Missouri State

McQUEARY COLLEGE of HEALTH AND HUMAN SERVICES

STUDENT RESEARCH SYMPOSIUM

Hosted Virtually on
ForgerOne
April 29-30, 2021

McQueary College of Health and Human Services

Student Research Symposium

Welcome to the 25th Annual McQueary College of Health and Human Services Student Research Symposium. The purpose of the symposium is to highlight student research and to provide an opportunity for students to gain experience discussing their scholarly work.

Above all, the symposium provides the MCHHS community with an opportunity to celebrate students' outstanding work, to acknowledge the faculty members who serve as mentors, and to recognize the schools and departments which support discovery. On this 25th anniversary of the symposium, we are excited to welcome members of the newly constituted MCHHS Advisory Board to this virtual event.

To all McQueary College of Health and Human Services faculty, staff, alumni, board members and students, THANK YOU for participating in this year's symposium! Your hard work, dedication, and active participation is greatly appreciated.

I would also like to thank the MCHHS Student Research Symposium Committee for their time and effort in organizing the symposium:

Dr. Ashlea Cardin, Occupational Therapy

Dr. Christie Cathey, Psychology

Dr. Melissa Fallone, Psychology

Dr. James Hackney, Physical Therapy

Dr. Michael Hudson, Public Health and Sports Medicine

Dr. Anne Marie Hunter, Biomedical Sciences

Dr. Wafaa Kaf, Communication Sciences and Disorders

Dr. Bogdan Kostic, Psychology

Dr. Jianjie Wang, Biomedical Sciences

Dr. Letitia White-Minnis, Associate Dean

Mr. Ian Alaimo, Technology Coordinator

Mr. Jeremy Henson, Distributed User Support Specialist

Mrs. Rebeca Reut-Robinson, Executive Assistant

Dr. Mark A. Smith

Dean, McQueary College of Health and Human Services

Presenters and Faculty Mentors by Department and Page Number

Biomedical Sciences

Presenters and Faculty Mentors by Department and Page Number

Communication Sciences and Disorders

Kinesiology

Presenters and Faculty Mentors by Department and Page Number

Nursing

Occupational Therapy

Physical Therapy

Psychology

Presenters and Faculty Mentors by Department and Page Number

Public Health and Sports Medicine

BIOMEDICAL SCIENCES

Reported Food Insecurity and Interventions of Collegiate Athletes at a Public Midwestern University

Shae Casey, Austin Barousse, Natalie Allen, Hillary Roberts
Faculty Advisor: Natalie Allen

This study assesses meal funding provided to student athletes, situational impacts, and food insecurity relief. Research shows athletes and students who are food insecure experience decreased athletic and academic performance, and declined mental and physical health (Coleman, 2019). The purpose of this study was to determine if the student athlete population at a public university was at risk for food insecurity, identify related factors, facilitate interventions, and to determine the situational impact of the SARS-CoV-2 (Covid-19) pandemic on food security. An online survey was distributed to 391 athletes at the university and a total of 79 surveys (20%) were returned. Those that reported having a meal plan or stipend for meals was 38% of the total participants. Data showed 30% of participants experienced food insecurity and 11% were situational due to the Covid-19 pandemic. All food insecure participants had taken interventions to alleviate their situation, the most popular intervention being to seek help from friends and family. Based on outcomes, the team dietitian will provide information on the university food pantry and emergency scholarships. This study will help provide a foundation to combat food insecurity."

Further Characterization of the Skeletal Phenotype in IDUA-W392X Knock-In Mice as a Model of Mucopolysaccharidosis Type 1

Samantha Brindley, Sophia Sadaro, Alyssa Gieselmann, Jacob Linhardt, Olivia Isaacks, Tyler Bates, Anna McWoods, Amanda Brodeur
Faculty Advisor: Amanda Brodeur

Mucopolysaccharidosis type 1 (Hurler syndrome) is a rare, autosomal recessive disorder caused by the deficiency in the lysosomal enzyme alpha-L-iduronidase (IDUA). Hurler syndrome is characterized by cognitive disabilities, hearing impairment, organ enlargement, as well as degenerative joint disease and bone deformities. Despite current treatments to improve the symptoms, very few improve the bone phenotype. As a result, diagnosed individuals experience disabling, painful bone disease that often requires surgical intervention. The Brodeur lab examines the bone phenotype using a knock-in mouse model, containing a nonsense mutation analogous to the human IDUA mutation. To better understand the physiochemical composition of the bone content of the IDUA mouse model, Immunohistochemistry can be used. This method targets antigens in the tissue by adding a primary and a secondary antibody to the bone sample. Immunohistochemistry examining RANK was performed to examine osteoclast function in the mouse model. In this study we demonstrate the ability to decalcify, fix, embed, and stain murine long bones. Through the procedures mentioned, the goal of this research is to further understand the bone phenotype seen in Hurler syndrome.

Further Investigation of the Initiating Mechanism of the Type I Collagen Glomerulopathy

Matthew Freese, Kaitlyn Armstrong, Rachael Ingram, Travis Jackson, Lillian van Biljon, Kaitlyn Weber, Petyton Wombacher, Amanda Brodeur
Faculty Advisor: Amanda Brodeur

In chronic renal disease, the progressive accumulation of collagen and other extracellular matrix proteins in the mesangium of nephrons results in fibrosis, glomerulosclerosis, and eventual renal failure. Mice deficient in proa2(I) collagen are a model for Osteogenesis Imperfecta and Type 1 Collagen Glomerulopathy, because homotrimeric type I collagen is accumulated in the mesangium. Picrosirius red (PSR) staining was used to evaluate collagen deposition. Histological evaluation and lesion scoring of kidney sections demonstrates that in comparison to wild-type mice, Col1a2-deficient homozygous and heterozygous mice exhibit

abnormal glomerular collagen deposition. Following staining, immunohistochemistry will be used to determine if platelet-derived growth factor (PDGF) B and D are responsible for initiating glomerulopathy in our mouse models. PDGFs contribute to healing wounds, repairing damage, building blood vessels, and growth of mesenchymal cells. These are major contributors to fibrosis in kidneys. Previous research has shown that PDGF are commonly involved in fibrosis, especially in kidneys. An association between either PDGF B or D and homotrimeric collagen could potentially lead to ways of limiting renal fibrosis.

COVID-19 Confusion: Mechanism, Ethics, and Hesitancy Surrounding the COVID-19 Vaccines
Jacob Gibson, Jordan Fox, Gina Gherardini, Ana Mertins Chiodini, Abbie Poisson
Faculty Advisor: Amanda Brodeur

According to the World Health Organization, COVID-19, caused by the SARS-CoV-2 virus, has swept across the globe infecting over 124 million and killing more than 2.7 million people worldwide as of mid-March 2021. In December of 2019, the first cluster of cases was reported in Wuhan, China. Four months later, the world was on lockdown. Racing to create an effective and safe vaccine, global pharmaceutical companies fast-tracked vaccine development in an attempt to end the pandemic. As of early March, the following three companies have produced vaccines that are authorized by the FDA for emergency use in the United States: Pfizer and BioNTech, Moderna, and Johnson & Johnson. Despite the vaccines' proven effectiveness and safety, a large population of U.S. citizens is still hesitant to receive the vaccine. Moreover, critics have raised questions regarding the ethics of the CDC's vaccine distribution plan, the expedited vaccine clinical trials, and the government's transparency about the vaccines. This presentation will expound on the efficacy and molecular mechanisms of the three authorized vaccines, the factors causing vaccine hesitancy across the country, and the ethics surrounding the vaccine and its development.

Pediatric-Onset Orthopedic Disorders
Abbie Poisson, Amanda Brodeur
Faculty Advisor: Amanda Brodeur

The human skeleton is a specialized organ that provides a framework for the human body, supports and protects numerous organs and structures, stores and releases minerals, and allows movement. As a metabolically active organ, bone undergoes constant modifications to adjust to the body's physical stresses and metabolic needs. The production of the major biomolecules and regulation of signal cascade pathways becomes vital for the proper formation, modification, and degradation of bone and its surrounding tissue as children develop. If the metabolism of these biomolecules and tissues becomes dysregulated, various skeletal diseases can evolve and cause a wide range of physical ailments. Examining biomolecules' impact on bone health, innovative research continues to provide insights into protein, nucleic acid, and carbohydrates' relation to hypophosphatasia, cleidocranial dysplasia, and mucopolysaccharidosis type I. Moreover, researchers are uncovering the pathophysiological cause of early-onset osteoarthritis. This presentation will expound on the causes, physical characteristics, current treatment options, and ongoing research surrounding hypophosphatasia, cleidocranial dysplasia, mucopolysaccharidosis type I, and osteoarthritis.

Effectiveness of HOCl Irrigation in Rat Peritonitis Models
Benjamin Pomeroy
Faculty Advisor: Patrick Brooks

Peritonitis is an inflammatory condition effecting mesothelial cells lining the peritoneal cavity and is commonly induced by perforations of the bowel. This event is a medical emergency often resulting in recurring peritoneal infections and contribute to patient mortality. Complications may be related to intra-abdominal irrigation solutions which have been reported to induce mesothelium cytotoxicity and express insufficient bactericidal and bacteriostatic properties. Consequently, hypochlorous acid (HOCl) has been proposed as a safer and more effective

irrigation solution with hopes of reducing recurrent infections and mortality rates. In this proposed study we will compare the efficacy of HOCl and common irrigation solutions of saline and chlorhexidine (CHX) on the acute treatment of induced peritonitis. Adult Sprague Dawley rats will undergo laparotomy surgeries where peritonitis will be induced through bowel perforations. Abdominal irrigation of either HOCl, saline, or CHX, and their efficacy will be assessed through abdominal and thoracic tissue analysis. We hypothesize that use of HOCl as a peritoneal irrigation solution in acute peritonitis treatment will reduce bacterial presence, tissue damage, and mortality rates.

Malaria: An Epidemiology Overview
Daniel Amuedo, Emily Chisum, Abby Gann, Hadyn Tisch, Leanna Zelle
Faculty Advisor: Richard Garrad

As of 2019 the WHO reported an annual 229 million malaria cases worldwide, with approximately 410,000 deaths. Malaria is caused by unicellular eukaryotic parasites that belong to the genus Plasmodium. Classic infection symptoms are fever, chills, and flu-like symptoms. However, infected pregnant women are at further risk of having per-term labor with low-birth-weight babies. According to the CDC Malaria would cost at least 90 billion to eradicate but it is estimated that if the United States contributed 5 to 6 billion incidence could be reduced by 40 percent in under 10 years. Currently Malaria is treated by effective anti-malarial drugs; however, the treatment for malarial infection relies on the patient's overall health, drug availability, use of other drugs prior to infection, and on the type of malarial infection. There are 4 different malarial parasites present in the female Anopheles mosquito that are infectious to humans. With anti-malarial drug resistance occurring, global warming increasing the breadth of infectious mosquitos, no viable malarial vaccines, its current effect on human life, and its eradication with relatively small fiscal contributions, it is imperative that steps are taken to eradicate malaria soon.

Investigating the Effect of Microplastics and Nanoplastics on Human Health
Daniel Amuedo
Faculty Advisor: Richard Garrad

Plastics take on many roles and forms, and their use is nearly ubiquitous. Microplastic (MP) and Nanoplastic (NP) particles have recently been identified in foods, air, treated water, oceans, human fecal matter, the polar regions, and in areas untouched by direct human contact. Both MPs and NPs are primarily produced from the breakdown of larger pieces of plastic in rivers, lakes, oceans, landfills, agriculture, industry, and urban effluent. Additionally, plastic production has increased since its inception, hence it is vital to investigate the potential health implications due to chronic or acute MP/NP exposure. This review searched various databases for all pertinent articles and has distilled the information pertinent to human health. Generally, MPs/NPs were observed to have a dose dependent toxicity that depended upon size, shape, polymer type, and associated additives. Overall, there were many cellular changes due to MP/NP exposure, but both an increase in ROS and proinflammatory cytokines were observed most consistently across all studies. Future studies should utilize aged and co-incubated MPs and NPs when testing, as virgin polymers are not representative of circulating plastics.

Hypothesis of Oxidative Stress and Aging
Tharron Roy
Faculty Advisor: Richard Garrad

The hypothesis of oxidative stress and aging postulates that phenotypic aging is induced by an accumulation of oxidative stress within an organism. Oxidative stress occurs when there is an imbalance between oxidants and the antioxidants that protect against them. Oxidants arise either endogenously through normal cellular processes or from exogenous sources. The oxidants have the capacity to cause damage to important macromolecules within a cell. Oxidative damage to DNA and other structures within the mitochondria can trigger mitochondrial dysfunction, halting normal energy

production and further damaging the cell. This may contribute to the development of a senescent phenotype. Here we investigate the hypothesis of oxidative stress and aging, support for this which is drawn from experiments demonstrating the effects of oxidative stress in different species. Further analysis shows that while oxidative stress can be detrimental to a cell, small amounts of oxidative stress can prove to be beneficial. This is the idea of mitochondrial hormesis. Future directions include defining what level of oxidative stress may cause a senescent phenotype and investigating ways to delay the onset of senescence and age-related diseases.

Neuronal Migration in Developmental Hyperserotonemia: Assessment of Vesicular Glutamate in the Raphe Nuclei

Trey Shupp
Faculty Advisor: Lyon Hough

Serotonin is involved in the early development of the central nervous system and the organization of neurons throughout the cerebral cortex. It is proposed that serotonin indirectly acts on cells of the cerebral cortex that secrete a protein called reelin. This protein is known for its role in neuronal organization and migration during early neural development. Neuronal disorganization of the cortex has been reported in response to increased levels of developmental serotonin which in turn lowers adult serotonin and reelin levels. For reelin to be secreted, the neurotransmitter Î³-aminobutyric acid (GABA) needs to be available to interact with cellular receptors. However, GABA is associated with the Glutamate/GABA excitatory and inhibitory feedback system. It is known that serotonin is the early regulator of glutamate release in the cell which activates the release of GABA. However, it is thought that in conditions where excess serotonin is released during development, serotonin will inhibit glutamate release. This study proposes to analyze the correlation of excess developmental serotonin on the neurotransmitter glutamate by examining the levels of vesicular glutamate transporter proteins within the rat dorsal raphe nuclei.

PCR Technique to Test for siRNA Knockdown of TRIM5α

Emily Graham, Amy Hulme
Faculty Advisor: Amy Hulme

Human Immunodeficiency Virus type 1 (HIV-1) affects around 38 million people worldwide. The HIV-1 viral capsid is a complex of 1500 capsid proteins that encase the genomic RNAs. A restriction factor called TRIM5α interacts with the capsid and alters infectivity. In rhesus macaque cells TRIM5α binds and degrades the capsid before reverse transcription, which decreases HIV-1 infectivity. In some human cells, however, TRIM5α has little to no effect on HIV-1 infection. To further test the effect of human TRIM5α on HIV-1 replication, siRNA knockdown will be used to decrease TRIM5α expression in the human microglial cell line CHME3. The goal of this project is to develop a PCR method to quantify the amount of TRIM5α expression. For this method, primers for TRIM5α were selected based from a BLAST primer search. Each primer set was tested using PCR with CHME3 complementary DNA. PCR products were run on a gel and cloned into a plasmid. The prime efficiency of each primer set was determined using a dilution series of the plasmid. Successful primer sets can then be used to quantify expression of TRIM5α in cells after the knockdown has occurred relative to normal expression using qRT-PCR.

Wastewater Testing for Sars-CoV-2

Hannah Matheney, Amy Hulme
Faculty Advisor: Amy Hulme

The novel SARS-CoV-2 virus that causes COVID-19 has caused over 2.6 million deaths worldwide since its discovery in December 2019. In Greene County alone there have been over 28,000 confirmed cases of COVID-19. Wastewater testing has been implemented by the state of Missouri to monitor SARS-CoV-2 infection and inform public health decisions. Infected individuals will shed virus in feces that can then be detected in the wastewater. Importantly virus can be shed by infected individuals that are asymptomatic or presymptomatic. After wastewater collection,

samples are filtered for virus sized particles, nucleic acids are concentrated, RNA is isolated, and RT-qPCR is done to determine the number of SARS-CoV-2 viruses present in the sample. Over time, this information can be used to implement testing to identify newly infected individuals and monitor the state of SAR-CoV-2 infection at a population level.

Effect of Cyclophilin A on HIV Infectivity
Lucas Ott, Amy Hulme
Faculty Advisor: Amy Hulme

HIV fuses with the cell membrane then its capsid disassembles, which is known as uncoating. The process of uncoating is poorly understood, but certain cellular factors can have an impact on uncoating. Previous research has shown that cyclophilin A (CypA) binds the HIV capsid to influence infectivity. CypA is inhibited by the drug cyclosporin A (CsA). The E45A capsid mutant has a hyperstable capsid that uncoats slower than wildtype HIV, while the E45A/R132A double mutant shows uncoating kinetics and infectivity similar to wildtype HIV. In this project we used CHME3 cells, which express CypA, to determine the effect of CypA on HIV infectivity. CHME3 cells were infected with HIV-GFP wildtype, an E45A mutant, or an E45A/R132A double mutant in the presence of CsA or EtOH. Flow cytometry was then used to detect the amount of GFP positive cells, which represents a successful HIV infection. CHME3 cells exposed to E45A showed very little infection in the presence of CsA and EtOH. The CHME3 cells exposed to HIV-GFP wildtype and the E45A/R132A double mutant in EtOH showed significant infection but showed slightly less infection in the presence of CsA. These results indicate that CypA promotes HIV infectivity.

CypA Facilitates HIV-1 Infection in CHME3 Cells via Capsid Uncoating
Emma Wise, Amy Hulme
Faculty Advisor: Amy Hulme

During infection, HIV-1 hijacks the cellular protein Cyclophilin A (CypA) to facilitate infection in some cell types. The goal of this study is to investigate the role of CypA in HIV-1 infection and capsid uncoating within CHME3 microglial cells. We hypothesize that CypA facilitates HIV-1 infection and assists in normal capsid uncoating. The process of uncoating will be assayed with the In Situ Uncoating Assay in the presence and absence of the CypA inhibitor Cyclosporin A (CsA). For the assay, CHME3 cells are infected with dual labeled virus and fixed on a time course. Once fixed, samples undergo primary and secondary antibody staining. To make the dual labeled virus, 293T cells are transfected with four plasmids: S15-Tomato to label the HIV membrane, VSV-G for the envelope spikes, GFP-VPR to label the viral core, and HIV-GFP to label the HIV genome and other proteins. For the assay, 80% of GFP-Vpr labeled virus should also have S15 fluorescence. Preliminary data indicates that CypA facilitates HIV-1 infection and capsid uncoating in CHME3 cells.

Association Between Acne and Dietary Glycemic Index in College Students
Hannah Yates
Faculty Advisor: Anne Marie Hunter

Acne is a visible skin condition with the potential to have negative impacts on quality of life in college students. Dietary glycemic index may have a role in acne pathogenesis. This cross-sectional study was conducted to explore the relationship among dietary glycemic index and acne severity in a college student population. Participants completed an online survey consisting of age, self-reported acne severity, and food frequency questionnaire. Data from 38 participants was included in the analysis. Spearman Rho correlations were performed to examine the relationship between the dietary glycemic index, acne severity, and age. Results showed no significant relationship between dietary glycemic index and acne severity, ($P = .957$.) However, results showed a significant, negative relationship between dietary glycemic index and age, ($P = .003$). This study had a relatively small sample size of 38 participants after exclusion criteria and partial responses were accounted for. A larger, more diverse study population may have yielded different results. Providing additional information regarding

the link between diet and acne may help prevent and treat the skin condition linked with a lesser quality of life.

Food Insecurity in International Students at a Midwestern Public University
Anna Laffoon
Faculty Advisor: Sarah Murray

Food insecurity is an issue found throughout the United States. There is considerable research on food insecurity and its impact on groups throughout the U.S., however, there is limited research on food insecurity experienced by college students, specifically international students. The purpose of this study was to learn if international students at a midwestern public university were utilizing the campus food pantry. Students were asked to share their thoughts and opinions related to experiences with the food pantry. International students at risk for food insecurity were identified by a university student wellness assessment tool. Participants reported having a positive customer service experience at the food pantry, while expressing interest in additional food pantry locations, flexible hours, and more information online. Food preferences were related to easy to prepare foods and snacks. Participants were particularly interested in access to more fresh fruits and vegetables. Overall, food insecure international students were found to be utilizing and enjoying the campus food pantry. This information can be used to improve and increase access and inclusivity of the campus food pantry for food insecure international students.

Determining the Acceptability of Savory Breakfast Muffins with Added Cricket Flour to Increase Protein Content and Sustainability
Lauren Bays, Kelsey Smith, Taylor Sands
Faculty Advisor: Deborah Piland

Increasing world populations place extreme pressure on our land and resources to produce adequate food. Flour made from dried and ground crickets can be used to increase the protein content of food without the environmental cost of other animal based protein sources. This research project focused on the acceptability of added cricket flour to breakfast muffins. Cricket flour contains 60 grams of protein per cup. Four types of muffins were produced using 0%, 10%, 20% and 25% cricket flour substituted for wheat flour. Results showed that the added cricket flour did not adversely affect volume or height of the muffins. Results of the consumer taste panel indicated that taste, aftertaste and texture scores decreased with increasing cricket flour added. Even so, the majority of taste panel participants stated that all of the products were acceptable. After tasting products and reading an educational flyer about cricket flour, only one participant stated that they would not consume the products in the future. 100% stated that these products would be a good choice for those wanting to consume a sustainable protein source. It appears that substituting up to 25% cricket flour for wheat flour is acceptable to increase protein content.

Development of Beverages Containing Beet Root Powder and Tart Cherry Juice Designed to Increase Athletic Performance
Keri Dougless, Emily Monje, Jeremy Hatten
Faculty Advisor: Deborah Piland

Beets are a naturally high source of nitrates which may enhance athletic performance by increasing the efficiency of mitochondria. They also may optimize oxygen usage and increase time to exhaustion. Tart cherry juice has been associated with reducing both muscle and joint pain as well as decreasing the inflammatory response and encouraging recovery. This study investigated the acceptance of a variety of beverages designed for athletes which included both beet root powder and tart cherry juice. Three beverages were developed; one juice based, one tea based, and one smoothie. Taste panelists stated that all of the products were acceptable and that they felt they would be beneficial for those desiring to increase their athletic performance. It appears that a variety of beverages which contain beet root powder and tart cherry juice are an acceptable way for athletes to optimize their performance.

The Effect of Leadership Training on School Foodservice Employee's Job Satisfaction

Ceira Fields
Faculty Advisor: Deborah Piland

Lack of knowledge on the application of quality leadership is a common issue in foodservice. This leads to the industry experiencing exceedingly high turnover and low job satisfaction. High turnover can result in additional cost for an organization, as more supervisory time is dedicated to training, rather than leadership. Additionally, poor quality leadership practices often have a deleterious effect on employee morale, motivation, and job satisfaction. Quality leadership, effective communication, and fostering of healthy interpersonal relationships between employees and supervisors/employees has shown to greatly increase morale and overall job satisfaction. This is particularly true of school foodservice staff, who must manage tight budgets, state and federal regulations, and the daunting task of keeping hundreds of students, teachers, and staff satisfied with the meals. With these overwhelming tasks, staff can suffer the same struggles for motivation and job satisfaction. The aim of this project is to develop a series of leadership training modules to increase knowledge in emotional intelligence, leadership styles, and conflict resolution to be presented to the kitchen managers at Springfield Public Schools in Springfield, MO.

Determining the Acceptability of Added Cricket Flour to Banana Nut Chocolate Chip Muffins in Order to Increase Protein Content and Sustainability

Abigail Fisher, Matthew Bertoldie, Emily Rudolph.
Faculty Advisor: Deborah Piland

Raising crickets for food requires a fraction of the resources required to produce meat from larger animals. Cricket production require little land, water and food. The purpose of this experiment was to determine the acceptability of substituting cricket flour for wheat flour in banana nut chocolate chip muffins. Four variations of muffins were produced containing 0%, 10%, 20%, and 30% cricket flour substitution. Results showed that substitution of cricket flour did not negatively affect the mean volume or height of the muffins. Taste panelists stated that muffins which contained up to 20% substitution with cricket flour were acceptable but at the 30% substitution level there noted negative texture and flavor attributes. Cricket flour contains 60 g protein per cup as compared to 13 g for a cup of wheat flour. A 10% cricket flour substitution increases protein content by 50%, a 20% substitution doubles the protein content. All but 2 panelists stated that they would consume this product and 100% stated that they would be a good choice for those wanting to consume a sustainable protein source. Results show that up to a 20% cricket flour substitution is an acceptable way to increase protein content in muffins.

Utilization of Nutrigenomics Principles to Develop Food Products Beneficial for Those with or at Risk of Developing Type II Diabetes Mellitus

Gianfranco Morote Galvez, Stephanie Urich, Tayla Smith
Faculty Advisor: Deborah Piland

The goal of this project was to develop products useful for blood glucose control. This project involved the development of products which contained probiotics and prebiotics associated as being beneficial for those with Type II Diabetes Mellitus. Two products were developed; a fresh fruit salsa with added inulin, a fructose polymer and a version which included dextrin, a digestion resistant glucose oligosaccharide. Both versions also included a probiotic supplement which included strains specifically beneficial for controlling blood sugar. The other product produced included a 100% blueberry juice, rooibos tea containing sorbet with probiotics also using inulin and dextrin in two different versions. Rooibos tea is the only known source of asphalthin, shown to help control blood sugar in animal studies. Panelists stated that all of the products were acceptable, and that they would consume these products, especially because of the potential health benefits. Panelists also stated these products would be acceptable for those wanting to control their blood sugar. This study demonstrated

that the purposeful development of food products which meet the needs of a specific population can be useful in attaining health goals.

Development of Savory Granola Bars Which Contain Anti-inflammatory Phytochemical Compounds for Those with Rheumatoid Arthritis
Emma Sesti, Jessica Jennings, Elizabeth Knipp
Faculty Advisor: Deborah Piland

Rheumatoid arthritis (RA) is an autoimmune inflammatory disease that mainly attacks the joints. Autoimmune diseases occur when the body's immune system mistakes its own tissues for foreign invaders, such as bacteria or viruses. RA affects 1.3 million Americans. Numerous phytochemicals found in fruits, vegetables, nuts, seeds and spices have been shown to significantly reduce inflammation. This study focused on developing savory granola bars which contained beneficial anti-inflammatory phytochemicals for those with RA. Three savory granola bars were developed which contained known anti-inflammatory compounds. Sensory panel results indicated that savory granola bars were an acceptable source of these anti-inflammatory compounds and the majority of panelists stated that they would consume these granola bars. Panelists also reported that these granola bars would be beneficial for those with RA who desired to consume an anti-inflammatory diet. It appears that savory granola bars which include a variety of anti-inflammatory food ingredients are an acceptable way to increase anti-inflammatory agents in the diet of those with RA.

Acceptance of Tomato Soup Produced with 50% Less Sodium Levels Developed to Help Reduce Blood Pressure Levels in Adult Americans
Audrey Williams, Alyssa Fleming, Meghann Robertson
Faculty Advisor: Deborah Piland

According to the American Heart Association more than 103 million Americans have high blood pressure. This represents one-half of the adult population and untreated hypertension increases the risk of heart attacks and strokes. A diet high in sodium intake is closely associated with elevated blood pressure. The average canned or prepared soup is high in sodium with a 1 cup serving containing 800 mg. The Daily Value for sodium is 2400 mg per day. This study investigated ways to decrease the amount of sodium in soups by using salt substitute, potassium chloride (KCl), as well as several types of sea salts. Five variations of tomato basil soup were prepared using 100% table salt, 50% table salt/50% KCl, 50% Black Lava salt, 50% Pink Himalayan salt, and 50% of evaporative sea salt from Mexico. Results showed that taste panelists rated all of the soups, except for the soup made with salt from Mexico, as acceptable. 100% of participants stated that these soups would be appropriate for those wishing to decrease their sodium intake. It appears that utilizing up to 50% KCl, and using ½ of the recipe amount of Black Lava and Pink Himalayan salt are acceptable ways to prepare soup with at least 50% less sodium.

Anatomical Reconstruction of an Exceptionally Large Triceratops: Insights Into the Life History, Pathology, and Body Proportions of an Exemplary Dinosaur
Lindsey Wilson, Henry Tsai
Faculty Advisor: Henry Tsai

Ceratopsians, or horned dinosaurs, were among the most abundant large-bodied land animal in the late Cretaceous period (66 million years ago). Triceratops represent the largest and latest surviving ceratopsian. This study describes a new skeleton of a Triceratops (MINS v-1036) discovered in the Lance Formation (Wyoming), currently housed in the Missouri Institute of Natural Sciences. We identified, measured, and 3D captured skeletal elements of MINS v-1036 and compared it with other ceratopsian skeletons. Limb dimensions of MINS v-1036 approach the upper range among known ceratopsians, making it one of the largest horned dinosaurs yet discovered. Additionally, MINS v-1036 possessed skeletal features that suggest it had reached an advanced stage of senescence at the time of death. To better understand its life history, we extracted core samples from the

right femur to identify growth patterns, as well as to decipher the identity of preserved soft tissues. We combined digital models of MINS v-1036's bones referencing the bones of other Triceratops; recreated anatomically accurate replicas of the missing bones for constructing an exhibit mount, and the first full-size dinosaur skeleton on display in the state of Missouri.

Tissue-Specific Changes in RNA Editing During Induced Inflammation

Claire Nichols, Brianna N. James, Travis S. Tebbe, Bridgette M. Macander, Randi J. Ulbricht
Faculty Advisor: Randi Ulbricht

A-to-I RNA editing is a process where adenosine (A) nucleotides are deaminated by an editing enzyme, ADAR1, to become inosines (I) in select RNA transcripts. Inosine is read as guanosine during translation. ADAR1 is upregulated during inflammation. The effect of increased ADAR1 on RNA editing is unknown. We are interested in RNA editing levels when ADAR1 is induced. We used lipopolysaccharide (LPS) to induce inflammation, increasing the amount of ADAR1. Organs were dissected four hours after LPS injection and RNA was isolated from heart and brain tissues. RT-PCR was used to amplify regions around editing sites of known targets. The amplicons were sequenced and analyzed by measuring the amount of unedited nucleotides (A) and edited nucleotides (G) at select editing sites. We found decreased levels of RNA editing in the heart and no change in RNA editing in the brain. This indicates a complex system where RNA editing is regulated in a tissue-specific manner. While the inflammation was global, the tissue-specific changes in editing may provide a mechanism by which tissues adapt to inflammation in unique ways. Overall, this work will uncover information on how infection and inflammation alter the physiology of each organ.

Sex Dependent Effects of Induced Acute Inflammation on RNA Editing and Glucose Metabolism

Christian Rivas, Claire Nichols, Kelsey Kendrick, Jianjie Wang, Randi J. Ulbricht
Faculty Advisor: Randi Ulbricht

The first line of defense against pathogen invasion is the innate immune system. Innate immunity sets in motion countless cascades that result in inflammation. Inflammation simultaneously affects processes like metabolism and gene expression. Males and females react differently to inflammation. To further understand sex differences in inflammation, we examined how inflammation affects RNA editing and glucose metabolism. Adenosine deaminase acting on RNA (ADAR1) is upregulated by inflammation and catalyzes RNA editing. RNA editing can change the proteins encoded by a messenger RNA, altering their functions. We speculate inflammation will alter RNA editing but potential sex-dependent differences in rates of RNA editing are unexplored. We also determined sex-dependent differences in glucose metabolism. Mice injected with lipopolysaccharide (LPS), an agent known to cause inflammation, were subjected to glucose tolerance testing to see how they metabolized sugar, as well as RNA editing analysis from tissues such as brain and heart. Female mice treated with LPS showed greater changes in RNA editing levels and increased sugar metabolism during inflammation. This work will provide further insights into known sex-dependent disparities.

P2Y2R Mediated Angiogenesis in Microvascular Endothelial Cells

Leanna Zelle, Abby Gann, Sofia Orlando, Jianjie Wang
Faculty Advisor: Jianjie Wang

Extracellular ATP and UTP act as signaling molecules and equally activate nucleotide P2Y2 receptor (P2Y2R). Angiogenesis mediated by P2Y2R is not well characterized in microvascular endothelial cells (MEC). We hypothesized P2Y2R would promote angiogenesis via Vascular Endothelial Growth Factor Receptor 2 (VEGFR-2),

an integral membrane marker protein in proliferating and angiogenic MEC. We used MEC cells isolated from wild-type (WT) and P2Y2R knockout (KO) mice to test the hypothesis. VEGFR-2 expression level in WT-MEC and KO-MEC was assessed by using flow cytometry under resting and UTP stimulation conditions over time. The angiogenic function of WT-MEC was assessed by using capillary-like tube formation assay under resting and UTP stimulation conditions over time. We found P2Y2R KO-MEC expressed lower baseline VEGFR-2 compared with WT-MEC. VEGFR-2 expression on the cell membrane decreased in WT-MEC, but it didn't change in P2Y2R KO-MEC, with UTP treatment. UPT promoted capillary-like tube formation in WT-MEC. The findings indicate that P2Y2R activation reduces VEGFR-2 expression on the cell membrane, and stimulates angiogenesis in MEC. In the future studies, we will further test if VEGFR-2 mediates P2Y2R-dependent angiogenesis.

Access to Adequate Nutrition: Two Sides of the Same Coin

Gabriela Sappington, Taylor Walker, Austin Sams, Shane Gruener, Gianfranco Morote Galvez
Faculty Advisor: Colette Witkowski

The lack of access to adequate nutrition is a health concern that affects both underdeveloped and developed countries alike, which could result in a spectrum of chronic conditions. Examples include malnutrition, micronutrient deficiencies, cardiovascular disease, diabetes, and obesity. In the United States, these problems primarily stem from a combination of social factors like food insecurity, lack of education, and poor nutritional choices. In contrast, underdeveloped countries such as Haiti are mainly facing a severe lack of resources, further exacerbated by corruption. While these issues may seem overwhelming and broad, there are a few solutions that include educating the public on healthy food choices, local community gardens, and genetic engineering. The field of genetic engineering could be utilized to increase crop yields or improve the nutritional value of food. The complexity of nutrition-related issues is explored here by comparing the lack of access to adequate nutrition in the United States verses Haiti. We hope to raise awareness and discuss long-term possible solutions that will not only inspire a call to action locally in Springfield but will be translated globally.

COMMUNICATION SCIENCES AND DISORDERS

Spanish Verb Use in Bilingual Children: A Predictor of Native Language Loss?

Amber Holko, Lindsey Hiebert
Faculty Advisor: Lindsey Hiebert

Research has found that bilingual children immersed in an English-only environment at an early age are at higher risk of experiencing a language loss. Studies of language loss predominantly measure expressive language skills, such as grammar, vocabulary, and code switching into English. Spanish grammar effects verb conjugation via person and number agreement, which are more susceptible to language loss. Language loss has been found overall in Spanish vocabulary, but case studies suggest that verbs more susceptible to loss. The progressive decline of Spanish verbs may be an indicator of language loss in bilingual children. The purpose of this study is to determine if the number of Spanish verbs used in narrative language samples decrease over time for bilingual Spanish- English-speaking children attending an English immersion school. Spanish narrative retell language samples from 14 bilingual children were coded to identify Spanish verbs and verbs code-switched into English (to remove them from the analyses). The number and proportion of Spanish verbs were reported across four academic semesters, beginning in preschool, for each individual child to determine the presence of loss of Spanish verb production over time.

Training Speech Language Pathology Graduate Students on Typical English Grammar of Spanish-English Bilingual Children

Emily Karnuth, Lindsey Hiebert
Faculty Advisor: Lindsey Hiebert

The Hispanic population in the United States is one of the fastest growing, yet a majority of speech-language pathologists are monolingual English speakers. Because of this language difference, it is important for speech-language pathologists to understand which factors of a bilingual child's language are considered differences and which are disorders. This study aims to determine the knowledge of current graduate students via self-assessment. Explicitly, this study determines the self-perceived knowledge graduate students had about assessing typical morphemes of Spanish-English bilingual kindergarteners for the purpose of differential diagnosis. We predicted the group receiving the training would score higher on their self-assessments than the control group. The experimental group received training in typical grammatical morphemes of typically developing Spanish-English bilingual kindergarteners before completing the self-assessment; the control group received the self-assessment without any training. The results showed a significant difference between the groups, suggesting that the training increased the self-perception of knowledge of the assessment of grammatical morphemes in the language of bilingual kindergarteners.

Maternal Level of Education and Home Language Use as Predictors of Expressive Spanish Semantic and Grammar Skills
Danielle Kelker, Lindsey Hiebert
Faculty Advisor: Lindsey Hiebert

Research shows a correlation between higher level of maternal education and higher child vocabulary skills and semantic development. Additionally, home language exposure and use impact language development in bilingual children. In homes with Spanish as the predominant language spoken with parents, siblings, and peers, children typically experience growth or maintenance of Spanish language skills. Children who use some English with siblings and peers at home often experience a decline in Spanish skills. This project investigates maternal level of education and home language use as predictors of expressive Spanish semantic and grammar skills in bilingual children. Spanish narrative retell language samples were obtained from 34 Spanish-English bilingual preschoolers. The narrative retells were transcribed and coded to measure expressive semantic and grammar skills in Spanish via moving-average type-token ratio and proportion of grammatical utterances respectively. Data for maternal level of education and home language use were obtained by parent report. Hierarchical linear regression will be used to determine whether home language use better predicts expressive Spanish language skills above and beyond maternal level of education.

A Study of the PEEP Family Science Program and its Possible Effects on Learning for Children
Ka Mak, Lindsey Hiebert
Faculty Advisor: Lindsey Hiebert

Opinions on child learning via media are often controversial. Parental interaction, characteristics of the app chosen, and presence of educational content (or lack thereof) are all variables that can have a large impact on the effect of learning through media. This study explores the potential pros of using the PEEP Family Science app to facilitate child learning. Evidence-based parental interaction strategies for shared media use include pausing to allow for a response, prompting with questions, modeling when necessary, and positive reinforcement; incorporation of such strategies may alleviate some negative effects of child media use. Furthermore, the use of active mediation can maximize a child's learning via media. This occurs when an adult is engaged in discussion with their child about the material before, during, and/or after use. The PEEP app encourages and teaches parents to use evidence-based strategies and real-life exploration through question prompts and parent training videos to increase learning outcomes in children. The app is free, downloadable, and includes a wealth of resources and educational cartoons with hands-on activities that correlate with each subject taught.

Mazing, Pausing, and Abandoned Utterances in Spanish-English Bilingual Preschoolers: A Case Study

Emily Steppig, Lindsey Hiebert
Faculty Advisor: Lindsey Hiebert

Language loss describes the process of a child losing expressive skills from their first language while they begin to acquire a second. Bilingual children may be over-identified as having a language impairment if characteristics of language loss are present. The purpose of this study was to examine the occurrence of features that may represent Spanish language loss, specifically pauses, mazes, and abandoned utterances. Three typically developing children were selected from a larger longitudinal study of Spanish loss, because they demonstrated loss of Spanish grammar and semantic skills over time. The Spanish-English bilingual children were enrolled in an English immersion school beginning in preschool. Each academic semester they provided a Spanish narrative retell using wordless picture books as a prompt. Samples were recorded, transcribed, and coded for length of pauses, mazes, and abandoned utterances. The data indicates that despite the participants' being typically developing, they produced lengthy pauses, and frequent mazes and abandoned utterances, which could be perceived as a language impairment. As a result, children who are losing their first language as they are immersed in a second language may be over-identified.

A Study of PEEP Family Science and its Potential Benefit as a Language Intervention

Samantha Tennyson, Lindsey Hiebert
Faculty Advisor: Lindsey Hiebert

On average, children from low socioeconomic households hear 30,000 fewer words than same aged peers. This impacts vocabulary development in young children. In addition, this word gap impacts the quality of language children are exposed to. Studies show preschool vocabulary can predict later success in formal education, as well as scores on kindergarten readiness tests. Parents play a key role in the semantic and overall language development of their children, specifically through their use of abstract language. Recent studies have shown the quality of language, rather that quantity, is more impactful on children's language development. Parents' use of abstract language can improve the quality of language input children receive. PEEP Family Science is an interactive, downloadable app that guides parents through science-based activities. The app contains specific tier 2 vocabulary for each lesson, pop-up questions, videos, and parent strategies to help parents provide their children with an engaging, educational activity. During science activities, parents use abstract language in the form of wh- questions and tier 2 vocabulary. This study examines the potential benefits of using PEEP Family Science as a language intervention.

Investigating the Relationship Between Preschool English Oral Language and Second Grade English Reading Skills in Bilingual Children

Macayah Ulrich, Lindsey Hiebert
Faculty Advisor: Lindsey Hiebert

Bilingual children's oral language skills in kindergarten have been found to predict later reading skills. For this study, we sought to determine if preschool English oral morphosyntactic or semantic skills predict young bilingual learners' reading skills in second grade. We hypothesized that morphosyntactic skills in preschool would better predict English reading skills in second grade above and beyond semantic oral language skills. Twenty-seven typically developing Spanish-English bilingual children attending an English immersion school provided English narrative retell samples in fall of preschool. We obtained standardized reading assessment data for the same participants in second grade. Hierarchical regression results revealed that English morphosyntax significantly predicted second grade reading outcomes. The clinical implications suggest that speech-language pathologists should target morphosyntax intervention as early as preschool.

The PEEP Family Science App and its Potential Impact on Abstract Language Use in Latinx Families

Jordan Rogers, Lindsey Hiebert
Faculty Advisor: Lindsey Hiebert

Abstract language use during parent-child book sharing has been found to be a crucial component in child language and literacy development. Socioeconomic status and culture often determine exposure to parent abstract language use. Research shows that Latinx mothers engage in conversation and book sharing opportunities less often than white mothers. Limited resources (i.e., access to books) produce barriers to quality language exposure as well. The PEEP Family Science app could serve as an alternative to book sharing if parents lack resources or confidence using abstract language. The purpose of this study was to explore the potential benefits of the PEEP app for Latinx families. The app requires no WiFi and is available in both English and Spanish. It provides lessons for parents on engaging in parent-child communication while increasing abstract language use and building vocabulary. Parent strategies provided in the app include asking wh- questions, elaborating on ideas (e.g., expansion), and following the child's lead during play. Research has also shown that Latinx parents from low socioeconomic homes used comparable abstract language with the PEEP app compared to middle-class, white parents in prior studies of book sharing.

Implications of COVID-19 on Early Childhood Education: Teachers' Perspectives

Tiffany Buchanan, Tyler Wegrzyn
Faculty Advisor: Sarah Lockenvitz

The effects of COVID-19 have permeated across many facets of life across the globe, including the American education system. The purpose of this study was to investigate the implications of COVID-19 for in-person early childhood education from teachers' perspectives. The video communications platform Zoom was utilized to interview three teachers from three different settings about their experiences teaching throughout COVID-19. Data analysis is forthcoming. However, we anticipate the participants to report experiences similar to that found in the current literature base regarding the provision of online instruction to older students, but in terms of in-person instruction in the early childhood context, including concerns related to socio-emotional challenges, difficulty building relationships, and issues with masking. The investigation of early childhood education teachers' perspectives in the current climate will assist future educators should pandemic concerns persist, and possibly predict the long-term effects the pandemic may have on both early childhood education teachers and students.

Effect of Mask Material on Communicative Exchanges

Joni Fielder, Hannah Braden, Amanda Zitting
Faculty Advisor: Sarah Lockenvitz

This study aims to explore how clinicians perceive the relationship between the wearing of face masks and clinician and client communicative exchanges in the clinical context. Altered or diminished communication between clients and mask-wearing clinicians, as reported by the clinicians, is investigated. Participants, including speech-language pathology and audiology students serving children and adult clients in the Missouri State University Speech Language and Hearing Clinic (MSU-SLHC), reported their perceptions of how masking has affected attitudes, empathy, rapport building, and speech intelligibility through an anonymous survey conducted electronically. Data analysis for this study is forthcoming. It is expected that survey results will reveal perceptions that face masks do impact communicative exchanges, including from the experience of frustration, limitations in building rapport with clients, emphasizing with clients, and hearing/intelligibility of various exchanges during interactions.

Masks and Speech and Language Development: A Survey of Parents' Thoughts on Teachers Wearing Masks at Daycare

Marissa Mills, Madison Rushing
Faculty Advisor: Sarah Lockenvitz

The goal of this research project was to explore the current evidence on whether face coverings affect the development of speech, language, and social communication in young children. A survey was given to gain insight on parents' thoughts towards daycare teachers wearing masks during the COVID-19 pandemic and how it might impact their children's speech and language (S-L) development. The sample included parents of children ages 6 months through 5 years without hearing loss, disabilities, or S-L disorders. Ninety-one percent of parents reported their child's S-L improved or maintained during the time of the pandemic. Approximately half of the surveyed population reported concerns about their children's S-L development during the pandemic. The top concerns reported included recognition of facial expressions and emotions as well as forming sounds and words. Evidence supports that facial expressions and visual cues created by movement of the mouth and lip movement greatly contribute to effective communication. If speech understanding is hindered by masks, this may negatively affect children learning to produce speech sounds and their ability to read emotions. The top parent concerns reported in this survey aligned with this evidence.

Measuring Enjoyment Using an Adapted Tool for PwA and Enjoyment in a Music-Based Game for PwA and Their Friends

Alex Bahl
Faculty Advisor: Alana Mantie-Kozlowski

Kusambiza-Kiingi, Maleka, and Ntsiea (2017) stated that communication difficulties may result in changes in relationships with family and community members which may contribute to a decline in participation in social activities. We hypothesized that people with aphasia (PwA) could access social activities by playing board games with others. This study presents outcomes from a game created by MSU students, Tricky Tune Throwdown, which was designed for PwA and their family members to play with a goal of access and enjoyment for all players. This study also presents a scale for measuring enjoyment in gameplay, which was modified from a tool by Kendzierski and DeCarlo (1991). Analysis and discussion include elements of the game that affected enjoyment rankings and the appropriateness of the enjoyment tool.

Enjoyment in Board Game Play Involving People with Aphasia: Board Game History

Kelci Carron
Faculty Advisor: Alana Mantie-Kozlowski

Brown, Worrall, Davidson, and Howe (2012) identified themes related to living successfully with aphasia: participation, meaningful relationships, support, communication, positivity, independence, autonomy, and living successfully with aphasia as a journey over time. Participating in group board game play may be one-way people with aphasia could find some success with adjusting to life with aphasia. This study presents a history of boardgame play. Additionally, outcomes are presented from a pilot of one game, Bingo-Rades, created by students from MSU for play to include people with aphasia. The study focused on enjoyment for both the participant with aphasia and the other players, as well as accessibility of the game. Elements of the game that contributed to or diminish enjoyment are discussed.

Inclusion of Multicultural Content in Introduction to Communication Sciences and Disorders Textbooks

Callie Combs
Faculty Advisor: Alana Mantie-Kozlowski

The American Speech Language Hearing Association (ASHA) has expanded their efforts towards recruiting professionals who are more reflective of the clients, patients, and students they serve. Despite these efforts, only 8% of ASHA members identify as members of an underrepresented racial group. The representation of

multicultural content within communication sciences and disorders classes can positively impact how students from underrepresented groups might envision themselves in the professions of speech-language pathology, audiology, and education of the deaf and hard of hearing. The aim of this study was to investigate changes of inclusion of multicultural content and considerations between older and newer Introduction to Communication Sciences and Disorders textbooks. Utilizing four diversity inclusivity items derived from Laird (2011), we assessed seven Introduction to Communication Sciences and Disorders textbooks ranging from 1977 to 2019 for inclusion of multicultural content. Results indicated an increase of inclusion of multicultural content in these textbooks over time and highlighted a need for further inclusion of multicultural considerations for adult populations.

Measuring Students' Critical Thinking in a Project-Based Course for Aphasia Care

Aki Fong
Faculty Advisor: Alana Mantie-Kozlowski

The Life Participation Approach to Aphasia (LPAA) is a philosophy that emphasizes quality of life and reengagement in meaningful activities for people with aphasia. As the management of aphasia continues to shift towards such models, it is important to expose students to these types of care philosophies. To investigate models for teaching the LPAA, an experiential learning-based course was designed to encourage critical thinking about the consequences of aphasia through the lens of accessibility to leisure, specifically gameplay. The purpose of this study was to investigate evidence of critical thinking over a five-week summer online course. Four assignments submitted by seven undergraduate students were analyzed and scored using the Holistic Critical Thinking Scoring Rubric (HCTSR; Facione & Facione, 2014). The mean critical thinking score was unchanged across assignments, with an average score of two (a judgement of "Unacceptable") on the HCTSR. We were unable to demonstrate increased levels of critical thinking using the HCTSR. While students' comments suggested appreciation of the experience, the scores from the HCTSR did not markedly differ. Complicating factors including COVID-19 restrictions will be discussed.

Categories of Tabletop Games and Enjoyment of a Modified Game for PWA and Their Loved Ones

Brendynn Petty
Faculty Advisor: Alana Mantie-Kozlowski

This study presents categories of common tabletop (AKA boardgames) games. These categories will be discussed in terms of motivation for participation in the type of game. Then, outcomes from a study in which one game was created for people with aphasia (PWA) and their friends and family will be presented. The game- "Guess What?"-- a modified version of the family board game "Guess Who?" was created by Missouri State University students and designed for and piloted by one PWA and his caregiver. An enjoyment scale was used for measurement, as well as a questionnaire that probed aspects of the game that were added for accessibility and with the expectation that it would be enjoyable for all participants. Components of the experience that added or diminished enjoyment for all the players will be highlighted.

Motivations to Engage in Tabletop Boardgames and a Piloted Study of a Game Promoting Inclusion of PWA in Gameplay

Emma Reeves
Faculty Advisor: Alana Mantie-Kozlowski

This study presents motivations for why people decide to play tabletop/boardgame games. Various motivators are discussed as they relate to participation in tabletop games. These motivators were then specifically looked at as they relate to people with aphasia (PWA), and how aphasia can affect one's ability to participate in boardgames. Additionally, outcomes are presented from a pilot of one game, "Sorry! Price is Right Edition"- a modified version of "Sorry!" with elements of "The Price is Right", which was created to ensure access and enjoyment in gameplay for all participants. The

focus of this is to assess enjoyment of both the PWA aphasia and other players, along with creating an accessible and fun game for all. Specific elements from the game that affected accessibility and enjoyment are discussed.

Exploring Leisure for PWA: Feasibility of Group Board Game Play as an Enjoyable Option
Macie Turntine
Faculty Advisor: Alana Mantie-Kozlowski

Haley, Womack, Harmon, McCulloch, & Faldowski (2018) identified that people with aphasia (PWA) required participation in interesting, pleasurable, and otherwise meaningful activities to live successfully with their condition. Although PWA have substantial differences in preferences in accordance with leisure activities, it was found that of the 26 participants, 40-60% of them selected board games to be a category of interest that they would like to participate in more (Haley et al., 2018). Perhaps participating in group boardgame play may be one-way PWA could find some success and enjoyment with adjusting to life with aphasia. This study presents a review of the literature related to what PWA report enjoying in terms of leisure activities. Additionally, outcomes are presented from a pilot of one game (Bingo Bandz) created by students at MSU to include PWA. The study focused on enjoyment for both the participant with aphasia and the other players, as well as accessibility of the game for all. Elements of the game that contributed to or diminish enjoyment are discussed.

Note-Taking Skills in College Students Across Various Disciplines
Monica Ballay, Shurita Thomas-Tate
Faculty Advisor: Shurita Thomas-Tate

Note-taking skills are an important part of the college experience. The level of skill for taking notes may depend on each student's training and experience, access to technology, and personal behavioral habits. The purpose of this study was to explore college students' note-taking skills across multiple disciplines. Our survey included college students from Missouri State University at both the undergraduate and graduate level. Information about students' note-taking styles, prior education about note-taking skills, and frequency of note-taking in courses were some of the topics included in the survey. Implications for preparing students for college success will be discussed.

Ujima Study Buddies: An Online Tutoring Program
Hannah Grills, Brea Koch
Faculty Advisor: Shurita Thomas-Tate

Ujima Language and Literacy, is an established community-based organization that uses literacy to educate, connect, and empower children and families. The Ujima Organization applied for and received CARES Act funds to develop an online tutoring program to support student learning in response to the disruptions caused by the COVID-19 pandemic. This study describes the development and outcomes of Ujima Study Buddies. The program paired college students with K-12 students, to work on literacy skills, homework, and mentorship. Some of the major challenges included getting families to sign up, technology, and maintaining regular tutoring sessions. A discussion about how we addressed these issues will be included, as well as suggestions for future programming.

An Analysis of Language Use in Toddlers Who Are in Foster Care or Adopted
Keelyn Lyon, Carly McClernon
Faculty Advisor: Shurita Thomas-Tate

Young children in foster care are at an increased risk for problematic language development, making early intervention a critical tool for enhancing these children's foundational language abilities (Raby, Freedman, Yarger, Lind, & Dozier, M, 2018). The purpose of this descriptive study is to gather a better understanding of language use within the home environment of toddlers who are in foster care or in the early adoption process. A LENA (Language ENvironment Analysis) device was utilized throughout the study to record language use during

daily interactions. This device was worn by the child for at least 10 hours while continuing daily activities within their home environment for at least 2 days. The report from the LENA device includes adult word count, child word count, and turn-taking occurrences to describe how the home environment supports or hinders language development. Parents were asked to complete a developmental survey to obtain information on the child's current language use. Following completion of the study, a descriptive report was provided to participants, as well as feedback on how to enhance language development. Implications for developing early intervention programs will be discussed.

Improving Language Elicitation Strategies During Shared Storybook Reading with Preschoolers: Effects of Video Parental Training
Samantha Sudduth, Ashton Doza
Faculty Advisor: Shurita Thomas-Tate

Shared storybook reading during the toddler/ preschool years has been proven to be an important contributor to the development of early language and literacy skills. This pilot study investigates the effectiveness of parental training on specific reading strategies in increasing language output by preschool children during joint book reading. Parents of preschool children between the ages of two and five were recorded during shared book reading with their children on three separate occasions using LENA recording devices. The initial recording took place prior to any training. The second recording took place after the parents had been provided a handout and a brief training video on the use of C.R.O.W.D. prompts for dialogic reading. The third recording took place following a second training video on use of the P.E.E.R. sequence to shape children's responses to C.R.O.W.D. prompts. LENA results were then compared between the pre- and post-training recordings to explore the efficacy of providing video training to parents and the impact on their children. Implications for early intervention programs will be discussed.

Investigating the Relationship Between Balance and Hearing Loss
Lesa Roy, Letitia White-Minnis, Sarah Barber, Susan Robinson
Faculty Advisor: Letitia White Minnis

Hearing loss is one of the most prevalent conditions affecting the elderly. Dizziness and balance problems are also a common concern. When hearing loss begins in adulthood, it often declines more with each passing decade. Researchers suggest that in addition to communication difficulties, hearing loss can have a negative impact on the elderly adult's mental and cognitive health. Like our hearing, our balance system often weakens with age. The purpose of this literature review was to investigate the relationship between hearing and balance and to explore the potential benefits that hearing aids may offer to those with balance or dizziness issues. Based on this literature review, it is suggested that audiologists educate elderly patients on the relationship between hearing and balance. To aid in patient education, a simple brochure was created.

KINESIOLOGY

Exploring College Student Stress and Physical Activity During the COVID-19 Pandemic
Delaney Scace, Sara Powell, Barbara A. Bushman, Stacy E. Goddard, Ryanne S. Klabunde
Faculty Advisor: Sara Powell

The negative health impacts of stress among college students are evident, especially during the COVID-19 pandemic. Physical activity (PA) can reduce stress levels and improve well-being. This study examined the effects of the pandemic on PA and stress levels among college students. Data were collected from U.S. college students (N=169, 72.3% female, 81.9% white) using an anonymous survey through Qualtrics. Participants self-reported demographic information, PA (PASS, 2020) and stress levels (Perceived Stress Scale), and changes to PA due to COVID-19. Results demonstrated significant differences between PA and stress. Students who met PASS guidelines for cardio and muscular fitness reported lower stress levels

compared to those meeting one or neither guidelines ($F(2, 173) = 3.04$, $p = .05$). Comparing gender, female students reported higher stress levels than males ($F(1, 174) = 8.7$, $p = .004$). Significant mean differences were also found concerning comfort level using campus recreation centers ($F(2, 130) = 3.9$, $p = .023$), as PA decreased for students feeling less comfortable utilizing the facility. This information can be used to promote the importance of regular PA among college students to decrease stress and improve well-being.

NURSING

Implementing a Virtual Wellness Group Intervention for Rural Female Veterans
Alison Kuhn
Faculty Advisor: Rita Million

Introduction/Background: Female Veterans are a vulnerable population. Female Veterans' suicide rate is higher than their male counterparts. Research shows mindfulness interventions represent accessible, safe alternative treatment options. Aims: This quality improvement project aims to enhance psychosocial health and well-being for rural female Veterans participating in a 4-session virtual weekly wellness protocol (LIVE). LIVE includes group social interaction and a weekly brief mindfulness practice. Methodology: The intervention method design minimizes risk. Recruiting uses the convenience sample method. Veterans participate in pre-and post-intervention sessions and LIVE intervention. Pre-and post-measurements assess perceived stress, sleep quality, mindfulness, and global mental and physical health. Results: Results indicate a potential medium clinical effect for the tendency toward greater mindfulness, reduced stress, and increased sleep quality. Conclusions: LIVE has potential to narrow mental health disparity gaps, reducing stress and negative impact of social isolation. Recommendations for future research include expanding the participant sample to gain additional insight on the efficacy of mindfulness interventions.

Implementing a Diabetic Foot Care Protocol in a Primary Care Clinic
Allison Chamberlin, Melissa Penkalski
Faculty Advisor: Melissa Penkalski

Introduction: Diabetic foot complications have devastating effects on patient's quality of life and an enormous financial burden on the healthcare system. Guidelines recommend an annual comprehensive foot exam. Unfortunately, many patients with diabetes do not receive this important screening. Aims: This project's focus was integrating an evidence-based protocol for diabetic foot screenings and care into a primary care clinic which included patient and provider assessment and education. Objectives included increasing provider's knowledge of and confidence in performing screenings and treating complications, increasing patient's self-care practices, and increasing the percentage of patients receiving their foot exam. Methods: Providers and patients signed informed consent prior to their assessments and educational sessions. Follow up occurred by phone. Results: Results showed statistically significant increases in provider confidence, patient self-care practices, and patient exam percentages. Conclusions: The study concluded patient self-care practices were low, provider baseline knowledge was high and provider baseline confidence was low. Each of these measures increased after educational interventions.

Implementation of a Rapid Chest Pain Protocol in a Walk-in Clinic
Lorilea Johnson, Diane L. Smith
Faculty Advisor: Diane Smith

Introduction: Patients with chest pain that are at high risk for cardiac origin need to be quickly identified. Protocols for outpatient clinics are not well defined. When patients with low-risk chest pain are sent to the emergency room (ER), resources are wasted. Aims: This protocol was performed to provide clarity of risk stratification in chest pain patients for clinicians without ER capabilities to perform rapid troponin levels or to access a cardiologist and activate a cardiac catheterization lab. Methodology: Patients with chest pain who presented to a walk-in

clinic were risk stratified into risk levels for cardiac events. Patients were screened including Marburg Score. Patients with low scores were more likely to be kept in clinic, high scores more likely to be sent to the ER. Scores of 2 or less are considered low risk with a negative predictive value ~98%. High risk patients received EKG. Results: There were 26 participants. Four were sent to the ER and found to have a cardiac event. Twenty-one were treated for non-cardiac causes in the clinic and remained free of cardiac issues on follow-up on days 30 and 60. This is a 15% prevalence of cardiac event with 100% positive and negative predictive value for cardiac origin in this study.

OCCUPATIONAL THERAPY

Areas of Occupation Affected by Fear in Individuals with Chronic Pain
Mackenzie Meyers, Mayce Willison-Allen, Amanda Ebert, Meshila Mullins
Faculty Advisor: Tara Boehne

Previous studies found an association between fear and decreased activity performance, suggesting fear of pain may affect individuals with chronic pain more than pain itself. Researchers assessed the degree to which fear impacted occupational participation and the areas most affected by fear in individuals with chronic pain. Using a novel telehealth approach, five participants completed the Activity Card Sort (ACS) and the Fear-Avoidance Components Scale (FACS). Significant results of the paired sample t-tests on all ACS subcategories indicate chronic pain has a large negative effect between previous and current activities ($p < .05$; Cohen's $d > 1.0$). Pearson's correlations between the FACS and ACS subcategories indicated no significant correlation between fear and occupational participation ($p > .05$). Researchers acknowledged the versatility of ACS administration in a telehealth setting and suggest occupational therapy has a valuable role in addressing participation of clients with chronic pain.

Infants with Neonatal Abstinence Syndrome (NAS) Experiencing Feeding Difficulties
Colleen Bellows, Katie Hansen, Allison Lacker, Jessica Perkins, Ashton Salmon
Faculty Advisor: Ashlea Cardin

Neonatal Abstinence Syndrome (NAS) is a group of withdrawal behaviors that can occur in infants exposed to certain drugs prior to birth. Fussiness, tremors, and poor feeding are common. Researchers sought to determine if a sensory-based occupational therapy intervention ("gentle movement therapy") would assist infants with NAS in organizing their suck pattern for nutritive feeding. Prior to COVID-19, participants were to receive three 6-minute interventions (bouncing, rocking, or remaining still) during non-nutritive sucking prior to bottle-feeding. "‹Suck pattern metrics were to be recorded utilizing nfant® "smartbottle" technology. Researchers were unable to collect primary data in 2020; thus, mock data was analyzed using descriptive statistics and a one-way repeated measure ANOVA. Results showed no significant differences in number of sucks per minute between each level of the independent variable. Feeding organization in NAS is an intricate process and further research is warranted.

Long-Term Impacts of Telehealth Modified CIMT for Children with One-Sided Weakness
Griffen Heller, Haley Isbell, Hannah Slusher, Bailey Waller
Faculty Advisor: Sapna Chakraborty

Constraint-Induced Movement Therapy (CIMT) delivered through telehealth services has shown improvements in motor function of individuals with stroke-related hemiplegia (Pickett et al., 2007). The single-subject ABAA study was used to assess the long-term impacts of telehealth-based modified CIMT on a child's use of the affected upper extremity for functional activities. Due to COVID restrictions, two mock participants' functional outcomes were measured by the Pediatric Motor Activity Log (PMAL) and Shriners Hospital Upper Extremity Evaluation (SHUEE) using mock data for student learning and analysis. PMAL scores for

"how well" (p=.068, η^2=.93) and "how often" (p=.081, η^2=.92) were insignificant, but a high effect size was determined. Participants showed notable improvements on the spontaneous functional analysis SHUEE subtest. Findings indicate that telehealth-based modified CIMT may have long-term gains in using the affected upper extremity for function. Further research regarding optimal CIMT protocol duration to promote effective interventions is warranted.

The Effect of Use of an Adapted Guitar on Post-Stroke Rehabilitation: A Randomized Controlled Trial

Lauren Allen, Leo Flint, Maria Hermann, Chelsea Jennings
Faculty Advisor: Traci Garrison

The purpose of this randomized controlled trial was to investigate the effects of using an adapted guitar on upper extremity (UE) function, quality of life, motivation, and logged practice time for individuals in the subacute stage of stroke. Due to COVID-19, researchers opted to use mock data with a reduced scope. Participants receiving in-clinic occupational and physical therapy with a subsequent home exercise program were planned to be randomized into a control group (n=10) receiving evidence-based practice (EBP) interventions and an experimental group (n=10) that used the adapted guitar and EBP interventions. Independent samples t-tests on Action Research Arm Test pretest scores found no significant difference between groups (t=-1.067; p=.300) and posttest scores found statistically significant improvement with the experimental group (t=2.68; p=.015). The mock implications include an interdisciplinary tool that can be used in conjunction with EBP to promote function by doing.

The Effects of Self-Adhesive Tape and Microporous Paper Tape on Hand Temperature and Discomfort During Paraffin Wax Treatment

Gabrielle Amos, Paige Shockley, Madeline Steinbach
Faculty Advisor: Marc Willey

Objective. Flexion strapping and paraffin wax treatment are used in conjunction in occupational therapy to prepare the hand for therapeutic activity. No clinical guidelines currently exist for this type of treatment. Researchers investigated the differences in hand surface temperature and the discomfort experience with different tape materials for flexion strapping during this treatment.
Method. Pilot data was gathered using research student participants. The participant's hand was dipped in paraffin wax in three conditions: no tape, self-adhesive tape, and microporous paper tape. Surface temperatures of the hand were measured using sensors and discomfort was reported using an ordinal scale. Primary data was not collected due to COVID-19.
Results. Mock data demonstrated a significant main effect (p = .003), with self-adhesive tape causing higher hand temperatures and a higher discomfort mean than the other conditions.
Conclusion. Occupational therapists should consider that the choice of material for flexion strapping may influence the client's experience. More research is needed to validate these findings and determine safety precautions to facilitate occupational participation.

The Phoenix 3-D Printed Hand: How Wrist Flexion Impacts Grip Strength

Samantha Nardi, Kori McCurry, Amy Jungbluth
Faculty Advisor: Marc Willey

Prostheses support independence in activities of daily living (ADLs) for individuals facing limb deficiencies. This research project used the Phoenix Hand™, designed for a 9- to 10-year-old child, to analyze the grip strength at varying degrees of wrist flexion. The Phoenix Hand™ was attached to a mechanical jig simulating a human forearm. A Jamar bulb dynamometer measured grip strength, and an electric goniometer measured wrist flexion. Researchers halted data collection due to COVID-19, leading to the utilization of mock data. Researchers used a one-way repeated measures ANOVA, F (2.31, 32.30) = 191.082, p<.001, Greenhouse-Geisser p<.001, η^2 =.932 to analyze grip strength at 5-degree increments, from 0-40

degrees. Grip strength increased from 0-30 degrees wrist flexion until maximum strength of 6.05 lbs was recorded at 30 degrees; grip strength decreased from 30-40 degrees wrist flexion. Future research on the Phoenix Hand's grip strength may inform therapists who work with children to maximize independence.

PHYSICAL THERAPY

Factors Influencing Trunk Proprioception in Healthy Young Adults

Brendan Black, Mark Braunberger, Bryce Brown, Collin Rhodes, Tyler Waterway
Faculty Advisor: James Hackney

Background: In dance, the ability to maintain maximally vertical posture of the upper trunk and shoulder girdle is important both aesthetically and for the prevention of overuse injuries of the upper trunk and shoulder girdle. To test an intervention intended to help students of dance maintain the desired posture, we investigated the amount of sensory perturbation necessary to challenge the ability of healthy, young adults to reproduce trunk posture. Methods: We tested 14 young adults for their ability to reproduce sagittal plain angle between the pelvis and trunk after five repetitions of bending the trunk in forward, backward, and sideways left and right under each of the following four conditions; no sensory perturbation, blindfolded to obscure vision, vision obscured and center of foot pressure sense dulled by standing on a foam pad, and after being passively rotated on a wheeled chair 12 times in 60 seconds while blindfolded. Results: Repeated measures ANOVA yielded a probability of .036 for all the within subject comparisons. Paired samples testing revealed no significant difference between condition 1 to condition 2, but an almost significant and significant difference, respectively between condition 1 and conditions 3 and 4 in reproduction of trunk angle, p. = .052, and p = .33. Conclusion: Healthy, young adults have a robust ability to reproduce lumbar pelvic angle. To make the task a challenge, multiple sensory modalities must be perturbed.

Effect of Reduced Stiffness Dance Flooring on Lower Extremity Muscle Recruitment During a Ballet Jump

Hannah Eaves, James Hackney, Sarah Wilcoxon, Gerard Harker, Mary Holtmeier, Amy Potthast
Faculty Advisor: James Hackney

Research shows that factors which can aid in extrinsic shock absorption; flooring and footwear, can help reduce lower extremity injuries. Since students and performers of some types of dance cannot depend upon footwear, the only extrinsic factor for shock absorption is flooring. We investigated whether doing sauté on a low stiffness dance floors produced a difference in EMG output of the vastus lateralis, gastrocnemius, of soleus compared to a hard floor. We measured average and maximum EMG output averaged across the same eight trials from 16 dancers on a low stiffness floor compared to a hardwood floor on concreted subflooring. Data showed a trend toward higher EMG average and maximum muscle activity during jumping on the “sprung” floor compared to a hard floor, especially for the soleus. Results suggest that whatever the mechanisms of a low stiffness dance floor in helping to reduce dance injury might be, it is not through decreased muscle activity. Although the difference in EMG output between floor conditions did not reach statistical significance for any of the muscles tested, the effect size “d” was medium for the average output for the soleus, and for the maximum output for the gastrocnemius and soleus.

PSYCHOLOGY

Meaning in Life and the True Self: A Construal Level Theory Approach

Lydia Needy, Christie Cathey
Faculty Advisor: Christie Cathey

People have higher ratings of meaning in life when they feel like they know their true self (Schlegel et al., 2009). In two studies, I examine whether one’s thoughts about their true self and meaning in life are consistent with a high-level construal. According to Construal Level Theory (CLT), the type of mental

construal used (i.e., low- versus high-construal) depends on how much psychological distance there is between the self and the object one is mentally representing. Objects perceived as far from the self use high-construal levels, which are more abstract, simple, and schematic. Objects perceived as close to the self use low-construal levels, which are more concrete, detailed descriptions. Research has demonstrated that the true self is thought about in abstract ways (Christy et al., 2019; Dulaney et al. 2019), and is tied more closely to mental states (Johnson et al., 2004). This suggests that the true self might be represented by a higher-level construal. Participants in Study 1 completed a task that primed either a high- or low-level construal and then completed a measure of meaning in life. Participants in Study 2 also completed the construal priming task followed by a writing task designed to prime and then measure either their true or actual self-knowledge. Planned analyses include ANCOVAs to determine if there are differences in ratings of meaning in life and perceived true self-knowledge based on construal level.

Correlates of Self-Compassion
Haein Won, Samantha Woemmel, Emma Sparks, Lydia Needy
Faculty Advisor: Christie Cathey

Self-compassion is a positive self-attitude that entails: (a) showing kindness and understanding to oneself rather than harsh self-judgment, (b) accepting one's current situation as a part of a common human experience, and (c) holding balanced awareness of one's thoughts and feelings rather than over-identifying with perceived failure (Neff, 2003). The current study investigated the relationship between self-compassion and three psychological constructs, including fears of compassion, grit level, and acceptance of one's own and others' immoral behaviors. Participants completed an online self-report survey consisting of a short version of the self-compassion scale, fears of compassion scales, grit scale, and an altered version of a moral transgression judgment scale. We will examine relationships among those variables with Pearson product-moment correlation coefficients and will focus our discussion on the importance of self-compassion development on overall psychological well-being, especially among college students.

A Moderated Mediation of Race on Racial Climate, School Liking and Belonging, and Academic Engagement
Savannah Jungmeyer
Faculty Advisor: Leslie Echols

School liking and belongings is correlated with academic engagement and school achievement but at varying degrees between Latino and white adolescents (Casilla, 2010). School racial climate as perceived by teachers have also shown a difference in achievement between Latino and white adolescents (Leavitt, 2017), as well as a relationship with academic engagement for black high school students (Griffin, 2017). The purpose of this study was to examine whether school belongingness mediates the association between school racial climate and academic engagement and whether these associations vary for ethnic minority youth. The data come from an intervention program designed to promote intergroup relations in ethnically diverse middle schools. The sample used for this study consists of 236 seventh and eighth grade students (121 male, 115 female). When asked about their ethnicity, 92 reported Latino and 144 reported white. When tested, school liking and belonging did account for the relationship between racial climate and engagement in the base model; and when race was accounted for, Latino students saw a stronger relationship between the three.

International Study and Personality: Higher Cross-Cultural Comfort Indicates Larger Transcultural Leaps
Sarah Crain
Faculty Advisor: Melissa Fallone

Those who seek international education often find it difficult to decide which world region would best suit their needs. More developed methods of advising are needed to assist students in choosing

the right study abroad program. This correlational study explores the connection between personality traits, risk-taking behavior, and study abroad location choice to begin developing a solution for this need. Students from Missouri State University (N = 271) were recruited to complete an online survey to measure these respective variables. Cross-cultural comfort was significantly correlated with both Agreeableness (r = .20) and Open-Mindedness (r = .51). Students who reported high scores of Agreeableness and Open-Mindedness reported higher comfort levels in cultures unlike their own, and they were more likely choose to study in these cultures than students who reported less cross-cultural comfort. Students high in Agreeableness and Open-mindedness also reported more risk-taking behavior. Examining preferences based on personality traits will likely improve placement as students choose a location, leading to higher satisfaction rates and easier cultural adjustment.

Covid-19 Effects on Academic Self-Regulation and Achievement Goals

Derrick Schaffer, Melissa Fallone
Faculty Advisor: Melissa Fallone

This study examined how changing from in-person to online courses due to the Covid-19 pandemic has impacted students' academic self-regulation and goal orientation. College students (N = 59) enrolled in psychology courses participated in a retrospective pretest-posttest study designed to assess differences in students' experiences during a pandemic (Fall 2020) and pre-pandemic (Fall 2019). Students completed an online survey containing a modified version of the Achievement Goal Questionnaire, the Academic Self-Regulation Measure, questions about their current academic courses. Next, they were asked to answer the same questions as they would have during the Fall 2019 semester. Our data support the hypothesis that the Covid-19 pandemic and forced integration to online or hybrid courses yielded decreases in academic self-regulation ($p < .001$), Performance Approach Goal Orientation ($p = .005$) and Performance Mastery Goal Orientation ($p = .002$), while Performance Avoidance Goal Orientation increased ($p < .001$). These finding indicate that college students perceive the pandemic as having a negative impact on their academic self-regulation and goal orientations which is likely related to students' academic performance.

Implicit Measures of Familial Relationship Attributes

Max Lischwe, Donald Fischer
Faculty Advisor: Donald Fischer

The purpose of this study was to develop IATs that assess intrafamilial relationship quality and later use them to understand interfamilial differences between nuclear families and step/adoptive families. A sample of college students (N=40) completed 3 standard 7-block IATs. The targets used in the IATs were mom and dad. The attribute labels and stimuli for the IATs were derived from the IFIRS (Iowa Family Interaction Rating Scales, 1998), which were: Worry (vs. happy), Angry (vs. warm), and Positive (vs. negative). Participants sorted stimuli into target and attribute categories for each IAT and scores were based upon response times. Statistical analyses indicated that the stimuli classification accuracy rates were all above 90%. In addition, the standard deviations of the IAT scores ranged from .31 to .38 and the reliability coefficients for the IATs ranged from .48 to .75. These results suggest that the psychometric properties of the IATs are sufficiently adequate to be useful measures of differences in the way family members experience their relationships. To the authors' knowledge, this is one of the first studies attempting to develop and utilize an IAT to measure and analyze relationship quality among families.

The Development and Validation of Implicit Measures of Job Satisfaction for Students

Xin Wei Ong, Donald Fischer
Faculty Advisor: Donald Fischer

Job satisfaction is one of the most researched topics in the field of industrial-organizational psychology. Researchers have examined different aspects of job satisfaction and have developed various scales to assess these dimensions, primarily through explicit

(self-report) measures. However, self-report measures can be contaminated by inaccurate self-knowledge and impression management artifacts, which may weaken the predictive validity of the measures. The Implicit Association Test (IAT) might be used to address these limitations because the procedure is based on reaction times in classification tasks. This research developed personalized implicit measures of job satisfaction (the work itself, supervisor relations, and coworker relations) using IATs and investigated their construct validity in a college sample. The construct validity of the measures was investigated with a multitrait-multimethod design (MTMM) that included explicit measures. Although the measures did not have adequate internal consistency reliability, some evidence of convergent and discriminant validity was found.

Explicit and Implicit Relationships Between Emotional Intelligence and Psychological Distress

Brooke Watson, Donald Fischer
Faculty Advisor: Donald Fischer

Trait emotional intelligence (EI) has been conceptualized as "behavioral dispositions and self-perceptions concerning one's ability to recognize, process, and utilize emotion-laden information" (Petrides & Furnham, 2003) Depression, anxiety, and stress are intimately related to one's psychological well-being. Several studies have found evidence supporting the relationship between psychological distress and EI (Kousha et al., 2018; Mikolajczak et al., 2009; O'Connor et al., 2017). Traditional approaches to measuring both EI and one's mental health rely on self-reports, which can be contaminated by impression management and inaccurate self-knowledge artifacts (Fazio & Olsen, 2003). The Implicit Association Test (IAT) can measure psychological attributes in ways that are resistant to these artifacts (Lane et al., 2007). This study further investigates the relationship between EI and psychological distress by employing both explicit and implicit measures of these attributes in a multitrait-multimethod design. CFA procedures were used to evaluate a set of nested latent trait models to test convergent and discriminant validity hypotheses. Hierarchical regression procedures were used to examine incremental validity in the IAT.

Adversity, Stereotype Threat, and Resiliency Affecting Student Performance

Courtney Cummins, Olivia Baron, Amber Massey-Abernathy
Faculty Advisor: Amber Massey-Abernathy

The current study aims to expand the understanding of the relationship between adverse childhood experiences, stereotype threats, and a person's level of resiliency and performance. Though previous literature has extensively examined racial (Steele & Aronson, 1995) and gender stereotype threats, this study looks specifically at adverse experiences creating a gap in performance and resiliency among participants. Kiesel and colleagues (2016), found significant correlations between child maltreatment, partner violence, and academic performance. Some studies have suggested a higher resiliency in participants that have faced adversities (Nussbaum & Steele, 2007), but for the purposes of this experiment, we predicted that participants who had exposure to adverse experiences in their childhood and were primed regarding these experiences prior to completing the task would perform worse or give up sooner than those who were not primed. The findings showed priming did not impact performance or time for completing of the task. It appears adverse experiences might not create a stereotype threat. These results are useful to consider for further studies examining the area of stereotype threats, adverse experiences, and resiliency.

Media and Personality Impacts on Emotional and Behavioral Problems

Lydia Needy, Courtney Cummins, CaSandra Stanbrough, Amber Massey-Abernathy
Faculty Advisor: Amber Massey-Abernathy

Media usage is highly prevalent in American culture today with over 70% of adults reporting social media use (Pew Research Center, 2019) and over 40% reporting video game play (Perrin, 2018).

Various aspects of media usage have been associated with positive impacts on an individual, including cognitive benefits (Boot, et al., 2008; Dye, Green, & Bavelier; 2009, Spence, & Feng, 2010), increased social support, and relationship intimacy (Morey, et al., 2013). However, other aspects of media have been connected to negative impacts such as poor relationships (Padilla-Walker, et al., 2010) and addictive behaviors (Skoric, Teo, & Neo, 2009). The current study examines aspects of media including video game and social media usages at various levels to determine if there are differences in problematic usages, personality characteristics, and negative emotional symptoms. ANOVA analyses, exploring three different levels of video game and social media usage, and correlations revealed that video game and social media usage, along with certain personality characteristics, have negative implications on emotion and behavioral problems.

That's My Friend: Exploring Personality, Subthreshold Autism Traits, and Fantasy Proneness in Parasocial Relationships

Weston Phipps, Kennedy Cooper, Amber Massey-Abernathy, CaSandra Stanbrough
Faculty Advisor: Amber Massey-Abernathy

Social interactions are integral to human life, quality, and outcomes. Recently technology has changed the way that individuals interact via media. Parasocial relationships are pseudo-one-way relationships that a viewer has created with a celebrity via media (Horton & Wohl, 1956). Previous research suggests these relationships are perpetuated by a combination of social and task attraction, physical attractiveness, similar or shared interests, and a sense of group identification (Auter & Palmgreen, 2000; Chory-Assad & Yanen, 2005; Hartmann & Goldhoorn, 2011; Rubin & McHugh, 1987). The current study expanded on previous literature by examining the effect that personality traits, subthreshold autism traits, and fantasy proneness have on the likelihood of developing parasocial relationships. Data collected from questionnaires displayed that conscientiousness, subthreshold autism traits, and fantasy proneness are all related to parasocial relationships. This suggests that media-based relationships can be of use for conscientious individuals who lack social skill abilities to create and maintain reliable friendships. The parasocial relationships then are viewed as 'real' by the individual, serving as a form of social connectedness.

Probing Popularity: Resource Control Strategies and High Status

Rebekkah Wall, Jazmyn Henderson, Amber Massey-Abernathy
Faculty Advisor: Amber Massey-Abernathy

The innate drive for humans to belong in cooperative societies is coupled with the strategies they use to gain and maintain resources (Sapolsky, 2004). Individuals in high social status use specific strategies to gain their status (Hawley, 2003). High status, or popularity among peers, can be assessed via social dominance or likability (Parkhurst & Hopmeyer, 1998). Prior research shows that those considered to be socially dominant use a combination of both prosocial and coercive strategies (Hawley, 1999; Hawley, 2003). Previous research has not determined what strategies are used for individuals high in sociometric popularity (likeability). This study examined self-report social dominance and self-report likeability as classifications of high status. A series of linear regressions showed that prosocial strategies predicted self-reported likability, and that both prosocial and coercive strategies predicted social dominance. This means those who are self-reported socially dominant use both prosocial and coercive strategies whereas those who are self-reported likable only use prosocial resource control strategies. This research helps differentiate between the two types of high status.

Service-Learning in Psychology: Identity, Cultural Competence, and the Teaching of Development & Educational Psychology

Hannah Pulse, Tegan Hoff, Amanda Bonnot, Jorre Hadley
Faculty Advisor: Ashley Payne

Service-learning is a form of experiential education that integrates academically relevant service into a course. It allows students to apply classroom knowledge to real-word situations and develop skills specifically designed for a chosen career field. Service-learning has been shown to be beneficial for higher education; however, research in this area is lacking in the investigation of students' perceptions of service-learning and how it connects to the development of their professional identities and incorporation of cultural competence and social justice within their careers. The purpose of this research study is to investigate the role that service-learning plays in the development of identity and cultural competence in education and psychology students. Based on previous research that demonstrates significant gains in social and academic aspects, this research study qualitatively investigates the role that service-learning plays in the development of professional identity and cultural competence in education and psychology students. This study will also investigate the role of service-learning as a transformative and social justice-oriented pedagogy for teaching educational and developmental psychology.

Exploring the Role of Diversity Courses on Implicit and Explicit Bias of College Students

Erinmarie Travis, Kaylee Rucker, Adena Young-Jones, Ashley Payne
Faculty Advisor: Ashley Payne

Racial bias on an American campus imitates the systemic racial biases evident in society. While previous research indicates an improvement of explicit prejudice from participation in diversity courses, limited evidence suggests diversity courses having an impact on implicit attitudes. This study examines whether both implicit and explicit racial attitudes changed when partaking in a diversity college class. Participants (N = 227) were recruited from the psychology diversity course at a Midwestern University. Five scales were utilized related to racial prejudice and biases: Modern Racism Scale items and Explicit Racial Resentment Scale items were combined to measure Explicit Racial Prejudice, Motivation to Control Prejudiced Reactions Scale, modified Racial Preference IAT, and Racial Stereotyping IAT. Repeated measures MANOVA revealed significant results for all four scores. Post hoc t-test revealed significant differences in scores between pre- and post-testing. Our results revealed promising change at both the explicit and implicit levels. Therefore, diversity courses can provide a positive shift toward structural change that might lessen the passive nature of diversity initiatives.

The Relationship Between Self-Reported Sensory Experiences and Personality

Mary Vonarx, Skyler Harmon, Elizabeth Troutwine, Carly Yadon
Faculty Advisor: Carly Yadon

Our study assessed the relationship between sensory processing and personality using sensory sensitivity questionnaires - Sensory Gating Inventory (SGI), Highly Sensitive Person Scale (HSPS), and Adult Sensory Processing Scale (ASPS) – and a personality scale, the Big Five Inventory (BFI). After providing informed consent, Introductory Psychology student participants (N = 43) completed a survey distributed through Qualtrics that contained the SGI, HSPS, ASPS, BFI, and a demographic questionnaire. A positive correlation between SGI total score and Neuroticism as well as a negative correlation between SGI total scores and Conscientiousness were found. These results differ somewhat from Yadon and Daugherty (2019), suggesting the self-reported SGI and physiological measures of sensory gating (event-related potentials) may measure different constructs. A positive correlation was found between HSPS scores and Neuroticism as well as a negative correlation between Auditory Overresponsiveness (ASPS) and Extraversion. An understanding of the relationship between sensory sensitivity and personality could help explain and predict behavior in highly sensitive and sensory reactive individuals.

The Bogus Pipeline Method: Unmasking the Modern Villain of Implicit Prejudice

Bryce Bettis, Megan Harty, Nicholas Stoll, Erinmarie Travis, Jorre Hadley, Ashley Payne, Adena Young-Jones
Faculty Advisor: Adena Young-Jones

Exposing prejudice and bias is difficult due to factors like social desirability. Using Jones and Sigall's Bogus Pipeline Method (1971; BPM), researchers urge more accurate results by suggesting that collected physiological data could detect dishonest reports. The goal of this study was to uncover unknown prejudices by exploring implicit biases regarding sexual orientation prejudice (SOP), ethnicity prejudice (EP), and ability prejudice (AP). In control groups, participants completed a pre-test and screening after providing informed consent. A questionnaire packet including a Diversity Assessment, Balanced Inventory of Desirable Responding, specific prejudice variable scales, and a demographic form. EP and SOP were evaluated using two specific prejudice scales each while AP utilized interaction-based scales. Experimental conditions involved the same data collection with the addition of the BPM intervention. We hypothesize that significant differences will exist with the BMP intervention. We expect more candid responses when one believes a distorted response will be detected. If prejudice levels differ between groups, results will support the existence of implicit prejudice and the BPM's ability to evaluate sensitive topics.

How Online Connectivity Impacts Anxiety, Depression, and Empathy Among College Students

Tegan Hoff, Adena Young-Jones, Ashley Payne
Faculty Advisor: Adena Young-Jones

Contemporary internet access allows developing adolescents and young adults to become increasingly intertwined in each other's lives more than ever before. While earlier research focused on the primary gender differences in anxiety, depression, and empathy, current research is examining how the internet and social media can influence those variables. Research suggests that given the context of internet use, there are mixed results on how it influences the variables. This study examined the relationship between online connectivity, levels of anxiety/depression, and empathy. Additionally, we sought to identify any gender differences specifically in those who self-identify as cisgender male or female. This study utilized undergraduate students who completed four self-report surveys. A correlational analysis confirmed previous research between internet usage and increased empathetic patterns for females but also suggested that male's empathetic concern is affected. These results narrowed the previous research sample to specifically college students. Future research should explore these constructs among a broader sample including non-university students and sexual/gender minority individuals.

PUBLIC HEALTH AND SPORTS MEDICINE

Policies vs. Practice in Collegiate Athletics: Concussion Return to Play and Return to Learn

Grace Gullett, Molly Franko, Corey Ratsch
Faculty Advisor: W. David Carr

Objective: The objective of this study was to study athletes' experiences with concussion management, and if their self-reported management met NCAA guidelines. Design and Setting:
Athletes were given contact information to reach out if they would be interested in participating. Twenty-minute interviews were scheduled and conducted via Zoom. Participants: The target population was collegiate athletes who sustained a concussion in the past calendar year. The selection criteria include athletes 18-26 years old within the Springfield, MO, area who have sustained a sport-related concussion in the last calendar year. Interventions: Interviews will be transcribed and analyzed to determine themes by two independent reviewers. Those themes will be returned to the participant for triangulation of our findings. Results:
Pending. Conclusions: We hypothesize there will be themes of frustration with the healing process, confusion with the return-to-play steps, but overall

satisfaction with management. We anticipate most NCAA guidelines to have been met.

The Relationship Between Clinician Mindset and Burnout

Fiona Lefresne, Caitlin Williams, Kennedy Holwerda, Ethan Freitas
Faculty Advisor: W. David Carr

Clinician burnout is a serious concern amongst athletic trainers as a limiting factor for career duration and success. It is possible there is a link between personality and mindset that could predispose some clinicians to experience burnout. The purpose of this study was to establish if there was a relationship between a clinician's mindset and the incidence of feeling burnout at some point in their career. We utilized the Personal Optimism and Self-Efficacy measure of mindset and the Oldenburg Burnout Inventory measure of burnout. Data was captured through an online survey through the National Athletic Trainers' Association and then analyzed using a Spearman's Rank Correlation and a Pearson Correlation. The research hypotheses were: 1) there will be a correlation between burnout and mindset; and 2) there will be no difference between each measure and the participant demographics.

The Effects of Patient-Reported Outcome Measures on Patient Satisfaction

Erin Harold, Ayron Osborn, Lexie Mikesell, Caleb Morlan
Faculty Advisor: Tona Hetzler

The objective of this research study was to determine if the implementation of patient-reported outcome measures (PROMs) improved patient satisfaction. A sample of NCAA Division I and II athletes were included. Participants were divided between Group 1 (satisfaction survey at 6 weeks) and Group 2 (Disablement in the Physically Active Scale (DPAS) every 3 weeks and a satisfaction survey at 6 weeks). Participants in Group 2 had on average a higher satisfaction rate but no significant difference between the two groups was present. An exploratory correlation item analysis assessed changes in the various DPAS subscale scores over the three assessments. There were observed changes with functional limitations being statistically significant, meaning the DPAS ratings improved over time. Across all participants, a strong trend was identified between a lower patient satisfaction score and athletes with no previous injuries as well as athletes who required a surgical intervention. We recommend clinicians incorporate PROMs into their practice as there is a strong trend that they have a positive influence on patient satisfaction.

Correlation Between Shapes of Movement Outcome Scores and Dancers' Perceptions of Their Pain and Functionality

Ariana Hetland-Purna, Katie Primrose, Haili Teeter
Faculty Advisor: Tona Hetzler

Several functional movement assessments are currently utilized within active populations. Individuals in healthcare and the fitness industry have attempted to use these screens to improve injury prevention. These screens were created with the "traditional athlete", and thus "traditional" movement patterns, in mind. None of the traditional movement screens specifically identify restrictions impacting dancers. While athletic, dancers also move with artistic qualities, which creates a different movement profile. The Shapes of Movement (SoM) screen was designed to be more sensitive to a variety of movement profiles. The objective of this study was to evaluate the correlation between collegiate dancers' perception of their pain and functionality with movement assessment outcomes of the SoM screen. A SoM screen was completed during the fall semester. Movement restrictions identified by the SoM were compared to the dancers' perception of their pain and functionality via a self-reported questionnaire. Analysis was completed by comparing both factors to determine correlation coefficients and evaluate regression analysis. A correlation between dancers' perception of their pain and functionality and the SoM outcome scores was noted.

The Prevalence of Dysfunctional Breathing in Collegiate Athletes

Melanie Noskowiak
Faculty Advisors: Tona Hetzler, McCall Christian

Over the course of a lifetime, the average person takes 400-500 million breaths. Changes in posture, requirements of speech and exercise can alter our breathing. Dysfunctional breathing is a term describing a group of breathing disorders where chronic changes in breathing pattern result in multi-systemic symptoms. The prevalence of dysfunctional breathing has been measured in several different populations, but has not been studied in a population such as collegiate athletics where exercise and posture place a consistent, chronic demand on the body. Methods: A survey was sent out to collegiate athletes including demographic questions and the Nijmegen Questionnaire; a dysfunctional breathing diagnostic tool. The results received thus far demonstrated that 50% of collegiate athletes show symptoms of mild or significant dysfunctional breathing with a higher significance in female athletes. Conclusion: The Nijmegen questionnaire recommends further examination of breathing for any score over 0. This study found that 91% of collegiate athletes reported symptom scores over 0. These findings demonstrated a higher focus be brought to breathing patterns during examination and treatment of collegiate athletes.

Does Biological Sex Affect Coping Behaviors in Collegiate Athletes After an Injury?

Tameka Stennis, Taisei Seki, Hannah Reed
Faculty Advisor: Michael Hudson

Athletic injuries are common when competing in sports. As health care providers, athletic trainers mostly focus on the physical injury and can sometimes overlook the mental and emotional effects of the injury. The purpose of this study was to identify if male and female collegiate athletes manage their stress differently after an athletic injury. The study utilized the Brief Cope Inventory Survey, a 28-questions survey examining 14 subcategories including self-distraction, active coping, denial, substance abuse, and self-blame. We identified participants via convenient sampling, which included 18 males and 15 females. We hypothesized there are differences in coping behaviors of collegiate athletes based on biological sex.

When is the Average Time an Athletic Trainer Starts Scar Tissue Mobilization and Why?

Alexis Zurheide, Sydnee Yancey, Allison Kreklow
Faculty Advisor: Allan Liggett

Scar tissue mobilization on surgical incision is common in athletic training. Although it is well established that everyone follows a similar healing process, healing may vary slightly between individuals. Many factors contribute to this variation in healing; these include age, location or type of surgery, and long incisions versus portal incisions. This study examined the average time an athletic trainer begins scar tissue mobilization on a patient following surgery. The study was conducted by interviewing a population of athletic trainers who work in a clinic setting and regularly see patients 1-2 days post-operation. Interviews were conducted via Zoom video conferencing and were completed at the interviewee's location of preference. Data from the interviews will be transcribed by the Zoom software and analyzed by the investigators by finding the main themes that occur. Because interviews are still ongoing, the data has not been fully analyzed yet. The information obtained from this study will help health care providers moving forward in the treatment of post-surgical scars.