initial sperm release), each male was replicated four times and grown in a growth chamber. To determine reproductive success (number of sporophytes), sperm was extracted from each genotype and used to fertilize four females. We statistically tested for differences among males and the relationships between key traits. Three measures (growth rate, antheridia number, and time for sperm release) varied significantly among males. Growth rate and number of antheridia per mm² had a negative relationship; meaning slow-growing males had more antheridia per mm², indicating a trade-off. Growth rate had a negative relationship with time for sperm release, indicating that slow-growing males take longer to release sperm. After analyzing reproductive success of each male, this latter relationship is consistent with a small male advantage because there was a positive trend between reproductive success and sperm release (males that take longer to release have a higher success), however the data was not significant. Future studies are needed to examine male-female competition and the resulting reproductive success of the competitors as it relates to male growth rates.

40. Sarah E. Whelan  
Mentor: Jeramiah J. Smith

*Vasa: Understanding Genomic Rearrangement in Lamprey*

Lampreys undergo massive genomic rearrangements early in their development, resulting in a situation wherein an individual’s somatic cells possess a genome that is dramatically different from its germ cells. While understanding these rearrangements can be beneficial to understanding diseases in humans, there are no existing genetic markers that can be used to track germline through the lamprey’s development. The *vasa* gene makes an ideal marker for tracking germline development because it is specifically expressed in the germline of nearly every animal species. However, the lamprey *vasa* gene had yet to be isolated and sequenced. In order to do this, several polymerase chain reactions (PCR) were performed to isolate the *vasa* transcript and individual introns, using computational predictions from a highly fragmentary genome assembly. Additionally, computational sequence alignment was used to compare the *vasa* gene in lamprey to its human homolog. Notably, several lamprey *vasa* introns are characterized by large inverted repeats at their 5’ and 3’ ends, which are not seen in the human *vasa* gene. We speculate that this unique structure may be related to germline regulation of *vasa*. Cloning and sequencing the vasa gene has set the stage for more in-depth characterization of germline development in lamprey and genome rearrangement.
**Poster Abstracts**

**41. Kelsey Zint**  
Mentor: Nicholas McLetchie

*The Effect of Gender, Habitat, and Sunlight Exposure on the Ability of the Marchantia inflexa to Survive in a Water Stressed Environment*

Sexual Dimorphism is an event that can sometimes occur in different species of plants. In the non-vascular *Marchantia inflexa* the frequency of male plants seem to increase when canopy openness increases (Groen et al. 2010). The aims of this study were to: 1) Compare the male and female plants of the *Marchantia inflexa* 2) Compare the *M. inflexa* taken from sites near a road (dry) with the *M. inflexa* taken from the sites near a river (wet) 3) Compare the *M. inflexa* kept in the shade with those kept in the light. *M. inflexa* tips were taken from both male and female plants as well as from both dry and wet sites. Each of the tips were placed in various sodium chloride concentrations (0/30/150 mM) and compared the fluorometer readings at 48 hours and 96 hours. Each of the experiments contained 39 tips, 3 tips from each genotype put in each of the 3 different concentrations of sodium chloride water and the experiment was replicated 8 times over. Our results were that there was no relationship between males and having a higher salt concentration. However, there was a significant correlation between salt concentration and amount of sunlight the plants were exposed to. Also, there was a significant correlation between the salt concentration and habitat, but only after the 2nd reading. Our first prediction about sexual dimorphism was not supported, however our prediction that sunlight and habitat effecting the ability of the plant to survive was supported.

**Biomedical Engineering**

**42. Todd W. Montgomery** (High School student), Bryan R. Orellana  
Mentor: David A. Puleo

*Drug Delivery from Biodegradable Calcium Sulfate/Hydrogel Composites*

Calcium sulfate can be used as an effective osteoconductive bone-filling scaffold. Composites of calcium sulfate and PBAE hydrogel particles loaded with drugs can be molded to allow for different release profiles. By using these composites to build a tenting barrier, vertical alveolar bone augmentation may be possible. Mechanical strength testing demonstrates that calcium sulfate is significantly weakened by the addition of A11 and H6 hydrogels into the calcium sulfate matrix when incorporated at a 1% or 10% ratio by weight. Degradation testing demonstrates that the same hydrogel-loaded samples do not degrade at a significantly different rate. Gel release studies have shown that the A11 and H6 hydrogels can quickly release simvastatin and metronidizole. Simvastatin is an effective drug in promoting osteogenesis by up regulating cellular production of BMP which increases the rate of osteogenesis. Metronidizole is an antibiotic used to help prevent periodontal diseases that could prevent osteogenesis. Release studies have shown that hydrogel loaded, direct loaded, and samples loaded in both manners can create a variety of release profiles including zero-order and burst release profiles. These results indicate that calcium sulfate loaded with hydrogels carrying simvastatin and/or metronidizole can be effectively used as part of a tenting mechanism to promote vertical alveolar bone augmentation leading to the ability to implant dental appliances.
Biosystems and Agricultural Engineering

43. Joanna Foresman
Mentor: Carmen Agouridis

*Comparison of Bankfull Regional and Hydraulic Geometry Curves for Physiographic Provinces in the Eastern and Western United States*

Bankfull regional curves relate the bankfull parameters discharge, cross-sectional area, width, and mean depth to drainage area; while hydraulic geometry curves relate the bankfull parameters cross-sectional area, width and mean depth to bankfull discharge. These curves are useful when assessing incised streams, where bankfull indicators are few or lacking, and in aiding in the natural channel design process. Presently, these curves are used only within the study area for which they were developed (e.g. Bluegrass Region of Kentucky). However, prior research on bankfull width suggests that regional curves within a physiographic province are statistically similar, and thus their usefulness may extend beyond the study area for which they were developed. Such knowledge is particularly helpful when conducting assessments and designs in locations for which regional and/or hydraulic geometry curves have not been developed. The objective of this study was to test the hypothesis that regional curves and hydraulic geometry curves do not differ within a physiographic province or between physiographic provinces for the Eastern and Western U.S., respectively. To test this hypothesis, a database representing nearly 20 physiographic provinces from over 40 studies was developed. A GIS map was constructed to visualize the concentration of studies across the physiographic provinces.

Chemical Engineering

44. Adrianne L. Shearer, Jennifer L. Fischer, Xiuwei Yang, Richard E. Eitel
Mentor: Kimberly W. Anderson

*Effect of CD151 on Initial Adhesion and Detachment of Prostate Cancer Cells*

Metastases are the cause of 90% of cancer related deaths. Though metastasis has been widely studied, there is still much to learn about the mechanisms tumor cells undergo during this process. A better understanding of the adhesion mechanism cancer cells undergo can be gained by studying specific adhesion molecules. The role of CD151, a gene encoded on cell-surface glycoproteins, was studied through adhesion and detachment assays. CD151 complexes with multiple integrins and is believed to play an important role in cellular motility, adhesion and invasion. Prostate cancer cells (PC3) with normal expression of CD151 were compared to PC3 cells with knocked-down expression. To test initial adhesion, PC3 cells were flowed across a monolayer of human umbilical vein endothelial cells (HUVECs), and the rate of adhesion was monitored. Detachment assays were accomplished by allowing firm adhesion of PC3 cells to the HUVEC monolayer under static conditions, and then applying a predetermined shear stress to the monolayer. After shearing, the percent detached was determined. Initial results from the detachment assays suggest CD151 plays an important role in the ability of cells to initially adhere to the endothelium; but of the adherent cells, those adhered stay attached after shearing regardless of CD151 expression.
Poster Abstracts

45. David Spencer, Ashley Hawkins
Mentor: Zach Hilt

Controlled Release of Nanoparticles from Biodegradable Hydrogels

The unique properties of nanoparticles (e.g., high surface area available for conjugation) make them effective carriers for biomedical applications. Here, iron oxide nanoparticles, which have numerous applications as therapeutic and diagnostic devices, have been incorporated into biodegradable hydrogels. These have potential applications where control over the release of nanoparticles for sustained, localized drug delivery or real time non-invasive imaging of implanted nanocomposite systems is desired. In previous work, a methodology for the enhanced functionalization of nanoparticles within poly(β-amino ester) (PBAE) hydrogel networks was developed and stable nanoparticles were released via the characteristic hydrolytic degradation. Herein, the rate of iron oxide nanoparticle release from PBAE systems was compared to degradation. Total acrylate to amine molar ratios of (1.2:1) and 48 hour reaction times were employed for macromer synthesis, and hydrogel nanocomposites were synthesized by free radical polymerization between glass plates. Varying molar ratios of diethylene glycol diacrylate (A), poly(ethylene glycol) diacrylate (n=400) (H), and isobutylamine (6) of A:H (0:1), (1:1), and (2:1) were used, with degradation time increasing from hours to days as the hydrophobic character increased with higher ratios of A:H. The rate of iron oxide nanoparticle release was measured by the 1,10 phenanthroline assay via UV absorbance at 511nm.

Chemistry

46. Emily Bryant, Erin Wachter, Brock Howerton
Mentor: Edith Glazer

DNA damage by ruthenium complexes induced by photoactivation

Nearly twelve million people in the United States are currently living with cancer and many of them receive chemotherapy. As most current chemotherapeutic agents are generally cytotoxic in nature, cancer patients endure a broad variety of abrasive side effects on their journey to eliminate cancer. Thus, more specific drugs and methods for cancer treatments are being sought in order to ease the deleterious effects of treatment while still effectively targeting cancer cells. A promising way to give a chemotherapeutic agent specific cytotoxicity is to utilize triggered photoactivity in treatment; this is the foundation of Photodynamic Therapy (PDT). If a chemotherapeutic drug can be light-activated, then light may be shined directly onto tumors to induce the drug to react with biomolecules in the cell, eventually leading to cell death. This reaction may be through the formation of singlet oxygen or other reactive species. The reactive species will not be formed in tissues unexposed to light, resulting in reduced systemic toxicity. The Ruthenium compounds that have been characterized in this study are designed for use in photodynamic therapy. These compounds are essentially inert until exposed to light, whereupon they create an active species that is able to bind or cleave DNA. Consequently, the damage created by Ruthenium complexes when incubated with plasmid DNA was investigated using gel electrophoresis after varying amounts of exposure to blue light. Preliminary results suggest that the Ruthenium compounds tested present a wide range of potencies for the induction of DNA damage when irradiated, while showing no activity in the dark. Many of these complexes have potential viability as photodynamic therapeutics that will successfully destroy cancer cells upon localized irradiation.
Poster Abstracts

47. Robert DeJaco  
Mentor: David A. Atwood

Stability of the Environmental Metal Capture Agent BDTH₂ over Time

Due to the extremely widespread use of water, contamination of surface and ground water with heavy metals is of great concern. Reagents capable of removing heavy metals from water are therefore very significant and important to society. The synthetic, organic, thiol-containing compound, N,N’-bis(2-mercaptoethyl)isophthalamide) abbreviated, BDTH₂, is capable of completely eliminating arsenic (III), mercury, and other heavy metals from water. BDTH₂ forms strong covalent bonds with these elements and contaminant concentrations in the ppm to ppb range can be decreased to a concentration under instrumental detection limits. This study was conducted to determine the stability of BDTH₂ to decomposition over time and to characterize any trace decomposition products. The attempt to characterize possible decomposition products was made in two different ways: first, by separation from an old batch of BDTH₂; and second, by two different oxidation reactions of pure BDTH₂. The old batch of BDTH₂ was synthesized roughly three years ago. Possible oxidation over time made this batch purposeful for its characterization and isolation in this way. One portion of the old batch was solvated, filtered, and pumped dry from various consecutive solvents. Pure BDTH₂ was first oxidized with H₂O₂ in an attempt to oxidize the thiol group to a sulfonic acid group. The aromatic sulfonation of pure BDTH₂ was also performed. This poster will demonstrate the possible impurities detected and their characterizations.

48. David John Dirkes III  
Mentor: John E. Anthony

Functionalized Acenes as Organic Solar Cells  
Anthony’s Aromatic Research Group

There is an increasing demand in the world today for cheap and efficient sources of clean, renewable energy. Solar cells have emerged as one of the few viable ways of generating clean energy and may one day be able to meet the world’s staggering energy demands. The main problem with conventional silicon solar cells is that they are currently very expensive, preventing widespread utilization of solar power. Organic solar cells are a promising low-cost alternative for solar energy generation. Linearly fused functionalized acenes and heteroacenes in particular have shown great potential for use as organic solar cells. The objective of this project is to develop and test a variety of new functionalized acene solar cells in the hopes of furthering the development of cheap, effective organic solar cells. One of the main requirements of organic solar cells is that they contain donor and acceptor molecules that absorb strongly across the entire visible spectrum. To this end, a number of donor and acceptor substituent molecules have been synthesized, over the last year, for addition onto a number of acene molecules. The relationship between donor and acceptor strength vs. absorption profile of these newly functionalized acenes will be tested. The most promising arrangements will undergo X-ray crystallography to examine the crystal structure of the molecule in question for signs of the necessary π-stacking, which is essential for good solar cells. The molecules with good π-stacking will then be subjected to electrochemical studies. This information will help in the selection of an appropriate acceptor material to use in the creation of the solar cells. Finally, solar cells, formed from the molecules that show the greatest potential, will be created and tested to assess their suitability for device studies, performed by our engineering collaborators.
Poster Abstracts

49. Lauren Ison
Mentor: David Atwood

Pesticide Detection in Honey

Honey and beeswax are important biological products, due to nutritional content and cosmetic utility. Pesticides, herbicides, and fungicides are commonly used in agricultural production. These products kill bacteria, fungi, and unwanted pests, but, at high doses, can have harmful effects on humans. Pesticides on these crops can be internalized by bees during pollen and nectar collection. Due to the way honey is manufactured by bees, it can be a source of pollutants and pesticides. This causes a wide range of problems, from Colony Collapse Disorder (CCD) to human pesticide consumption. We qualitatively tested for pesticides within honey samples. The honey was produced in Lily Cornett Woods in eastern Kentucky on a reclaimed mine site. The reclamation of former mining sites enables their rehabilitation. These sites are being transformed into “oases”, meaning no pesticides are used within a five-mile radius. Due to the fact that bee collection methods are restricted to a one-mile radius, we hypothesize that bees will not encounter pesticides. A multi-residue analysis was developed to quantify pesticides in honey and its by-products. It consisted of a single extraction, based on a modified "QuEChERS" method followed by gas chromatography. The "QuEChERS method" combines salting-out liquid-liquid extraction with acetonitrile and a dispersive clean-up. We have tested for Atrazine and its degradates within our samples, and have deemed the honey samples free of these contaminants. Finally, after observing pesticide degradation, we have deemed quantitative analysis impossible due to the short half-lives of the pesticides (decomposition over several days).

50. Ilya Vinogradov
Mentor: John Selegue

Synthetic Approaches to Manganese-Complexed Acenequinones for Electronics Applications

Organic semiconductor chemistry has the potential for low start-up cost production of electronic devices such as transistors, sensors and organic solar panels. Unfortunately, there are a number of problems with classic organic semiconductors (e.g., pentacene), including poor solubility and low stability. One possible workaround to these problems is to synthesize organic acenes coordinated with metals (e.g., iron, manganese or ruthenium) to help improve solubility and stability as well as introduce enhanced electrical properties, redox potentials (electrochemical switches) and new optical properties (electrochromism). Our new approach to metal-coordinated acenes is via the Diels-Alder reaction of organometallic heterocycles with dimethylacetylenedicarboxylate (DMAD) to form indenyl diesters. In this case, 1,2-C₅H₃(CROH)(COR), with R = Me or 4-Tol, was synthesized from sodium cyclopentadienide (NaCp) and the corresponding acyl chloride (R = Me, acetyl chloride; R = 4-Tol, p-toluoyl chloride) in 41% (R = Me) and 54% (R = 4-Tol) yield. Thallation of the 1,2-diacylcyclopentadienes gives [TI{1,2-C₅H₃(COR)₂}] in 95% (R = Me) and 40% (R = 4-Tol) yield. Transmetallation with [MnBr(CO)₅] yields the corresponding manganese tricoronyl complex, [Mn(CO)₃{1,2-C₅H₃(COR)₂}], in 85% (R = Me) and 73% (R = 4-Tol) yield. Ring closure of [Mn(CO)₃{1,2-C₅H₃(CO-4-Tol)₂}] can be done with phosphorus pentasulfide (P₄S₁₀) to form the thiophene, [Mn(CO)₃{SC₇H₃-1,3-(4-Tol)₂}], in 68% yield or with hydrazine (N₂H₄) to form the pyridazine, [Mn(CO)₃{SC₇H₃-1,3-(4-Tol)₂N₂}], in 88% yield. Ring closure of [Mn(CO)₃{1,2-C₅H₃(COMe)₂}] is only possible with hydrazine (99% yield). Diels-Alder reaction of the thiophene complex with DMAD appears to make both endo- and exo-isomers of [Mn(CO)₃{SC₇H₃-1,4-(4-Tol)₂-2,3-(CO₂Me)₁,4-S}]. The ditolylpyridazine is too unstable for the conditions required for Diels-Alder with DMAD. Diels-Alder reaction of the dimethylpyridazine complex with DMAD gives a
complex mixture of decomposition products. Reduction of the indenyl diester, followed by mild oxidation should form the indenyl dialdehyde, a precursor for a double aldol reaction with aromatic 1,4-diones to yield a desirable manganese-complexed “pentacenequinone.”

Civil Engineering

51. Zoe Bezold
Mentors: James F. Fox, University of Kentucky,
Alice Jones, Eastern Kentucky University

Effects of Mining Reclamation on Sediment Yield and Organic Carbon Flux in First Order Watersheds

Previous models of the carbon cycle have treated fresh water systems as a direct transport system for terrestrial carbon; however, recent research has proven this to be a simplified and incorrect model (Cole et al.). Research on the role of fresh water systems in the carbon cycle remains limited. Furthermore, little research exists on the effects of surface coal mining on the carbon transport cycle. The purpose of this study was to investigate the effects of coal mining and reclamation on the sediment and carbon fluxes in first-order watersheds in Eastern Kentucky. During the study, sediment was collected at two different sites affected by coal mining. Isotopic ratio mass spectrometry analysis was performed on the samples to evaluate the percentage of particulate organic carbon (POC). Sediment concentration values were also measured. Utilizing concentration and estimated flow data, hydrographs and sedigraphs were constructed for several rainfall events. The resulting graphs were compared between sites, and sediment yields and POC fluxes were determined. When investigating the changes in concentrations, the first flush, equilibrium transport, and multiple sources such as forests, mined soils, and stream banks explained concentration fluctuations. While newly reclaimed sites had higher sediment yields and POC fluxes, further investigations were needed to make significant conclusions.

52. Ryan C. Ortiz
Mentor: Sebastian Bryson

Effects of Initial Conditions on the Strength of Acrylamide Grouted Sands

This study used two chemical solutions that when mixed together form a grout, which is a gel-like substance. When these two chemicals are mixed, along with soil, they produce very hard grouted sand. The initial ideas for goals in the study were to find the effects of variations of the mixtures, time, temperature, and the cost benefits concerning chemical grout. The research was investigated further by analyzing previous research. One solution used in this study consists of Avanti AV-100 Acrylamide Chemical Monomer. The other solution is Avanti AV-102 Catalyst Ammonium Persulfate. These two chemicals are necessary in order for a reaction to occur. These chemicals were mixed together to obtain the Acrylamide Grout. The reaction that forms a hard substance using just the two solutions is considered a grout. The substance that is formed by mixing the two solutions with the sand is considered grouted sand. The formations of these grouts and grouted sands were used to meet the goals of the research. Specific goals from the initial goals were targeted, with help from the analysis of previous research. Previous research investigated important problems such as fines content and curing conditions of chemically grouted sand. While previous research was vital our study, issues such as variations of densities and variations of moisture content of the sand have been either overlooked or only touched on. The goal of this study, to further previous research, is to test the grout under variations of AV-100
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(chemical monometer), AV-102 (catalyst), and dilution with water, along with the permeability of the grout. This study also tests the strength of grouted sand under variations of density and moisture content. For the grout, relationships should be found between the ratios, grout time, and strength. For the grouted sand expected results will show relationships between density, moisture content, and strength.

Communications

53. Kelly Aardema
Mentor: Elaine Wittenberg-Lyles

*An Exploratory Analysis of Oral Literacy Demand during Hospice Care*

Reducing the burden of oral literacy in clinical interactions is part of the fundamental commitment of helping patients become full participants in their own health care. Low health literacy greatly impedes caregivers’ and patients’ abilities of decision-making and adherence, especially in end-of-life contexts concerning hospice. Education and socioeconomic status are key factors in both oral and health literacy. “Oral literacy” refers to one’s functional, communicative, and critical comprehension of dialogue, which is impacted by use of medical jargon, general complexity of the language, highly contextualized language, and structural characteristics of the dialogue. 22 video recorded sessions of communication between hospice teams and family caregivers were analyzed for oral literacy. Family caregivers were Caucasian, predominantly female (86%), and the average caregiver age was 63 years with the majority of participants living with, as well as caring for, their parent, who was on average approximately 89 years old. The videos were transcribed then reviewed using a 3-step health literacy model. Analysis is also included determining the average Flesch Kinkaid reading level of the interaction, quantifying the amount of questions a caregiver asked during the interaction, and observing the amount of talking-turns hospice teams and caregivers had. Preliminary analyses have shown that within the dialogue between a caregiver and their hospice team the average Flesch Kinkaid score was a 5.95 and medical terms were used an average of 4 times, with one interaction containing up to 10. The hospice teams took an average of 28 talking-turns per video, whereas the caregivers took an average of 20 talking-turns. Since caregivers only asked about 1 question per interaction and the hospice teams did not ask about the caregiver’s comprehension, team members missed opportunities to reduce oral literacy burden. Future research will focus on the extent to which communication in a hospice setting is impacted by differing familial kinships.

54. Tamika Tompoulidis
Mentor: Brandi Frisby

*Grading student participation: College students’ beliefs on quality classroom participation*

College professors have different grading policies in regards to grading student class participation. In previous research, there are debates on whether the quality or quantity of participation should be graded. From a student’s perspective, they may disagree, become frustrated with their professors on how they grade participation, or even argue that it should not factor into their overall grade. Students at the University of Kentucky (N=23) were asked to take part in focus groups to discuss their beliefs about quality participation. Additionally, students were asked to generate a series of behaviors that they believed represented quality participation. Results indicated that students prefer to not be graded based on the number of questions students ask, or answer, in lecture, they did not think that attendance was considered participation, and should not be penalized if they did not correctly participate in class. Instead,
they agreed that coming prepared to class, helping others learn, and participating in class activities were some examples of quality participation. Students have diverse beliefs on participation and there is not a fixed grading rubric for class participation. Quality participation varies between each discipline, course, professor, and student. However, the insights provided by these students can help instructors to structure their classroom to enhance participation and learning.

Computer Science

55. Josiah Hanna, Libby Knouse  
Mentor: Judy Goldsmith  

Planning Under Uncertainty Using Markov Decision Processes

Planning under uncertainty is a central problem to artificial intelligence problem solving systems. A Markov decision process (MDP) is a mathematical formalism for representing problems that deal with uncertainty. Solutions to these problems involve mapping a recommended action to each possible state in which an agent executing the solution could find itself. Various algorithms and planning systems have been developed that attempt to improve solutions to these problems by speeding up computation and decreasing memory demands, or reaching the greatest convergence in the final result. Two approaches to solving MDPs are graph-based algorithms and deterministic based planners. Graph-based algorithms attempt to find an explicit solution. Deterministic based planners find ways to ignore uncertainty and then re-plan as needed, much like how a GPS navigator recalculates when in a location not in its original plan. This research has focused on comparing these two approaches to see how they compare in terms of memory and speed of computation and ability to find an optimal solution.

Dentistry

56. Burhanuddin Johar  
Mentor: Chifu Huang  

Chemical Effects On Oral Squamous Cell Carcinoma

With increasing research and new technology, researchers are getting a better understanding of how cancers work. However, in the past 20 years the overall incidence and morbidity rates of oral cancer have been increasing. The most common type of oral cancer is oral squamous cell carcinoma, making up about 90% of all oral cancers. Even though the increasing morbidity rates are due to the absence of a comprehensive program that screens for oral cancer, researchers still do not have a full grasp on this subject. While there are treatments for oral cancer, patients usually are diagnosed with oral cancer in its later stages. This experiment will help answer some puzzling questions about oral cancer, like what kinds of products or chemicals can inhibit further growth of oral squamous cell carcinoma and how are they effective? This experiment attempts to proceed with this problem through an unorthodox method. Various chemicals or natural products will be tested in cultured FaDU cells to determine the growth of the oral cancer cells. The chemical Resazurin will be used to determine cell death or further growth of cells during these tests. Further research is necessary to determine which chemicals to use but after chemicals that do inhibit further growth are identified, the pathways affected in this process will be studied. The purpose of this research is to not only find chemicals that can inhibit growth of oral squamous cell carcinoma, but also to understand biochemical pathways involved in these cancerous cells.
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Economics

57. Drake S. Jackson
Mentor: John E. Garen

_Bang for Our Buck: Education Spending and Test Scores_

In a world where a primary concern in economics and politics is the fiscal responsibility of government, this research seeks to examine the effectiveness of government spending in public education. To evaluate empirically the effect of spending on students’ success in the classroom, this study uses one of few national measures available for this purpose—test scores. For both spending and test score data, the primary source was the National Center for Education Statistics (NCES). The NCES offers full yearly reports on state-by-state education expenditures, broken down into various subcategories such as actual instructional expenses and expenses in the acquisition of capital (buildings, equipment, etc.). Moreover, the NCES stores data for National Assessment of Educational Progress (NAEP) testing for fourth, eighth, and twelfth graders. The data was analyzed in two ways. First, the study simply compares the percent change in education spending (adjusted for inflation) with the percent change in test scores (for the period 1990-2009). Then, it proceeds to use regression analysis to determine if test scores over the relevant time period were dependent on government spending in education. The research suggests that, though there was a marked uptick in spending during this time period in virtually every US state, changes in test scores were relatively underwhelming (and, in many cases, hardly existent). This result raises questions concerning the usefulness of spending in education. Future research should also examine how states were permitted to omit data for disabled or otherwise inhibited student test-takers. Regardless, spending was not shown to be an overall factor in improving test scores.

Educational Policy and Studies Evaluation

58. Bonnie Hance
Mentor: Dr. Nicole Lewis

_The Impact of an Undergraduate Research Program on Students Interested in Graduate Study_

Undergraduate research experience is a valuable way for students to gain an understanding of the research process, along with being a solid preparation for graduate school. According to CarolAnne M. Kardash research is limited on the subject of the influence of undergraduate research on students. Discovering the outcomes of undergraduate research can be beneficial for institutions as they learn what aspects of their programs need reworking and what qualities truly make the research experience purposeful for students. This research study analyzes the impact of an undergraduate research program on students’ interest in graduate study. Data examined from interviews by students enrolled in the SPGRE program that occurred at the University of North Carolina during the years of 1996, 1997, and 1998 is compared to the current status of each alumnus as a method of determining the efficiency and impact of the program on students. The analysis of interview data presents the reasoning for why students chose to attend the program (such as a genuine interest in research). The research also resulted in a correlation between attending the SPGRE program at UNC and the decisions students made of actually applying for graduate school at the same institution. This research did not provide strong evidence that the SPGRE program changed a student’s decision to attend graduate school. Even so, these findings may be used to tailor undergraduate research programs and possibly encourage research universities to start up and possibly fund these programs for future undergraduate students.
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Emergency Medicine

59. Hassan, Faiza (High School student)
Mentor: Zaki Hassan
Title: Dissolution Testing of Dantrolene and the Use of the Human Patient Simulator to Demonstrate Use of A New Form of Dantrolene

Endocrinology and Molecular Medicine

60. Geraldine Goh, Joel Thompson,
Mentor: Lisa Tannock

Biglycan Deficiency Does Not Affect Lipids

Around 2 million children and adults in the United States have diabetes, which is linked to hyperlipidemia, hypercholesterolemia, and high blood glucose levels, and is a risk factor for atherosclerosis. Biglycan, a small leucine rich matrix proteoglycan, has been found in atherosclerotic lesions in both humans and mice but the exact role of biglycan in atherosclerosis is as yet undetermined. The goal of the overall project is to determine if biglycan plays a role in the development of atherosclerosis in diabetes. Mice in which the biglycan gene has been knocked out (KO) were compared to mice with intact biglycan (wildtype: WT), using both diabetic and non-diabetic mice. The goal of this study is to determine if factors known to contribute to atherosclerosis development, namely cholesterol and triglyceride levels, were different between mice with and without biglycan, and to determine if the presence or absence of biglycan affected the severity of diabetes. If cholesterol, triglyceride levels, or diabetes severity differs between KO and WT, then it would be difficult to determine if differences in atherosclerosis are due to the presence or absence of biglycan, or due to differences in these risk factors. Our results show that cholesterol was not different between groups. There was a non-significant trend for higher triglycerides in the diabetic KO mice. The diabetic KO mice had the most atherosclerosis, compared to the non-diabetic KO mice and all WT mice (P<0.05). Taken together these data suggest that biglycan deficiency increases atherosclerosis, especially in diabetes, independent of lipid levels.

Gender and Women’s Studies

61. Tyler Davoren
Mentor: Cristina Alcalde

Opinions on Immigration throughout the Geographic Regions of Kentucky

With immigration beginning to affect all corners of the United States, it is necessary that we study how it affects the people that already live here. Various factors can lead to the acceptance or rejection of immigration and immigrants, including but not limited to national heritage, political and religious beliefs, and language and socio-economic status. This paper will focus on the varying attitudes among different geographic regions throughout the state of Kentucky. Thirty students were gathered to fill out demographic surveys and then participate in focus groups. Through the four focus groups conducted, it was learned that acceptance vs. rejection is a topic of intense discussion based upon polled and questioned people from different geographic regions of Kentucky, as well as several more from different regions of the country. How immigration was received in these different parts of the country was based mostly on long-held beliefs in any given area; as an example, much of Southern and Western Kentucky was often
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described as being "inherently" prejudiced, although opinions on immigration are slowly but surely changing for the better. A major factor on the immigrants side was how quickly or easily the immigrants would assimilate into the culture already present in the area; many immigrants staunchly hold on to the culture, beliefs and practices of their homeland, which does not allow for a smooth transition into an "American" lifestyle. Many locals see these who do not adopt American ideals as aliens and do not accept them as Americans. It is important to study this because thoughts and beliefs regarding immigration are quickly changing and need to be documented throughout every step of the process.

62. Elizabeth Kunnecke
Mentor: Cristina Alcalde

Acceptance and Assimilation of 1st and 2nd Generation Immigrants

American culture has seen several immigrant controversies in regards to legal citizenship and acceptance of documented and undocumented immigrants. There is a need to study the population’s attitudes toward immigration as to better understand what is happening in our society. The purpose of this research is to explore opinions of first and second year college students’ and their experiences in regards to immigration. The focus was placed on this group because they had just experienced a form of migration themselves by moving from home to college. For some, exposure to immigrants increased and for others it remained the same. This presentation will focus on the differing types of acceptance Americans show to first or second-generation immigrants. The data was collected through discussion-based focus groups and a short demographic survey. A total of 30 students participated in focus groups and those same 30 students completed the demographic survey. Preliminary results indicate that acceptance of second generation immigrants to first generation immigrants is greatly influenced by how the immigrants interact with other students in school, the language(s) they speak, and their willingness to assimilate. The ability to speak English greatly enhances the perception of being “more American”. Many students agreed that those immigrants who were more willing to adopt aspects of America culture were more likely to be accepted by the dominant, English speaking segment of society. This happened more often with second-generation immigrants because they grew up with more American tendencies. Their first generation parents grew up in the home country with their original culture as influence. This study further adds to our understanding of why immigrants are or are not accepted into a dominant, English speaking society.

63. Nicole Schladt
Mentor: Srimati Basu

The Language of Law: Domestic Violence Discourse in Fayette County Family Court

Feminist legal research often questions whether subjects can truly speak in a courtroom, depending on their gender, race, or class. Many scholars hypothesize that law and the language of law are patriarchal (Finley 1988, Trinch and Berk-Seligson 2002). Others argue that the legal system inherently provides opportunities for all individuals to be heard on some level (White 1990, Conley and O’Barr 1985). This project explores the theme of silence and speech within legal discourse at the local level. Drawing from six domestic violence hearings in Fayette County Family Court, this study identifies three forms of speech and authority in the realm of law: that of female petitioners, male respondents, and judges. Through ethnographic analyses of these forms of speech, I argue that female petitioners are given a voice in the framing and resolution of their cases; for example, judges regularly award protective orders based solely on a petitioner's testimony. On the other hand, inconsistent storytelling and excessive timidity often lead judges to ignore female claims. Men similarly assert their right to speak in the courtroom as husbands, citizens, and working people, the most successful male respondents being those who do not have a past history with family court and do not provide extraneous information. Finally, both judges
observed had distinct styles of handling their courtrooms: while their personal styles varied from carefully professional to advisory, they seemed to favor the female petitioner voice and did not shy away from awarding protective orders. These findings confirm that courtrooms are able to provide individuals with a platform for having their voices heard. There was no evidence that entire groups of people had been silenced based on gender, race, or class in Fayette County Family Court, which is promising for any person seeking protection from domestic violence.

64. Emily VanMeter  
Mentor: Cristina Alcalde

“No Longer Foreigners and Strangers”: Religion's Impact on Immigration Views

In “And Who Is My Neighbor?” Religion and Immigration Policy Attitudes” Benjamin R. Knoll argues that religion is an independent variable which is crucial to comprehending the formation of attitudes toward immigrant public policy. This focus group study tests the validity of his quantitative research on the roles of personal religious views and applies it qualitatively—specifically, through the immigration views of first- and second-year University of Kentucky students. The main method of observation utilized in this study was four focus groups that occurred between February 27, 2012 and March 28, 2012 with a total of 30 students. In addition, several scholarly sources were analyzed that supported the prevalent themes that religion is not necessarily a unifying force, particularly with the presence of language barriers, and that the universal nature of the Catholic Church makes it one of the more welcoming religious environments for immigrants. While the qualitative results have not yet been finalized, the preliminary evidence appears to support these theories. Ultimately, this presentation will argue that religious beliefs have a significant effect on the way in which these students treat and view immigrants, and that religion is indeed an independent variable crucial to understanding their perceptions.

Health Science Rehabilitation Sciences

65. Grant Boggess (High School student)  
Mentor: Brian Noehren

The Effect of Filtering Frequency upon the Vertical Ground Reaction Force and Moments within the Sagittal Plane during Walking and Running

It has long been believed that the Heel Strike Transient is responsible for a number of runners’ injuries due to the quick nature (40ms) of the impulsive force it represents. This quick force application possibly overloads the compensatory tissues before they have time to react and transition to their viscoelastic stage. However, due to the quick loading, among other factors, the frequency at which the Heel Strike Transient appears is well above the 10-20 Hz that many studies filter their data at. This range is used by some due to some evidence that a mismatch between the frequency at which kinematic and force data are filtered can create “artifacts” that appear in the moment data. In many cases these moments appear to be fictional because a muscle is unable to produce such a quick force. Thus, this study is intended to investigate the effect of filtering frequency upon the Sagittal Plane moments and Vertical Ground Reaction Force of patients who have undergone ACL reconstruction and a control group who have no cause for abnormal gait. In this study the changes of these variables were investigated as the frequency at which the force data is filtered at it changed to 10, 20, 30, 35, 40 and 50 Hz using a low pass Butterworth filter. The kinematic data was consistently filtered at 10 Hz. This research will aid in the development of more accurate filtering techniques that minimize the attenuation of curves while eliminating any present artifacts. This knowledge will hopefully aid in isolating factors that contribute to runners’ injuries and
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will reduce the pain that millions experience every year for participating in an activity that develops healthy bodies and should be enjoyable.

66. Jerry Coleman, II; Luke Dinan; Kristen McGraw; Brittany Roy; Matthew Stevens; Andrea Cripps, MA, ATC
Mentor: Scott C. Livingston

*Establishment of Normative Data for Motor Evoked Potentials among Healthy Young Adults*

The purposes of this research study were to (1) establish normative MEP response data, (2) identify any differences in MEP responses between men and women, and (3) determine if MEP responses are correlated with subject’s prior concussion history (PCH). Subjects included 108 healthy volunteers (61 female, 41 males) ages 20.12 ± 2.37 years, height 173.66 ± 13.05 cm, and mass 84.24 ± 28.66 kg. Transcranial magnetic stimulation was applied over the primary motor cortex using a MagStim 200² magnetic stimulator and the MEP response was recorded from the contralateral tibialis anterior muscle. MEP response parameters included: motor threshold (expressed as a % of maximum stimulator output), MEP response latency (msec) and amplitude (µV), absolute and relative cortical silent period durations (msec), central motor conduction time (msec) and the slope of the recruitment curve. Descriptive statistics were calculated for each of the dependent variables. Bivariate correlation analyses were used to determine any correlation between the MEP variables and PCH. A one-way ANOVA was conducted to determine any significant differences in MEP responses between genders. There was a significant difference in MEP latency ($t_{103} = 4.72, p=.032$) and slope of the recruitment curve ($t_{87} = 6.95, p=.010$) between males and females. Males had longer MEP response latencies (29.24 ± 4.19 msec) compared to females (27.34 ± 4.57 msec). The slope of the recruitment curve was greater for males (35.43 ± 25.10) compared to females (22.49 ± 21.22). Prior concussion history was not significantly correlated with any of the MEP response measures ($p>.05$). There were no significant differences between males and females except for MEP response latency and slope of the recruitment curve. PCH was not significantly correlated with MEP responses. The normative MEP data provides clinicians and researchers with reference values for interpreting clinical measures.

67. Aman Shah, Jena White, Tyler Kirby, Amy Ferry
Mentor: Esther Dupont-Versteegden

*P-bodies are Elevated with Age-, but not Disuse-associated Skeletal Muscle Atrophy*

Processing Bodies (p-bodies) are small cytoplasmic granules which contain many enzymes involved in decapping and degradation of mRNA molecules and are proposed to function as storage sites for unused mRNA transcripts until translation. We hypothesized that age- and disuse-induced muscle atrophy would be associated with an increase in p-bodies. Therefore, the purpose of this study was to determine the difference in the abundance of p-bodies in skeletal muscle with aging, and between the ambulatory versus hindlimb suspended rats. Brown Norway/Fisher344 male rats at 6 and 32 months of age were hindlimb suspended for 14 days to induce muscle atrophy. Gastrocnemius muscles were dissected from rats at 6, 15, 24 and 32 months of age and from 6 and 32 months old ambulatory and hindlimb suspended rats. Muscles were homogenized for protein abundance determination. Western blotting was performed with the Decapping Protein 2 (DCP2) antibody to estimate the abundance of p-bodies. DCP2 is a protein involved in decapping and degradation of mRNA and is a strong marker for p-bodies. Bands from Western blots were analyzed based on their optical density value, which is directly proportional to the abundance of DCP2 protein. We found that DCP2 was significantly more abundant in the gastrocnemius
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muscle of 32 months old rats compared to all other ages. However, no significant difference was observed in the abundance of DCP2 between the ambulatory and hindlimb suspended rats at 6 or 32 months of age. Therefore, we conclude that p-bodies are elevated with age-associated muscle atrophy only at old age, but not with muscle atrophy induced by disuse.

Hispanic Studies

68. Rachel Aretakis
Mentor: Francisco Salgado-Robles

Willingness to Communicate in Spanish

As more and more students seek to learn Spanish, some Spanish courses have begun to implement service-learning in order to put the students’ knowledge to practical use. Service-learning, defined as an educational activity that combines serving the community while incorporating student learning, is an opportunity for students to utilize their knowledge of the language in a practical setting. Little research has been done to examine how service-learning affects students; this research seeks to discover if students’ confidence levels, when speaking Spanish, changes after a semester of participating in service-learning. Two Spanish classes at the university provide students with the opportunity to participate in service-learning. Students worked in various agencies in the local Hispanic community, completing a certain number of hours per week. While completing the hours, each class met weekly—one class learned about the benefits and science behind service-learning, while the other was a normal 300-level course. While this research seeks to find confidence-level changes, it also examines if there are differences between the students who learn about service-learning and students who take a normal Spanish course. To measure a change, the two classes were surveyed at the beginning and the end of the semester. The surveys asked the same questions regarding confidence when speaking, writing and reading both English and Spanish. Because the semester has not ended, the results are still being processed and will be complete when the final survey is administered. Researchers expect to find that there will be some improvement after completing service-learning, however, they know that improvements will be on an individual basis. Furthermore, researchers expect that service-learning is beneficial for students, in some way, just through students being immersed in the local Hispanic community.

69. Brad O’Neal
Mentor: Alan Brown

Course Grades as Research Tool and Programmatic Gatekeeper

A crucial component of foreign language curriculum design is the use of grades and grade point averages as a perquisite. Moreover, how often do course grades or grade point averages appear as discrete variable in L2 research? Five peer reviewed journals were searched using “grade” as the keyword and 2000-2010 as the date range. There was little use of grades/GPA as a valid, reliable dependent/independent variable in the research studies of the five journals. While scholarships, study abroad programs, and admission selection committees make decisions based on foreign language grades, researchers may not. This leads to the question, “What achievement metrics are included among course perquisites in the university Spanish undergraduate curriculum? Seventy-three public institutions, classified as research universities/Very High Research Activity according to Carnegie Foundation Classification, were searched for perquisites by utilizing their online bulletin/course catalogs. What achievement metrics are used for course prerequisites in the undergraduate curriculum? The variables include previous course letter grade,
cumulative GPA, Spanish major GPA and does not include scores on placement exams. This all leads to the question: Do grade and GPA perquisites foretell the student’s foreign language proficiency?

**History**

**70. Martha Groppo**  
Mentor: Mike Farrell  

*The Greatest Stunt: Identity, Image and Ideals in Stunt Reporter Nellie Bly’s Journey around the World*

This study examined early female stunt reporter Nellie Bly’s 1889 attempt to beat the fictional record for a trek around the world set by Phileas Fogg in Jules Verne’s novel *Around the World in 80 Days*. The multiple-part project involved traveling in Bly’s footsteps and corresponding back to a newspaper as she did, as well as writing a historical thesis. Bly was a spunky 26-year-old willing to perform outrageous stunts in order to storm the male bastions of journalism as a reporter for Joseph Pulitzer’s famous *The New York World*. This research called upon primary sources, most notably Bly’s 1890 account of her journey, and argued that her journey around the world was more than a stunt: it was a historically significant event that provides unique insight into the complex bulwark of notions and ideals supporting the American female journalistic image at the time—an image that both tenaciously clung to the traditional ideas of femininity adhered to for centuries and boldly plunged into the increased liberation of the New Woman. Unlike existing scholarship on Bly characterizing her as an early feminist, this research cast her as a “New Woman” with ties to both progressivism and traditionalism. In order to remain publishable while performing stunts that could be damaging to her reputation, like her journey around the world with no chaperone, Bly needed to maintain her respectability and thus her traditional ties through her writing. Faced with a plethora of perceptions of the New Woman, Bly chose for herself one that would both afford her new opportunities and keep her safe. Calling upon the New Woman ideal set forth by Charles Dana Gibson in his iconic images of the Gibson Girl, Bly fashioned an image that kept her stories about her journey around the world selling papers, but also kept her in a job.

**Horticulture**

**71. Taylor Lloyd, Santosh Kumar**  
Mentor: Bruce Downie  

*Differential Expression Of PIF1-Targeted Genes In Various PIF1 And CTG10 Mutants*

Successful completion of germination of *Arabidopsis thaliana* seeds is contingent upon the actions of PHYTOCHROME (Phy) and PHYTOCHROME INTERACTING FACTOR 1 (PIF1). Previous studies have shown that PIF1, a basic helix-loop-helix (bHLH) transcription factor, regulates genes through preferential binding to G-box motifs (CACGTG) in their regulatory regions. A polyubiquitin-26S proteasome mediated pathway has been identified as a regulator of PIF1 amounts. One aspect of this pathway is hypothesized to be the binding of the kelch beta-propeller of the COLD TEMPERATURE GERMINATING 10 (CTG10) F-BOX protein to PIF1 following a PIF1 phosphorylation event caused by the movement of active Phy into the nucleus. The binding of CTG10 leads to the polyubiquitination of PIF1 and its subsequent degradation by way of the 26S proteasome. This experiment investigated the interaction of PIF1 and CTG10 indirectly through a study of the relative expression of PIF1 direct-target genes using quantitative Real Time – Polymerase Chain Reaction (qRT-PCR). Over-expressing and
knockdown mutants of PIF1 along with over-expressing mutants and an RNAi line of CTG10 were verified as affecting transcript abundance for \textit{PIF1} and \textit{CTG10}, respectively. Additionally, indirect evidence supporting, in some instances, the hypothesized interaction of PIF1 and CTG10 was acquired from two up- and two down-regulated PIF1 direct target gene transcripts using qRT-PCR. The preponderance of these results indirectly corroborate the interaction of the two proteins, PIF1 and CTG10, which can lead to the degradation of PIF1 thus allowing the completion of germination in the presence of light of the seeds from the positively photoblastic model plant.

\textbf{Interior Design}

\textbf{72. Sabrina Mason, Shannon Senderling}
Mentor: Lindsey Guinther

\textit{UK Chandler Medical Center Emergency Department Post Occupancy Evaluation: A Study to Inform Future ED Design}

The Post Occupancy Evaluation (POE) has become an important research tool in the design industry. Design firms worldwide have begun to use the POE to qualitatively and quantitatively measure the success or failure of implemented designs in order to improve design strategies and create better environments. The Emergency Department (ED) at the University of Kentucky’s Chandler Medical Center was originally planned to accommodate 55,000 annual visits by 2015. Today the ED is anticipating 65,000 visits in 2012, and therefore is exceeding programming parameters. The ED features separate adult and pediatric services and a Level I Trauma Center. When planned, the project’s goals focused on prioritization of patient access and care, integration of the academic mission of the hospital and clinical services, overall efficiency and flexibility, and promotion of an intended hospital image. Because this ED was planned using evidence-based design research, a POE is currently being conducted to determine whether integrated research strategies are proving effective for all users. This POE will look at how well the unit is coping with increasing patient volume, how well the design matches users’ needs, and how users’ have adapted their work patterns in unforeseen ways. The research conducted in Phase I utilized behavior mapping, walk-ability studies, wait timing, acoustical and light meter measurements. This presentation will discuss these processes utilized for the first phase of the UK ED POE. As the various phases of this research are completed, the study will identify ways to improve ED design to create better environments in the future.

\textbf{Journalism}

\textbf{73. Whitney Harder}
Mentor: Buck Ryan

\textit{Coming to Public Judgment: An Analysis of Young Voters in the 2011 Kentucky Governor’s Race}

The Kentucky Governor’s Race of 2011 was as significant to the future of the Commonwealth as it was a key national election. A case study of young voters, including a content analysis of front-page newspaper headlines, revealed that the key determinants for young voters on coming to public judgment on which candidate to support were: news coverage, parent’s influence, and research. The study also revealed that 90% of news coverage, as defined as front-page newspaper headlines, were framed in the traditional-elite approach rather than the public journalism approach and that the student newspaper at the University of
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Kentucky was found “bowling alone” in its coverage on the Governor’s race, having only 18% of front-page newspaper headlines, compared to professional papers with 41% of front-page newspaper headlines. The results of this case study are valuable to scholars doing research on young voters, particularly in statewide elections.

Linguistics

74. Lindsey Austin
Mentor: Jennifer Cramer

Perceptual Dialectology in Kentucky

Because of Kentucky’s geographical location in the continental United States, Kentuckians are exposed to a wide variety of accents that might be labeled Northern, Southern, and Midwestern. This exposure shapes Kentuckians’ perceptions about dialects and makes for an interesting region to study. With some exceptions (Cramer, 2010), most research thus far has focused on the perceptual dialectology of people living in northern, southern, and western states (Preston, 1989). Inspired by popular myths like “they speak really bad English down south and in New York City” and “everyone has an accent but me” (Bauer & Trudgill, 1998), this project aims to quantify the effects of Kentucky’s geographical location on the linguistic perceptions of its residents by asking participants, all of whom are from Kentucky, to rank the 50 states, plus Washington, D.C. and New York City, in the categories of degree of difference, pleasantness, and correctness. An analysis of the results of an online survey shows that Kentuckians find Southern and Northeastern dialects less pleasant, more incorrect, and most different than their own way of speaking, suggesting that Kentuckians believe the first of these myths. The survey also asked Kentuckians to describe their dialect. More than half of participants said they simply do not have an accent. Some participants preferred to label their own variety as “normal,” “American,” and “neutral,” “no accent,” or “bland.” This falls right in line with the belief that only other people have accents. One final question this study seeks to answer deals with where Kentuckians place their home state among the others. Overall, respondents placed Kentucky somewhere in the middle of the pack.

Management

75. Benjamin Kinsella
Mentor: Nancy Johnson

Spanish Foreign Direct Investment in Latin America: Analysis of a New Special Relationship and the Case of Telefónica

The rise of Spanish foreign direct investment (FDI) in Latin America since 1990 is an economic and cultural phenomenon that has called attention to very few scholars. I hypothesize that colonial ties are a significant influence of foreign direct investment taken by Spanish multinational companies in Latin America. I use primary and secondary data sources including manager interviews to understand their strategic decisions. Leading Spanish firms in the areas of banking, energy, and telecommunications entered the emerging Latin American market. Having experienced rapid economic modernization in Spain after the country’s dictatorship and entrance to the European Union, these firms saw Latin American liberalization and privatization as a lucrative opportunity, facilitated by a shared culture, language and political support. Given the depth and diversity of this topic, this research will explore these investments through a case study of the world’s largest Portuguese and Spanish telecommunications
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company, Telefónica. The results indicate that Spanish managers underestimate the complexity of their supposedly shared cultural affinity and new mutually beneficial relationship with Latin America. The traditional exploitation of natural resources, disregard for the region’s well-being and the pursuit of profits suggest that much has not changed since Latin American colonialism.

76. Bethany McClintock
Mentor: Gordon Holbein

*The Effect of International Cultural Stereotypes on the Hiring Process*

Despite vast research pertaining to racial, gender, and other stereotypes that are present during the hiring process, little research has been done that examines the effect of international cultural stereotypes on the hiring process. In a survey that utilized resumes of the same quality and content that only differed on the basis of applicant name and apparent nationality, participants were asked to rank an applicant based on several different levels of qualification. The following research presents the results of this survey and analyzes differences among the applicants’ scores that the participants gave them.

Materials Engineering

77. Yunchao Li
Mentor: Yang-Tse Cheng

*Al-Si Thin Film and Porous Silicon Electrodes for Lithium-ion Batteries*

Department of Chemical and Materials Engineering, University of Kentucky
Silicon has been extensively studied as a potential candidate anode material for lithium-ion batteries (LIB). Although silicon has much larger theoretical capacity (4200 mAh/g) than the commercial material graphite (372 mAh/g), silicon usually shows poor cycle performance because of its huge volume expansion (300%) and crack formation. Alternative electrode materials Al-Si and porous silicon thin film were studied in this work. Phase separated Al-Si thin film was deposited by co-sputtering and Al was etched out from the Al-Si thin film to obtain porous silicon thin film. Both of the electrode materials were assembled into coin cells and showed better cycle performance and good capacities. The improved performance of Al-Si electrode was due to the good electron conduction and high lithium ion diffusion rate in the Al phase. Porous silicon thin films could buffer the volume expansion during cycling to avoid crack formation. The experimental method in this work is expected to simplify the porous silicon thin film electrode preparation process, and both of these alternative thin film materials are the promising anode materials for future large capacity and good cycle performance lithium-ion batteries application.

Mechanical Engineering

78. Daniel Bostelman
Mentor: Alexandre Martin

*Wind Tunnel Simulation*

The purpose of this project is to simulate the fluid flow in a wind tunnel in preparation for its construction. Using computer programs, the three-dimensional space of the wind tunnel is created and then calculated on a supercomputer. The results obtained in this project will be used by Dr. Martin and his
team in the Gas Surface Interactions Lab as they construct a new wind tunnel to further explore thermal protection systems.

79. John Bumb, Evan Sun
Mentor: Johné Parker

RFID Static Testing

Radio Frequency Identification (RFID) static testing was completed in an effort to characterize a subset of 16 RFID tags. Thus by characterizing these tags, the RFID team can have accurate information in the use of these tags as they move onto more elaborate and intricate testing. The testing of the RFID tags involved selecting tags that were readily available on the market and had a range of different characteristics, such as manufacturer and far field/near field ranges. The static testing on the different RFID tags was conducted at different power levels, antenna heights, and different orientations to determine what produces the greatest impact on the read success of the tags. With manufacturer specs in mind, it was expected that different heights and power levels would change the read success, but the manufacturer indicated that tag orientation would not have a large effect. The results of the testing did indicate that some of the tags would fail at certain power levels and at different antenna heights as expected; however it was also noticed that with select tags the read success on tag orientation would range from almost no read ability to almost perfect readability. Further analysis has also been conducted to determine whether the effect from changing these factors was above the natural variation in the experiment, indicating whether the response witnessed was significant to the tag readability. By using the data obtained in static testing, the team can apply the new knowledge obtained to future dynamic testing of the tags and system.

Microbiology, Immunology, and Molecular Genetics

80. Grant S. Jones, Elsa N. Bou Ghanem
Mentor: Sarah D’Orazio

Role of Internalin-A in L. monocytogenes infection

L. monocytogenes is a gram-positive intracellular bacterium responsible for food-borne illness. Though the most common form of the infection is limited to mild gastroenteritis, the systemic spread of bacteria beyond the intestines can result in serious infections, particularly affecting the elderly, pregnant women, and newborns. The bacterial surface protein, internalin-A (InlA), is thought to be responsible for intracellular invasion by targeting E-cadherin adhesion proteins on the intestinal epithelium cells. While InlA binds tightly with human E-cadherin, it does not bind efficiently with mouse E-cadherin. A novel model of a food-borne listeriosis was used to track the natural spread of the bacteria. In addition to the wild-type strain, a modified InlAm strain was studied, which has a higher affinity for mouse E-cadherin. In this study, wild-type and InlAm expressing L. monocytogenes were differentially tagged so they could be monitored during the course of intestinal infection. This made it possible to study the defined role of InlA in a mouse model. After co-infecting mice with the modified InlAm strain and the wild-type strain of L. monocytogenes, no significant difference in the level of initial invasion was shown in intestinal epithelium cells at 16 hours post-infection. However, at 60 hours post-infection InlAm had significantly higher titers compared to wild-type in the lamina propria, mesenteric lymph nodes, and spleen. These studies have revealed that a high affinity binding of InlA may be important for the systemic spread of bacteria beyond the intestines, in addition to aiding in initial invasion.
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Molecular and Biomedical Pharmacology

81. Clifford L. Freeman, Jenan Hilal, Lauren N. Jutras, Amy L.S. Dowling
Mentor: Elizabeth Head

Changes in Myelin Basic Protein in the Frontal Cortex as a Function of Age and Alzheimer’s Disease in Individuals with Down Syndrome

Alzheimer’s Disease (AD) affects 5.4 million Americans and is the only one of the top ten leading causes of death that cannot be prevented, cured, or slowed. Individuals with Down syndrome (DS) have trisomy of chromosome 21, where several genes associated with AD are localized. Therefore, individuals with DS are at a higher risk of developing AD. Structural changes in gray and white matter of the brain, as well as changes in plasma signaling proteins, may be linked to both the accumulation of AD neuropathology in the frontal cortex and to white matter degeneration. Here, immunohistochemistry was used with a rat monoclonal antibody to Myelin Basic Protein (MBP) to compare white matter integrity in frontal cortex samples from individuals with DS, DS and AD, AD alone, and controls. For each case, 5 adjacent images of white matter and 5 images from grey matter were captured. Image J to quantify area of MBP-positive staining were used in order to compare MBP levels between groups. Preliminary analysis suggests a positive linear relationship between MBP in the grey matter and age in non-DS samples, and an exponential positive relationship between MBP in the grey matter and age in DS samples. This increase begins around the age of 30 years. Although the cause of this is uncertain, this relationship may be due to increased compensation for loss of functional neurons in aging brains.

Molecular and Cellular Biochemistry

82. M. Kathryn Brewer, Satrio Husodo
Mentor: Matthew S. Gentry

Making Strides Toward Understanding Neurodegeneration: Determining the Structure and Function of a Unique Phosphatase

Lafora disease is an autosomal recessive epilepsy that is caused by an abnormal buildup of insoluble glycogen, called Lafora bodies. Patients typically exhibit progressive neurodegeneration leading to death around age 25. Mutations in the gene encoding the protein laforin lead to Lafora disease. Laforin is a bimodular protein that contains a phosphatase domain and a carbohydrate-binding module. This enzyme is necessary for proper glycogen metabolism, but its role in neuronal cell death is not yet fully understood. It has been demonstrated that one role of laforin is to remove phosphate from glycogen. The ultimate goal is to crystallize laforin to determine its three-dimensional structure and use these insights to understand the enzyme. Another group recently published that laforin is mainly present as a dimer and that dimerization is critical for its phosphatase activity. However, it has also been seen that the monomeric species is dominant and more functional than the dimer. Human laforin is difficult to purify due to its tendency to be sequestered into inclusion bodies when expressed in E. coli. To avoid this problem, the gene for laforin from the Xenopus tropicalis (frog) and Gallus gallus (red rooster) genomes was cloned into a bacterial expression vector, and laforin from E. coli was purified using a two-step purification procedure. The monomeric Gallus gallus laforin was subjected to gel electrophoresis, mass spectrometry, dynamic light scattering, and phosphatase assays. It was concluded that laforin is present mainly as a monomer, remains monomeric, and has phosphatase and carbohydrate binding activity comparable to human laforin. Therefore, Gallus gallus laforin is an appropriate model for human laforin,
and any insights gained from it can be directly applied to human laforin. With this information, more understanding of the role of laforin in the body and treatment options for Lafora disease can be developed.

83. Travis Bridges  
Mentor: Matthew Gentry

Lafora Disease E3-ubiquitin Ligase Malin is related to the TRIM Family of Proteins at both the Phylogenetic and Functional Level

Malin is an E3-ubiquitin ligase that is mutated in Lafora disease, a fatal form of progressive myoclonus epilepsy. In order to perform its function, malin forms a functional complex with laforin, a dual specificity phosphatase that facilitates targeting of malin to its corresponding substrates. While the laforin phylogeny has been deeply studied, there is no data on the evolutionary lineage of malin. After an extensive search for malin orthologs, we discovered that malin is exclusively present in vertebrate species and a cephalochordate, in contrast with the broader species distribution previously reported for laforin. These data suggest that in addition to forming a functional complex, laforin and perhaps malin may also have independent functions. In addition, we discovered that malin shares significant identity with the E3-ubiquitin ligase TRIM32, which belongs to the tripartite-motif containing family of proteins. Also, experimental data showed evidence that TRIM32 is capable of ubiquitinating malin substrates. Taking together, these results suggest a common origin for malin and TRIM32 and provide insights into functional redundancy of both proteins.

84. Courtney Ford  
Mentor: Rebecca Dutch

Examination of a Critical Valine Residue in a Paramyxovirus Fusion Protein: Roles in Protein Folding and Membrane Fusion

The paramyxovirus PIV5 is able to fuse its viral envelope to the plasma membrane of cells through conformational changes in the viral fusion (F) protein. Infection is initiated when the viral attachment (HN) protein binds the virus to the host cell. This binding then triggers changes in the F protein which drive the critical membrane fusion process. It has been shown that decreasing the size of the residue at position 50 in the F2 domain of the F protein by mutation of the residue from valine to alanine significantly decreased the ability of the F protein to promote fusion, suggesting that the packing of the amino acid side chains in this region is critical. When the size of the side chain at position 50 was slightly increased via mutations of valine to isoleucine or leucine the ability of the virus to promote fusion was comparable to the wild type fusion protein. However, when a large increase in side chain size was made with a mutation of valine to phenylalanine, the ability of the virus to fuse was significantly lower than that of the wild type. The lack of fusion of the V50F mutant correlated with alterations in posttranslational processing, suggesting that large increases in side chain volume at this position affect initial protein folding.
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85. **Jessica Geddes** (High School Student), Perry Christian  
Mentor: John D’Orazio

*Elucidating the Molecular Mechanism of UVB-induced p38 MAP Kinase Activation in Human Transformed Keratinocytes*

Basal cell carcinoma, the most common form of skin cancer, occurs in keratinocytes and is strongly linked to ultraviolet radiation. p38 MAP Kinase is part of the cellular response to ultraviolet radiation in numerous human cells, including keratinocytes. Recognizing the initial signaling events upstream of p38 activation leads to a better understanding of how the keratinocyte responds to ultraviolet radiation and how basal cell carcinoma occurs. It is known that p38 is activated by phosphorylation at residues Y180/T182. However, it is unclear which upstream kinase is responsible for p38 – 180/182 phosphorylation. Evidence suggests either Map Kinase Kinase 3/6 (MKK 3/6), Map Kinase Kinase 4 (MKK 4) or both can perform this enzymatic reaction. Here, we show that p38 is activated in human transformed keratinocytes cells (HaCaT) when irradiated with Ultraviolet-B (UVB) radiation at a sub-lethal dose, most notably at 500 J/m² UVB. By utilizing UVB irradiation, SDS-Page, Western Blotting, and small molecule inhibitors, it was determined that Map Kinase Kinase 3/6 is responsible for the activation of p38 in HaCaT, but may not be the sole cause of the activation. The data supports the hypothesis that MKK 3/6 and MKK4 activate p38 in HaCaT cells.

86. **Corey J. Ketchen**, Min Chen, Trevor Creamer  
Mentor: Kathleen L. O’Connor

*Identification of the interaction motif between S100A4 and Rhotekin*

Ongoing studies in our lab indicate that the coupling of Rho to S100A4 alters Rho signaling output in breast cancer. This coupling permits S100A4 to complex with RhoA and switch RhoA function from stress fiber formation to membrane ruffling in order to facilitate an invasive phenotype. Notably, we find that this interaction is mediated through the Rho effector Rhotekin in which S100A4 binds to Rhotekin through its Rho Binding Domain (RBD) using residues different from the RBD residues that Rho utilizes. In this study, we seek to elucidate the amino acid residues that are important for the interaction of Rhotekin and S100A4 to better define the binding motif. Preliminary structural mapping predicted that the RBD structure is a coiled-coil domain containing a connecting loop. Based upon this protein structure, the amino and carboxyl terminus of Rhotekin RBD were amplified by PCR and then the PCR products were cloned into pGEX-6P-3 vector. Then, GST-fusion proteins were expressed in bacteria and coupled to glutathione beads. The fusion-protein coupled beads were incubated with purified S100A4 protein and the amount of S100A4 bound was detected by immunoblotting. Our data suggested that both termini of the RBD have interaction with S100A4, but that the amino terminus had a stronger affinity. Also, using mutagenesis to mutate a cysteine to a serine located on the carboxyl terminus, a decreased ability of the mutant RBD to bind S100A4 was observed. Since both RBD termini constructs had an overlapping region that is hypothesized to be the location of a connecting loop, it is possible that this loop plays a key role in the ability of the RBD to bind S100A4. In future studies, the role of the loop and other portions of Rhotekin RBD will be examined to more accurately identify the crucial residues necessary for interaction.
87. **Timothy J. Waits**, Hackett B.A.
Mentor: Rebecca Dutch

*Potential Interactions of Charged Residues in the Membrane Fusion Mechanism of Human Metapneumovirus*

Human metapneumovirus (HMPV) is a recently discovered respiratory pathogen capable of producing pneumonia and bronchiolitis in severe cases. Previous research in our laboratory showed that the membrane fusion activity of the HMPV fusion protein is pH dependent, with fusion stimulated at pH 5, and that mutations at the E51 residue of the fusion protein significantly inhibit this process. We hypothesized that charge-charge interactions between the E51 and either the K138 or K142 residues are important in regulating the triggering of conformational changes necessary for membrane fusion. Site-directed mutagenesis was employed to generate alanine mutants at both positions 138 and 142, eliminating the potential charge-charge interaction with glutamate. Both mutant F proteins were found to express at a level similar to that of the wild type protein suggesting that these mutations do not lead to gross defects in protein folding. We then tested the fusion activity of the mutants in syncytia assays alongside the wild type F protein at both pH 5 and 7. Both the K142A and K138A mutants showed fusion at pH 5 at similar levels to that of the wild type but showed no syncytia formation at pH7. The fact that mutations at E51 and those at K142/K138 give different fusion phenotypes suggests that these residues do not form direct charge-charge interactions that control fusion triggering.

88. **Daniel T. Atwood**
Mentor: David Yurek

*Differentiation of induced pluripotent stem cells into dopamine neurons*

Parkinson’s disease is a neurodegenerative disorder characterized by the death of dopamine neurons in the substantia nigra region of the midbrain. Replacement of those dead dopamine neurons with new dopamine neurons may replenish dopamine levels within the substantia nigra, thereby treating and possibly curing Parkinson’s disease. In order to produce dopamine neurons, a cell line of genetically unmodified mouse embryonic fibroblasts were differentiated into mouse primary induced pluripotent stem cells via a lentiviral vector and verified by the expression of Yamanaka factors (Oct4, Sox2, c-Myc, and Klf4). The mouse induced pluripotent stem cells were then differentiated into dopamine neurons through an embryonic stem cell five-stage procedure. In stage five, brain-derived neurotrophic factor, glial cell-derived neurotrophic factor, ascorbic acid, dibutyryl cAMP, TGFβ3, Wnt5a, and FGF20 were applied to increase dopamine neuron differentiation. After fifteen days dopamine neurons were successfully produced. These results suggest that dopamine neurons can be generated from induced pluripotent stem cells, and, more importantly, dopamine neurons can be generated from any type of somatic cell. This is a revolutionary discovery for both Parkinson’s disease treatment and stem cell therapy, because differentiating a cell type from an induced pluripotent stem cell progenitor may eliminate risk of immunogenic rejection.
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89. Salman Jeelani
Mentor: Justin F. Fraser

Severe Dural Venous Sinus Thrombosis: Modern Management and Therapeutics

Venous sinus thrombosis (VST) is a rare form of stroke that results from the formation of a blood clot (thrombosis) in one or multiple dural venous sinuses. With a prevalence of 3-4:1,000,000, VST is a rare cause of stroke. While the disease can manifest at any time in one’s life, it usually occurs in one’s thirties and approximately 75% of all cases have affected females. The driving principle of the experimenter’s work was to better understand mechanisms and treatment of this specific type of stroke. In particular, the specific projects evaluated mechanisms and treatments of two different types of stroke: acute ischemic stroke and venous infarction. Specifically, on a clinical level, the experimenter performed a review of the most recent literature on natural history, presentation, and treatment of severe dural venous sinus thrombosis with specific emphasis on endovascular approaches to treatment. From a laboratory research perspective, the experimenter will remain involved in the use of the Middle Cerebral Artery Occlusion (MCAO) model of ischemic stroke in the study of correlations between values on a transcutaneous perfusion probe and actual infarct volume. The results of the clinical research on venous sinus thrombosis will be used to formulate a publication to educate practitioners about venous sinus thrombosis and the utility of endovascular therapies as part of the treatment paradigm. The results of the laboratory work will be used to better understand the application of transcutaneous perfusion monitoring, and to develop benchmarks for its value in the rat model of ischemic stroke.

Nursing

90. Ashlei Hardin
Mentor: Jennifer Hatcher-Keller

Fear as a Barrier to Mammography in African American Women

Breast cancer is the most common cancer and the second leading cause of cancer death among African American women, exceeded only by lung cancer (American Cancer Society, 2006). Breast cancer mortality rates have been steadily declining. However, African American women have not benefited at the same rates as women of other ethnicities from this decline. The five-year survival rate for African American women diagnosed with invasive breast cancer is only 77% compared to 90% among Caucasian women (American Cancer Society, 2007). The objective of this project was to explore the concept of fear among African American women as it relates to mammography. This project was a secondary analysis of existing interviews of 39 African American women. The interviews were conducted as Phase I of a randomized controlled trial exploring the barriers and benefits of mammography screening for women attending the ED for non-urgent care. This analysis consisted of multiple readings of the interviews previously entered into NVivo to further analyze any fear related passages. A codebook was developed which included fear related quotes. The results concluded that over 40% of the fears identified pertained to anxiety associated with finding out the results or discovering the outcome of the mammography and over 30% related to the fear of pain that may come with receiving a mammogram. Less overwhelming results were related to not knowing what to expect from the mammography procedure, radiation, and fear of being mistreated because of race or finances. These results reveal that fear may be an influential factor in African American women’s decision to obtain a mammography. Further research should be done with regards to the best way to address fears related to possible cancer diagnosis, including best practices in culturally sensitive mammography preparation.
91. Viktoria Melnyk  
Mentors: Susan Frazier, Melanie Hardin-Pierce  

*Admission serum anion gap as an independent predictor of mortality in critically ill patients*

Systemic acidosis is common in critical illness, particularly in patients who require mechanical ventilation. Increased anion gap, a measure of the balance between cations and anions, indicates presence of unmeasured ions, which may aid in differential diagnosis and be a useful predictor of patient outcomes. The utility of anion gap as a predictor of ventilator days and mortality is not known. The aims of this study were to compare demographic and clinical variables between those patients who lived and died and to determine whether anion gap predicted ventilator days and mortality in critically ill patients. Using a secondary data analysis, we studied adults (n = 150) who required mechanical ventilation for more than 12 hours. Anion gap was calculated as Na⁺ - (Cl⁻ + HCO₃⁻). Demographic and clinical variables were extracted from the medical records. Patients were categorized by mortality and compared using independent t-tests and Chi square. Linear and logistic regression evaluated the predictive power of anion gap. Patients were primarily male Caucasians, aged 54 ± 16 years. Nonsurvivors had a significantly higher admission APACHE III score (92 versus 67, p < 0.001) and anion gap (12.2 versus 8.5 mEq/L, p = 0.002) and a significantly lower admission Glasgow coma score (7.6 versus 9.8, p = 0.008) and arterial pH (7.282 versus 7.37, p = 0.009). Anion gap was an independent predictor of mortality (OR = 1.11, 95% CI 1.02 to 1.21, p = 0.02). Admission anion gap was an independent predictor of mortality in critically ill patients; for each 1 mEq/L increase in anion gap, there was an 11% increase in likelihood of mortality. It may be useful to monitor anion gap and focus interventions on early normalization to improve outcomes.

**Nutrition and Food Science**  
*(NFS 475 with Alison Gustafson)*

92. Chris Artner  
Mentor: Alison Gustafson  

*Association between Types of Beverages Consumed and Behavioral Habits of College Students*

In the past decade, the energy drink industry has been growing rapidly. Consumption of caffeinated beverages, which includes energy drinks, soft drinks, and coffee, has also been increasing. One of the supposed uses and benefits of these energy drinks is more energy for exercise and other lifestyle habits such as studying or weekend activities. However, little is known as to whether their actually is an association between energy drink intake and reported lifestyle habits among college students. Data was collected from 150 college students at the University of Kentucky. The participants ranged in age from 18 to 30 years old and were 59% male and 41% female. Self-reporting surveys were given randomly to students around the University of Kentucky campus. The questions recorded the participant’s level of caffeinated beverage consumption, frequency of exercise, and the habits associated with each. Descriptive statistics were used with Microsoft Excel. The data concluded that 34% of the participants consumed five or more caffeinated beverages per week. It also showed that 49% of respondents participated in physical activity at least 3-4 times per week. A Pearson correlation (0.046) showed that there was no significant association between the level of caffeinated beverage consumption. There is a significant correlation between beverage type consumed and the situation it was consumed in. (r=0.4 p=0.0001). Those who
drink energy drinks are two times less likely to consume it with alcohol than for studying compared to those who drink a soft drink (-2.25 0.006 (p-value) 95% CI -3.84 -0.654). The results suggest that college students who consume more caffeinated beverages do not actually engage in physical activity more frequently than those who do not consume caffeinated beverages. However, it shows that students are more likely to drink soft drinks with alcohol and energy drinks while studying.

93. Jessica Barney
Mentor: Alison Gustafson

**Correlation between Nutrition Education with BMI and Food Choices in Kentucky College Students**

Obesity levels in the United States have been at a steady increase with approximately one in three adults currently being obese. More importantly, Kentucky is the fourth most obese state in the country (31.3% in 2010). Obesity leads to diseases (hypertension, type 2 diabetes, etc.) also leading to increased health costs in the U.S. However, the education an individual has on nutrition and healthy lifestyles may provide a benefit on health status/eating habits, which may help lower obesity levels. Self-reporting surveys were distributed randomly to students from two different colleges in Kentucky (Morehead State University & University of Kentucky). Data was collected from 59 college students. 34 females and 25 males completed the survey in ages from 15 to 53. The survey documented each student’s vegetable, fruit, milk, and sugar-beverage knowledge along with their vegetable, fruit, milk, and sugar-beverage actual intake. The survey also documented students’ exercise knowledge and actual exercise and the number of nutrition-related classes taken up to the point of the survey. Stata 11.0 and Excel were used to calculate descriptive statistics and multinomial regression. The data showed a moderate negative correlation (r=-.4) between BMI and nutrition education. It found that knowledge of how much exercise a person thought they were supposed to get is associated with how much exercise the individual actually obtains (r=.4 p=.0053). An association was also found between knowledge of sugar-beverage consumption and actual consumption (r=.42 p=.0001). The findings suggest that BMI is inversely correlated with the number of nutrition-related classes these students had, and that there is an association between knowledge and actual intake with varying foods. This shows that more nutrition-related classes at varying ages may be beneficial in lowering, or preventing the ongoing incline of obesity levels in the United States.

94. Candace Beam
Mentor: Alison Gustafson

**Correlation between Prescription Stimulant use and Different Ethnicities**

The aim of this study is to examine the correlation between prescription stimulant use and the likelihood of different ethnicities using them. I hypothesized that Caucasian students are more likely to abuse/use prescription stimulants than students of a different ethnicity. Adderall and Ritalin are popular drugs found at many college campuses. Illegal use and abuse of these prescription stimulants is an increasing problem at the University of Kentucky. There are limited studies addressing racial and ethnic difference in relation to use of ADHD drugs for improving grades. The aim of this study is to compare students who misuse prescription stimulants based on different ethnicities. Data was collected from 68 college students (51 females and 17 males) ranging between the ages of 18 to 24 at the University of Kentucky. Surveys were distributed randomly to students from various backgrounds. The survey recorded the student’s use of prescription stimulants, whether they were prescribed the medication or not, the frequency of usage, and the reason for usage. Descriptive statistics were used with Stata 11.0. The data concluded that
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38.24% of college students reported prescription stimulant usage, of the 38.24%, 84.62% were not prescribed the medicine. It was found that 96.15% of the students who reported using a prescription were Caucasian, leaving 3.8% of the students who reported yes being African American. There was a slight correlation ($r=0.35$, $p=0.0039$) between ethnicity and prescription stimulant use. There was also a strong correlation between those who reported prescription stimulant use and using the drugs to study. Of the students who reported usage, 88.40% reported using the drugs to study ($r=0.9045$, $p=1.32e-18$). The results suggest that college students who abuse/use prescription stimulants are more likely to be Caucasian. The data also proves that the majority of students using the drugs are not prescribed the medications and use it to help with studying.

95. Terri Bolden
Mentor: Alison Gustafson

Association between Self-Reported GPA and Current BMI Status

The objective is to determine if self-reported grade point average (GPA) is associated with body mass index (BMI) among college students at the University of Kentucky by conducting a survey questionnaire. The expected outcome from this research study is to determine if there is a correlation between self-reported GPA and BMI (if reporting a high GPA is somehow related to having a healthy BMI and vice versa). The proposed hypothesis for this research question is- is there a correlation between self-reported GPA and current BMI status? How strong are the biomarkers that influence reported values when uncontrolled factors that are present will affect the outcome of this research question? Research has been done to determine the possible biomarkers that are directly related to BMI of children and adolescents but not for college students. Little research has been done to determine if other factors such as self-esteem and satisfaction with size are indicators of unhealthy weight status among college students besides diet and exercise. Data was collected from 137 college students from the University of Kentucky, 23 males and 114 females of different ages. A self-reported anonymous survey was randomly distributed to the students. Questions from the survey recorded participant’s responses about weight status, body shape, physical exercise and overall impression of self-image, etc. The data showed a strong correlation ($r=0.77$) between self-reported normal weight students who exercise 7 days a week for 30 minutes. There was a strong and significant correlation between self-image and frequency of exercise ($r=0.67$, $p=0.0001$). The results concluded that there is a correlation among students who exercise 7 days a week for 30mins and report themselves as normal weight. However, some students reported being normal weight and only work out 1-2 days per week. This could be because of self-perception and not actual facts since a self-reported survey were given.

96. Brady Bryant
Mentor: Alison Gustafson

Correlation between Physical Activity in “Colder Months” and Weight Gain in College Students

The correlation between physical activity in “colder months” and weight gain is hypothesized to be positive. Do environmental conditions influence one’s tendency to be active? This study aimed to find correlations between college students and weather-dependent activity. Specifically, it aimed to find physical activity rates during “colder months” and correlations to college students’ weight. Primary data was collected through survey response. Results were obtained through online and written participation surveys that were distributed at a public university. A total 60 students completed the volunteer survey. From 60 surveys, recorded data calculated the trends of college students’ physical activity coupled with
weather. Using Microsoft Excel, the Pearson Correlation examined both factors. These results stated the majority of students’ weight stayed the same over time. About 70% of the students were female and 68% of the females’ weight was constant. In male students, almost 40% stated to gain weight, with 45% of other males’ weight staying constant. Results indicate 71% of students engaged in indoor activities. When asked if they exercised outdoors, 63% answered no, 37% answered yes. Male students’ had lower outdoor physical activity percentages, illustrating their 24 BMI. Nearly 56% of men rejected exercise outdoors, with 90% of those men walking to class “less.” The females’ lower BMI of 21 validated their average Physical Activity rate of 2.5; with zero equaling no activity and five extremely active. 46% of those females walked to class “more.” But, 63% of females and 38% of males exercised indoors during colder months. The females’ average physical activity was lower with a higher percentage weight gain. (r=0.240192231). Results concluded college students would see higher prevalence of weight gain/BMI during “colder months” of 6-month period. The physical activity levels correlated positively in colder months. Finally, 83% of students stated to become more active in coming months.

97. Tracy R. Carter
Mentor: Alison Gustafson

**Correlation between the Nutritional Quality of Food Consumed and a Student’s Perceived Health and Body Image**

Does the nutritional quality of food consumed influence a student’s self-perceived health and body image? It was hypothesized that students who consume high nutrition quality food would have a higher self-perceived body image and health, based on previous research concerning quality of food, which is said to influence a person’s BMI. However, quality of food can also be a contributing factor to the self-perceived body image and health status. The aims of this study were to determine how the association of quality of food among college age men and women ages 18 through 28 1) is associated with BMI, and 2) self-perceived health status and body image. Data was collected from 125 college students (92 females and 33 males) ranging from ages 18 to 28 years old. Self-reporting surveys were taken electronically and anonymously from college students in Kentucky. The survey recorded the participant’s average nutritional quality of food consumed, BMI, self-perceived body image and self-perceived health status. The data concluded that only 30% of the participants rated their nutritional quality of food at least a four out of five. There was a moderate correlation (r=.3, p=.4) between quality of food and body image, a moderate correlation (r=.5, p=.045) between quality of food and self-perceived health, and a moderate correlation between self-perceived body image and health (r=.4, p=.3). Therefore those that consumed a higher quality food had a higher self-perceived body image, which influenced a higher self-perceived level of health. Results found a correlation between the quality of food, and self-perceived body image and health. The findings suggest that for a college student to maintain a good self-perceived body image and health, they should consume a higher quality food. Those who had a higher self-perceived level of health also had a higher body image.

98. Jonathan Chadwell
Mentor: Alison Gustafson

**Association between a University Student’s Body Mass Index and their Grade Point Average**

The aim of this study is to examine the correlation between a student’s BMI and their GPA. I hypothesized that those who have a high BMI will have a low GPA. University students are suggested to spend 2 hours studying for every hour of class in order to be successful. This can cause students to
become sedentary during their free time which can result in weight gain and obesity. However, there may be an association between academic success and Body Mass Index (BMI). Data was collected from 223 college students (106 males and 117 females) ranging between ages 18 to 25 years (mean 21.4 years, standard deviation 4.14) old at the University of Kentucky. Self-reporting surveys were distributed randomly to students from various academic backgrounds. The survey recorded the participant’s height, weight, GPA, frequency (how often) of exercise, frequency of studying and if they receive an academic or athletic scholarship. BMI was calculated by weight divided by height squared and then multiplied by 703. The data concluded that students who had a GPA between 4.0-3.5 had an average BMI of 25.6211. Students who had a GPA between 3.4-3.0 had an average BMI of 25.9601. Students who had a GPA between 2.9-2.5 had an average BMI of 26.3. Students who had a GPA between 2.4-2.0 had an average BMI of 27.0276. Students who studied 10+ hours a week had the highest average GPA (3.9). There is an r-squared value of 0.9583 when comparing these results. There is a correlation between BMI and GPA. The results suggest that college students who have a lower BMI will have a higher GPA. However GPA may be related closer to the amount of exercise per week, but the amount of time spent on studying had the greatest effect on GPA. A person’s BMI and physical activity has a small positive effect on academic performance, but studying is the most important factor.

99. Rhoda Dankwa
Mentor: Alison Gustafson

The Relationships between Fruits and Vegetable Intake, BMI, and other Relating Factors of University Kentucky Students

With the rise of conditions like obesity and type 2 diabetes in the United States, there is a need to investigate the lifestyles leading to these diagnoses. It has been shown that diet has a significant effect on health status. There is limited data on college students and their food choices. The food choices college students make now are more likely to stay with them later into their adulthood. A look into the trends of fruit and vegetable intake and body-mass-index (BMI) of college students can be an indicator of the overall wellbeing of adults in the future. A cross-sectional survey among 74 college students at the University of Kentucky was administered to identify the relationship between fruit and vegetable intake and BMI. The study focused on both males and females of various majors. The mean age of the study participants was 21.1 years (range 18-27 years), and the mean BMI was 22.73 (normal weight). The survey used has been proven both reliable and valid. It is the survey used for research of Preventing Chronic Disease: Public Health Research, Practice, and Policy. The correlations between estimated fruits and vegetable intake per day and the BMI were as followed r= 0.77 for underweight, r= 0.09 for normal weight, r= -0.27 for overweight, and r= 0.97 for obese. There is a strong correlation for the underweight and obese BMI ranges. In addition, at least 74.35% of participants thought that their diet ranged between good to excellent and about 70% had a BMI in the normal weight range. Conclusion: The findings show relationships between the fruit and vegetable intake, BMI, and other relating factors. Further studies and assessments among the college-aged population can be essential to providing adequate education and interventions to improve the wellness of older adults.

100. Sarah K. Eberts
Mentor: Alison Gustafson

Correlation between the Duration and Intensity of Physical Activity and Self-reported Symptoms of the Common Cold among College Students
The aim of this study is to examine the correlation between duration and intensity of physical activity (times/week and self-reported intensity) with self-report symptoms of the cold over a 2 month period. It was hypothesized that those who engage in daily, moderate physical activity will have decreased risk of the common cold. Physical activity and the immune system have commonly been paired as affecting one another. Different stages of physical activity impact the immune system. The concern now being, what physical activity is necessary to boost the immune system and prevent the common cold? There is little knowledge known about what frequency, intensity, and duration of physical activity is required. Data was collected from 113 college students (84 females and 29 males) ranging between ages 18 to 24 years old at the University of Kentucky. Self-reporting surveys were distributed randomly to students from various academic backgrounds. The survey recorded the participants’ physical activity concerning problems, intensity, duration, and frequency, 10 common cold symptoms, and whether or not they took a vitamin or mineral supplement. Descriptive statistics were created using Microsoft Excel. The data concluded that 21.2% of participants were in the probable common cold category, while 78.8% did not show probably common cold symptoms. The highest percentage of those with no common cold was 82.9% engaging in moderate intensity exercise. Therefore moderate intensity shows the most correlation, however this was not strong enough to conclude its affects. The results suggest that college students who engage in moderate physical activity do have a small correlation to have a decreased risk of the common cold. However, this correlation cannot be ruled advantageous because it was not strong enough. The participants were also self-reporting, which is not as reliable. Therefore, future research is needed to determine if specific physical activity is correlated to the common cold.

101. Lauren Ehrler
Mentor: Alison Gustafson

Correlation between Muscle Supplement Use and Aggression among College Men

Pressure from family, friends, coaches, and the media are causing young adults to turn to supplements to enhance their athletic performance and/or improve their physique. College athletes and males are convinced that the only way to reach their physical goals is with the help of supplements. However, little research has been done to determine how muscle-building supplements affect male users psychologically. This area needs to be explored more due to the popularity of these supplements and the aggressive tendencies college-aged men. Data was collected from 80 male students, ranging between ages 18 and 30, at the University of Kentucky. A cross-sectional survey was conducted among random participants in January and February 2012. The survey recorded participants’ exercising habits, muscle building supplement use, and aggressive behaviors. A statistical analysis was performed using Microsoft Excel. Most males exercise 2-3 times per week (33.8%) and lift weights 2-3 times per week (40.0%). Among the 80 male students, only 22 (27.50%) reported using muscle building supplements and most consumed them 4-5 times per week (31.8%). A moderate correlation between whey protein and general aggression was determined (r=0.33). More specifically, a moderate correlation was found between both whey protein (r=0.45) and creatine (r=0.50) and verbal aggression. Lastly, a moderate correlation was determined between those who reported using “other” supplements and physical aggression (r=0.30). The results demonstrate that there is a correlation between whey protein, creatine, and other supplements and varying types of aggression. These correlations need to be further investigated to determine if there is causation between the two variables (muscle supplement and aggression).
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102. Rachel L. Flaherty
Mentor: Alison Gustafson

Association between Frozen Meal Replacements and Dietary Guidelines

The aim of this study is to examine the correlation between the caloric and nutrient content of Kashi, Lean Cuisine, and Healthy Choice meals and those suggested in the Dietary Guidelines. It was hypothesized that Kashi will be the only company to meet the Dietary Guidelines, and that all three frozen meals will have a sodium content that exceeds the suggested intake. The manufacture of meal replacements has been a growing industry over the last few decades. The companies producing frozen meals have responded to consumer demand and increased the nutritional content of their meals. However, many consumers are confused over the nutritional quality of these products and are concerned with whether or not they meet the Dietary Guidelines. Data was collected from three major frozen meal companies: Kashi, Healthy Choice, and Lean Cuisine. Breakfast, lunch, and dinner meals were evaluated for their nutritional content and quality. These meals were then compared to the 2010 Dietary Guidelines. Descriptive statistics were used to evaluate and compare the nutritional values. The results of the nutritional analysis suggest that the meal replacements meet the nutrient intake of the Dietary Guidelines. This information can be helpful for consumers looking for inexpensive, quick, and nutritious meals.

103. K. Scott Gwinn
Mentor: Alison Gustafson

Association between the Quantity of Alcohol Consumed and the Length of Time Spent Exercising among College Students

Aim: to examine the correlation between quantity of alcohol consumed and the length of time spent exercising in college students. Hypothesis: those who drink larger quantities of alcohol will participate in less physical activity compared to those who consume less/no alcohol. Over the past several years, obesity has become more prevalent. Alcohol consumption can be a contributing factor to weight gain and obesity, and perhaps lack of exercise. However, little is known about the association between alcohol intake and the physical activity and obesity status among college students. Data was collected from 92 college students (66 females, 26 males) ranging between 18-26 years old at the University of Kentucky. Self-reporting surveys were distributed randomly to students from various academic backgrounds. Surveys recorded participants’ alcohol consumption and frequency, their exercising habits, and whether drinking encouraged them to exercise more. Descriptive statistics and multinomial regression were used with Stata 11.0. Data concluded 90.2% of participants did consume alcohol, with females more likely to consume alcohol (92.4%) than males (84.6%). Also, 94.6% of participants partook in regular physical activity, where females were slightly more active (95.5%) than males (92.3%). Those who drink a greater quantity of alcohol in one setting report exercising about 2 times more per week (RR 2.31 95% CI 0.05 and 0.66); however, they have a higher Body Mass Index score of about 2 units compared to normal weight individuals (z-score 2.00 95% CI 0.014 and 1.34). Results suggest college students who consume more alcohol do exercise more than those who consume less/no alcohol; however, they still have a higher BMI. This is most likely due to the fact that although they are participating in physical activity, they are not burning enough calories to counteract those gained from alcohol.
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**104. Egan Haddix**  
Mentor: Alison Gustafson

*C* **Association between Energy Drink Consumption and Self-Report BMI**

The aim of this study is to determine the associations between energy drink consumption and self-report BMI in college age students. It was hypothesized that consuming energy drinks on a routine basis will result in higher BMI for height and weight status. Previous studies have concluded that somewhere between 30% and 50% of adolescents and young adults consume energy drinks. These types of drinks have been associated with many adverse side effects due to the high concentrations of caffeine. Recently, a lot of research has involved the implications of alcoholic energy drinks but little research has been done with associations between energy drink consumption and weight status in college age students. Self-report surveys were distributed randomly to college students on the University of Kentucky’s campus (n=94). The survey aimed to report whether the participant consumed or did not consume a form of energy drink on a routine basis as well as assess the student’s Body Mass Index. Amounts of physical activity for participants were also taken into account. Survey Data concluded that of the sample (n=94) 12.77% did consume energy drinks on a regular basis. Of the sample, 92.56% of participants reported getting regular physical activity but compared to those who do not consume energy drink beverages, consumers get minimally less physical activity. Those who consume energy drinks have 2.03 higher BMI units compared to those who do not drink energy drinks (2.03 95% CI [0.07, 6.13]). The results suggest that those who consume energy drinks have a higher body mass index than those who do not. It is possible, however, that this difference is due to the participants’ physical activity levels.

**105. Danielle M. Hamilton**  
Mentor: Alison Gustafson

*C* **Correlation between a Family History of Type II Diabetes Mellitus in relation to the amount of Weekly Exercise and Dietary Habits among College Students**

The prevalence of Type II Diabetes Mellitus has continually increased throughout the years. A diet that consists of unhealthy choices and a lack of exercise can contribute to unwanted weight gain, resulting in a higher risk of Type II Diabetes Mellitus. Little research has been performed on the correlation of a known history of Type II Diabetes Mellitus with increasing exercise and altering dietary habits among college students. Self-reporting surveys were distributed to 100 college students (82 females and 18 males) ages 18-49 years old at the University of Kentucky. Students surveyed were from various academic backgrounds. The survey asked the participants if there was a known family history of Type II Diabetes Mellitus. Students then answered questions about their exercising habits, how often they eat away from the home and where (fast food, fast casual, and sit down). The data concluded that 46.5% of participants had a known family history of Type II Diabetes Mellitus. It was also found that 88.9% of individuals participated in some form of physical activity. Of the 100 college students surveyed, 62.6% reported eating out at least 1-2 times a week. Individuals that reported having a known family member with Type II Diabetes Mellitus tended to not eat out at fast food restaurants as much as those who did not have a family member with the disease (p-value=0.00017). The results suggest that college students who have a family member with Type II Diabetes do not eat at fast food restaurants as much as those participants who did not report having a family member with the disease. This is most likely due to the fact that these participants are aware that unhealthy eating habits can potentially put them at a greater risk for developing the disease.
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**106. Danielle S. Hamilton**  
Mentor: Alison Gustafson

*Alcohol Consumption and Stress*

Along with many other factors, stress can be a major reason that individuals choose to participate in alcohol consumption. Research suggests some correlation on the topic, but more can be understood about the motivation of consumption in the Fayette County area. The aim of this study was to find a correlation between stress levels and its motivation for alcohol consumption. The method facilitated for this research was distribution of surveys to individuals in the local Fayette county area in 2012. The surveys were distributed and data was collected for approximately one month, with a total of n= 64 participants. 59 of the 64 participants qualified with completely filled out surveys returned. Statistical analysis used Microsoft Excel. The sample selection was 28% male and 71% female, with 49% Caucasian and 51% African American. 56% of the population reported being somewhat stressed on average, while 53% reported dealing with a serious grievance. Only 11.8% of the population reported never consuming alcohol, and 83% of those that did drink reported drinking for social reasons. The weak but significant pearson correlation found a correlation between average daily stress and the number of days drinking per week (r=.2039, p=.030). The findings suggest that there is a weak but significant correlation between average stress levels and the consumption of alcohol. Due to this significance, it can be inferred that stress levels may have something to do with the consumption of alcohol. With this knowledge, stressed individuals should try out other coping mechanisms besides alcohol consumption.

**107. Alexandra R. Hicks**  
Mentor: Alison Gustafson

*Association between the Quantity of Family Dinners Spent Together and the Amount of Fruits and Vegetables Consumed among 3rd and 4th Grade Students*

The aim of this study is to examine the correlation between the quantity of fruits and vegetable consumed by 7 and 8-year olds and whether they help with the family dinner through a self-report survey given to their parents. I hypothesized that the more a child helps out with dinner the more fruits and vegetables the child will consume. Since the 1960s, family dinners have become less of an evening routine and more of an evening chore. Today, more time is spent in cars going from school, work, and after school activities which makes less time spent at home making dinner with the family. However, most families do not realize that taking the time to make dinner and including their kids in the dinner making process will help them achieve a better eating habit. The raw data was collected from the parents of 61 3rd and 4th grade students in the Fayette County area. Self-reporting surveys were distributed amongst parents who had children in the classroom and with a few randomly selected from various backgrounds. The survey recorded how many nights per week the family had dinner together and the number of fruits and vegetables included in their meal. The data concluded that most of the families surveyed consumed dinner together four times a week (24%), with five times a week (17%) being a close second. The more a child helps out with dinner the more likely they are to consume at least 1 vegetable (70%) and 1 (25%) or 2 (44%) fruits. There is a moderate correlation of 0.43 that concludes that 3rd and 4th graders who are involved with helping their parents make dinner consume more vegetables and a stronger correlation of 0.52 for consuming more fruits.
108. A. Denise Humphrey  
Mentor: Alison Gustafson  

*Association between Hair Maintenance and Aesthetic Practices and Amount of Physical Activity among College Students*

The aim of this study is to determine the association between physical appearance practices and meeting guidelines for physical activity. It is hypothesized that those who view hair maintenance and other aesthetic practices as highly important are less likely to be as physically active (PA). Those who view aesthetics as more important than physical activity are less likely to be active. Research has shown that women are less likely to be physically active due to grooming and maintenance. Due to the connection between lifestyle choices there is a connection between not engaging in PA due to these habits. Little is known about the association between hair and aesthetic practices and rates of physical activity in college students. Data was collected from 84 college students (64 females and 20 males) ranging in ages 19-31 at the University of Kentucky. Self-reporting surveys were distributed to random students around campus from various racial, socioeconomic and academic backgrounds. The survey recorded the participant’s views on diet (how important) and exercise (how often) and how these played a role in hair and aesthetic maintenance. The data collected concluded that 60.7% of participants were active, 84.5% believed that diet was important to overall appearance, 66.6% believed that staying physically active does not hinder aesthetic appearances. 15.5% of participants thought they would work out more if aesthetic practices were not hindered. Associations between how hair is worn and expenses resulted in a Pearson (r-value) correlation of .5163; race and PA, -.00253; race and hindrance to PA, .01538; gender and hindrance to PA, -.0077. The results suggest that the majority of the participants do not feel like aesthetic practices would hinder them from keeping physical activity levels. Most active students are less concerned about hair maintenance. However, more investigating will be done to explore more views on physical activity and hair maintenance.

109. Eric Jacobson  
Mentor: Alison Gustafson  

*Correlation between the Fruit and Vegetable Intake of College Students and whether or not they had a Meal Plan during their Freshman and Sophomore Years of College*

The aim of this study is to examine the correlation between having or not having a meal plan for a given academic year and the fruit and vegetable intake during that year. I hypothesize that those who have a meal plan during their freshman year of college will consume decreased amounts of fruit and vegetables compared to their consumption before college and that fruit and vegetable consumption will increase when students do not have a meal plan and live off campus during their sophomore year. The University of Kentucky requires students that live in campus housing to purchase a meal plan. Two of the four dining establishments that accept meal swipes feature buffet style dining. It is possible that the food environment the meal plan creates contributes to decreased fruit and vegetable consumption and therefore an increase in weight. Data was collected from 100 college students ranging between 19 and 41 years old at the University of Kentucky. Self-reporting surveys were distributed to students during a Nutritional Food Sciences class and randomly to other students. The survey recorded the participants’ living accommodations for the year before college, freshmen, and sophomore years of college as well as fruit and vegetable intake (servings/week), weight change, and satisfaction with eating habits (scale of 1-5). Statistics and analysis were calculated using Microsoft Excel. Results suggest that during academic years when college students have a meal plan they will consume fewer fruits and vegetables, report lower satisfaction with eating habits, and are more likely to gain weight when compared to academic years.
without a meal plan. This is possibly due to the large portions and lack of knowledge or self-discipline to make nutritious dietary choices.

110. Alyssa L. Jarrell  
Mentor: Alison Gustafson

*Association between use of Emerging Technologies for Individual Nutrition and Effectiveness at Maintaining and Improving Overall Health*

Based on the need for a better understanding of the impact personal technology might have on maintaining and optimizing health and nutrition efforts, recent attention focused on social networking and technology for improving diet and weight. The aims of this study were to: 1) determine the relationship between personal use and use of technology to maintain the health and nutrition of someone else, and 2) understand the association between awareness and use of available products, programs, websites, and apps for the maintenance of nutrition, health, and physical activity efforts. An exploratory cross-sectional survey of 209 college students (69.9 % female, 30.1 % male, average age 21.51 ± 4.39 years) at the University of Kentucky in 2012 assessed types of devices and programs, functionality preferences, and usage patterns of available resources to maintain health, nutrition, and physical activity. Descriptive statistics and multinomial regression were used with Stata 11.0. For the 209 students that used technology for the maintenance of their individual health and nutrition or for someone else, a mean effectiveness rating of 3.22 ± 1.11 was reported (scale from 1-5). A moderate significant correlation exists between personal use of technology for health and using technology for someone else’s nutrition (r=0.3 p=0.0001) and health information (r=.3 p=.00001). A modest correlation is seen between an individual’s personal tech use for physical activity and use of tech for someone else’s physical activity (r=.3 p=0.0001). The individuals that were aware of a social networking app that could be used in conjunction with their nutrition, health, and physical activity maintenance efforts were 4 times more likely to use the app than those that were unaware of the app (OR 4.02 95% CI 1.78-9.09). These findings suggest a relationship between awareness and use of a technological product to maintain and improve health, nutrition, and physical activity efforts, increasing reported effectiveness ratings by the user.

111. Gaberiel Jones  
Mentor: Alison Gustafson

*Implications of Nonnutritive and Natural Sweetener Metabolism by 85 W 1036 Streptococcus Mutans*

The state of Kentucky leads the nation in the number of persons with partial and complete edentulism at approximately 44% (oral and craniofacial data resource center). Furthermore, intake of carrots, salads, dietary fiber, and serum levels of beta carotene, folate and vitamin C are all lower in people with less than 28 teeth (Sheiham 2007). Additionally, the number of teeth that an individual has can be effectively and accurately used as a predictor of cardiovascular disease (Holmlund 2010). Cavities are the result of the metabolism of sugar, and acid metabolite production by oral bacteria, particularly, *streptococcus mutans*. This mechanism prompts investigation into sweeteners that cannot be metabolized and subsequently decrease acid production preventing cavities and tooth loss. The current study explores that principle by “feeding” *streptococcus mutans* 10 different natural & artificial sweeteners and observing the growth and production of acid. The sweeteners tested were (Listed by Market name) Dextrose (Control), Lactose, Splenda, Sugar in the Raw, Stevia in the Raw, Domino Sugar, Equal, Honey, Sweet ‘N’ Low and Stevia Blend. Growth was determined using optical density and pH was determined using a standard pH monitor. The experiment showed that there was one sweetener that supported growth and acid production
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far less than all others. That sweetener was Stevia Blend. Stevia Blend had an optical density of 0.446 compared to the control, dextrose at 2. The 24 and 48 hour pH’s of Stevia Blend were 7.11 and 6.72 respectively. The starting pH of all solutions was 7.32. The control, dextrose displayed a 24 hour pH of 5.01 and a 48 hour pH of 4.68. This proves that Stevia Blend supported growth less than the control and was substantially better at resisting pH change. Therefore, Stevia Blend consumption may discourage tooth decay relative to the other sweeteners tested.

112. Kala Kane
Mentor: Alison Gustafson

*The Relationship between Sleep and Physical Activity on Weight Gain in College Students*

Many students are concerned with gaining weight when they first come to college. For this reason, many people have researched the reasons behind and ways to prevent weight gain. This research looks at the effects of sleep on physical activity and weight change. A study was conducted at the University of Kentucky to test the relationship between the amount of sleep and weight gain in college students. The study consisted of 88 students between the ages of 18 and 23. After the data was collected, it was analyzed to find the correlation between the sleeping and physical activity patterns of students as well as their weight change since the beginning of college. A correlation was found between the amount of time spent participating in physical activity and an increased amount of sleep since college began. The r-vale found was 0.294. This shows a slight correlation that those who participate in longer physical activity are more likely to get more sleep in college than those who participate in a smaller amount or no physical activity. This correlation was not strong enough to produce a significant p-value. There is not a strong relationship between the amount of sleep and weight gain in college students. It was thought that if students focused on getting enough sleep, they would be more energized in order to participate in physical activity which would decrease their chances for weight gain in college. However, the research did not support this idea.

113. Juhee Kim
Mentor: Alison Gustafson

*Association between the Availability of Cafeteria on Campus Buildings and Breakfast Consumption among College Students*

As people pay more attention to how to become healthier and make their life richer, one of the first things people can think of is eating breakfast. There have been proven benefits to consuming breakfast. However, few college students consume breakfast on a regular basis. The aim of this study was to find if the availability of cafeterias in campus buildings will help increase students who eat their breakfast. Data was collected from 207 students (77 males, 127 females) ranging between ages 18 to 30 years old at the University of Kentucky. Self-reporting surveys were distributed randomly to students from various academic backgrounds. The survey recorded the skip frequency with reason, location, restaurant if chosen, and nutrition about participants’ breakfast consumption. Descriptive statistics were used with Microsoft Excel. The data concluded that 22.22% of participants had their breakfast every day and 15.46% of participants never had breakfast every day. Among them, 55.35% of participants said they did not have enough time to eat in the morning as the largest reason for skipping breakfast. 82.59% of breakfast eaters had their meals at home. The results suggest that college students who have cafeterias within their classroom buildings do not have a higher tendency to eat breakfast than those who do not have cafeterias within their buildings. And most students eat break their breakfast at home so this supports the fact there
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is no association between the availability of restaurant within their buildings and students’ breakfast consumptions.

114. Nick Kirkpatrick
Mentor: Alison Gustafson

*Correlation between ADD/ADHD Medication Consumed and Grade Point Average among College Students*

College students have many strategies they follow to help them achieve the grades they desire in college courses. A popular way to study among some students is to take ADD/ADHD medication prior to an exam to help them study. Previous studies have shown that students believe the medication helps to improve their concentration and attention. However, little is known about the correlation between ADD/ADHD consumption and grade point average among college students. Data was collected from 82 college students ranging between ages 18 to 41 years old at the University of Kentucky (mean of 21.3 years old). Self-reporting surveys were distributed randomly to students from various academic backgrounds in several different courses. The survey recorded the participants’ ADD/ADHD medication consumption, their overall and previous semesters’ grade point averages, and several possible reasons as to why they have taken the medication. Descriptive statistics and correlation analysis were used with Stata 11.0. The data showed that 45.7% of participants had consumed an ADD/ADHD medication at some point in college, with 33.3% consuming ADD/ADHD medication the previous semester. There was a negative correlation between those who consumed ADD/ADHD medication to achieve a better grade and the previous semester’s GPA (r= -0.34, p=.0014). The results suggest that college students who consume ADD/ADHD medication because they wish to achieve better grades are actually hurting their grade. This could be due to students depending on the medicine to help them attain better grades rather than using proven, more effective study habits.

115. Michele Kirn
Mentor: Alison Gustafson

*Correlation between Organic Food Intake and Fruit/Vegetable Intake*

The aim of this study is to examine the relationship between quantity of organic food consumed and fruit and vegetable intake. I hypothesized that those who consume more organic food will consume more fruit and vegetables. Organic food is a rapidly growing trend around the world. Many people are turning toward organic foods because they are becoming more aware of what they are eating. Most food is offered organically, but when most people think about organic food, they think of fruit and vegetables. There is limited research on those who choose organic food and if they consume more fruits and vegetables than those who do not eat organic food. Data was collected from 123 young adults (103 females and 20 males) ranging between 18 to 31 years old in Kentucky. Self-reporting surveys were distributed online via social networking websites and email. Most subjects were students from the University of Kentucky. The survey recorded the participants’ organic food consumption in amount and frequency, where they shop, their fruit and vegetable intake, and why they choose or don’t choose organic food. The results concluded that 52.1% of the subjects’ food consisted of <25% organic food, 18.4% consumed >26% and 29.4% consumed no organic food. The main reason (40.27%) for choosing organic food was health. The main reason (39.35%) for not choosing organic food was because expense. The r-value between fruit intake and organic food consumption was 0.81, and determines there is a positive correlation between organic food consumption and fruit intake. The r-value between vegetable intake and organic food consumption was 0.84 and determines there is a positive correlation between organic food...
consumption and vegetable intake. The results suggest that young adults who consume more organic food do in fact consume more fruit and vegetables than those who do not consume organic food or consume very little.

116. Brandon Larry  
Mentor: Alison Gustafson

*College Students vs. Stress: It Can Knock You Out*

A lot of students take prescription drugs before test to stay alert and focused, but have signs of high stress. Stress is caused by a variety of various things in different people, and some of its caused by personal imagination or just by being a senior trying to skate by. The question is what is the major cause? Data was collected from 54 college students (27 males and 27 females) between the ages of 18 and a little older than 25 at the University of Kentucky. The data was collected using an online survey creator Qualtrics distributed through campus email and Facebook. The students had varied backgrounds and were anonymous; it recorded the participant’s grade level, stress levels, job status, and their personal cause of stress. The ending statistics were gathered and interpreted through the website and Microsoft Excel 2010. The data proved that females had a higher reported stress level compared to males. Also, it gave information that homework (56%) and money (26%) were more responsible for self-reported stress levels than family (6%) and class (9%). And it was reported that homework had a strong correlation with amount of credit hours in increasing stress levels. The correlation between college year and stress level was moderate ($r = .31$ and $p$ value$= 3.114e^{-15}$). The results came to be the opposite of what was hypothesized in that those in the senior class had lower reported stress levels than those of lower class levels. This may be due to the fact that being in a higher grade seniors are more likely to know what to expect and being at the end of the road there is no point of getting stressed out now. While being an underclassman, they have a lot to live up to and a slightly higher course load.

117. Ashley Lee  
Mentor: Alison Gustafson

*Correlation between the Frequency of Visits to the Dentist and Self-image among College Students*

Over the last century, cosmetic dentistry has increased with popularity as Americans’ interest in the aesthetic look of their smile increased. New products have been introduced to the market to enhance a smile such as teeth whiteners, special formulated toothpaste and mouth wash. However, a small amount is known whether or not the aesthetic look of a person’s smile is directly correlated to their self-esteem or self-image. Especially among college age individuals who are the target consumers for many aesthetic enhancer products. Data was collected from 92 University of Kentucky students (62 females and 30 males) ranging between the ages of 19 to 26 years old. Self-reporting surveys were distributed randomly to students from various academic majors. The survey recorded the frequency of tooth brushing, flossing, visits to the dentist, and how they would rate their self-esteem and self-image. Descriptive statistics were used with Stata 11.0. The data concluded that race/ethnicity is inversely related to visits to the dentist. African Americans were less likely to agree to visit the dentist (RR -1.59 95% CI -3.16, -0.023) compared to Caucasians; however other races was more likely to disagree about visiting the dentist (RR 3.17 95% CI 0.13, 6.22) compared to Caucasians. The results suggest that race and ethnicity can play a role in an individual’s decision of following through with aesthetic upkeep of their smile. This could be dependent on several factors such as confidence in their own smile, and how they think others perceive their smile.
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**118. Hannah Marcum**  
Mentor: Alison Gustafson

*Association between Binge Drinking and BMI*

The aim of this study is to determine the association between frequency of alcohol consumption (days/week) and BMI among college age students. I hypothesize that the higher the alcohol consumption, the higher their BMI will be. There is a correlation between obesity/BMI and alcohol consumption. College students are obviously not going to quit drinking. The alcohol that these college students consume, no matter the type, is bad for them due to all of the carbohydrates, sugar, and fat. With the increase in consumption of carbohydrates, sugars, and fat, this can lead to an increase in BMI. A cross-sectional study will be performed. A survey will be conducted on UK’s campus pertaining to the amount of alcohol consumed, height and weight (for BMI), and why these college students drink. There were 84 (51 females, 33 males) student involved from the University of Kentucky. Their ages ran from 18 to 31. The independent variable is drinking, especially paying attention to binge drinking while the dependent variable being BMI. The results of this survey were completely opposite of the proposed hypothesis. The relationship of drinks consumed within an hour and BMI was p-value<0.001 and an r value of 0.278. BMI correlated with the amount of drinks consumed Thursday to Sunday had a p-value<0.001, and an r-value of -0.1004. BMI and the type of alcohol consumed had a p-value<0.001, and an r value of 0.1025. A majority of the students (90%) claimed to drink for social reasons. The results did not follow up with my hypothesis. There were no positive correlations. This could have been due to the fact that the only participants that filled out surveys were at the library at 3pm on a beautiful sunny day.

**119. R. Coty Mills**  
Mentor: Alison Gustafson

*Association between Regular Exercise and Diet Soda Consumption among High School Students*

This study examines the correlation between regular exercise and the quantity of diet soda consumed by high school students. I hypothesize that those who exercise regularly will consume more diet soda than those who do not. With the obesity pandemic shifting from mainly adults to currently including many children and teens, many researchers are assessing why this is happening. There has been a linkage of the increased consumption of soda and the increased likelihood of becoming obese. Drinking diet soda instead of regular soda greatly reduces the amount of calories a soda drinker consumes. However, there is little research about the association between regular exercise and the consumption of soda, among high school students. Data was collected from 121 high school students (60 females and 21 males) ranging between ages 14 to 19 years old at a high school in rural Kentucky. Surveys were distributed both online and in person to students of various economic, academic, and athletic backgrounds. The survey recorded the participants’ beverage consumption (how much and type), exercise habits, fast food consumption, and supplement use. Descriptive statistics and multinomial regression were used with Stata 11.0. The data concluded that 75% of participants got regular exercise and of those, 48% exercise 3 to 4 days per week. It was found that the average amount of regular soda consumed was 2.24 times per day, while diet soda was only consumed 0.4 times per day, while the average amount of water consumed per day was 3.82 times. Those who drank diet soda had an inverse relationship with exercise. (r=-0.2217 p-value =0.0154). The results suggest that high school students who consume diet soda actually exercise less than those who drink other beverages. This suggests that those who consume these beverages do so with the mindset that it will help assist them in not exercising.
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120. Maura Minix
Mentor: Alison Gustafson

Correlation between Weight Gain and Self-report Depressive Symptoms among College Students

Depression is becoming more common among college students. There are many factors that can contribute to depression, and weight gain may be one of them. Weight gain is common in many college students due to lack of physical activity. The weight gain in college may be a contributing factor to the increasing rates of depression in college students. Data was collected from 141 college students (127 females and 14 males) at the University of Kentucky. Self-reporting surveys were completed online by a random group of willing participants. The survey recorded the participants’ weight gain in college, the way the weight was put on (mostly in one year or gradually), the incidence of self-report depressive symptoms, and the frequency of these symptoms. Descriptive statistics and analysis were done with Microsoft Excel. The data showed that 77.3% of students surveyed gained weight during college, with 27.66% gaining 10 or more pounds. The survey also showed that 64.54% of the students surveyed recorded feeling depressive symptoms at some point in college. 36.88% of the students experienced self-report depressive symptoms after weight gain, and 41.84% of students reported eating more when experiencing feelings of depression. There was a negative correlation between self-report depressive symptoms after weight gain and weight gain in college with an r-value of -0.57. This is a moderate correlation. The results suggest that college students who have gained weight do not experience more feelings of depression. More research could be done to see what other factors influence depression.

121. Tristan A. Moorman
Mentor: Alison Gustafson

The Correlation between the Frequency of HIIT and Weight Maintenance

Overweightness and obesity are becoming a startling problem at college campuses around the country. The American College Health Association estimates that three out of ten college students are overweight or obese. HIIT (high-intensity interval training) can be one of the ways to help reduce overweight and obesity in the world. However, not much is known about the correlation between weight maintenance and HIIT among college students. Data was collected from 69 college students (50 females and 19 males) ranging between ages 19 to 23 years old at the University of Kentucky. Self-reporting surveys were distributed randomly to students from various academic backgrounds. The survey recorded the participants’ use of HIIT (including frequency), their exercising habits (how long and how strenuous), and whether or not they used HIIT for weight maintenance, weight loss, or muscle building. The data concluded that 71% of the participants used HIIT as a part of their exercise regimen, with females (78%) more likely to use HIIT than males (52.6%). The data also found that 87% of those surveyed thought HIIT was helpful with weight loss or weight maintenance, and 76.7% of those use HIIT for weight maintenance. Those who have a frequency of HIIT report using HIIT for weight maintenance ($r$: 0.46, p-value: 0.0027). The results suggest a moderate correlation between the frequency of HIIT and weight maintenance, meaning that the people who do HIIT the most believe that HIIT is helping with their weight maintenance. While HIIT is not used by all college students, the ones who do use it have found it to help with their weight loss or weight maintenance.
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122. Jerrin O. Nabers
Mentor: Alison Gustafson

Correlation between the Amount of Stress Felt and the Time Spent Engaging in Physical Activity among College Students

This study examines the correlation between the amount of stress felt and the physical activity regimen of college students. It is hypothesized that college students who partake in a regular physical activity regimen will see a reduction in stress level. The pressure on college students to outperform and stand out from their colleagues continues to increase. Managing this stress can be a difficult task, but it is thought that physical activity may be able to help. However, little is known about the correlation between the amount of stress felt and the physical activity regimen of college students. Self-reporting surveys were distributed randomly to 80 University of Kentucky students (70 females and 10 males) between 18 and 35 years of age from various academic backgrounds. The survey recorded the participants’ everyday life stresses (e.g., course load and work load) as well as their physical activity habits. Descriptive statistics and multinomial regression were calculated. The data concluded that 64% of participants hold a job outside of school, while 95% of participants are taking 13 or more course hours. It was also found that 89% of participants are physically active on a weekly basis. A positive correlation was found between the number of course hours taken in a semester and the hours devoted to physical activity weekly (r = 0.88, p-value = 0.00), as well as between the frequency of exams during a semester and the hours devoted to physical activity weekly (r = 0.71, p-value = 0.00). The results suggest that college students who take more course hours or take more exams during the semester tend to exercise more, which could aid in the management of their everyday stresses. Based on these results, a physical activity program could be implemented at colleges and universities to help students cope with the stresses and pressures of everyday college life.

123. Kylie Newman
Mentor: Alison Gustafson

The Effect of Not Sleeping on Exam Scores

This study examines the correlations among GPA and amount of all-nighters. I hypothesize that good night's sleep before an exam will result in a better score than not sleeping and binging on caffeine while studying before an exam. College students report erratic sleeping behaviors such as not sleeping the night before an exam. One approach suggested in the literature to achieve long periods of wakefulness are consumption of energy supplements, and high caloric snack food. Yet, little research has been conducted on the benefits of a good night’s sleep versus binging on caffeine in order to stay up all night and study. Data was collected from 85 college students aged 18 to 24 from the University of Kentucky. The surveys were distributed randomly in paper form and electronically to students. The survey recorded the number of all-nighters completed, what is used in order to stay awake, GPA, and hours of sleep were usually acquired the night before an exam. The survey revealed that 61% of participants have pulled an all-nighter, and only 42% of those people thought their score improved as a result. It was found that 29% of participants got less than 5 hours of sleep the night before an exam. There is a moderate negative correlation between using energy to stay awake all night and GPA (r=-0.209). A moderate significant correlation can also be seen between GPA and hours of sleep on a normal night (r=0.24, p-value=0.0268). Another significant correlation can be seen between those who have pulled an “all-nighter” and it resulting in an affected score (r=0.47, p-value=0.0001). The results show that there is an inverse relationship between using energy to stay awake to study and GPA. Data shows a higher GPA for those who get more sleep on normal week nights.
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124. Idia Okpebholo
Mentor: Alison Gustafson

The Correlation between Infant Feeding Method and GPA

Over the past several decades and still today, neural and cognitive development studies have been on rise. Many possible contributing factors including methods of infant feeding has been studied in relation to increased neural and cognitive functions. Yet, there is so little that is known about the association between the method of infant feeding and the association with cognitive development and cumulative GPA among college student. Data was collected from 70 college students (21 males and 49 females) ranging from the ages of 18-29 years old at the University of Kentucky. Surveys were randomly distributed to students of various majors. The survey recorded the participant ID, method of feeding as an infant, approximate duration of the feeding method and preferred feeding method, current credit hours, amount of ours used to study, and GPA. Statistics were correlated using Microsoft Excel. The data concluded that 24.3% of participants were fed strictly human milk and 40% were fed strictly infant formula the reaming 35.7% were fed using both methods. Also, it was found that 37.1% of participants prefer to feed their child strictly human milk in comparison to the 12.9% who prefer strictly infant formula. The results suggest that there is a small correlation between infant feeding method and cognitive development and that other factors contribute to cognitive development.

125. Deepa P. Patel
Mentor: Alison Gustafson

Correlation between Stress and Caloric Intake among College Students

The aim of this study is to determine if there is a relationship between self-reported stress on a college student and the total number of calories consumed during mid-terms. I hypothesize that college students who report higher levels of stress will consume more calories than college students who report lower levels of stress. Stress is the body’s reaction to a change that requires a physical, mental, or emotional adjustment or response, which may cause someone to feel frustrated, angry, nervous or anxious. Due to high levels of stress, it is suggested that an increase in cortisol may induce an increase in appetite stimulating hormones. Stress plays an important role on a student’s appetite and food cravings. For many college students, food becomes a mechanism for coping and dealing with stress. Data was collected from 80 college students (57 females and 23 males) ranging between 18 to 30 years old at the University of Kentucky. Self-reporting surveys were distributed randomly to students from various academic backgrounds. The survey recorded the participant’s stress level by asking questions about financial support, job outside of school, number of exams in a week, if they drink when they are stressed, what kind of foods they eat when they are stressed, and if they skip meals. The data suggests that when stressed, 36.25% eat out 1 time/week. 42.50% skip breakfast and 31.25% skip lunch when stressed. Also, 55% said they do not eat healthy when stressed and 48.75% said they do not consume alcohol when they are stressed. The results from the pearson test and t-test were not statistically significant and suggest that college students who are stressed more eat little or eat unhealthy. Even though the percentage of students that drank alcohol when stressed was slightly low than the students who do not drink, there is still a correlation between the two variables.
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126. Anita C. Powell
Mentor: Alison Gustafson

Physical Activity and Fruit and Vegetable Intake of College Students at Kentucky Universities

Due to the obesity epidemic in the United States and the increasing awareness of the importance of physical activity (PA) and proper dietary intake, the aims of this study were to: 1) determine the correlation between PA and fruit and vegetable (F/V) consumption and 2) determine if this correlation is suggestive of an effect of PA on food preference. An online survey of 59 college students attending various universities in Kentucky was administered in 2012. The survey questions addressed the variables of age, gender, academic standing, race, living arrangement, income, chronic health issues, F/V intake, and PA. F/V consumption and PA values were compared. Pearson correlation was used to determine this correlation as well as correlations investigated amongst other variables. The correlation between PA and F/V intake was generally weak, with most values between 0.03 and 0.30. The correlation between PA duration and fruit intake was moderate (r=0.315), and there were positive, moderate correlations amongst each of the aspects of PA: 1) between duration and frequency, r=0.476, 2) between intensity and frequency, r=0.414 and 3) between intensity and duration, r=0.373. As a secondary finding, there was a negative correlation between PA intensity and body mass index (BMI), where r=−0.246. PA is generally not strongly correlated with F/V intake. This is not to say that it has a weak correlation with intake of other food products – more investigation should be done to determine this. The findings suggest that generally, PA intensity is negatively correlated with BMI and PA duration is positively correlated with fruit intake.

127. M. Kayla Robertson
Mentor: Alison Gustafson

Descriptive Statistics between the Different Types of Physical Activity and BMI among Female College Students

Cardiovascular disease is the number one cause of death in the United States. Weight and cardiovascular fitness influences ones risk of developing cardiovascular disease. Research has shown that the average college student will gain weight, in many cases continually throughout the four years. Research also indicates that college students typically do not get the adequate amount of exercise in due to their busy lifestyles. Because of this, it is important for college students to get the best workout in a limited amount of time to maintain a healthy BMI and reduce cardiovascular disease risk. Data was collected from 82 female college students ranging between the ages of 18-24 years at the University of Kentucky. Self-reporting surveys were distributed to random students with different races and educational degrees. The survey captured the participants BMI along with eating and exercise habits. It was found that 65% of female college students ran. 18% used the elliptical or another type of workout machine at every workout whereas 49% would never or occasionally. 78% of the participants have normal BMI whereas 21% are overweight and 1% is underweight. 62% of normal weight females reported running, however 69% of overweight females reported running. There was a weak correlation between running and weight status (r = .07) as well as using cardiovascular workout machines. Those who ran were also more likely to participate in weight training (r=.32). The results show that there is not a correlation between physical activity and BMI in college students. This is most likely due to the fact that there are other factors that influence weight such as nutrition. False reporting could have also been an issue.
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128. Megan Romines
Mentor: Alison Gustafson

Relative Risk of Negative Self-perception of Body Image and Weight Thoughts among College Aged Women

The aim of this study is to determine the correlation between membership in a sorority and the prevalence of a negatively self-perceived body image. I hypothesize that women who are members of a sorority display a greater risk for a negative self-perception of body image and attitude towards food. Body image dissatisfaction has proven to be prevalent amongst college women. Little is known about the relationship between this negative perception and membership in a sorority. Data was collected from 241 college women, both those involved in sororities and otherwise, ranging between ages 17 to >23 years currently attending universities across the United States. Using Qualtrics, self-reporting surveys were made available for a three-week period. The survey recorded the participants’ perceptions of body image and attitude towards food through a series of questions regarding weight, dieting, satisfaction, etc. Descriptive statistics and multinomial regression were used with Stata 11.0. While there were no significant correlations between sorority membership and negative self-perception of body image present within the data, there were multiple strong correlations present within the data as a whole. It was found that women, regardless of sorority membership, who are either dissatisfied with or have a neutral view of their body, have a greater risk of thinking about their weight compared to those who are satisfied with their body. Women who are very satisfied with their body have a lower risk of thinking about their weight compared to those who are satisfied about their shape (RR -0.74 95% CI -1.24, -0.23). While the results do not suggest that sorority membership plays a significant role in a negative self-perception of body image, they do support fairly strong relative risks between a woman’s satisfaction with her body weight and the amount of time she spends thinking about her weight.

129. Shawn Seymour
Mentor: Alison Gustafson

Exercise Frequency among College Student Who Also Have Jobs

The aim of this study is to determine the correlation between students who have a job and their physical activity frequency and BMI. I hypothesize that students who are taking classes and also have a job will report a lesser frequency of exercising, and will have a higher BMI. Obesity has been a health problem throughout America in recent years and continues to get worse. While there are many different contributing variables, one major aspect is a decrease in physical activity. While it is known that college students are very busy and short on time, this study tries to determine if there is a relationship between a student having/not having a job and their exercise frequency and/or BMI. Information was collected from surveys that were distributed to 149 different students at the University of Kentucky (results and conclusions drawn from 145). These surveys were distributed to students in 5 different classrooms. Some of the questions that were included were: height, weight, current job status, exercise frequency, etc. Fifty-three percent of the college students currently had a job and 47% didn't have a job. The average reported BMI among students surveyed was 23.5. An r-value between having/not having a job and exercise frequency was .17, which shows that there is no correlation between these two variables. Also relating job status to BMI gave an r-value of -.03, which shows no correlation. Results of the study show that there is no correlation among college students between having a job or not and their physical activity level/BMI. While the study showed no correlation, there are many other factors that could have affected this relationship, one such factor is that students who hold jobs might be more motivated at succeeding in life which could also lead to the desire to exercise and stay physically fit.
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**130. Rachel Skidmore**  
Mentor: Alison Gustafson

*Correlation between Participation in Exercise Classes and Weight Loss or Weight Maintenance among College Aged Females*

Exercise classes are gaining popularity among college females. The exercise classes function as a social group to the attendees which offer motivation and encouragement. Exercise classes are offered in local gyms and establishments, and often at low costs. As the classes gain popularity, it is predicted that attendees will experience weight loss or weight maintenance. It is predicted that this will be desirable and a result of increased motivation and likelihood of attendance due to the nature of the exercise classes. Data was collected from 90 female college students ranging in age from 19 to 29 at the University of Kentucky. Self-reporting surveys were distributed randomly to students on campus. The survey recorded if the participants had participated in exercises classes and the frequency of doing so. The survey also recorded if weight loss or weight maintenance was experienced as a result. The degree of weight loss/maintenance was recorded, as well as feelings of motivation and increased likelihood. Descriptive and correlation statistics were used with Excel. The data concluded that 82.2% of the sample had participated in an exercise class. Of these participants, 16.7% participated in exercise classes yearly, 38.9% participated in exercise classes monthly, 24.4% participated in exercise classes weekly, and 2.2% participated in exercise classes daily. The data found that 61.1% of the sample had experienced weight loss or weight maintenance since beginning participation in exercise classes. 61.1% of the sample recorded an increased motivation and 52.2% recorded an increased likelihood to exercise when participating in exercise classes as compared to exercising on their own. The results suggest a correlation between exercise class attendance and weight loss/maintenance among college age females. The attendees report an increased motivation and likelihood of exercise when participating in the classes.

**131. Lauren Slabaugh**  
Mentor: Alison Gustafson

*Correlation between High School Athletic Involvement and current BMI status*

The aim of this study is to examine the correlation between High School athletic involvement and the impact it plays on college student’s BMI status. I hypothesize that prior involvement in a High School level athletic sport will decrease the risk for a high BMI and increase the amount of physical activity level of college students. In recent years, the childhood obesity has become an epidemic and a leading cause to the overall health and obesity status of our nation. One of the contributors could be do to the lack of physical activity in High School primarily from a disassociation in High School athletic involvement. High school sports present students with disciplinary skills associated with a high regard for success.

Data was collected from 103 college students (82% female, and 18% male) ranging from 18 to 22 years old currently attending the University of Kentucky. Self-reporting surveys were distributed among a randomized sample of students from different academic associations. The participants were asked to record High School athletic participation, current physical activity levels, and cumulative GPA’s from High School and college. The data concluded that 86% of participants had involvement in High School athletics for some duration of their schooling with 78% participating in additional physical activity other than a sport. The correlation between athletic participation and BMI was r=0.3. Results also produced a correlation (r=0.3) between body satisfaction and BMI with a specific regard to GPA. The results suggest that college students who participated in High School athletics were more likely to continue physical activity in college therefore having a lower Body Mass Index. Having a lower BMI reported findings of higher body satisfaction and therefore higher cumulative GPAs. Continued physical activity is most likely
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due to the impact of athletic participation and a desire of body satisfaction. Self-perception then, plays a role in academic achievement.

132. Michael Southall  
Mentor: Alison Gustafson

**Association between Stress Level and its Effect on Weight Gain and Physical Activity among College Students**

The aim of this study is to examine the correlation between the amount of stress and the impact that has on body weight in college students. I hypothesized that those college students who felt more stress would see an increase in weight gain than those who experienced little or no stress. The prevalence of obesity has dramatically increased over the past thirty years and it doesn’t seem like it will end anytime soon. Stress can be attributed to weight gain and a lack of physical activity. Findings suggest an association between the level of stress and weight gain among college students. The data was collected from 50 college students (18 males and 32 females) ranging between the ages of 18 to 22 years old at the University of Kentucky. Surveys were handed out randomly to students in various colleges. The survey recorded participants’ stress (how much) and frequency (how often), their physical activity habits, and whether or not stress caused them to eat more or gain weight. From the data collected 100% of participant’s felt some sort of stress throughout the week and 90% of that stress was due to school. Also, it was found that 68% of participant’s said that stress affects the way they eat, while 32% said no stress does not affect the way they eat. Those students who felt stressed tended to have a higher weight gain percentage. \( r = 0.265 \) The results suggest that those college students who feel stressed do indeed see a change in the way they eat due to that stress. This is likely due to the fact that eating helps relieve them of some of their stress.

133. Elaina Stoeckle  
Mentor: Alison Gustafson

**Correlation between the Number of Sweetened Beverages Consumed and Body Mass Index (BMI) among College Students**

The aim of this study is to examine the correlation between the number of sweetened beverages consumed and body mass index (BMI) in college students. I hypothesize that those who consume a larger quantity of sweetened beverages will have a higher BMI compared to those who consume less or no sweetened beverages. Obesity has long been a problem within American society and continues to grow. Sweetened beverage consumption is a possible contributing factor to weight gain. Little is known about the association between sweetened beverage consumption and its effect on BMI among college students. Data was collected from 100 college students (71 females and 29 males) ranging between 18 and 28 years old at the University of Kentucky. Self-reporting surveys were randomly distributed to students from a variety of academic backgrounds. The survey recorded the participants’ amount of sweetened beverage consumption, types of beverages consumed, and whether or not they thought their weight gain or loss may be due to consuming these beverages. Descriptive statistics and multinomial regression were used with Stata 11.0. The data concluded that 49% of participants are consuming one drink per day. It was found that 35% of the participants admitted that their sweetened beverage consumption has increased since college. It was also found that 56% of participants that consume sweetened beverages, consume soft drinks. Of this 56%, 33.3% never drink diet soft drinks. Those who consume sweetened beverages report 2 BMI units higher for overweight and obese individuals compared to low consumers of sweetened beverages (z-score 2.05 95% CI 0.02 and 0.91, z-score 2.21 95% Cl 0.08 and 1.36). The results suggest
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that college students who consume a greater amount of sweetened beverages do in fact have a higher BMI than those who consume fewer sweetened beverages. Future research addressing obesity among college students needs to focus on calorically dense beverages.

134. Michelle Studeny
Mentor: Alison Gustafson

Are School Lunches the Real Culprit of Obesity in Middle School Aged Children?
A Study Conducted in Webster County

Students receive approximately 35% of their daily dietary intake while at school. Due to increasing BMI’s of children, it is hypothesized consumption of school lunches may be the cause. Other factors that may influence student’s dietary intake are vending machine usage, family, and fast food consumption. Eighty-two middle school students (50 females and 32 males) in Webster County of Kentucky participated in Qualtrics cross-sectional surveys distributed randomly. BMI was calculated from self-reported weight and height. The survey recorded the student’s concern level about their weight, as well as dietary intake influences. Statistical analysis was performed in Excel. BMI was not significantly correlated with frequency of days that the children ate lunch (r=-.137.) BMI was negatively correlated with the days students brought lunch from home (r=-.233.) 60% of students reported they decide what they eat while 39% reported their parents decide. The increasing number of days students ate school lunch was negatively correlated with their opinion of liking school lunch and thinking school lunch is healthy (r values were -.307 and -.286, respectively.) Students opinion on “liking” school lunch is correlated with their opinion on thinking school lunch is healthy (r=0.446.) Overall 65% of students did not like eating school lunch and 60% of students did not think school lunch was healthy. There is a positive correlation between students who are concerned about their weight and increasing BMI, increasing days/week eat school lunch, increasing days/week purchase vending, increasing days/week eat fast food (r values are .288, .209 ,.199, .227 respectively.) The results show that student’s healthy eating habits may not be directly related to school lunch. Student’s dietary intake is related to other factors such as family influence and vending machine usage. Interventions should be designed to encompass all factors instead of focusing solely on school lunches.

135. Nicole Tifft
Mentor: Alison Gustafson

Store Type and Frequency of Shopping and the Association with Dietary Intake and Weight among College Aged Students in Kentucky

Research on the food environment has begun to disentangle the interdependence between individuals and their neighborhoods. However, little research has focused on college students and how their food shopping habits within their food environment are associated with dietary and weight status (DWS). This study determined the association between 1) store purchases; 2) frequency of shopping; and 3) amount spent on food with DWS among college age students. One hundred sixty-seven college students were recruited to participate in a cross-sectional online survey in spring of 2012. Multivariate linear regression and multinomial regression was used to model the association between diet, weight and food shopping habits. Stata 11.0 was used for all analysis. Those who purchase fruits and vegetables (FV) often have a 2 unit lower BMI compared to those who purchase them less often (-2.14 95% CI [-1.04, -0.10]). Those who purchase store prepared food (PF) often have a 2 unit higher BMI compared to those who purchase them less often (2.21 95% CI [0.03, 0.65]). Those who spend $20-$30 per visit purchase less types of FVs (-0.54 95% CI [-0.82, -0.27], but also less salty snacks (SS) (-0.27 95% CI [-0.53,-0.02]), and prepared
food (PF) (-0.32 95% CI [-0.52, -0.12]) compared to $60-$70 per visit. Conversely, those who spend more than $80 per visit purchase more types of FVs (0.23 95% CI [0.04, 0.46]) compared to $60-$70 per visit, but not more on SS or PF. College students shopping habits influence their DWS. Future interventions and policies aimed at improving DWS among college students may need to consider food shopping habits and amount spent on food as a way to improve health outcomes.

136. John Wehry
Mentor: Alison Gustafson

**Physical Activity and the Association with Psychological Stress in College-aged Students in Kentucky**

Psychological stress has long been linked with negative physiological side effects in addition to its detrimental impact on personal well-being. Recently, research has shown a relationship between decreased stress and increased physical activity. However, there is a gap in the research concerning the effect that the nature of the physical activity has on stress. The goal of this study is to analyze different aspects of physical activity to determine their particular role in the reduction of psychological stress. Data was collected from a survey that was distributed to college-aged students at the University of Kentucky. The total number of respondents was 151. To model the association between stress and physical activity, logistic regression was used with Stata 11.0. The data showed that there was a slight negative correlation between stress levels (at the time of response, on a normal day, and over the course of a month) and amount of physical activity in a typical week (-.0288, -.0554, and -.0228 respectively). Females had higher odds of exercising more per week as a way to cope with stress (OR 1.30 [95% CI 1.54-2.35]). Those who exercised more per week, 4-5 times, had higher odds of reporting a more positive attitude towards physical activity (OR 1.5 [95% CI 1.93-2.56]), and exercised with higher intensity (OR 1.89 [95% CI 2.32-4.56]). Physical activity is an important regulator of psychological stress, and its full benefits may be related to specific aspects of the physical activity. In order to provide the most relief from stress, interventions involving physical activity must also consider how different characteristics of the physical activity affect the outcome.

137. Haley Willett
Mentor: Alison Gustafson

**Alcohol Consumption and the Consumption of Food after 10PM**

Late night eating on college campuses is extremely common, especially with the sleeping, studying, and drinking habits of the students. Little research is done, however, to determine the association between alcohol consumption and the consumption of food in later hours of the evening. Data was collected from 59 college students (56 females and 3 males) between 18 and 22 years old at the University of Kentucky. Self-reporting surveys were distributed via Qualtrics online to various students of different majors and backgrounds. The survey reported alcohol consumption and frequency, late night food consumption (with and without alcohol), the types of food being eaten late night, and the factors influencing their decision to eat late. The data concluded that 56.9% of participants consumed more than 5 drinks per week, and that 91.4% of those drinks were consumed during the weekend. It was also determined that 15.5% of participants mostly consume food after 10pm without consuming alcohol, and that 41.4% of participants mostly consume food after 10pm after consuming alcohol. 34.5% of participants attributed their late night eating to the amount of alcohol consumed prior to eating. A moderate but insignificant correlation between the number of drinks before consuming food and eating late night (r 0.48, p 0.445) was reported. There is also a moderate and insignificant correlation between participants who eat normally late at night and participants who eat late at night after consuming alcohol (r 0.459, p 0.0002). The results suggest that
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college students who consume more alcohol are more likely to consume food after 10pm, than those who consume fewer drinks. It is also suggested that students who typically eat late at night will be more likely to consume food after 10pm after consuming alcohol.

138. Rachel Wise
Mentor: Alison Gustafson

Correlation between Fast-food Consumption and the Frequency of Exercise

The aim of this study is to determine if the frequency and type of fast-food consumption is associated with the frequency of exercise among college students. Obesity has become an epidemic in the United States and fast-food consumption has increased. With the ease of running through a drive-thru, many students turn to fast-food. Fast-food consumption and lack of exercise are both shown to be related to weight gain and obesity. Few studies have looked at the relationship between fast-food consumption and the frequency of exercise. Data was collected from 100 college students (56 females, 44 males) attending the University of Kentucky aged 18 to 28 years. Self-reporting surveys were distributed randomly to students with a variety of majors. The survey recorded the amount and type of fast-food consumed in a typical week, their frequency of exercise, and if their fast-food choice influenced their decision to exercise. Surveys were analyzed using Microsoft Excel 2007. Data showed that 93% of college students consume fast-food at least once per week. Most participants (88%) engage in some type of physical activity each week. Fifty-eight percent reported no, they do not exercise more after consuming fast-food. Those who did report exercising more (44%) participate in vigorous exercise after consumption. Participants reported eating at sub sandwich restaurants the most (77%). Those who eat at a pizzeria 1-2 times a week have a higher BMI of about 2.28 BMI units (p-value 0.022, 95% CI) compared to normal weight individuals who eat pizza less than one time a week. The results suggest that those who do consume fast-food do not report exercising more after doing so; however, those who report exercising more after a fast-food meal participate in vigorous exercise. This suggests that they are more worried about excess calories. Fast-food consumption has increased for most students since coming to college.

Nutrition and Food Science
(Mentor: Jason Swanson)

139. Kellie Cash, Amber Steltenkamp, Rob Stromquist
Mentor: Jason Swanson

Spa Industry Trends

Over the past decade, the spa industry has grown drastically. Spas employed approximately 330,000 people at 19,900 locations. The spa industry generated an increased revenue of 4.3%, from 2009-2010. Over the course of the semester, various industry professionals were surveyed regarding trends in the spa industry. The method used to collect data from industry experts was the Delphi method – an iterative process that helps to identify consensus among a group of experts. The top trends identified by industry professionals are: environmentally sustainable practices, changing demographics, changes in marketing, clients becoming more culturally diverse, customer spending habits, variety and uniqueness in spa treatments, and increased competition (differentiation). These trends affect the way spa managers have maintained a thriving business.
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140. Allison Dailey, Ryan Nicholson, Rohan Johnson
Mentor: Jason Swanson

Trends in the Full-Service Hotel Industry

The full-service hotel industry sector includes hotels that also have a food and beverage department. There are 51,015 lodging properties in the US and 4.8 billion total rooms provided by hotels. The industry employed about 16.7 million people in 2010. The workforce within the sector represents the diversity in America. Large percentages of women, people of color, immigrants, single parents and welfare-to-work participants characterize industry employment. The Delphi method was used to obtain data about the industry from experts. Three rounds of questionnaires were sent out and the data were analyzed and used to gain knowledge on the full-service hotel industry. The main impacts on the full-service hotel industry currently are: sustainable tourism, social media, emerging technology and increased guest services. Guests and hotels are becoming more aware of the state of the environment and are now implementing eco-friendly practices. Social media can be a positive or negative tool but it does allow hotels within the sector to reach the greatest amount of people in a quick and easy way. It is important for hotels to stay updated on current technologies in order to stay competitive. Guest expectations are on the rise and they expect to have the greatest value and experience each time they visit.

141. Kaitlyn Engelman, Kasha Davied, Santy Permatasari
Mentor: Jason Swanson

Trends in the Tour Operator Industry

The tour operator industry sector, comprised of 26,014 employees in 2010, uses experience and relationships within the travel industry to design and package trips for people. The industry sector resulted in revenues close to $4 billion. By using the Delphi Method, data of current trends in the tour operator industry were collected. The Delphi Method is a way to discover consensus of opinion among a panel of experts through an iterative process of refining their responses. Analysis of the data showed that current trends in the tour operator industry include younger travelers desiring active pursuits in their travel packages, the availability of information via technology is expanding customers’ desired destinations, airfare rules are becoming more complicated for tour operators to follow, and customers consider travel a right and have high expectations for the travel packages. The tour operator industry has seen drastic changes in the recent years due to an increased presence of technology and a struggling economy. The trends mentioned are a result of circumstantial and environmental factors such as the economy, technology, government regulations, and safety concerns.

142. Megan Goehler, Michelle Roos, Rachel Boemker
Mentor: Jason Swanson

Trends in Tourism Destination Planning and Promotion

Tourism destination planning and promotion is a broad sector of the tourism industry that has provided over 7.4 million jobs in 2011 with travel expenditures reaching over $700 billion. The Delphi Method is a process where surveys are distributed to industry professionals these surveys are broken into three rounds of questionnaires to find the current trends in the industry. It is a useful method to display commonalities within trends. Through this research, the Delphi Method revealed three prominent trends that are affecting the industry. These include: the increased use of technology, the rising economy, and increasing political involvement. Destination planning is moving from paper marketing to an increased
emphasis on electronic marketing. Tourism destination planning is able to reach a broader audience with the use of technology such as social media and smart phones. Though the economy is on a steady incline, affordability is still on the forefronts of businesses’ and travelers’ minds. The Obama administration announced a strategic plan to bring more international tourism to the United States. He wants to make the traveling processes for foreign tourists more efficient in order to increase the U.S.’s economic development and global competitiveness.

143. Christina Labude, Paige Aldridge, Kayla Hadley
Mentor: Jason Swanson

Trends in the Event Planning Industry

Event planning is the process of coordinating a festival, ceremony, meeting, or social gathering. Recent research shows that in 2011 there were $263 billion spent on meetings and conventions. The total economic output of the meeting industry includes direct spending and multiplier effects, which contributed $907 billion to total U.S. economic activity. The Delphi Method was used to gather opinions from industry experts about emerging trends in the event planning industry. After industry experts were identified, they participated in three rounds of survey questions. Each round expanded on the previous round in order to gain more specific results. The findings from the surveys revealed there are four main categories that current event planning trends fall under, with some crossover. The four categories are cultural diversity, economy and spending, advances in technology, and the environment. An increase in cultural diversity has led to more customized events. The state of the economy has created a need for smaller budgets, planners to broaden their services, and clients to want more value at a cheaper price. Advances in technology have increased the use of social media and smart phones and made more resources available for clients to plan events on their own. The global focus on the environment has created new types of events like hybrid and green events.

144. Kasey Paterson, Mary Mason, Lydia Miller
Mentor: Jason Swanson

Trends in Private Clubs

There are currently 4,415 private clubs in the United States varying from golf/athletic clubs, country clubs, yacht clubs, and social clubs, among many others. Using the Delphi method, an initial survey was sent out to club professionals inquiring about the trends they have noticed within their industry. From the results, their responses were categorized into common themes and another round of questions was sent to them for more in-depth information. The survey revealed many common trends among the various types of clubs. These trends included a shift in policies to cater to the interests of members for retention and recruiting, an increased social media presence to keep members informed, and different styles of memberships being offered to attract more members and generate more revenue. Among other trends, more and more clubs have become increasingly environmentally-conscious by “going green.”

145. Caleb Speck, Colton Fick
Mentor: Jason Swanson

Horse Racing in the Third Turn

There are around 125 race tracks in the United States today with racing events that include Arabian, barrel, endurance, harness, mule, quarter horse, steeplechase, and thoroughbred. Of the $26 billion
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generated by the horse industry annually, $20 billion is directly generated by thoroughbred racing. When trying to learn more about the horse racing as a spectator sport, a Delphi study was performed. First contact was with leaders in the industry for general information about trends and their observations, and then by two more samplings to narrow and focus on which trends where the strongest among them. The most important trends found by the study were dealt with politics, catering to different demographics, and the proliferation of other alternative gaming. From the study it was found that all trends are intertwined. The demographics of spectators being catered to in turn affect the forms of alternative gaming being offered, and politics are affecting the amount of revenue available to support the industry and bring in new spectators. Alternative gaming is also a major political issue but without which many tracks feel that they cannot compete with casinos as a form of entertainment for the changing demographics of spectators.

156. Jacob Van Winkle, Sam McDowell, Kyle Stith
Mentor: Jason Swanson

*Trends in Full Service Restaurants*

Full-service restaurants are establishments primarily engaged in providing food services to patrons who order and are served while seated. In 2010, restaurant food and drink sales accounted for 49% of the national food dollar in the United States. The industry sector employed 12.8 million people and earned $604.2 billion in sales. The Delphi method was used to collect information. First, researchers compiled a sample of 60 professionals who are experts in the industry. Then six open-ended questions were submitted via online survey to the expert panel. Once data were received, results were coded and used to create the second survey, which asked the experts to score the statements based on changes from last year to the current year. Responses were then analyzed and transformed into the third round of surveys where the expert panel was asked to rank the importance of the trend statements. Based on the results from the Delphi survey, researchers were able to determine many of the full-service restaurants tend to be pressured to keep up with cultural trends, political changes, and competition from other restaurants. The state of the economy also has had a large impact on both the customers and the restaurant operations.

Ophthalmology

147. Hunter Morgan, Benjamin Fowler, Bradley Gelfand, Valeria Tarallo, Jayakrishna Ambati
Mentor: Judit Z. Baffi

*Alu-derived small RNAs: Novel Regulators of micro-RNA Expression*

Micro-RNAs are key factors in regulating gene expression. The RNase enzyme DICER1 is critical in the biogenesis of micro-RNAs, and is reduced in degenerating retinal pigment epithelial (RPE) cells in age-related macular degeneration (AMD). Besides its role in direct miRNA processing, DICER1 cleaves Alu RNAs, which are transcribed from a family of sequences present at about 1.4 million copies in the human genome. We hypothesized that these Alu-derived small RNAs (ADSRs) can repress the expression of micro-RNAs and serve as novel classes of small RNAs. The Microarray Facility Pilot Grant supported this project. Human RPE cells were grown in culture and transfected with ADSRs or control PBS or tRNA for 16 hours. Total RNA was extracted and electrophoresed on a denaturing gel. The gel region corresponding to micro-RNA was excised, and RNA was purified from the gel slab. This RNA was analyzed by micro-RNA array profiling on an Affymetric miRNA array 2.0 chip. A global decrease in micro-RNA levels was not observed in ADSR or control-treated cells. However, two micro-RNAs were significantly decreased by the ADSR treatment compared to controls. Micro-RNA-510 was repressed by
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the Alu-derived small RNA treatment over 4-fold compared to control samples (p<0.005). Micro-RNA-1255a was repressed in the treated cells by 1.5-fold (p<0.005). The only confirmed gene targeted by miR-510 is the serotonin receptor subunit 5-HT3E. Serotonin antagonism has shown promise in the treatment of light-induced retinal inflammation. One predicted target of miR-1255a is Deltex-4, a key molecular player in the Notch signaling pathway. Notch signaling and pathological angiogenesis in AMD correlates with epithelial growth factors, which may lead to new discoveries for the protective (or pathologic) roles of ADSRs in disease. Follow up experiments will be conducted to support micro-RNA repression by ADRS.

Physics and Astronomy

148. Kayla L. Craycraft
Mentor: Christopher Crawford

Measurement of the Background Gamma Spectrum at the SNS FP12

The NPDGamma experiment is running at the Fundamental Neutron Physics Beamline (FP13) of the Spallation Neutron Source (SNS) at Oak Ridge National Laboratory. It will measure the parity violating weak contribution to the long-range part of the hadronic interaction in the reaction \( n + p \rightarrow d + \gamma \). We have measured the background gamma-ray spectrum in the FP13 experimental area using a high purity germanium detector. Various sources of background are discussed, including the supermirror polarizer, and materials in the target and detector array, and their projected effect on the NPDGamma experiment.

149. Michael J. Detisch
Mentor: Gary Ferland

Traces of the Big Bang

The Big Bang is the prevailing theory explaining the early stages of our universe. It may seem that something that happened so long ago can only be guessed at, but the Big Bang is not beyond the reach of modern science; it has left remains that are still visible today. The Cosmic Background Radiation is the primary example, but measuring Primordial Helium Abundances can also give us information about the Big Bang. The hydrogen and helium around us were produced in the Big Bang, while the elements that comprise us were made inside stars. The amount of Helium created during the Big Bang tests that theory. The Primordial Helium Abundance contains much information about the conditions during the seconds after the Big Bang. While it may sound impossible to measure something created so long ago, there are regions of the universe which have not changed much since the Big Bang. These nebulae do not undergo fusion to alter their composition and are very far away. Observing these nebulae allows scientists to look far into the past and get a glimpse of the early universe. To make statements about the validity of the Big Bang Theory using these measurements great precision is needed. One source of error in these calculations is in determination of the photoionization cross-section of Helium. Recently, new atomic data has been published for Helium that have allowed a more accurate calculation of Helium cross-sections. These new cross-sections should allow for a better determination of Primordial Helium Abundances and better testing of the Big Bang Theory.
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149. Michael J Detisch
Mentor: Gary Ferland

Traces of the Big Bang II

Primordial Helium Abundances are measured in order to test the current understanding of the Big Bang Theory and the very early universe. In order to measure this quantity the amount of helium in distant nebulae is measured. This measurement is carried out by recording the spectrum of light emitted from the nebulae. This spectrum is compared to known emissions of elements and the chemical composition of the nebulae is determined. In the same way that photoionization cross-sections can be a source of error in Primordial Helium Abundances so too can certain atomic processes inside the nebulae cause irregularities in the measured spectrum. This in turn leads to errors in measurements of Primordial Helium Abundances as well. Using simulations run in the plasma simulation code Cloudy, radiative transfer effects were investigated as sources of error. Simulated spectra from a variety of nebulae were analyzed to better understand the different errors that were creeping into the calculations.

150. Charlie Fieseler
Mentor: Christopher Crawford

Simulating Non-Chaotic Neutron Traps

Abstract Precision measurements of the neutron lifetime ($\tau_n$) are important for many fields from astrophysics to theories of weak interactions. The chief sources of errors are neutrons escaping or interacting with matter instead of decaying, so characterizing the traps to understand these effects are important. Neutrons are uncharged, which leaves few ways they can be trapped. Some well-known experiments use material bottles, magnetic and gravity fields, or combinations, and are designed to minimize escape and material interactions. Magneto-gravitational traps are promising for this investigation because there are no interactions with nuclei, so absorption is not a source of error. The major problem with this kind are marginally trapped neutrons, that is, neutrons which have enough energy to escape, but the trap dynamics are such that it is trapped for some large fraction of $\tau_n$. To this end, non-chaotic traps can allow neutrons trapped in periodic or near-periodic orbits to be studied, without the worry that those orbits will later decay.

This research simulated a specific magnetic field geometry and characterized its maximal Lyapunov exponent, a measure of how chaotic the orbits are. This exponent defines a natural time scale for the trap, which was found to be much larger than $\tau_n$. Therefore this geometry is a good candidate for a future precision experiment being designed to measure the neutron lifetime.

151. Mario Fugal, William Berry
Mentor: Christopher Crawford

RX130 Robot Calibration

In order to create precision magnets for an experiment at Oak Ridge National Laboratory, a new reverse engineering method has been proposed that uses the magnetic scalar potential to solve for the currents necessary to produce the desired field. To make the magnet it is proposed to use a copper coated G10 form, upon which a drill, mounted on a robotic arm, will carve wires. The accuracy required in the manufacturing of the wires exceeds nominal robot capabilities. However, due to the rigidity as well as the precision servo motor and harmonic gear drivers, there are robots capable of meeting this requirement with proper calibration. Improving the accuracy of an RX130 to be within 25 microns (the accuracy
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necessary of the wires) is the goal of this project. Using feedback from a displacement sensor, or camera and inverse kinematics, it is possible to achieve this accuracy.

152. Brandon Isaac
Mentor: Ambrose Seo

_Characterization of Atomically Flat Transition Metal Oxides Substrates for Growth of Complex Oxide Heterostructures_

Many electronic devices operate on fundamental physical laws that were developed over the past 100 years with the discovery of quantum mechanics and a host of other unexpected properties of atoms. Novel materials have been developed by manipulating these properties and one category, the transition metal oxides, offers a diverse range of compositions that can potentially lead to new electronic devices. Standalone transition metal oxides illustrate all ranges of electrical conductivity; however, it is the combination and synthesis of super lattices that leads to interesting electronic characteristics that can be developed into tunable devices. For example an interface between an insulating oxide structure and a conductive oxide, can lead to semiconducting film due to the electronic orbital reconstruction, or a superconducting layer at low temperatures. In the initial research of these materials, it is important to eliminate as many sources of imperfection as possible in order to gain the most complete understanding of the physics behind the phenomenon observed. Substrates chosen for the growth of super lattices are explored and characterized by observing crystal structure and interface properties using AFM and X-Ray diffraction.

153. Kahloon, Idrees (High School student)
Mentor: Gang Cao
Title: Correlated Giant Dielectric Peaks and Antiferromagnetic Transitions near Room Temperature in Pure and Alkali-doped BaMnO3−δ

154. Robert Milburn
Mentor: Christopher Crawford

_Vector Field Meter Calibration Technique_

At the University of Kentucky, several novel magnets are currently being constructed for use in future experiments. These magnets have unique properties and design parameters which typically require a constant magnetic field in one region and very little fringe fields everywhere else. The geometries vary, but one such magnet is planned to be as small as 2 cm in diameter; therefore, any device measuring its field must be appreciably small. As such, a magnetic field probe of high precision and small dimensions, 0.3in x 0.3in x 0.6in, was ordered. This poster will go over the exact method and technique used to calibrate and understand the exact properties of such a unique probe.
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Physiology

155. Byron Hempel, Benjamin Lawson
Mentor: Kenneth Campbell

Optimal Storage of Skeletal Muscle Tissue for Biophysical Experiments

Studying contractile properties of skeletal muscles at the cellular level reveals important sarcomeric interactions. Techniques to study myofilament function are highly sophisticated and very few labs in the world are equipped to perform these mechanical experiments. As such the Center for Muscle Biology at University of Kentucky has set up a single muscle fiber mechanics core under the guidance of Dr. Kenneth Campbell. This core allows muscle biologists to send their muscle samples to study the function of muscle cells. However, one problem is transportation of these frozen samples from different labs to the University of Kentucky. Cryopreservation, or significantly dropping the temperature of a sample to essentially stop all cell function while preventing ice formation, is believed to be the best means of transportation and long-term storage of samples. Therefore, the goal of this study was to find the most effective, efficient and least damaging means of preserving skeletal muscle for biophysical experiments weeks after storage. This was tested using freshly excised muscle tissues from Sprague-Dawley rats.

After dissection, the muscles were placed in a solution containing cryopreservants to begin the freezing process. Sample temperatures were then reduced to -80°C at controlled rates and thawed similarly after overnight storage. The samples were determined effectively stored if 1) they pulled into bundles easily without tearing the cells, and 2) when comparing structural characteristics of frozen tissue with freshly dissected tissue, there were no observable differences. The results suggest that a slow freezing rate with a high rate of thawing in high concentrations of glycerol, a cryoprotectant, allows for the best structurally sound cells. The result will allow for effective transportation, as well as decreases the amount of waste due to degraded muscle tissue.

156. Kristofer Nava
Mentor: Kenneth Campbell

Transmural Modifications of N2B and N2BA Titin Isoform Ratio and Phosphorylation Patterns in Failing Human Left Ventricular Cardiac Tissue

The contractile function of cardiac muscle depends upon the integrity of sarcomeric proteins. Titin, the largest sarcomeric protein, is a major contributor to cardiomyocyte passive tension. In adults, titin exists as two isoforms – N2B (3.0 MDa) and N2BA (3.4 MDa). Shifts in the titin isoform ratio (N2BA:N2B), as well as changes in titin isoform phosphorylation patterns, could have functional consequences in heart tissue. Still unknown are the modifications in titin across the transmural regions of the left ventricular wall, which may affect the motion of the heart wall. The hypothesis investigated in this study is that failing left ventricular cardiac tissue will exhibit a transmural hypophosphorylation pattern for the N2BA isoform such that epicardial N2BA will be the least phosphorylated. A specialized electrophoresis technique known as sodium dodecyl sulfate-vertical agarose gel electrophoresis, SDS-VAGE, was used in this study to facilitate the resolution of higher molecular weight protein isoforms of titin. The gels were stained with ProQ Diamond and SYPRO Ruby stain in order to detect phosphorylated proteins and total protein content, respectively. ImageQuant software was used to analyze the densitometry profiles of the N2BA:N2B ratio and the phosphorylation of both titin isoforms. Thus far, the results seem to suggest a decrease in phosphorylation of N2BA in heart failure. This trend implies a decrease in cardiomyocyte passive tension with heart failure, i.e. the heart wall gets less stiff under failing conditions.
157. Zaheen Rabbani, Jennifer Moylan
Mentor: Michael B. Reid

**Role of nSMase-3/Ceramide Signaling in Muscle Atrophy**

TNF α is a proinflammatory cytokine that causes muscle atrophy and stimulates neutral sphingomyelinase-3 (nSMase-3), an enzyme hydrolyzing phospholipids in the cell membrane producing ceramide, a lipid-signaling molecule. The purpose of this study was to investigate the role of nSMase-3/ceramide signaling in the atrophy response. However, not much is known about the role of nSMase/ceramide signaling in this regard. Our data show that nSMase-3 promotes loss of muscle proteins, actin and myosin, implicating nSMase-3 as a key regulator in muscle wasting. Based on these findings, we hypothesized that increasing activity of nSMase-3 causes skeletal muscle wasting as evidenced by a decrease in myotube width and degradation of muscle proteins actin and myosin. Cultured C2C12 myotubes were targeted with nSMase-3 specific siRNA to knockdown gene expression at two exons (exon 11 and exon 18). We used Western blot to measure protein content. Myosin and total protein were elevated when either exon 11 or exon 18 were targeted with respect to the control. Cultured myotubes were also transfected with pAcGFP fusion plasmid to induce overexpression of nSMase-3. Total protein and myosin proteins were decreased. Myotube width was also measured. Cultured C2C12 myotubes were pretreated with nSMase-3 siRNA or nonsense siRNA (48 hrs.) then treated with vehicle (control) or TNF α. Myotubes pretreated with nSMase-3 siRNA and then TNF α showed an increase in myotube width compared to the control. On the other hand, myotubes pretreated with nonsense siRNA and then TNF α showed a decrease in myotube width with respect to the control. Based on these findings, we concluded that inhibiting expression of nSMase-3 serves a protective function against TNF induced muscle atrophy.

158. Lisa M. Settle, Mary L. Garcia-Cazarin
Mentor: Francisco H. Andrade

**Separation and Identification of Myosin Heavy Chain (MHC) Isoforms from Single Extraocular Muscle (EOM) Fibers**

Extraocular muscles (EOMs) are responsible for eye movements, a function necessary for vision. They exhibit distinctive biochemical, physiological and structural differences compared to other skeletal muscles. In addition, many myofilament, cytoskeletal and extracellular matrix proteins have unique expression patterns in developing and adult EOMs, including the expression of embryonic and fetal myosin heavy chain (MHC) isoforms, the presence of an EOM-specific MHC, and co-expression of cardiac and skeletal muscle isoforms of thick and thin filament accessory proteins. The type of MHC determines the functional abilities of the muscle fiber. MHC exists in several forms. The main ones are currently referred to as Type I, Type IIA and Type IIB, also known as IId/x. **Purpose:** Our goals were 1) to optimize a gel electrophoresis technique to separate MHC isoforms from skeletal and cardiac muscle homogenates, 2) to separate MHC from single EOM fibers, and 3) identify the type of MCH in single EOM fibers and correlate it with results obtained from single fiber functional data. **Methods:** For MHC isoform separation, we used gels consisting of 5% glycerol, 8% acrylamide with an acrylamide: N,N'-methylene-bis (acrylamide) (bis) ratio of 50:1, 200mM TRIS (pH 8.8), 100mM Glycine and 0.4% SDS. Samples were run at 70 volts for 24 hrs at 4°C. After separation, MHC isoforms were identified using Silver Stain Plus™ from BioRad. **Results:** Our results indicate that we were able to successfully separate and identify MHC isoforms from muscle homogenates and EOM single fibers.
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Plant and Soil Science

159. Kelsey L. Turcotte  
Mentor: Nadine J. Kabengi

*Are Bulk and Non-sized Titanium Oxides Really Different: Determining the Heats of Ion Exchange on their Surfaces*

Due to high photocatalytic activity, low cost, and water stability, titanium oxides (TiO2) are widely used in commercial applications leading to their disposal on a more communal level than previously experienced. Thus, it is important to investigate their basic surface properties to fully understand their effectiveness and potential effect on the environment. The aim of this study is to examine whether bulk and nano-sized TiO2 surfaces are really different in regard to their charge properties. For that purpose we have measured the molar enthalpies (ΔH) of electrostatic ion exchange on their respective surfaces using flow adsorption calorimetry. We selected two different sizes of TiO2: a nanosized Titan(IV) aeroxide P25 ® and bulk anatase and rutile mixture. Both products were characterized using X-ray diffraction and N2 gas adsorption for surface area determination. Using a flow calorimeter, Cl/NO3 and K/Na heats of exchange were measured at pHs of 3.0, 5.8 and 10.0. Solutions of 50 mM NaCl, NaNO3 and KCl were used and pHs were adjusted with 1mM acid (HCl or HNO3), or 1mM base (NaOH or KOH). Analytical quantification of anion and cation exchange capacities along with the calorimetrical data yielded ΔH in kJ/mol. Initial results showed that there are differences in ΔH(exchange) between bulk and nano-sized TiO2 and that these differences seem to be pH dependent. These results could be interpreted on the basis of differences in TiO2 band-gaps energy and hardness/softness of surface reactive groups with size. Ongoing work is aimed at better elucidating our results.

Political Science

160. Chelsea Ahting  
Mentor: William Swinford

*Effectiveness of Negative Political Advertising among Collegiate Level Adults*

This research explores the influences of media in the political realm, specifically: the influence of political advertisements on an individual’s voting decisions. Americans are bombarded with advertisements from candidates, but little research has been conducted on the effectiveness of a particular means of advertising. A large portion of the voting population includes young adults, ages 18-25, who are in college or have attended college (collegiate level adults), and as these individuals are exposed to massive amounts of media, I hypothesized that they are highly susceptible to such advertising. This research project used advertisements in the form of actual campaign commercials. Volunteer participants completed pre-research questionnaires to account for political affiliations as well as other affiliations that may have had an effect on their preferences. Focus groups were then conducted where the participants were shown past senate or gubernatorial race advertisements from two opposing candidates. Two advertisements, one positive and one negative from each candidate were shown. The participants then were asked discussion-style questions relating to the effectiveness of the advertisements. This research will prove useful in future political campaigns in determining how money, as well as time is allocated to this demographic of collegiate level adults. Knowledge of the results of this research could potentially affect whether or not a candidate makes use of negative advertising, and subsequently whether a candidate gets elected.
161. Caitlin Hagan  
Mentor: Geoffrey Wallace

*The International Committee of the Red Cross: Effectiveness in the Cold War Era (1950-1980)*

Since its founding in 1863, the International Committee of the Red Cross (ICRC) has worked tirelessly to protect and aid victims of conflict around the world. Throughout time, academics have questioned the role of such Non-Governmental Organizations (NGOs) in the complex system of international politics and peacekeeping. Using the annual reports released by the ICRC, the movements and actions of this famed NGO throughout the Cold War Era were dissected. This in-depth study of the ICRC examined where the organization operated. Additionally, it questioned if the ICRC was especially active in a particular region of the world, in democracies or autocracies, in developed or underdeveloped states or in civil or interstate conflicts during this time period. The report is concluded with an analysis of the resulting data; more specifically, it questioned if the ICRC had a visible effect upon regime change and human rights protections during this tumultuous era in which democratic states and authoritarian, Marxists regimes fought to control the world. Measuring effectiveness classifies which ICRC actions aided states and their citizens. Additionally, similar NGOs can use findings to improve services and maximize resources.

162. Sarah L. Hayden, Michael B. Senters, Daniel S. Morey  
Mentor: Clayton L. Thyne

*Leader, Follower, or Spectator?: The Role of President Obama in the Arab Spring Uprisings*

As a major superpower in foreign politics, America requires able leadership. President Obama has been accused of ineffective leadership, demonstrated in his mixed messages during the Arab Spring uprisings of last year. However, no empirical method of analyzing his leadership during international crises has been developed. To assess Obama’s behavior as a leader, an original dataset was created from over 1,000 news articles to detail the signals that major foreign powers (e.g., United States, United Kingdom, France) sent to Tunisia and Egypt during the Arab Spring from December 2011 to February 2012. These signals were analyzed for their content, and comments from state officials regarding Tunisia or Egypt were weighted on a scale of -10 (most hostile) to +8.3 (most supportive). The data were evaluated for the frequency of state interaction, for consistency of signal weight, and for a pattern indicating that states waited for the U.S. to signal and subsequently followed and/or matched that signal. A leader would be expected to act quickly, have a high frequency of interaction, become consistent over time, and command followers. Obama was the most frequent signaler in both Tunisia and Egypt. However, he was largely inconsistent over time when signaling to Tunisia, though he was slightly less variant with Egypt. Obama was several weeks late to the scene in Tunisia but was on the ball in Egypt, arriving promptly on Day 2. While no major power clearly followed the U.S.’s erratic patterns, many states began to send signals only after the U.S. sent its first message. Despite this, there is little evidence overall that President Obama acted as an international leader in the Arab Spring uprisings.
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**Preventive Medicine and Environmental Health**

**163. Madison Gooch, Elizabeth Harper**  
Mentor: Erin Louis

*Examination of Kentucky Local Boards of Health Code and Policy*

The purpose of this research is to identify issues within the makeup of Local Boards of Health in the state of Kentucky. Local boards of health are composed of nine different member categories: a consumer, a fiscal court representative, a physician, dentist, registered nurse, engineer, optometrist, veterinarian, and pharmacist, six of which must be fulfilled in order for the local board of health to be active in a county. All 120 counties in Kentucky hold a board of health, however, not all citizens of a county that are eligible to serve in these categories are willing to serve. To correct this, a lay representative from the community is appointed to serve in the position where a professional is unavailable or unwilling. Because these lay members may have a narrow scope and insight about issues in a particular area of health, a problem is created for the composition of these local boards and limits the impact they are capable of having in the county. To determine how many counties in Kentucky included lay representatives, all local board of health data from 2010, 2011, and 2012 was recorded. This included a member’s occupation, licensure verification, race, gender, if the person had a disability, or was a veteran. Information was also recorded about new and re-appointments to the local boards and how long a member has served. By completing this research, it is seen that the greater number of lay members on a local board, the less impact that local board has on public health issues throughout the county. This study was indicative to observe plausible problems with these boards in order to build a foundation for possible Board of Health policy revision in the near future.

**Psychology**

**164. Elizabeth Anderson, Kellie Lynch**  
Mentor: Jonathan Golding

*Perceptions of Spousal Rape in the Court Room*

This project investigated the impact of juror gender on juror decision-making during a rape and physical assault trial. The project also investigated the impact of either being married or living together on juror decision making during a rape and physical assault trial. Female (N = 86) and male (N = 55) undergraduates served as “mock jurors”. They read a fictional criminal trial summary in which a male defendant was accused of raping and assaulting either his wife or live-in partner. They then had to render a verdict and also rate witnesses on several dimensions. During the trial various witnesses testified (e.g., the alleged victim, a police officer, the defendant, and the alleged victim and defendant’s neighbor). The alleged victim testified that either her husband or partner (depending on the condition) had physically assaulted (e.g., choked) her and then forced her to have sexual intercourse. The defendant (e.g., the alleged victim’s husband or partner) denied having raped or assaulted the alleged victim. Female mock jurors were more likely to render a guilty verdict than the male mock jurors for both the rape and assault charges regardless of whether the condition was married or living together. However, female mock jurors were less likely to render a guilty verdict for the assault charge than the rape charge.
Student Use and Student Perceptions of Facebook in Psychology Classes

This exploratory project investigated how students in Psychology classes used and perceived Facebook as an educational tool. The participants were students in Dr. Jonathan Golding’s Introduction to Psychology course (PSY 100, N = 500) and Cognitive Processes lecture/lab (PSY 427, N = 26) during the Fall 2011 semester. All students were given the opportunity to join the Facebook group for each class. A total of 461 joined from PSY 100 and all 26 joined from PSY 427. Data collected included determining how often and for what purpose did students make “posts”, “comments” and “likes” on the group Facebook page of each class. In addition, at the end of the semester students (whether a member of the group Facebook pages or not) completed a survey. The survey included open-ended questions (e.g., Why did you join/not join the Facebook page), “yes-no” questions (e.g., Did you set up a study group using Facebook?), and rating questions (e.g., How often did Facebook give you info that you could not get in class?). The results showed that the vast majority of students regularly used the Facebook group page for each class, and that most posts were made by the students themselves, as opposed to the Instructor and Teaching Assistants. Also, the survey found that students perceived Facebook as a helpful tool that not only gave them information about class (including class notes) but made class more personable. These initial findings indicated that Facebook can serve as a valuable pedagogical resource when teaching both large and small college courses.

Inducing a Mindful State in Non-Meditating Students

Mindfulness is a way of paying attention that can be cultivated through meditation practices and behavioral exercises. Mindfulness-based therapies have demonstrated positive therapeutic effects in many populations. In laboratory settings, mindfulness is often studied using brief mindfulness inductions in which participants are guided through a mindfulness exercise and effects on subsequent measures of affect, memory, emotion reactivity, or other variables are then examined. However, most studies have not assessed whether participants achieved a mindful state during the induction. The present study compared two different types of mindfulness inductions: mindful yoga and mindful breathing. A relaxation exercise was included as a control group. After the induction, participants completed measures of the extent to which they attained a mindful state. Trait-levels of rumination, neuroticism and mindfulness were measured prior to the induction to test for moderating effects. Results revealed that the mindful yoga induction led to a significantly higher score on the Decentering subscale of the Toronto Mindfulness Scale than did the mindful breathing induction. However, the difference between yoga and relaxation was not significant. Rumination was a significant moderator of the relationship between induction type and state mindfulness; however in the unexpected direction. High trait ruminators reported higher levels of state mindfulness after the mindful yoga and breathing inductions compared to low trait ruminators; while low trait ruminators reported higher levels of state mindfulness after the relaxation exercise compared to high trait ruminators. Findings suggest that movement may offer a beneficial introduction to mindfulness. Findings also bring into question the merit of brief mindfulness inductions as compared to a relaxation technique at inducing a state of mindfulness in non-meditating participants.
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167. Jonathan Chow
Mentor: Michael Bardo

The Role of D1 and D2 Dopamine Receptors on Incentive Salience Acquisition and Subsequent Cocaine Acquisition

Pavlovian conditioning with a discrete stimulus can elicit two types of conditioned responses. These conditioned responses are sign-tracking, which is approach and contact with the cue, and goal-tracking, which is approach to the site of reward delivery. It has been identified that sign-tracking and goal-tracking animals also express differences when it comes to abuse-like behaviors. Animals that attribute incentive value to reward-related cues and display sign-tracking behaviors are more likely to initiate cocaine self-administration and are more susceptible to the relapse of cocaine-seeking behavior. It has also been identified that dopamine, a neurotransmitter associated with learning and reward, plays a major role in the attribution of incentive value to reward-related cues exhibited during sign-tracking behavior. However, the specific dopamine receptors governing incentive salience attribution have not been identified. The present experiment examined the role of the D1 and D2 dopamine receptors in incentive salience attribution using a preclinical model. Rats were treated with a D1 or D2 antagonist and underwent a Pavlovian conditioned approach task (a measure of incentive salience attribution). The results demonstrated that animals treated with the D1 antagonist relative to the saline control group expressed decreased sign-tracking behaviors, while animals treated with the D2 antagonist sign-tracked just as much as the saline control group. D1 treated animals self-administered less cocaine compared to the saline control as opposed to the D2 treated animals which self-administered just as much as the saline control. The results indicate that the D1 receptor plays an important role in the attribution of incentive salience to reward-associated stimuli.

168. Emily Combs, Stephanie Richman
Mentor: Nathan DeWall

Processing Style and Integrated Self-Concepts Increase Relationship Maintenance Behavior

In a committed relationship, a person’s self-concept can become intimately infused with their partner’s. This can influence peoples’ motives and behaviors, including how they respond to a relationship threat such as an attractive alternative. Those with self-concepts more infused with their partner’s (high on srisc) process information and behave in ways that support the relationship. Specifically, those high in srisc, when faced with an attractive alternative, should move closer to their partner and away from the relationship threat, thus, exhibiting relationship maintenance. In two studies, it was explored how the self-concept changes in response to a romantic threat. In study 1, participants viewed a profile from a fake romantic dating site or a political candidate site. On the profile was an attribute the participants previously rated as somewhat characteristic of themselves and not very characteristic of their partner. After viewing the profile, participants rated the attributes again. It was hypothesized that those who are in a relationship and view the romantic profiles will move closer to their partner and distance themselves from the attractive alternative as indicated by the change in the target attribute rating. It was hypothesized that those high in srisc will move further away from the romantic threat compared to those low on srisc. It was found that a significant interaction between condition and srisc. Participants in the relationship threat condition, who were high on srisc, moved the furthest away from the threat. Study 2 is methodologically identical to study 1 with one change. Before viewing the profiles, participants are primed using the Navon letters task to process locally or globally. The expectation is that an interaction
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between threat condition and processing style, such that those in the romantic threat condition will move even further away from the attractive alternative if primed with a local versus global processing style.

169. Carter W. Daniels, Jessica P. Stagner
Mentor: Thomas R. Zentall

*Can a Pigeon Learn to Choose Optimally by Watching another Pigeon*

The question was asked to what extent suboptimal choice by pigeons (gambling-like behavior in which pigeons choose a lower probability of reinforcement with discriminative stimuli over a higher probability of reinforcement without discriminative stimuli) is influenced by observation of another pigeon choosing sub-optimally versus choosing optimally? Observer pigeons were given a choice between (1) an alternative that provided them with a stimulus that predicted food 100% of the time on 20% of the trials or 0% of the time on 80% of the trials (20% reinforcement), or (2) an alternative that provided them with food 50% of the time irrespective of the stimulus. One group (Observe Suboptimal) observed a demonstrator that chose the suboptimal alternative; the other group (Observe Optimal) observed a demonstrator that chose the optimal alternative. Choice by the experimental subjects in the two groups did not differ significantly but both groups initially chose more optimally than control subjects that did not observe a conspecific. However, with additional experience with the task, all subjects chose suboptimally. The results suggest that exposure to a conspecific (pecking for food) prior to performance might affect the observers’ attention or motivation and make it initially more sensitive to the overall probabilities of reinforcement.

170. Ellen Darnell
Mentor: Jonathan Golding

*Adults who commit parricide: Perceptions in court*

This project investigated mock jurors' perceptions of adults who committed parricide (the killing of one's parents). Male and female undergraduates (N = 111, 68 females) read a fictional trial summary in which a male defendant was accused of shooting his father in their home. The defendant's reason for the killing was manipulated: the defendant claimed he had been sexually abused 20 years earlier, but had only recently recalled the abuse; (2) the defendant claimed he had been sexually abused 30 years earlier, but had always recalled the abuse; and (3) the defendant had not been sexually abused. The participants had to render a verdict and rate the witnesses and defendant on several dimensions (e.g., credibility). The results showed that mock jurors who read that the abuse had been forgotten but only recently recalled were less likely to render a verdict of guilty of murder than mock jurors who read that the sexual abuse had never been forgotten or there was no claim of sexual abuse. In addition, the mock jurors who read that the abuse had been forgotten but only recently recalled believed the defendant more than mock jurors who read that no sexual abuse had occurred. Thus, mock jurors in both conditions in which sexual abuse was said to have occurred did not differ in their belief of the defendant. It appears that mock jurors who read about sexual abuse based their verdict on whether they perceived the forgetting of the sexual abuse for many years to be a mitigating factor (i.e., led to an extreme emotional disturbance) in rendering a guilty of murder verdict.
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171. Alexis Farley
Mentor: Jonathan Golding

**Impact of Defendant Demeanor on Jury Verdict**

This project investigated the impact of a defendant’s demeanor (e.g., facial expression) on juror decision making during a child sexual assault trial. Female undergraduates (N = 91) served as “mock jurors”. They read a fictional criminal trial summary in which a male defendant was accused of raping a 6-year-old girl. The mock jurors had to render a verdict as well as rate witnesses on several dimensions. At the start of the trial, the judge instructed the participants that they should not use the defendant’s demeanor (e.g., facial expression) in rendering a verdict unless the defendant actually testified. During the trial various witnesses testified (e.g., a detective, the alleged victim, the defendant’s co-worker); the defendant did not testify. As each witness testified a drawing of the defendant with a neutral expression was shown to the mock jurors. However, when the alleged victim testified the defendant’s facial expression was manipulated: smiling, grinning, or neutral expression. Mock jurors shown the grinning or smiling defendant drawings were more likely to render a guilty verdict than mock jurors shown the drawing of the defendant with a neutral expression. In addition, mock jurors in the former conditions were more sympathetic toward the alleged victim and had lower positive affect toward the defendant than mock jurors in the latter condition CONFIDENCE OF VERDICT, GUILT RATING. The discussion focuses on the impact a defendant’s demeanor has on jury verdicts, even in cases in which this demeanor should not be used.

172. Eloise Fourie, Richard S. Pond, Jr.
Mentor: C. Nathan DeWall

**It’s Not You, It’s Me:**
**Social Anhedonia Moderates the Effect of Social Rejection on Aggression**

Social rejection, which implies a broken social contract, often leads to aggression. However, some people—those high in social anhedonia—have no interest in interpersonal contact. Social anhedonics might even find social interaction displeasing. Little research has examined whether people high in social anhedonia are influenced by rejection. The purpose of the current study was to determine whether levels of aggression after rejection are similar among high and low social anhedonics. Participants (N=195) completed a measure of social anhedonia and then played a virtual ball tossing game, in which they were either included or excluded by the other players. Participants were then given the option to behave aggressively towards one of the other players during a competitive reaction-time task. Replicating previous research, it was found that exclusion increased aggression among low social anhedonics. However, high social anhedonics were aggressive, regardless of whether they were included or excluded.

173. Danny Hamid, Laurence Gottlob
Mentor: Jonathan Golding

**Availability of To-Be-Forgotten Words in a List Method Directed Forgetting Task**

Directed forgetting (DF) studies measure the effect of an instruction to forget (i.e., “Forget that”) in reducing proactive interference (i.e., interfering information that comes before information that is to be remembered). In the present study, a list method DF task was used to investigate the impact of a forget instruction over time. Participants were presented two lists. In the forget condition, they were instructed to forget List 1 and remember List 2, while in the remember condition participants had to remember both
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lists. Both conditions were given a two-minute period to recall words presented in List 1, followed by two minutes to recall words presented in List 2. In addition to what words were recalled, we measured when each word was recalled. The focus of the study was on List 1 recall. It was hypothesized that DF would be apparent during the first 60 seconds of List 1 recall (i.e., forget condition < remember condition). However, it was predicted that the DF effect would disappear during the final minute of recall (i.e., forget condition = remember condition). These results were predicted based on the view that to-be-forgotten information is initially inaccessible due to low activation in memory, but over time its activation level increases and the to-be-forgotten words can then be retrieved.

174. Mandy Kaiser, Benjamin Lewis, Kristen Wellman, David Nall, Megan Carter
Mentor: Susan Barron

Adding Insult to Injury:
Hypoxia Following Ethanol Exposure Produces Multiplicative Damage in Vitro

Prenatal alcohol exposure has a variety of negative effects on the developing brain. Prenatal and neonatal hypoxia can also be damaging, although mild hypoxia seems to have little or no long-lasting effects. Alcohol, more specifically alcohol withdrawal, and hypoxia exert some of their damaging effects through similar excitotoxic mechanisms brought on by NMDAR overactivity. The hypothesis of this study was that prenatal alcohol exposure and consequently withdrawal can reduce the ability of the organism to respond well to otherwise innocuous hypoxic challenges due to the shared mechanism, and therefore the combination can have far worse effects than either variable alone. The hypothesis was tested using a hippocampal slice model taken from neonatal rats as a model for the human 3rd trimester of pregnancy. Slices were exposed to either alcohol or a control solution for ten days. After ten days of chronic alcohol exposure, during alcohol withdrawal, half of the slices were exposed to a hypoxic challenge, either 15, 30, or 60 minutes. Cell damage was quantified using propidium iodide as a marker in the CA1, CA3, and dentate gyrus of the hippocampus. No damage was observed with 15 minutes of hypoxia, while there was a ceiling effect for the 60 minute exposure. After 30 minutes of hypoxia, significant increase in cell damage was observed when hypoxia had occurred during ethanol withdrawal, when compared to either variable alone. These results suggest that exposure to an amount of alcohol that would not cause significant damage on its own would sensitize the brain to hypoxic challenges, which could cause significant damage when in combination. This could explain the variability that is seen among the clinical population of individuals exhibiting fetal alcohol spectrum disorder. Supported in part by NIAAA 017956 to SB, and the Commonwealth of Kentucky Research Challenge Trust Fund.

Mentor: C. Melody Carswell

The design of product comparison tables and its effects on decision making

Consumers are constantly presented with new information about new products. The presentation of this information can affect decision making processes by varying the form, organization, and sequence of the information (Kleinmuntz & Schkade, 1993). One organization strategy frequently used in marketing is a product comparison table which allows for side-by-side comparisons to be made. Two decision making heuristics which can occur when using such tables are the “as-if (AI) heuristic,” where all features are treated “as if” they are equal in importance or value, and the other is the “elimination-by-aspect (EBA) heuristic,” where a preferred feature must be present for an alternative to be considered further. One design manipulation that could affect such heuristics when using a table is shading. When applying the Proximity Compatibility Principle (PCP) and theories of visual search, it is easy to see how shading can
influence or shape the perceptual acquisition of information and, in turn, affect decision making strategies. This research looked at shading orientation and its effects on decision making during a guided choice task. The study of spontaneous choice is ongoing.

176. Dorothy McKay, Ebony Vinson, Tahirah Abdullah
Mentor: Tamara Brown

**Self-esteem and Help-seeking among African American College Students**

This study examined the relationship between self-esteem and help-seeking attitudes among 40 African American college students at the University of Kentucky. Various factors can influence both self-esteem and attitudes toward seeking help for psychological problems. Unfortunately, there is not much research that measures the relationship between these two variables among African Americans. Results from this study indicate that those with higher self-esteem were more likely to have favorable attitudes towards seeking help. Although we can’t determine causality from this study, further research may help to whether high self-esteem influences attitudes towards help-seeking or vice-versa.

177. Ramey Monem
Mentor: Jonathan Golding

**Juror’s Focus on a Courtroom Trial**

The present research examined how mock jurors focus their attention (i.e., what mock jurors look at) during a trial and how this attention ultimately affects verdicts. It was the first study to assess attention by measuring eye movements in order to determine the cognitive processing of information presented in a courtroom. Male and female undergraduate students served as mock jurors in the study. At the start of the trial participants were told that they were to treat the simulation as if it were real and to treat it as if they were in fact jurors. These participants were presented with a simulated child sexual assault trial (with a six-year-old alleged victim) from the perspective of a juror and, using an eye-tracker, eye movements were monitored. In addition, at the conclusion of the trial the mock jurors rendered a verdict and answered several rating questions about the witnesses (e.g., credibility of the alleged victim). The simulated courtroom case consisted of ten drawings of various stages of the trial (e.g., witnesses taking the stand, cross and direct examination of several witnesses, and judge's instructions to jurors) accompanied by an auditory narration of a summary of the trial. The data will be examined to determine whether participants focused more on each witness as he or she testified or whether attention was focused on other aspects of the courtroom (e.g., the attorneys, the judge, or the defendant sitting at the defense table). The data will be discussed in terms of the implications for real-world courtroom cases.

178. Kristina Murray
Mentor: Tamara Brown

**Racial Centralities Affect Blacks Thoughts about Psychotherapy**

The relationship between racial identity and thoughts about therapy amongst blacks is a topic that has not been studied thoroughly. This lack of research raises the question of whether there are different concerns about receiving psychological help for blacks who have high racial centrality, meaning they strongly identify with their race, as compared to blacks who have low racial centrality, meaning they identify with their race less strongly. In this study, 38 black college students from the University of Kentucky were asked to complete a questionnaire containing the Thoughts about Psychotherapy scale (Kushner & Sher,
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1989) and the racial centrality subscale of the Multidimensional Inventory of Black Identity (Sellers et al., 1998). The results indicated that there is no significant correlation between racial centrality and concerns about therapy. Failing to find a significant correlation suggests that the concerns blacks have about therapy are the same regardless of how strongly they identify with their race. Future research is needed to investigate other cultural factors that might distinguish among blacks in their therapy concerns.

179. Victoria Parker, Tahirah Abdullah, Ebony Vinson
Mentor: Tamara Brown

Can Socioeconomic Status Affect Thoughts About Therapy?

Although many African Americans struggle with mental health challenges, research shows that they underutilize the services provided by mental health professionals. Unfortunately, very little research has investigated the factors that make African Americans more or less likely to use professional mental health services. In this study, we investigated whether a participant’s socioeconomic status (SES) has an effect on his or her thoughts about therapy. Forty African American students attending the University of Kentucky participated in this study and we measured their SES using the Simplified Measure of Social Status (Barratt, 2006), and we measured their thoughts about therapy using the Thoughts about Therapy Scale (Kushner & Sher, 1989). Using the mean, we divided participants into a high SES group and a low SES group and then compared these groups on their scores on the thoughts about therapy measure. The results indicated that there was not a significant difference between the groups, t (31) = .703, p = .49. In other words, African Americans tended to have the same thoughts and concerns about therapy regardless of their SES level. It is possible that SES does influence therapy thoughts but African Americans who go to college are too similar in their SES levels for this difference to emerge. To better understand this relationship, future research is needed with African Americans who are the same age but not in college so that a wider range of SES levels can be observed.

180. Matthew Peach
Mentor: Nathan DeWall

Does Emotion Differentiation Act as a Physiological Buffer to Aggression?

People high in trait levels of emotion differentiation are better able to describe their emotions using discrete emotional descriptors compared to those low in trait levels of emotion differentiation, who describe their emotional experiences in terms of positive or negative valence. Those better able to differentiate their emotions are also better able to regulate and control their emotions, and also better able to cope with trying emotional experiences and display less aggression when provoked. One reason why people might behave aggressively when provoked is because the provocation causes them to become physiologically aroused. In this study, levels of emotion differentiation were manipulated in a laboratory setting, participants experienced a provocation manipulation, and then participants took part in a task that measured their levels of displayed aggression as a result of the provocation. Their physiological state was also monitored throughout the study. It was hypothesized that those in the high emotion differentiation condition would show less aggression and less physiological arousal when provoked compared to those in the low emotion differentiation condition. Unfortunately, the study was underpowered and the results found were not significant enough to support the hypotheses. If the emotion differentiation manipulation were to prove successful in deterring aggression, then it might prove beneficial to try and manipulate levels of emotion differentiation as a way to treat those with anger management problems or difficulty controlling and regulating their emotions. More participants are needed to truly determine the
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effectiveness of the manipulation, and future studies might use new software that was developed after this study was completed.

181. Brooke Razor
Mentor: Peggy Keller

Transmission of Antisocial Behavior across Generations: The Role of Psychophysiology

Antisocial and disruptive behavior is believed to be determined partially by genetics; however, the role of physiological stress response systems is understudied. The current study addresses this gap. A mediated moderation model was tested in which parent antisocial behavior was a predictor of child behavior problems, moderated by parent sympathetic nervous system (SNS) activity and mediated by child SNS activity. In a sample of 60 families with a child between the ages of 6 and 12 years, mothers and fathers reported on their antisocial behavior and their children’s behavior problems. Parent and child skin conductance (skin conductance level and response) were assessed during a 3 minute resting baseline period. Although full criteria for mediated moderation was not found, results indicated partial support for the model. Mother antisocial behavior was associated with child delinquency when mothers had higher skin conductance level; father antisocial behavior was linked to higher child delinquency when fathers had lower skin conductance response. Father antisocial behavior was related to lower child skin conductance level when fathers had lower skin conductance level. Children’s lower skin conductance response was associated with greater child aggression.

Theatre

182. Michael Sheehy
Mentor: Nancy Jones

The Changing Face of Musical Theatre: A Lecture Recital

The current state of musical theatre is one that is limited by fear and skepticism. Skeptics refuse to open a show without a major star on the stage and refuse to green light any material that an audience will be unfamiliar with. As a musical theatre student, it is important to examine which factors created the current musical theatre climate. This includes political, economic, and social issues, as well as drastic changes in the music industry. The largest and most radical period of growth for the Broadway musical begins right after World War One. Thus, I decided to examine the changing landscape of musical theatre from the 1920’s until the present. In order to examine these changes, I put together a lecture and recital reflecting on information I gathered from research materials. I had wanted performance to be a big part of my research, so to give the information context; I performed a musical theatre standard from each decade as part of my lecture. For instance, as I spoke about the 1920’s and how Showboat drastically changed the book musical, I sang a song from another hit 1920’s show, No No Nanette. Presenting the information in this manner I believe helped provide context to the material as well as create an excellent teaching tool, one that will be of benefit as I pursue a professional career in theatre.
Evidence for a Role of Genetics and Foaling Date in Wobbler Syndrome

Cervical stenotic myelopathy (CSM) commonly known as Wobbler Syndrome affects the musculoskeletal and neurologic systems of horses. Malformations in neck vertebrae cause structural narrowing in the vertebral canal which produces severe neurological deficits through compression of the cervical spinal cord. Wobbler Syndrome is thought to be a multi-factorial disease, yet the relationship of proposed factors is not well understood. Research objectives in this study focused on investigating the roles of two factors – foaling date and genetics, in the development of this disease. Foaling dates were collected on 225 Thoroughbreds with a confirmed diagnosis of Wobbler Syndrome and compared to foaling dates of registered Thoroughbred horses (105757) over an 11 year period from the Kentucky area. A significant difference between Wobbler and general population horses was observed in regards to foaling date over a cumulative 11 year period. For the second objective, venous blood was drawn from 57 Thoroughbred horses with a confirmed diagnosis of CSM. Genotyping data for study horses was generated using the Illumina Equine SNP 50 Chip and SNP 74 Chip. Genome-wide association analysis (GWAS) between CSM horses and data from 414 Thoroughbreds including controls and general population data was performed. The GWAS analysis yielded several regions of interest, specifically loci on ECA 2 and 28. Multiple closely related SNPs of high significance were found in these areas.
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