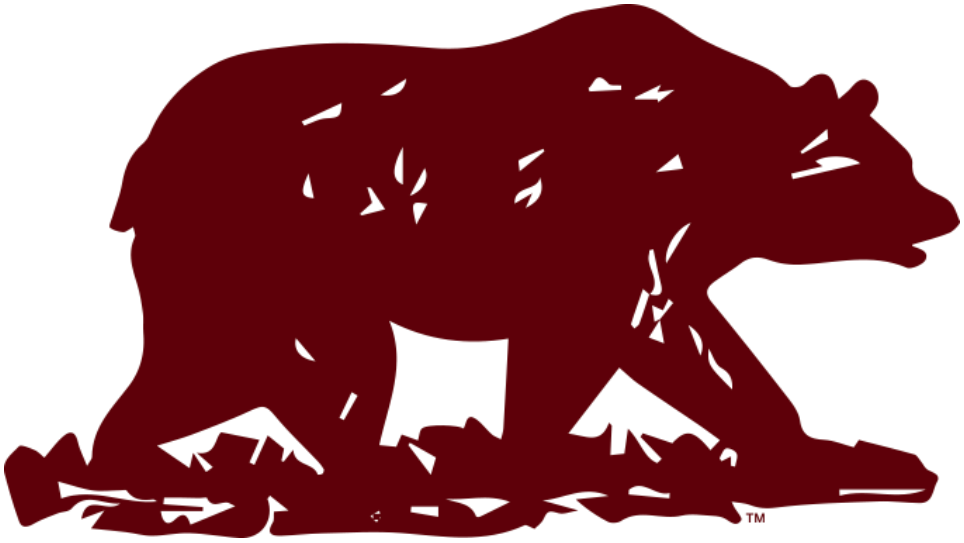
Missouri State

McQUEARY COLLEGE of HEALTH AND HUMAN SERVICES

STUDENT RESEARCH SYMPOSIUM



April 16, 2026

PSU Ballroom

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1. Acute Surgery vs Conservative Treatment for Traumatic Acute Subdural Hematoma

Michelangelo Alfano

Faculty Supervisor: Jianjie Wang

Biomedical Sciences/Clinical Lab Sciences

Acute subdural hematoma (ASDH) is a severe form of traumatic brain injury associated with high morbidity and mortality. Optimal treatment remains uncertain, particularly for patients who fall between clear surgical and nonsurgical indications. Data from the TRACK-TBI cohort was used to examine the outcomes following early surgical evacuation versus conservative management. Patients were categorized by treatment strategy and differences in injury severity were analyzed. Outcomes assessed at six months using the Glasgow Outcome Scale-Extended (GOSE) showed that patients undergoing surgery generally presented with more severe injuries, including lower Glasgow Coma Scale scores, larger hematomas, and greater midline shift. Statistical analysis suggests that early surgical intervention improves outcomes and reduces mortality in patients with severe injury. However, outcomes are comparable between conservative management and surgical excavation in mild injury patients. The findings show that ASDH treatment decisions may vary across populations with higher socioeconomic status and access to care. Additionally, neurological status, imaging findings, and overall injury severity ought to be considered when determining treatment strategies.

2. How Attending a National Conference Fosters a Sense of Belonging in Dietetic Students

Kamryn Amstutz, Simoriah Longhorn, Sarah Murray, Hillary Roberts

Faculty Supervisor: Sarah Murray

Dietetics and Nutrition

Leadership is a vital competency in dietetics. This mixed-methods study investigated how a structured framework, that included pre-, during, and post-conference tasks, impacted sense of belonging among nine dietetics students attending the Academy of Nutrition and Dietetics Food and Nutrition Conference and Expo. Prior to the study, 100% of participants had never attended the national event. Analysis using a Wilcoxon signed-rank test found a statistically significant increase in sense of belonging. Qualitative analysis aligned with this, identifying networking, increased comfortability, and improved peer relationships as primary drivers of development. Guided activities, such as group dinners and presenting to professional audiences, built self-efficacy. Following the intervention, 88.9% of students reported they were likely to attend future conferences. These findings suggest that structured activities and mentorship help mitigate barriers to inclusion and foster professional identity, helping to bridge the gap between student life and their sense of belonging to the profession.

3. Informing Teaching Kitchen Curricula for Patients of a Free and Charitable Clinic: A Population Assessment

Natalie Barbieri, Jaime Gnau, Stephanie Urich, Daniela Novotny

Faculty Supervisor: Jaime Gnau

Dietetics and Nutrition

Economically disadvantaged groups are frequently at higher risk for poor nutrition due to limited access to kitchen tools, minimal cooking experience, and reliance on cheap nutrient poor foods. Teaching Kitchens (TK) offer a multifaceted solution. These interactive workshops provide the skills and coaching necessary to improve health management through development of cooking skills and preparing nourishing foods on a budget. This population assessment will inform development of a TK series to support low-income patients in cooking healthy meals using ingredients provided by the onsite food box program at a free and charitable clinic in Southwest Missouri. A survey was developed using a validated tool, Food Insecurity Experience Scale (FIES), to measure food insecurity and targeted questions to assess the cooking confidence, interests, needs, and barriers among this population. Data was collected anonymously through both online and paper surveys accessed in the clinic lobby and patient rooms. A descriptive approach is used to analyze data obtained from this study. This study will inform the development of a TK series to facilitate improved health management with nutrition and address barriers for a low-income clinic patient population.

4. Perceptions of Teletherapy as a Service Delivery Method in Speech Language Pathology

Madelynne Barnett, Olivia Beard

Faculty Supervisor: Dee Telting

Speech-Language Pathology

Since the pandemic in 2020, telehealth services have become mainstream, from wellness checks to rehabilitative care. Even still, many clinicians and clients alike are hesitant to utilize this service delivery method, believing it to be ineffective. This study is a between-group design that analyzes perceptions of teletherapy effectiveness in student clinicians with minimal experience and experienced clinicians with 3+ years of teletherapy experience. Using a survey, I hope to collect data that gives an understanding of whether these clinicians feel teletherapy is an effective modality for providing services. My hypothesis is that experienced SLPs will perceive teletherapy as a valid and effective service delivery method with greater ratings than student clinicians. This study is rooted in preexisting, evidence-based literature. Comparing perceptions of inexperienced clinicians to experienced clinicians, however, is less researched. This study contributes to existing literature and may help prevent clinicians from dismissing teletherapy as a service delivery method.

5. The Consequences of Vaccine Hesitancy for RSV Prevention and Infant Health

Brady Bourgeois, Ethan Foster, Maya Horn, and Landry Huey

Faculty Supervisor: Randi Ulbricht

Biomedical Sciences/Clinical Lab Sciences

Vaccine hesitancy is a rising global health complication and a prominent factor for increased disease risk and spread throughout populations. Because of this, the World Health Organization has recognized vaccine hesitancy as a top ten global health concern. In pediatrics, vaccine hesitancy includes refusal of all vaccinations or delaying of the recommended vaccination schedule. Vaccine hesitancy has shown up in American politics, resulting in the recent removal of respiratory syncytial virus (RSV) vaccinations from the routine vaccine schedule recommendations by the Centers for Disease Control (CDC), the main public health agency in the United States. This increases the risk of severe respiratory disease in infants and may harm public trust in the RSV vaccine. RSV vaccine hesitancy allows for the potential of disease outbreaks and increasing risk and mortality in infants and the elderly. The reasons for rising vaccine hesitancy include concerns of safety and side effects, novelty of the vaccine, and wanting increased research. Interventions should center on public health education, building trust in the safety and efficacy of the vaccine, and increasing accessibility to vaccine resources.

6. Does Dry Needling Improve Range of Motion More Than Manual Therapy in Patients With Myofascial Trigger Point Pain?: A Critically Appraised Topic

Avery Brooks

Faculty Supervisor: Michael Hudson

Athletic Training/Sports Medicine

Restricted range of motion (ROM) associated with myofascial trigger points (MTrPs) is commonly observed in patients with musculoskeletal pain and may contribute to movement limitations and functional impairments. This condition can disrupt normal movement patterns and negatively affect athletic participation. Both dry needling (DN) and manual therapy (MT) are commonly used interventions aimed at improving ROM and reducing pain associated with MTrPs. The purpose of this critically appraised topic is to evaluate current evidence comparing DN and MT for improving ROM in patients with myofascial trigger point related pain in order to inform clinical decision making. Each study was assessed for methodological quality and risk of bias using the PEDro scale. Current literature indicates that DN may reduce pain and improve MTrP sensitivity in patients with myofascial pain. However, studies comparing DN with MT techniques demonstrate similar improvements in pain and function, with inconsistent evidence of greater improvements in ROM. These findings suggest that while DN may be an effective intervention for managing myofascial trigger point related pain, it does not appear to produce superior improvements in ROM compared with MT.

7. Emotional Factors Related to MSU Retention

Hope Cabral, Maggie Murphy, Olivia Jansen, Chloe Thostenson, Samantha Carstens, Eryn Fanning

Faculty Supervisor: Thomas Kane

Psychology

We examined emotional factors related to MSU freshman retention for students who dropout voluntarily—leaving because they want to rather than for academic reasons. Such emotional factors include affective institutional commitment, social integration, academic satisfaction, and career passion. Those who feel emotionally connected to their college experiences persist because college is where they want to be. The dependent variable of this study was students' intentions to stay at MSU. In prior research, intentions to stay tends to be the single best predictor of college dropout. We studied the effects of these factors on students' intent to stay at MSU. In regression analysis, affective commitment most strongly predicted intentions to stay (Beta = 0.38), followed by social integration (Beta = 0.31). Career passion and academic satisfaction were not predictive. Universities can use these results to target factors directly related to students' voluntary retention. Our discussion includes how MSU can promote students' institutional commitment (e.g., involvement, feeling cared about, forming meaningful relationships).

8. The Role of 5-HT3 Receptors in Seizure Activity and Neuroprotection

Joshua Cassell

Faculty Supervisor: Jianjie Wang

Biomedical Sciences/Clinical Lab Sciences

Epilepsy is a chronic neurological disorder characterized by recurrent seizures and altered brain function. Serotonin (5-HT) is an inhibitory neurotransmitter that has been shown to increase the threshold for seizure activity. Specifically, activation of the 5-HT3 receptor (5-HT3R) has been shown to inhibit epileptic seizures. Multiple medications have been tested in rodents to assess their effects on seizure activity. Ondansetron (OND), a selective 5-HT3R antagonist commonly used to treat nausea, has shown anti-epileptic and neuroprotective effects. Amitriptyline (ATT), a tricyclic antidepressant, has been shown to lower seizure threshold and cause oxidative stress and mitochondrial damage in the brain. Other tested agents included pentylenetetrazol (PTZ), a competitive GABA antagonist, ATT combined with a 5-HT3R antagonist, and ATT combined with the 5-HT3R agonist biguanide (BIG). Results showed that ATT lowered seizure threshold, increased oxidative stress markers, and caused mitochondrial dysfunction. When combined with the 5-HT3R agonist BIG, seizure threshold increased, oxidative stress decreased, and mitochondrial function improved.

9. Developing qPCR Technique to Assess DNA Content in RecA Overexpression Mutants in Tetrahymena Thermophila

Shawnewa Dahozy, Jianna Cox, Joshua Smith

Faculty Supervisor: Joshua Smith

Biomedical Sciences/Clinical Lab Sciences

RAD51, a RecA recombinase homolog, is highly expressed in some aggressive and chemotherapeutic resistant cancer cells in humans. Dmc1 is another RecA recombinase that functions in crossing over a meiotic specific recombination activity and is not associated with cancer. *Tetrahymena thermophila* is a good model organism as it contains the same homologous recombination pathway and has a complex genome with a micronucleus and macronucleus. Tetrahymena that overexpress Rad51 have a faulty macronuclear division phenotype creating cells with increased amounts of DNA content. This research aims to develop a quantitative polymerase chain reaction (qPCR) technique to assess the copy number of DNA in the macronucleus versus the micronucleus in *T. thermophila*. The technique can be used to characterize DNA content levels in cells overexpressing Rad51 or Dmc1. This technique will be used to help understand the role of Rad51 in genome stability.

10. Stakeholder Judgments of Eyewitness Identification Outcomes

Jesse Davis, Melody Whitman, Emma Pierce, Jillian Rector, Kylee Mumma, Jude Wright, Eunice Obeng, Jennifer Sample, Faith Byrum, Kim Ho Nguyen Thien, Paige Mazeitis, David Zimmerman, Dario Rodriguez

Faculty Supervisor: David Zimmerman

Psychology

Most wrongful convictions involve false identifications of innocent suspects from lineups. The eyewitness science community has recommended numerous reforms to improve lineups (e.g., see National Academy of Sciences, 2014; Wells, Kovera, et al., 2020). One such recommendation is to avoid the use of a showup, if possible. A showup is a common identification procedure in which a witness views a single suspect's face (i.e., no photo array with fillers) and indicates whether they recognize the suspect as the culprit. Along with considering the relative accuracy of various lineup protocols and the base rates of culprit presence, policymakers must consider how desirable or undesirable the various forms of correct and erroneous outcomes are. In the current systematic replication (Zimmerman & Rodriguez, 2024), criminal defense attorneys, academic eyewitness researchers, previous jurors, non-jury community members, and university students provided such evaluative weights. In this poster we compare these samples' outcome evaluations along with the results of a methodological variation in which we varied the order of key evaluations.

11. Relationship Between Aerobic Capacity and Functional Gait in Community-Dwelling Older Adults

Brittany DeMoney, Morgan Goodridge, Kennasyn Ray, Jordan Drum

Faculty Supervisor: Marcia Himes

Physical Therapy

As the population of older adults continues to grow, identifying clinical measures that reflect functional capacity and fall risk is increasingly important. Aerobic capacity plays a key role in mobility and endurance, yet its relationship to functional gait performance remains unclear. This study examined whether aerobic capacity, measured by the Two-Minute Step Test (2MST), predicted fall risk as assessed by the Functional Gait Assessment (FGA) in community-dwelling older adults. A cross-sectional analysis was conducted with 36 participants recruited from community senior centers. Each participant completed the 2MST and FGA using standardized protocols. Linear regression examined the relationship between 2MST performance and FGA scores. Participants who performed better on the 2MST tended to demonstrate slightly higher FGA scores; however, the relationship was not statistically significant ($B = 0.05$, $p = .12$). The 2MST explained only a small proportion of variance in FGA scores ($R^2 = .07$). These findings suggest aerobic capacity alone may not strongly predict functional gait performance or fall risk in community-dwelling older adults and should be interpreted alongside other balance measures.

12. Effect of SPTBN1 Knockdown on Interferon-Stimulated Gene IFIT1 Expression During HIV Replication

Braden Dennis, Amy Hulme

Faculty Supervisor: Amy Hulme

Biomedical Sciences/Clinical Lab Sciences

Interferon-stimulated genes (ISGs) are a component of the innate immune response by regulating antiviral signaling pathways and viral replication. Interferon-induced protein with tetratricopeptide repeats 1 (IFIT1) gene may inhibit viral replication by blocking translational initiation and viral protein synthesis. The cytoskeletal protein spectrin beta, non-erythrocytic 1 (SPTBN1) has previously been associated with early steps of HIV replication, but its role in HIV nuclear import has yet to be examined. We hypothesize that knockdown of SPTBN1 will reduce nuclear import, increasing the amount of time HIV exists in the cytoplasm and increasing IFIT1 expression. For this study, IFIT1 primer sets were designed, and RT-PCR reaction was used to generate a PCR product. The PCR product was cloned into a plasmid and transformed into Escherichia coli. Colonies were screened utilizing restriction digest and PCR to confirm correct insertions. Primer efficiency will be determined and subsequently IFIT1 transcript levels will be measured by qRT-PCR. This study will determine whether SPTBN1 knockdown affects IFIT1 expression during HIV infection and may provide future directions for understanding how SPTBN1 affects nuclear import.

13. It Just Makes Scents: Olfactory Function and Mental Health

Rachel Deters, Natalie Scott, Noah Carrow, Madie Hager, Jayden Echols, Carly Yadon

Faculty Supervisor: Carly Yadon

Psychology

Olfactory dysfunction has been associated with negative psychological and quality of life outcomes, particularly following the COVID-19 pandemic. Although prior studies have examined these associations, few have integrated both objective olfactory testing and subjective self-report measures within a young adult population. Participants 18 and older will be recruited through an online participation system and campus advertisements. Olfactory functioning will be assessed using the Sniffin' Sticks Threshold and Screening tests. Participants will also complete questionnaires assessing mental health (quality of life, perceived stress, anxiety, and depression) and COVID-19 history. We predict that participants with olfactory deficits will report higher levels of mental health symptoms, as well as lower olfactory-related quality of life. Individuals with a history of COVID-19 and persistent olfactory dysfunction are expected to demonstrate the greatest impairments across both sensory and psychological measures.

14. The Effects of Tissue Flossing on Improving Ankle Dorsiflexion in Athletes with Limited Range of Motion: A Critically Appraised Topic

Dillon Duncan

Faculty Supervisor: Michael Hudson

Athletic Training/Sports Medicine

Limited ankle dorsiflexion (ADF) is a common issue that is found in most athletes at every level and can often lead to increased risk of injury. Tissue flossing using floss bands are growing therapeutic techniques used to improve joint range of motion. This critically appraised topic evaluated the effects of floss bands on improving ankle dorsiflexion and other ranges of motion. Four articles, published since 2017, were chosen for this topic and were found in the PubMed database using the keywords tissue flossing, floss bands, ankle dorsiflexion, and athletes. The PEDro scale was used to assess the quality and risk of bias of the four articles with all the articles scoring a 6/10 or higher. Tissue flossing was shown to have immediate increases in ankle dorsiflexion in athletes but minimal improvements over the long term. Tissue flossing resulted in more increases in ankle dorsiflexion than some other interventions.

15. Characterization of Ubiquitin Modification on Rad23 Following Ultraviolet Light Exposure in Tetrahymena Thermophila

Ethan Foster, Joshua Smith

Faculty Supervisor: Joshua Smith

Biomedical Sciences/Clinical Lab Sciences

Rad23 is a key protein involved in both nucleotide excision repair (NER) and the ubiquitin-proteasome system (UPS) in eukaryotic organisms. This protein is clinically relevant and important since two paralogs exist in humans with overlapping functions linked to mutation and cancer. Experimental research in other eukaryotic model organisms such as *Tetrahymena thermophila* can compare Rad23 function to that in humans. *T. thermophila* contains all similar pathway proteins in NER and UPS and is used to model cancer research related to genome integrity. The goal of this study is to determine if the UBL domain of Rad23 is the site of post-translational modification that can enable Rad23 to switch between NER and UPS depending on the situation in the cell. Western blots looking at ubiquitylation on Rad23 UBL domain post UV treatment indicate a change in ubiquitin modification. Ddi1, a ubiquitin chaperone similar to Rad23 functioning only in UPS and not NER, was used as a control. Future research should further examine the UBL domain of Rad23 and if ubiquitin plays a role in determining function in UPS versus NER. Research on modification on Rad23 affecting its function in NER can assist in sensitizing cancer cells to chemotherapeutics.

16. From Sidelines to Front Lines: The Impact of Athletic Trainer Intervention on Military Operational Readiness

Madeleine Gallavan

Faculty Supervisor: W. David Carr

Athletic Training/Sports Medicine

Musculoskeletal injuries (MSKIs) account for ~80% of non-combat injuries and 65% of non-deployable soldiers. This critical appraisal examines how athletic trainer implementation affects military operational readiness. Evidence was gathered from EBSCOhost and PubMed using the terms athletic training, military, and musculoskeletal injury. Studies evaluated MSKI rates, cost-effectiveness, and return-to-duty (RTD) timelines. Eleven studies were reviewed using Joanna Briggs Institute tools. All were level 3 evidence or higher; level 4 systematic reviews were also included. From 2019-2023, the Army's Holistic Health & Fitness (H2F) program reduced MSKI referral odds by 61%. Every $1 invested in H2F produced $8.15 in value, totaling $24.44M annually per brigade. The U.S. Air Force saw a 25% decline in MSKI-related attrition among basic trainees within two years of ATC implementation. In one year, the Army AT program reported a $23M ROI and 10.5x greater odds of RTD. Athletic trainers significantly reduce injury rates and improve RTD timelines, enhancing readiness. Since initial implementations, all four military branches have announced plans to expand athletic training programs, demonstrating their essential role in military operations.

17. Counseling Needs of Youth with Visual Disabilities

Madhusudan Ghimire

Faculty Supervisor: Aysegul Ercevik

Counseling

Globally, about 15% of the population lives with some form of disability, and the World Health Organization estimates that over 2.2 billion people experience vision impairment or blindness. Despite growing awareness of disability inclusion, individuals with visual disabilities often face stigma, social barriers, and limited access to supportive services. Youth with visual disabilities, who are in an important developmental stage of life, may experience psychosocial challenges such as isolation, loneliness, emotional distress, and low self-esteem due to social and environmental barriers. While counseling can play a significant role in promoting mental well-being, the specific counseling and inclusive mental health support needs of youth with visual disabilities remain underexplored. This presentation aims to underline the counseling needs and psychosocial challenges experienced by youth with visual disabilities in light of the cumulative literature to highlight the importance of accessible counseling services and contribute to improving inclusive mental health support for youth with visual disabilities at both community and professional levels.

18. Juvenile American Alligator (Alligator mississippiensis) Stress Response and White Blood Cell Differentials in Response to Auditory Cohort Alarm Calls

Asher Gross, Josh Gill, Katie Helm, Sunny Slater, John Finger Jr., Meghan Kelley

Faculty Supervisor: Megan Kelley

Biomedical Sciences/Clinical Lab Sciences

The hypothalamic-pituitary-adrenal (HPA) stress response influences both endocrine signaling and immune function. This study examined whether exposure to a threat-associated auditory signal (e.g., juvenile alligator alarm calls) elicits a physiological or molecular stress response in juvenile alligators and thus, may cause impacts to overall immune function or health. In this study, juvenile alligators communally housed were exposed to auditory stimuli (e.g., white noise treatment vs. alarm calls) for 30 minutes. Immediately following exposure, blood samples were collected from each individual for white blood cell differentials and separation of blood plasma from red blood cells for hormone (e.g., corticosterone) extraction and quantification via enzyme-linked immunosorbent assays (ELISAs). Corticosterone is the predominantly circulating hormone commonly associated with stress responses and glucose mobilization in reptiles. If exposure to an auditory threat signal elevates corticosterone levels in individuals, findings could indicate an upregulation of the stress response and thus, overall impacts on health in affected individuals.

19. The Effect of Stress on Gene Regulation Involved in Pain Signaling and Wound Healing in American Alligators (Alligator mississippiensis)

Katie Helm, Lauren Stepanek, Josh Gill, Dr. John Finger Jr., Dr. Meghan Kelley

Faculty Supervisor: Meghan Kelley

Biomedical Sciences/Clinical Lab Sciences

The stress response can cause a variety of physiological effects, from a decrease in insulin secretion to an increase in alertness, with most of these symptoms being well studied. According to the American Psychological Association, 76% of the population reports stress to the point of having physiological symptoms, making this a very prevalent issue. Any stimulus that disrupts organismal homeostasis could be deemed a "stressor," and as such, pain itself could be an example of a stress stimulus. The spinothalamic neurological pathway is a co-represented parallel pathway for both the sympathetic nervous system (the fight or flight response) and the pain response. In this study, we aimed to explore how pain and stress interact in juvenile American alligators (Alligator mississippiensis) as a model organism by using scute marking, a common identification method, to create a wound and measure the genetic expression of PICK1, NPY, and CXCL8, both at the site of the cut and systemically. Since little is known about these processes, which are both highly conserved across taxa, including in humans, this project will provide important indications in understanding how molecular markers of pain and stress interact for individual health.

20. Examining Changes in Body Composition, Muscular Quality and Size, and Indices of Strength in GLP-1 RA Users Without and With Resistance Training

Charles Hill, Jon Rattenborg, Shelby Houchlei, Adrien Martens, Brooklyn Vleisides, Samantha Buehler, Anabella Verkler, Aiden McLean, Taylor Dinyer-McNeely, Keith McShan, Cody Smith, Stacy Goddard, Ryan Gordon

Faculty Supervisor: Ryan Gordon

Exercise Science

Semaglutide induces large reductions in body mass that includes both fat mass and fat free mass. Limited evidence has assessed changes in body composition and muscular health while combining semaglutide use with exercise. We investigated changes in these outcomes in middle-aged (30-55 years) adults. Participants visited the Exercise Physiology Lab three times. During each visit (V1, V2, V3), body composition (BodPod), size and quality of the quadriceps and biceps brachii (B-mode ultrasound), and strength were assessed. Following V1, participants performed no resistance training (RT) for four weeks before returning for V2. Following V2, participants performed an eight-week RT protocol. Final assessments (V3) took place after the final RT session. Fat mass (kg) and body fat (%) changed from V2 to V3 ($p = .004$ and .008, respectively). No differences in fat free mass (FFM) appeared, indicating participants retained lean mass across the RT protocol. Indices of muscle health remained unchanged. From V2 to V3, leg press (MD = 43.4, $p < .001$) and chest press strength (MD = 5.8, $p = .005$) increased. These findings provide support that lean mass and muscular function can be preserved when RT is included while using semaglutide.

21. Introducing Centerlines to Two Bike Paths on a University Campus

Caleb Holcomb, Grace Frey, Brayden Vickers, Bogdan Kostic

Faculty Supervisor: Bogdan Kostic

Psychology

Previous research has suggested that introducing a centerline to a bike path on a university campus could reduce the number of pedestrians walking in the bike path. The goal of the current study was to replicate the findings in two new locations. In the first location, an observer recorded the number of pedestrians walking on campus in a pedestrian path or an adjacent bike path, while keeping track of device usage and direction of travel. After five observation sessions, the experimenters drew a chalk centerline and resumed observations for three sessions until rain washed away the chalk, and observations continued for three more sessions for a total of 1,135 observations. Logistic regression showed that the presence of a centerline did not improve pedestrian path adherence, $\chi^2(1) = 0.09$, $p = .77$, $OR = 1.05$. The study was repeated in a new location with three observers working in pairs across 11 observation sessions (five without a centerline, six with, and six more without) for a total of 1,257 observations. The presence of a centerline again did not improve pedestrian path adherence, $\chi^2(1) = 0.42$, $p = .52$, $OR = 1.08$. There were inconsistent effects of device usage and direction of travel.

22. Changes in Dietary Intake and Metabolic Health in Semaglutide Users Without and With Resistance Training

Shelby Houchlei, Charles K. Hill, Jon Rattenborg, Adrien C. Martens, Brooklyn Vleisides, Samantha Buehler, Anabella Verkler, Aiden McLean, Stacy Goddard, Keith McShan, Cody Smith, Taylor Dinyer-McNeely, Ryan A. Gordon

Faculty Supervisor: Ryan Gordon

Exercise Science

Semaglutide induces significant weight loss through appetite suppression and caloric restriction. We investigated changes in dietary intake and metabolism in semaglutide users both without and with a resistance training (RT) protocol. Eleven adults (30-55 years) using semaglutide participated in this study. At three different lab visits (V1 - baseline; V2 - after four weeks of continued medication use and no RT; V3 - after an eight-week RT protocol alongside medication use), measures of resting metabolic rate (RMR), glycated hemoglobin (HbA1c), and fasting blood glucose (FBG) were collected. Additionally, prior to each lab visit, three-day dietary logs were used to assess caloric and protein intake. At V1, participants were encouraged to consume adequate calories and protein (e.g., 1.2 g/kg of body weight). We observed no significant changes from V1 to V3 for RMR, HbA1c, or FBG. Food logs indicated caloric intake increased from 1097 kcals/day (V1) to 1258 kcals/day (V3), though these findings were not significant. Protein intake increased from V1 to V2 (53 g at V1 vs 63 g at V2, $p = .036$). Further research should examine how diet, physical activity, and metabolism interact within users of semaglutide when combined with exercise.

23. Evolutionary Transitions of the Ornithischian Acetabulum: Anatomical Transitions and Functional Inferences

Dylan Kaiser, Henry Tsai

Faculty Supervisor: Henry Tsai

Biomedical Sciences/Clinical Lab Sciences

Ornithischians are an extinct group of herbivorous dinosaurs that include species such as Triceratops and Ankylosaurus. Ornithischians underwent shifts between bipedality and quadrupedality, as well as occupying a wide range of body sizes. As terrestrial animals, the ornithischian hip joint bore locomotion-induced loads. We conducted qualitative assessments of fossil ornithischians to investigate the evolutionary transitions of the acetabulum (hip socket). Osteological characters were scored as correlates for once-present soft tissues. We plotted the specimens onto a composite phylogeny constructed based on the literature and used Maximum likelihood ancestral state reconstruction to infer the character state at each ancestral node. Results suggest that early ornithischians had laterally oriented acetabula, with a medial wall bound by ligamentous membranes. However, armored dinosaurs, such as stegosaurs and ankylosaurs, evolved a ventrally oriented acetabulum but with different extents of acetabular membrane ossification. Our results suggest that both groups modified their acetabulum to allow load bearing of dorsal defensive structures. Different implementations might have been driven by divergence in locomotor behaviors.

24. Enhancing Student Empathy and Perceptions Through Aging Simulation

Morgan LaFollette, Neema Shabazz, Melanie Wolf, Kiley Bess, Reilley Moore

Faculty Supervisor: Marcia Himes

Physical Therapy

As the population of older adults continues to grow, preparing healthcare students to care for this population is increasingly important. This study implemented an aging simulation activity for first-year physical therapy students to examine whether participation influenced attitudes toward older adults and to capture student frustration during simulated tasks. Forty-two students completed tasks designed to mimic age-related impairments including visual deficits, reduced sensation, limited mobility, aphasia, and assistive device use. Activities included dressing, medication management, paying bills online, feeding, and functional mobility tasks. Attitudes toward older adults were measured pre- and post-activity using the UCLA Geriatrics Attitudes Scale (GAS). Results showed a significant difference between pre- and post-intervention GAS scores ($t = 5.756$, $p < .001$) with a moderate effect size (Cohen's $d = 0.51$). Participants reported high frustration during several tasks, particularly paying bills online (90.48%) and buying snacks (83.33%). These findings suggest that simulated impairments, which increased frustration during everyday tasks, positively influenced student empathy toward older adults.

25. Exploring RAD23-Mediated Gene Expression: Molecular Pathways and Potential Effects

Delaney Langenstein, Joshua Smith

Faculty Supervisor: Joshua Smith

Biomedical Sciences/Clinical Lab Sciences

RAD23 is a multifunctional protein present in *Tetrahymena thermophila* (human homolog hHR23A/B). While it has known influential roles in nucleotide excision repair and the ubiquitin proteasome pathway, its roles in transcriptional regulation are widely unknown. In this study, qRT-PCR was used to amplify a number of genes present in transcriptional and cell signaling pathways, including MEC1, RPN8, DUN1, RNR1, RNR2, and THD7. The mRNA expression of these genes was analyzed in multiple RAD23 knockout cell lines and compared to a wildtype. Comparing the overall effect of transcriptional changes of these genes may point to pathways and possible roles of RAD23 in transcriptional regulation. This may be influential to fully understanding RAD23 and its ability as an oncogene found in numerous cancer cell types, as well as its ability to resist chemotherapeutics.

26. Cadaver Case Study: Determining Demographic Effects on Arthritic Cadaver Knee Tissues

Delaney Langenstein, Nicole Gorley

Faculty Supervisor: Nicole Gorley

Biomedical Sciences/Clinical Lab Sciences

Arthritis is a common inflammatory joint condition causing pain and cartilage degradation throughout the joint. Understanding how arthritis affects joint structure over time in different demographics including age and biological sex may lead clinicians to provide treatment with a more targeted approach. This study used dissected cadaveric knee tissue to analyze sex and age influences on anatomical changes including menisci and articular cartilage wear, signs of bone sclerosis, and any other notable features. A dissection of the knee joint with an anterior approach following Grant's Dissector guided the dissection to reveal the most important findings influenced by arthritis. Measurements and observations were recorded and compared to living tissue analyses obtained from outside sources. Working backwards can highlight the most clinically relevant changes seen in demographics of age and biological sex, as well as narrow the broad scope of arthritis treatment to a more targeted approach.

27. Dry Needling Shown to Reduce Pain and Improve Disability Outcomes in Chronic Tendinopathies: A Critically Appraised Topic

Cooper Lewis

Faculty Supervisor: Allan Liggett

Athletic Training/Sports Medicine

Chronic tendinopathy of the long head of the biceps (LHBB) and the patellar tendon presents a challenge for both athletes and the general population. This is due to the persistent pain, effusion, and reduced function of the affected tendon. This critically appraised topic evaluates the following question: In patients with chronic tendinopathy, does dry needling (DN) compared to transcutaneous electrical nerve stimulation (TENS) or conventional physical therapy (CPT) improve pain, patient-rated outcomes, and characteristics of tendon structure over a period of 2 to 22 weeks? A systematic search was performed across PubMed and Missouri State University Libraries for articles published between 2021 and 2026. Keywords included dry needling, tendinopathy, biceps, and patellar tendon. Three randomized control trials were analyzed. In a study on LHBB tendinopathy, dry needling (DN) was similar to TENS for pain, but superior in reducing effusion surrounding the tendon ($p < 0.01$). Two trials regarding jumper's knee found that ultrasound-guided DN plus CPT significantly improved VAS and VISA-P scores ($p < 0.05$) compared to CPT alone. However, long-term effects were insignificant between DN and eccentric exercise at 10 and 22 weeks.

28. Atherosclerosis and Smoking

Kelly Lord, Keagan Buscho, Long Hoang, Diana Petrashyshen, Marshall Swope, Jianjie Wang

Faculty Supervisor: Jianjie Wang

Biomedical Sciences/Clinical Lab Sciences

Atherosclerosis is a chronic inflammatory disease marked by endothelial dysfunction, lipid deposition, vascular smooth muscle cell remodeling, and progressive plaque formation. Smoking is a major risk factor that accelerates coronary artery disease. Globally, daily tobacco use is estimated at 32.6% for men and 6.5% for women. This project analyzed evidence on how smoking contributes to atherosclerosis at the molecular and anatomical levels, with emphasis on reactive oxygen species (ROS) and nitric oxide (NO) imbalance. Smoking markedly increases vascular ROS production, overwhelming antioxidant defenses and creating sustained oxidative stress. Excess ROS directly injures endothelial cells and rapidly reacts with nitric oxide, reducing NO bioavailability and forming reactive nitrogen species. Loss of NO impairs vasodilation and removes its anti-inflammatory and antithrombotic effects, promoting vasoconstriction, platelet activation, and leukocyte adhesion—key early events in plaque formation. ROS signaling further activates inflammatory pathways, amplifying endothelial dysfunction and vascular injury. In vascular smooth muscle cells, ROS-driven stress contributes to remodeling and necroptosis, promoting plaque instability.

29. Differences in Resistance Training-Induced Muscle Damage Assessed Via Ultrasound in Untrained Males and Females

Adrien Martens, Chuck Hill, Leann Rhoads, Jon Rattenborg, Ryan Gordon

Faculty Supervisor: Ryan Gordon

Exercise Science

Untrained males and females (n = 7, 21 ± 1 yr) visited the Exercise Physiology Lab over two consecutive days. B mode ultrasound was used to collect images of the rectus femoris (RF), vastus intermedius (VI), and the vastus lateralis (VL) pre-exercise (PRE). Participants completed a resistance exercise (RE) session composed of leg press and leg extension (5 sets x10 reps for both exercises). Ultrasound images were collected for the RF, VI, and VL immediately post-exercise (POST) and 24 hours post-exercise (24hr POST). Muscle thickness (MT) and corrected echo intensity (cEI) were measured from each image to indicate exercise-induced muscle damage. MT was higher POST vs PRE (RF; $p = .005$, VI; $p = .005$) and POST vs 24hr POST (RF only; $p = .043$) in both males and females, with no differences between sex. cEI of the RF, VI, and VL was not different across the timepoints in both males and females; however, cEI was higher in women at PRE, POST, and 24hr POST (VL only). Increases in MT indicate transient damage that is detectable immediately post-exercise. Moreover, RE seems to cause similar temporary changes in MT in men and women. Lastly, our findings for cEI suggest sex-specific differences that are irrespective of training.

30. Development of an AI-Augmented Leukocyte Tracker for Studying Inflammatory Dynamics in Vivo

Derrick McMillan, Xin Miao, Spencer Thomas, Yifan Zhang, Jianjie Wang

Faculty Supervisor: Jianjie Wang

Biomedical Sciences/Clinical Lab Sciences

Post-capillary venules are the primary vessels where leukocytes adhere to the endothelium and emigrate from the lumen to the interstitium, a process enhanced during inflammation. We investigate the role of $P2Y_2$ receptors ($P2Y_2R$) in regulating leukocyte-endothelium interactions in these venules using $P2Y_2R$-knockout and wild-type mice. The cremaster muscle of an anesthetized mouse is surgically exposed following tail-vein injection of Rhodamine-6G (R-6G). Time-lapse images of circulating blood in a cremaster muscle venule are captured using intravital epifluorescent microscopy. R-6G-labeled leukocytes are traditionally tracked manually across frames, a process that is time-consuming and subject to rater bias. To address this limitation, we fine-tune Meta's Segment Anything Model (SAM3) to automate leukocyte segmentation and tracking in Roboflow using prompt-based guidance (e.g. points or bounding boxes). Automated outputs will quantify leukocyte kinetics and enable comparison between genotypes to assess the role of $P2Y_2R$ signaling. This approach reduces analysis time while improving standardization and reproducibility in inflammatory research.

31. Effects of SPTBN1 Knockdown on Expression of IFI27 During the Early HIV Replication Process

Thomas McVey, Amy E. Hulme

Faculty Supervisor: Amy Hulme

Biomedical Sciences/Clinical Lab Sciences

Spectrin B Non-Erythrocytic 1 (SPTBN1) facilitates early steps of HIV-1 replication, but the exact mechanism is unknown. One way to test which steps are facilitated is by observing Interferon stimulated gene (ISG) expression. ISG expression correlates with the amount of nuclear import being performed by HIV-1 during infection. Increased expression of the ISG Interferon Alpha-inducible protein 27 (IFI27) has been shown when nuclear import of HIV-1 is reduced. To measure IFI27 expression, the efficiency of the primers targeting the IFI27 gene was established. To do this, RNA was isolated and then converted to cDNA using the AMV transcriptase reaction. A plasmid which contained the sequence for IFI27 was then created using PCR and visualized by gel electrophoresis, before being ligated. qPCR was performed using a 10-fold dilution set with the cDNA, the results were used to make a standard curve to calculate primer efficiency. Primer efficiency will be to compare ISG expression during HIV-1 infection between conditions, where SPTBN1 is present and absent in the cell.

32. Femoral Soft Tissue Anatomy and Growth in a Giant Dinosaur: Histology of the Midshaft and Cartilage Attachment Sites of Camarasaurus

Megan Mengwasser, Maei Crum, Henry P. Tsai

Faculty Supervisor: Henry Tsai

Biomedical Sciences/Clinical Lab Sciences

The limb segments of vertebrates are joined by synovial joints for load bearing and articulation. Unlike mammals, whose limb joints are mainly hyaline cartilage, archosaurs use both hyaline cartilage and fibrocartilage. Recently, the fossilized femur of a Camarasaurus, a sauropod dinosaur, was found to preserve putative joint cartilage. This study aimed to identify preserved structures. Drill cores were obtained from the femoral head, femoral neck, muscle insertion sites, and the midshaft. Samples were embedded in resin and sectioned via a mineral saw. The midshaft shows fibrolamellar bone, indicating moderate growth. Haversian remodeling is more concentrated deeper in the midshaft cortex, whereas the superficial layers possess lamellae, indicating slower growth. Finally, the outermost surface of the bone exhibits the external fundamental system, indicating that this dinosaur has reached skeletal maturity. If the preserved joint structures are cartilage, we expect to see features such as chondrocyte lacunae and collagen fibers within a matrix. Identifying these structures could provide the first documentation of fibrocartilage preservation in dinosaurs, thus increasing our understanding of the evolution of joint tissues.

33. Quantifying Iliopubic Cartilage Contribution and Pelvic Evolution in Sauropods Using Three-Dimensional Analysis

Mary Shennette Montejo, Henry Tsai

Faculty Supervisor: Henry Tsai

Biomedical Sciences/Clinical Lab Sciences

Sauropods are long-necked, terrestrial, herbivorous dinosaurs of massive size. They supported their body weight using limbs, with the hip joint bearing much of the load. Unlike humans, sauropods possess unfused pelvic joints separated by cartilage, as indicated by rugose joint surfaces. This study quantifies cartilage contribution to the iliopubic joints in the two major sauropod lineages, Diplodocoidea and Macronaria. The ilia and pubes from 10 taxa were sampled. The bones were digitized to generate surface models, and Geomagic was used to measure peduncular surface areas and generate artificially "smoothed" surfaces. The ratio between the naturally rugose and the artificially smoothed peduncular surfaces served as the proxy for cartilage thickness. Evolutionary transitions of the rugosity indices were inferred using Maximum Likelihood Ancestral State Reconstruction. Rugosity indices were consistently near 0.98 at all ancestral nodes, suggesting no clear relationship between iliopubic cartilage thickness and the two sauropod lineages. These findings suggest that iliopubic cartilage morphology remained relatively consistent across sauropods and that the iliopubic joints functioned similarly in macronarians and diplodocoids.

34. Evaluating Dry Needling for Hamstring Tightness: A Review of Randomized Controlled Trials

Malia Moore, McCall Christian

Faculty Supervisor: McCall Christian

Athletic Training/Sports Medicine

Background: Dry needling (DN) is commonly used to address hamstring tightness and improve range of motion (ROM). Objective: To synthesize current evidence on the effectiveness of DN for improving hamstring flexibility, extensibility, pain, and functional outcomes. Methods: Recent randomized controlled trials and related clinical studies examining DN for hamstring tightness were reviewed. Articles were selected based on relevance and evaluation of DN on hamstring flexibility and related outcomes. Priority was given to recent peer-reviewed RCTs to include higher-quality evidence. Outcomes assessed included hamstring flexibility, knee ROM, muscle compliance, stretch tolerance, pain, and functional performance. Results: Findings were mixed. Some studies reported improvements in hamstring flexibility, muscle compliance, and knee extension ROM following DN compared with stretching or sham interventions. However, other studies found no benefit when DN was combined with stretching versus stretching alone. Conclusion: DN may improve hamstring flexibility in the short term but does not consistently outperform traditional treatments such as stretching. Further high-quality research with larger samples and longer follow-up is needed.

35. The Effects of Transcranial Photobiomodulation on Cognitive Recovery After Mild Traumatic Brain Injury: A Critically Appraised Topic

Bailey Morgan, W. David Carr

Faculty Supervisor: W. David Carr

Athletic Training/Sports Medicine

Context: Transcranial photobiomodulation (tPBM) uses red or near-infrared light applied to the head to stimulate brain activity and increase cerebral blood flow, which may support neurological recovery. This critically appraised topic determines if tPBM improves cognitive recovery in individuals with mild traumatic brain injury (mTBI) compared to standard care. Methods: This literature search utilized PubMed and EBSCOhost databases. Keywords included photobiomodulation, transcranial photobiomodulation, mild traumatic brain injury, concussion, and cognitive recovery. Studies published within the last 10 years, free full text, and involving human participants were included. Five articles were used, and study quality was assessed using the Physiotherapy Evidence Database Scale, with scores ranging 7-8/10. Results: Several studies reported improvements in decision-making and problem-solving abilities, working memory, and verbal learning following tPBM treatments. Participants also showed improvements in sleep quality and post-concussion symptoms. Conclusion: Current evidence suggests tPBM may improve cognitive recovery and symptoms following mTBI, but small sample sizes and various treatment protocols limit strong evidence.

36. Cooking Up Confidence: A Teaching Kitchen Series for Bears Lead

Ellarae Morton, Janelle Patterson, McKenna Stiles, Lillie Dodge, Autumn McClain, Reish Burnett

Faculty Supervisor: Daniela Novotny

Dietetics and Nutrition

Teaching kitchens (TKs) can improve cooking self-efficacy and nutrition knowledge, but research among college students is limited. This gap matters because students often face barriers to cooking, including experience, time, money, and kitchen access. This study examined the impact of TK on cooking confidence, nutrition knowledge, and the perceived ability to apply skills. A quasi-experimental design evaluated a two-part series led by students and faculty. Each 90-minute session included demonstrations, hands-on dorm cooking, nutrition education, and shared meals. Pre/post surveys assessed cooking confidence and nutrition knowledge, and open-ended questions captured perceptions. Quantitative data were analyzed with paired tests, while qualitative responses underwent thematic analysis. Thirty-eight first-generation students participated, and results suggested statistically significant improvements in both cooking confidence and nutrition knowledge. Qualitative themes included increased confidence, knowledge, practical skills, and social connection. Together, these findings indicate TK participation can enhance cooking-related skills and confidence. Future research should examine longer-term retention and application of skills.

37. A New Measure of Hostile Attribution Bias for Adolescents: Evidence From a Middle School Sample

Caleb Niccum, Levi Spirk, Hudson Janes, Cameron Sterna, Leslie Echols

Faculty Supervisor: Leslie Echols

Psychology

Hostile attribution bias is a tendency to interpret ambiguous or accidental actions by others as intentionally malicious or meant to cause harm, and it is a common risk factor for reactive aggression, bullying victimization, and social rejection (Crick & Dodge, 1994; Dodge & Coie, 1987). Identifying students with hostile attribution bias is important for both prevention and intervention, especially in middle school when rates of aggression are at their peak (Nansel et al., 2001). Unfortunately, the measures of hostile attribution bias that currently exist were primarily designed for children (Dodge, 1980; Dodge & Coie, 1987). Thus, the purpose of this study was to create a measure of hostile attribution bias for adolescents and examine its psychometric properties. The measure includes four hypothetical vignettes followed by questions that ask participants to infer intent and report what they would do (e.g., get help, seek revenge) in each situation. Pilot data were collected from approximately 500 middle school students from Southwest Missouri participating in a larger study on bullying. The validity and reliability of this new measure will be evaluated with exploratory and confirmatory factor analysis and Cronbach's alpha.

38. Telehealth Gaps During and After the Pandemic: A Multi-Dataset Analysis of Disparities in Medicare Beneficiaries

Lal Nima, Monika Chaparala, Jennifer Nnaemeka, Molly Lancaster

Faculty Supervisor: Molly Lancaster

Public Health/Health Promotion and Wellness Management

COVID-19 pandemic accelerated telehealth utilization, yet disparities persist, particularly in rural areas. Secondary analysis was conducted using the CMS Medicare Telehealth dataset (2020-2021) and the National Health Interview Survey (NHIS) 2024 to examine rural-urban differences and predictors of telehealth use among adults aged 65 and older. Telehealth utilization was the dependent variable; geographic location, race, gender, education, and income were independent variables. Descriptive analysis was conducted using proportions. CMS data showed high utilization in 2020 (72.29%), followed by a sharp decline in 2021 (11.88%), and NHIS 2024 indicated low use (15.84%), observing rural-urban differences. Two-proportion z-tests confirmed significantly higher use in urban areas across all years. Logistic regression found education was a significant predictor ($\chi^2(9)=20.99$, $p=.013$); individuals with a master's degree had lower odds of utilizing telehealth (OR=0.35, p=.010) compared to all other educational attainment groups. Gender, race, and income were not significant. Future research should focus on non-Medicare recipients and investigate structural barriers such as internet infrastructure and provider availability.

39. EBP1 as a Mediator of Inflammasome Signaling and Epigenetic Gene Regulation in Early Embryogenesis

Kaylee Ohlson, Christopher Lupfer, Randi J. Ulbricht

Faculty Supervisor: Randi Ulbricht

Biomedical Sciences/Clinical Lab Sciences

The inflammasome is a protein complex that regulates inflammation in early embryonic development. Inflammasome activation increases levels of DNA methylation, an inherited mark on DNA affecting gene expression. This inflammasome-mediated regulation of DNA methylation occurs through an unknown mechanism, which we postulate to include a protein essential to regulatory cellular processes, EBP1. EBP1 knockout cells are generated using gene editing. Because EBP1 has previously been shown to be essential in HEK 293 cells, we adjusted the gene editing strategy to complement EBP1 expression to maintain the knockout line. Once successful knockouts are generated, the amount of DNA methylation is quantified using a colorimetric ELISA. It is expected that the cells lacking EBP1 will have an increased amount of global DNA methylation compared to cells expressing EBP1. Our data showed that EBP1-deficient cultured human cells exhibit increased levels of global DNA methylation following inflammasome protein overexpression compared to cells expressing EBP1. This work will increase our understanding of the influence inflammation has on epigenetic regulation in embryonic development, a potentially important part of preventing recurring pregnancy loss.

40. Impact of SPTBN1 on STAT1 Expression During Early HIV-1 Replication

KimberLea Owen, Amy Hulme

Faculty Supervisor: Amy Hulme

Biomedical Sciences/Clinical Lab Sciences

The intracellular replication cycle of HIV-1 involves a complex relationship between cellular factors and viral processes. Uncoating, intracellular trafficking, nuclear import, and reverse transcription can share overlapping steps, with the early steps of replication often using the same or similar cellular factors. SPTBN1 has been observed interacting with HIV-1 CA protein, aiding in replication. However, the exact mechanism of assistance remains unclear. Here we examined the effect of SPTBN1 knockdown on the expression of the interferon-stimulated gene STAT1. First, the efficiency of primers targeting the STAT1 gene was established. RNA was isolated from microglial cells and converted to cDNA using an AMV reverse transcriptase reaction. A plasmid containing the STAT1 sequence was then generated by PCR, gel electrophoresis, and ligation. Then qPCR was performed on a 10-fold dilution series of this plasmid to create a standard curve to determine the primer's efficiency. Because the level of ISG expression corresponds to the amount of viral particles present in the cytoplasm, elucidating the effects of SPTBN1 knockdown on ISG expression allows us to determine if SPTBN1 facilitates nuclear import of HIV-1.

41. International Students' Mental Well-Being: Key Factors and Support

Ishva Patel, Ashleen Girn, Sophia Dela-Coleta, Bruno Miranda Guerra, Dr. Ashley Houston

Faculty Supervisor: Ashley Houston

Psychology

International students face challenges such as acculturative stress, language barriers, and discrimination, which contribute to higher rates of depression and anxiety. Some students experience social withdrawal, while others find support through digital networks (Liu et al., 2024; Yin et al., 2024). In comparison to domestic students, international students are less likely to access mental health services due to stigma, lower mental health literacy, and a lack of culturally relevant resources (Maharaj et al., 2024). This study explores the barriers, protective factors, and intersectional experiences that influence international students' mental health. Thirteen international students from a mid-sized Midwestern university participated in a one-hour focus group. Preliminary findings indicate that acculturative stress and language challenges significantly affect well-being, while shared identity and opportunities for cross-cultural exchange serve as supportive factors. These findings highlight the ongoing negotiation of cultural identity and suggest that institutions should provide more culturally responsive and accessible mental health support for international students.

42. Role of Inflammation in Tau Pathology

Alexander Phelps, Megan Mengwasser, Jessica Aye, and Taylor Kaminski

Faculty Supervisor: Jianjie Wang

Biomedical Sciences/Clinical Lab Sciences

Excessive kinase-driven hyperphosphorylation of tau promotes oligomer formation, a central feature of Alzheimer's disease and frontotemporal dementia. Pathological tau activates inflammatory signaling pathways that intensify tau modification. This review synthesizes findings linking the upregulation of pro-inflammatory pathways and the hyperphosphorylation of tau. Studies demonstrate differential expressions of MAPK family members using an immunoblot in sham and induced-traumatic brain injury (TBI) rats. Inactivation of ERK2 and tau oligomerization was quantified using a western blot. Gene-knockout mice were used to investigate the role of the NLRP3 inflammasome in the expression of the pathological Tau associated with frontotemporal dementia - Tau22 - via immunohistochemical staining for phosphorylated tau. Based on the literature reviewed, MAPK family members were found to increase in expression after an induced TBI. Inactivation of ERK2 led to decreased oligomeric tau. Knockout of the NLRP3 and ASC both showed reduced expression of Tau22. The findings show an upregulation of pro-inflammatory pathways such as NLRP3 and MAPK is associated with the hyperphosphorylation and oligomerization of Tau.

43. Behind Students' Mental Toughness and Success: The Power of Advisor Support

Raegan Probus, Ishva Patel, Alison Stephens, Grace Esker, Amara Elliott, Isabella Lambert, Reana Montalvo, Regan Becker, Paige Mazeitis, Camryn Burns, Dr. Adena Young-Jones

Faculty Supervisor: Dr. Adena Young-Jones

Psychology

Traditional academic advising focuses on course selection and policies, overlooking motivational and emotional factors that influence student persistence (Blankenship, 2023). Supportive advising can strengthen students' autonomy, competence, and connection within the academic environment (Burt et al., 2013). Research also suggests that students who perceive strong advisor support report stronger help-seeking behaviors (Young-Jones et al., 2013) and higher resilience (Gray et al, 2022; Holland et al., 2020). These factors are closely linked to student persistence; in particular, supportive advising can promote well-being and academic success (Burt et al., 2013). Building on previous research, this study explored the relationship between perceived advisor support and outcomes among college students, including locus of control, help-seeking behavior, mental toughness, and academic motivation. Results showed significant relationships between perceived advisor support and each outcome. Students who reported higher advisor support also reported more internal locus of control, greater willingness to seek help, stronger mental toughness, and higher academic motivation. These findings play a vital role in student success and well-being.

44. Associations Between Ultrasound-Derived Muscle Morphology, Adiposity, and VO2peak in Young, Trained Runners

Jon Rattenborg, Charles Hill, Adrien Martens, Shelby Houchlei, Stacy Goddard, Ryan A Gordon

Faculty Supervisor: Ryan Gordon

Exercise Science

This study examined how body composition, as well as muscle thickness (MT), corrected echo intensity (cEI), subcutaneous adipose tissue (ScAT) of quadriceps and calf musculature are associated with VO2peak in trained runners (150-300+ min. of moderate-to-vigorous intensity running per week). Participants (n = 25, 22 ± 3 yr) were recruited from the surrounding area. Ultrasonographic images of the rectus femoris (RF), vastus intermedius (VI), vastus lateralis (VL), and medial gastrocnemius (MG) were taken prior to a test to assess VO2peak. Associations between all variables and VO2peak were determined using Pearson's correlation coefficient. Multiple linear regression was also performed to determine if MT, EI, or ScAT of the assessed muscles were predictive of VO2peak. VO2peak was negatively associated with BMI ($r = -.670$), fat mass ($r = -.791$), body fat percentage ($r = -.707$), and ScAT of the VL ($r = -.436$, all $p < .05$). VO2peak was positively associated with cEI of MG ($p = .047$). Additionally, cEI of the MG ($p = .047$) and cEI of the MG and VL ($p = .019$) were the strongest predictors of VO2peak. VO2peak was associated with more favorable whole-body composition, as well as ScAT and cEI, but not MT, of lower extremity musculature.

45. The Effect of SPTBN1 Knockdown on Nuclear Import of HIV-1 in CHME3 Cells

Olivia Reinwald-Johnson, Amy Hulme

Faculty Supervisor: Amy Hulme

Biomedical Sciences/Clinical Lab Sciences

Human immunodeficiency virus (HIV-1) causes chronic illness, and as of 2024 there are roughly 40.8 million people living with HIV-1 worldwide. Many HIV-1 therapies focus on blocking steps of viral replication. The goal of this thesis research focuses on the effect of the cellular protein SPTBN1 upon the nuclear import step of HIV-1 replication. To better understand how SPTBN1 affects HIV-1 nuclear import in CHME3 cells, the formation of 2-LTR circles will be measured. The circular 2-LTR form of the HIV-1 genome can be detected when viral DNA has entered the nucleus but failed to integrate into the host cell genome. 2-LTR circles can be accurately quantified by qPCR analysis with the primer efficiencies calculated for the beta-Actin and 2-LTR primer sets. For this project, siRNA knockdown of SPTBN1 will be confirmed with qRT-PCR before infecting CHME3 cells with a 1/8 dilution of virus. DNA will be isolated from the infected cells, and qPCR will follow. In the future, an infectivity assay will be performed with N74D and E45A capsid mutants to better understand how cellular proteins interact with HIV-1 capsid. These experiments will allow us to further understand the role of cell factors like SPTBN1 in HIV-1 nuclear import.

46. The Role of Sensory Processing in Self-Identified Neurodivergence

Natalie Scott, Madie Hager, Rachel Deters, Noah Carrow, Jayden Echols, Carly Yadon

Faculty Supervisor: Carly Yadon

Psychology

The present study primarily explored the role of self-reported sensory dysregulation on the likelihood to self-identify as neurodivergent (in the absence of a formal diagnosis). Participants were recruited via a participant management system (SONA) and provided consent before completing an online survey containing a series of self-report questionnaires. Preliminary analyses replicated past research demonstrating a strong positive relationship between global sensory processing and both anxiety, $r(89) = .57$, $p = <.001$, and depression, $r(89) = .52$, $p = <.001$, suggesting that increased sensory processing dysregulation was associated with greater levels of depression and anxiety. Hours per week on social media revealed a positive relationship, but did not reach significance when correlated with anxiety, $r(85) = .19$, $p = .086$, and depression, $r(85) = .21$, $p = .056$. Additional analyses will explore how sensory processing and social media impact what factors are associated with a tendency to self-diagnose.

47. Form to Function: Evolution and Mechanics of Archosaurs Pelvic Joints and Implications for the Theropod Lineage

Sophie Shannon, Henry P. Tsai

Faculty Supervisor: Henry P. Tsai

Biomedical Sciences/Clinical Lab Sciences

The vertebrate pelvis is composed of the ilium, ischium, and pubis, joined during development by three cartilaginous pelvic joints. In mammals, pelvic bones fuse at skeletal maturity, whereas the pelvic joints of archosaurs (birds, crocodilians, and extinct dinosaurs) exist in several states of non-fusion into adulthood. However, evolutionary trends among archosaurian pelvic joint fusion and their functional consequences remain unclear. This project investigates evolutionary transitions in theropod pelvic joints. We hypothesize that pelvic joint fusion offers greater stability than non-fusion, favoring fusion in large-bodied taxa and those with high levels of hindlimb loading. Dissection, histology, and imaging examined pelvic anatomy of extant archosaurs, while extinct theropods were analyzed using photography, morphometrics, and 3D surface capture. Pelvic joint character states were classified as synchondrosis, syndesmosis, symphysis, or synostosis based on cartilage, dense fibrous connective tissue, and their osteological correlates. Improved understanding of archosaur pelvic joint evolution will contribute to comparative research on the functional diversity of cartilaginous joints in extant and extinct vertebrates.

48. Role of $P2Y_2$ Receptor in Endothelial Inflammation: Adhesion Molecules for Leukocyte Recruitment

Lindsey Shepard, Emily Mahnken, Dr. Jianjie Wang

Faculty Supervisor: Jianjie Wang

Biomedical Sciences/Clinical Lab Sciences

Endothelial adhesion molecules play a critical role in leukocyte recruitment during inflammation. Although $P2Y_2$ receptor ($P2Y_2R$) has been associated with inflammatory signaling, its role in regulating endothelial adhesion molecule expression is not fully understood. This study examines the function of the $P2Y_2R$ by comparing microvascular endothelial cells derived from $P2Y_2R$ knockout mice with those from WT controls. The project focuses on the regulation of key adhesion molecules, including P-selectin, VCAM, and ICAM. To do this, total RNA was isolated, reverse transcribed to cDNA and analyzed using qPCR to determine relative gene expression. Preliminary findings from WT endothelial cells establish the baseline expression under inflammatory stimulation and provide a framework for direct comparison with $P2Y_2R$ knockout cells in future studies. Completion of these experiments will allow us to clarify the contribution of $P2Y_2R$ to endothelial activation and inflammatory responses. These findings may improve understanding of vascular inflammation and identify $P2Y_2R$ as a potential target for therapeutic intervention in inflammatory diseases.

49. Investigating the Impact of Healthcare Accessibility on Maternal Mortality

Lindsey Shepard, Madison Allen, Delaney Langenstein, Sophie Shannon, Dr. Colette Witkowski

Faculty Supervisor: Colette Witkowski

Biomedical Sciences/Clinical Lab Sciences

Maternal mortality remains a critical global healthcare concern, particularly in rural and underserved communities. The purpose of this study is to examine the relationship between maternal mortality and access to healthcare, focusing on socioeconomic status, culture and ethnicity, and education availability by surveying the current literature. Common determinants of maternal mortality were compared with global healthcare accessibility across different countries. Evidence consistently shows that rural communities often face limited access to critical care, experiencing socioeconomic barriers that further reduce the ability to obtain consistent prenatal and postpartum care and increase the strain of cultural and ethnic disparities in healthcare. Reducing maternal mortality requires strengthening rural healthcare infrastructure, expanding the maternal health workforce, improving access to transportation and insurance, increasing maternal education, and addressing systemic inequalities. Through existing programming, like Lady Health Workers in Pakistan and Peace Corps, the extent of health education gaps among mothers will diminish as maternal mortality rates improve.

50. Hyperglycemia-Induced Oxidative Stress and Mitochondrial Dysfunction and GLP-1 RA Treatments for Diabetic Neuropathy

James Speake, Nina Abrudan, Audrey Lawless-Young, Riley Nixon, Lauren Stepanek

Faculty Supervisor: Jianjie Wang

Biomedical Sciences/Clinical Lab Sciences

Objective: Type I diabetes is characterized by chronic hyperglycemia (HG), which contributes to diabetic peripheral neuropathy (DPN). This review examines how HG induces oxidative stress (ROS) and mitochondrial dysfunction (MD) and evaluates glucagon-like peptide-1 receptor agonists (GLP-1 RA) as potential therapies. Methods: MD was analyzed using fluorescent immunohistochemistry of human tissue sections from patients with varying diabetes (DM) and DPN severity. Mitochondrial size was measured using IMARIS software and processed in Excel. ROS levels were measured using fluorescent DCF with average pixel intensity used to estimate mitochondrial ATP production. Results: Chronic HG increases ROS in peripheral nerves, activating apoptotic pathways and contributing to DPN. Current treatments emphasize strict glycemic control, but emerging therapies show promise. Studies indicate GLP-1 RAs, such as semaglutide, may restore peripheral nerve density, while magnesium (Mg) appears primarily beneficial for symptomatic management. Conclusions: HG-induced ROS and MD contribute to DPN development. GLP-1 RA therapies show potential for neural restoration, while Mg may aid symptom management.

51. Qualitative Case Study on Student Thriving

Alison Stephens, Dr. Ashley Houston

Faculty Supervisor: Ashley Houston

Psychology

Poor mental health in students predicts higher rates of anxiety, depression, and burnout. Student athletes face additional, unique demands, including pressure to perform athletically, physically and mentally rigorous training schedules, and high expectations of academic achievement; this places them at greater risk for lower mental well-being. Positive mental health in higher education is linked to increased motivation, belonging, and academic achievement (Allen et al., 2017). Using the Thriving Quotient as a guiding framework, this qualitative study sought to understand what "thriving" means for college students and how it may differ between student-athletes and non-athletes. The characterization of thriving in both populations was explored through focus groups and semi-structured interviews. Preliminary findings reveal three themes: (1) thriving as an ever-changing identity process, (2) thriving as a metacognitive process, and (3) the psychosocial implications of pursuing thriving. These results suggest that thriving is a developmental process involving the interconnection of identity, cognitive, and social experiences that varies across individuals.

52. Process Evaluation of a University Food Recovery Program

Kanij Sultana, Melinda Novik

Faculty Supervisor: Melinda Novik

Public Health/Health Promotion and Wellness Management

Objective: This study examines the process evaluation of a university food recovery program to identify logistical and personal barriers and explore students' perceptions. Participants: All students enrolled at a large, Midwestern public institution who were registered members of the campus food pantry were recruited. Methods: An online survey was administered in November 2025 and included both qualitative and quantitative questions assessing program participation, perceived effectiveness, and students feedback. Descriptive statistics and thematic analysis were utilized. Results: Sixty-eight students completed the survey; 31 reported picking up food from the program at least once. Students provided positive experiences, particularly with food quality and amount of food received. The most common reasons for non-participation were off-campus location, inconvenient timing, and not seeing the email notification in time. Conclusions: The findings suggest that universities should adopt food recovery programs. An emphasis on effective marketing with tailored communication, intentional alerts and ongoing evaluation is crucial.

53. Speech (Mis)perceptions and Mondegreens

Teagan Sumy, Delaney Thompson, Alexandria Wools

Faculty Supervisor: Sarah Lockenvitz

Speech-Language Pathology

The purpose of this study was to examine the influence of formal instruction in phonetics (i.e., undergraduate Communication Sciences and Disorders course) on the perception of mondegreens, misheard song lyrics or spoken phrases, that result in unintended interpretations. Two independent groups of undergraduate students participated: one group had not completed an introductory phonetics course, and the other group had completed the course. Participants completed a recognition task designed to assess their ability to accurately perceive and interpret mondegreen phrases. By comparing performance across the two groups, the study investigates whether phonetic training improves awareness of speech sound patterns and reduces susceptibility to misperception. Preliminary findings suggest that individuals who had not taken the phonetics course scored notably better across trials. However, these results should be interpreted with caution, as there were fewer participants in the group that had taken phonetics. The study is ongoing, and additional data collection will help determine whether this trend remains consistent with a more balanced sample.

54. Social Media and Recruitment in Higher Education

Chloe Thomure, Ella Wolfe, Natalie Allen, Sarah Murray

Faculty Supervisor: Natalie Allen

Dietetics and Nutrition

Background: This study explores how social media influences college students' decisions regarding enrollment and engagement in higher education institutions. As recruitment and retention strategies evolve in the digital landscape, understanding social media's impact is important. There is a gap in the literature regarding social media content that influences students and how it affects decisions at the program, career, and institutional levels. The purpose of this study is to understand social media's role in shaping students' decisions about enrolling at universities, majors, or academic programs. Design: This qualitative study uses virtual focus groups with higher education students to explore experiences, opinions, and preferences related to university social media content and its influence on academic choices. Methods: Participants were recruited via email, word of mouth, and social media. Eligible participants were at least 18 years old and currently enrolled in a higher education institution. Focus groups were conducted via Zoom, recorded, and transcribed for analysis. Data was analyzed using thematic analysis from participant statements. Results: Results are currently under analysis and will be available by the presentation.

55. Hemodynamic Mechanobiology Governs Plaque Progression and Stabilization in Atherosclerosis

Trishna Timalsena, Jianjie Wang

Faculty Supervisor: Jianjie Wang

Biomedical Sciences/Clinical Lab Sciences

Atherosclerosis is a major cause of heart disease and stroke, signified by the accumulation of plaque in the arteries. Plaques preferentially form at regions exposed to disturbed blood flow (d-flow) and low shear stress despite systemic risk factors such as hyperlipidemia. This review examines how blood flow patterns influence plaque progression and stability, hypothesizing that if disturbed flow promotes plaque progression, restoration of laminar flow may induce plaque regression. Mouse models were used to manipulate arterial flow. A perivascular cuff induced disturbed shear stress and plaque formation. Later removal of the cuffs restored the laminar flow. Plaque composition was assessed using histological staining and inflammatory markers and compared with statin therapy. D-flow caused partial flow induced reprogramming of endothelial cells (FIRE), but atherosclerosis developed only when d-flow occurred with hypercholesterolemia. Restoration of laminar flow decreased lipid and inflammatory cells while increasing collagen deposition and fibrous cap thickness, comparable to statin therapy. These findings highlight atherosclerosis as a mechanosensitive disease and suggest vascular biomechanics as a potential therapeutic target.

56. Pilot Test of a Student-Led Employee Fitness Program

Micah Walker-Schaefer, Barcley Graham, Shelby Houchlei, Charles K. Hill, Stacy Goddard DHEd, MCHES, ACSM-EP, Jessica Willis MS, Hanna Grenko

Faculty Supervisor: Stacy Goddard

Exercise Science

The purpose of the pilot study was to determine how feasible it would be to implement a 12-week personal exercise program for MSU employees with exercise science and graduate Kinesiology students as trainers and to determine if improvements in fitness assessments could be achieved with the student-led exercise intervention. Student trainers conducted pre- and post-fitness measurements on the employees and developed an exercise program for each participant, leading them in their exercise plan one time per week for 10 weeks between the pre- and post- tests. Significant differences were found in waist circumference, lean body mass, muscular endurance, and the modified sit-and-reach tests. The pilot study showed a student-led employee fitness program is feasible in a 12-week timeframe, significant differences in health and fitness measurements can be achieved, and student trainers and employees can both enjoy and benefit from the program.

57. The Role of Inflammation in Atherosclerosis

Brooke Weiss, Ezoza Khikmatillaeva, Jacob Brunworth, Leo Gindling, Jianjie Wang

Faculty Supervisor: Jianjie Wang

Biomedical Sciences/Clinical Lab Sciences

What are the contributions of the pro-inflammatory mediators interleukins 1 and 6 to the pathogenesis of atherosclerosis? Atherosclerosis is a chronic inflammatory disease initiated by endothelial injury. Endothelial dysfunction promotes monocyte recruitment by upregulating VCAM-1. Recruited monocytes differentiate into macrophages that secrete inflammatory mediators. These macrophages release IL-1 and IL-6, cytokines that promote plaque inflammation and systemic inflammatory signaling. Systemic inflammation injures the endothelium, accelerating disease progression and plaque instability. IL-1 signaling requires the co-receptor IL-1RAP, thereby activating inflammatory pathways such as NF-κB. This cascade induces IL-6 production, amplifying inflammation. Cytokine signaling is associated with increased neutrophils, monocytes, and platelets, with reduced lymphocytes. In ApoE−/− mice, anti-IL-1RAP treatment reduced plaque formation and inflammation. This project evaluates how cytokine signaling relates to systemic inflammatory indices in patients with atherosclerosis. Understanding interactions between cytokines and IL-1RAP may improve the identification of patients with heightened inflammation and support targeted therapies.

58. Teaching Kitchens and Campus Food Pantries: A Collaborative Approach to Addressing College Food Insecurity

Betsy Whitehurst, Stephanie Urich

Faculty Supervisor: Stephanie Urich

Dietetics and Nutrition

Food insecurity among college students is an ongoing public health concern that negatively impacts academic performance, health, and well-being. Teaching kitchens are emerging as experiential learning environments where students build food literacy, culinary nutrition skills, and social connection. Integrating teaching kitchens with campus food pantries may combine food access with health education.
To examine a collaboration between a dietetics student-led teaching kitchen and a campus food pantry to provide hands-on culinary nutrition education students experiencing food insecurity.
A pilot program was developed through a partnership between a graduate dietetics program and an on-campus food pantry. Graduate students led cooking demonstrations using pantry ingredients, emphasizing affordability, balanced nutrition, and simple preparation. Participants were pantry users. Pre- and post- surveys assess food literacy, cooking confidence, and sense of belonging. Nine students completed the pre- survey, showing low cooking confidence and mixed belonging. Post program data collection is ongoing. Pantry-based teaching kitchens may improve food literacy, cooking confidence, and sense of belonging among food-insecure students.

59. *Tetrahymena Thermophila* Rad23 Knockdown Response to Genotoxic Stressors

Mason Whitworth, Emma Liimatta, Joshua Smith

Faculty Supervisor: Joshua Smith

Biomedical Sciences/Clinical Lab Sciences

DNA damage can lead to mutations and diseases like cancer. In order to prevent mutations from proliferating DNA must be able to be repaired efficiently in response to genotoxic stress. Reactive oxygen species, such as hydrogen peroxide (H2O2), can cause lesions in DNA that can cause mismatched bases which distort the helical shape of DNA; these lesions are repaired by base excision repair. Rad23 is a highly conserved protein in *T. thermophila* which has 2 human homologs hHR23A and hHR23B. Rad23 plays a role in the nucleotide excision repair (NER) pathway, proteasome pathway, and shuttles apoptosis inducing factor (AIF) to the nucleus in caspase independent cell death (CICD). In our lab, loss of Rad23 in *T. thermophila* has been shown to increase resistance to UV radiation. This phenotype is similar to the process by which cancer develops multi-drug resistance (MDR). Further investigation by our lab has shown that Rad23 knockout *T. thermophila* mutants differently express proteins involved in CICD, however these cells continue to reproduce despite the genotoxic stress. The aim of this study is to investigate if increased survivability is NER specific or if increased resistance will be observed in response to other forms of DNA damage.

60. Swipe Right: The Impact of Disclosing Mental Health Conditions on Dating Profiles

Dana Williams, Allie German, Chance Barber, Evelyn Flotron, Riley Rosentreter, Sophie Brickman, Dr. Amber Abernathy

Faculty Supervisor: Amber Abernathy

Psychology

Previous research demonstrates that disclosing mental health conditions might have a negative impact on dating profile success (McKinley, 2024). However, research also suggests that those with mental health conditions may participate in "assortative mating" and select potential mates who have similar conditions (Boysen, 2022), which may ameliorate the negative impact given the rise of mental health conditions in young people (Xiang et al., 2024). The current project aims to examine the potential impact of disclosing mental health conditions (specifically depression and anxiety, as the two are often comorbid, Kalin, 2020; Wu & Fang, 2014) on dating profiles using similar procedures to Parker and Burkley (2009). Researchers will also examine personality traits and diagnosis of mental disorders (either self-diagnosed or official diagnosis) as potential moderators.