



TARLETON  
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2024  
Division of Research,  
Innovation,  
and Economic  
Development (RIED)  
Research Symposium

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Tuesday, February 6, 2024  
Thompson Student Center

Sponsored by



Division of  
**Research, Innovation and  
Economic Development**  
TARLETON STATE UNIVERSITY®



## ***Program Overview***

Welcome to the 2024 Research Scholars Symposium, where we celebrate another impressive year of groundbreaking discoveries by our first-rate faculty and student researchers. The quality and diversity of the research being done at Tarleton State University is exceptional.

Tarleton State researchers are championing, among other topics, plant-based materials to improve water safety; innovative smart climate practices; enhanced rural communications and healthcare; healthier pollinators for increased food production; and greater transportation efficiency.

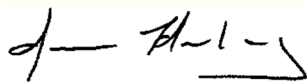
Our university will continue to commit resources to research designed to serve regional, state and national needs as we dare to imagine a better world.

Today these researchers will exhibit their work to allow you to learn about their discoveries and leave with a new appreciation for the energy it takes to move ideas from the lab to the marketplace.

My sincerest appreciation to Dr. Rupa Iyer and the Division of Research, Innovation, and Economic Development for providing this valuable academic forum.

The next generation of engineers, educators, healthcare professionals, creatives, scientists, communicators, and entrepreneurs will come from Tarleton State University, and Tarleton will be recognized as *the* premier comprehensive public university in the country.

You can count on it.



Dr. James Hurley  
President

I am pleased to welcome you to the 2024 Division of Research, Innovation, and Economic Development's (RIED) Research Symposium. This year we are excited to showcase 76 faculty-mentored student research projects of some of the best and brightest from our campus community. This includes 38 research projects funded by the President's Excellence in Research Scholars (PERS). The funding has enabled student researchers to take part in their projects from vision to proof of concept.

Last year we started the elevator pitch competition for our undergraduate poster session, this year we are pleased to add the Three Minute Thesis (3MT) competition in collaboration with the Tarleton College of Graduate Studies. 3MT is an academic event that challenges Ph.D. and Master's degree students to present their research in just three minutes in a language appropriate to a non-specialist audience. The addition of the 3MT competition to the RIED Research Symposium exemplifies a significant enhancement in promoting research communication skills among our graduate students.

The posters and oral presentations featured illustrate Tarleton's commitment to robust discovery and research. Our university continues to climb the Higher Education Research and Development rankings due to many of the innovative thinkers you will see and hear from. They think big and push boundaries to make life better for us all.

Thank you for taking time to explore Tarleton's scholarly and creative endeavors. We're doing more and achieving more, and our work is more vital than ever.

Dr. Rupa Iyer  
Vice President, Division of Research, Innovation, and Economic Development



## ***Thank you Note***

Our Tarleton Texans have worked hard on their projects, and they are excited to present the results of their research and conclusions to you. We are grateful to our following community partners who have taken the time to judge poster and presentations.

Ashleigh Feuerbacher	Stephenville Economic Development Authority (SEDA)
Case Horton	Stephenville Economic Development Authority (STEDCO)/Tanglewood Medical Supplies
Colemon Stokes	Stokes & Stokes Law
Hilary Stephans	Texas Health
Jeff Sandford	Stephenville Economic Development Authority (SEDA)
Joe Grimshaw	Square One Real Estate
Kari Kunze	TechnipFMC
Kathy Goodwin	Stephenville ISD Technology
Larry Smith	Brown & Root
Steve Trogdon	Texas State Health Services
Wendell Hollingsworth	Retired Head of Fibergrate-Stephenville

Special thank you to our colleagues for supporting our students.

Janice Horak	Tarleton State University, Executive Director of Development
Bobby Waddell	Tarleton State University, Assistant Director of Development
John Pelham	AgriLife/Tarleton State University
Diana Ortega-Feerick	Tarleton State University, VP for Student Engagement and Success
Anthony Vidmar	Tarleton State University, VP for Institutional Advancement
Chief Matt Welch	Tarleton State University, Police Chief
Aimee Shouse	Tarleton State University, Associate Provost, AVP, Dean of Faculty, & Acting Dean (COLFA)
Rudy Tarpley	Tarleton State University, Associate Dean (COANR)
Abbie Driver	Tarleton State University, Communications Manager (COGS)

## ***Program Schedule***

*Tuesday, February 6, 2024*

7:45am – 8:45am	<b>Presenter Registration</b>	TSC Lobby
8:45am – 9:00am	<b>Welcome and Opening Address</b> Dr. Rupa Iyer President James Hurley	TSC Ballroom
9:00am – 1:30pm	<b>Poster Sessions (Judging from 9-12pm)</b>	TSU Ballroom
9:30am – 10:30am	<b>Three Minute Thesis (3MT<sup>®</sup>) Presentations</b>	TSC Room 130
1:30pm – 2:00pm	<b>Poster and Three Minute Thesis (3MT<sup>®</sup>) Awards</b> President James Hurley Dr. Rupa Iyer	TSC Ballroom



*9:30–9:33am, TSC 130*

**The Economics of Factors Affecting Dryland Crop Yield in the Texas Southern High Plains**

**Presenter:** Cord Brown

**Principle Investigator:** Dr. Selin Guney

**Department:** Agribusiness and Agricultural Economics

*9:36–9:39am, TSC 130*

**Modeling Supraventricular Tachycardia Using Dynamic Computer-Generated Left Atrium**

**Presenters:** Gavin McIntosh

**Principle Investigator:** Dr. Bryant Wyatt

**Department:** Mathematics

*9:42–9:45am, TSC 130*

**Agricultural Land Management: Offsetting Carbon or Blowing Smoke?**

**Presenter:** David Northup

**Principle Investigator:** Dr. Anne Egelston

**Department:** Chemistry, Geoscience and Physics

*9:48–9:51am, TSC 130*

**Crime, inflation, and unemployment in American cities: A time series analysis**

**Presenter:** Heather Lucas

**Principle Investigator:** Dr. Olga Semukhina

**Department:** Criminal Justice

*9:54–9:57am, TSC 130*

**Removal of Microplastics Using Plant-Based Polymers in Marine Environment and Risk Analysis Using Machine Learning Models**

**Presenter:** Marconi Azadah

**Principle Investigator:** Dr. Rajani Srinivasan

**Department:** Chemistry, Geoscience and Physics

*10:00–10:03am, TSC 130*

**Investigating the Cortical Activity Associated with the Impact of Acute Pain on Working Memory Using EEG**

**Presenter:** Nichol Civitello

**Principle Investigator:** Dr. Amber Bozer

**Department:** Psychology

*10:06–10:09am, TSC 130*

**The effect of moderate intermittent hypoxia on blood glucose tolerance and indices of sympathetic neural activity in Sprague Dawley Rats fed a short-term High Fat Diet (45 Kcal as Fat)**

**Presenter:** Matthew Williams

**Principle Investigator:** Dr. Max Sanderford

**Department:** Biological Sciences

*10:12–10:15am, TSC 130*

**Cortical oscillations of the sensory-discriminative and affective-motivational dimensions of pain using the electroencephalogram**

**Presenter:** Isabella Casmedes

**Principle Investigator:** Dr. Amber Bozer

**Department:** Psychology

*10:18–10:21am, TSC 130*

**Toward a Cost-Effective Smart Crop Health Monitoring System**

**Presenter:** Joseph Meier

**Principle Investigator:** Dr. Haitham Abu Ghazaleh

**Department:** Electrical Engineering

*10:18–10:21am, TSC 130*

**A Contralateral Comparison of Beta-Band Oscillations in the Motor Cortex Following Blood Flow Restriction Training**

**Presenter:** Sierra Washington

**Principle Investigator:** Dr. Michael Luera

**Department:** Health and Human Performance

*10:24–10:27am, TSC 130*

**Neuromuscular Adaptations to Low-intensity Blood Flow Restricted Training**

**Presenter:** Calvin Smith

**Principle Investigator:** Dr. Michael Luera

**Department:** Health and Human Performance

# ***Poster Presentations***

## **College Of Agriculture and Natural Resources**

### **1. Effects of oral Cannabidiol on serum blood glucose levels and gut permeability.**

#### **PERS Recipient**

**Research Area:** Animal Modeling

**Student Presenter:** Madelynn Hayen (Lead/Undergraduate) and Ashley Plasencia

**Faculty Mentor (Dr):** Kimberly Guay and Arthur Low

**Department:** ANSC

**Abstract:** Both humans and horses can suffer from the negative effects of alterations in the gut that increase intestinal permeability, otherwise known as “leaky gut” (LG). This increased epithelial permeability can be fomented from a variety of situations that are very common in society. Stressors such as poor health, age, poor diet, medications, extreme exercise, heat stress, and numerous types of social stressors can cause increased gut pH, and decreased blood flow to the intestine. This can lead to dysfunction including limiting the intestine’s ability to serve as a barrier from the harmful components of digesta. In humans, changes in intestinal permeability are associated with Crohn’s disease, inflammatory bowel disease, and Celiac disease. Horses with LG may present with reduced performance, weight loss, ulcers, colic, and laminitis. Because there are so many factors that contribute to these conditions, stress mediation alone is often not an effective means of preventing intestinal dysfunction. Cannabidiol (CBD) interacts with the body’s existing endocannabinoid system but also has an affinity for serotonin, and vanilloid receptors, suggesting potential influence of cellular response when binding. Furthermore, CBD has been reported to reduce cellular death in cells affected by the endotoxin associated with colitis. The goal of this study was to evaluate the effects of oral CBD (0.12mg/kg/d) intestinal permeability in an equine model after a sucrose challenge. Eighteen stock-type horses were used for this study and socially housed at the Tarleton Equestrian Center/Farm Annex in covered pens during the summer of 2023. After acclimated all horses were food fasted for 18 h before undergoing a sucrose challenge (ingesting 250 g sucrose with water). Blood glucose was measured at time 0, 15, 30, 45, 75, 120, and 150 min post sucrose ingestion to establish baseline blood sucrose levels. Horses were returned to normal diet and given 0.06 mg/kg/BW before feeding twice daily for 10 d. After the 10 d treatment period, a post-treatment sucrose challenge was performed. None of the horses seemed to have a negative reaction to CBD. Analysis was run in Prism statistical software as a 2 way ANOVA with repeated measures and significance level set at  $P < 0.05$ . The data followed a typical blood glucose (BG) response curve peaking between 45 and 75 m. PRE BG levels peaked at 111 mg/dL (45min) while POST peaked at 113 mg/dL (75min) however they were not significantly different. Interestingly, POST BG levels were lower ( $P = 0.03$ ) just prior to the sucrose challenge (PRE = 70.8, POST = 66.8), then gradually shifted to POST having a higher BG levels ( $P = 0.03$ ) at time point 150 (PRE = 97.1, POST = 109). This could be due to individual horse response as variation noticeably increased post sucrose challenge. It may help to know how body condition score and obesity plays a role in this interaction? More investigation is needed to understand the questions that these data present.

### **2. Silver Bluestem as a Catalyst for Restoring Juniper Encroached Grasslands**

#### **PERS Recipient**

**Research Area:** Grassland Restoration

**Student Presenter:** Hannah Atkinson (Lead/Undergraduate)

**Faculty Mentor (Dr):** Jeff Breeden and David M Johnston

**Department:** Wildlife and Natural Resources

**Abstract:** Grasslands comprise 20 to 40 percent of earth’s ecosystems and are on a global decline. Woody plant encroachment is transitioning grassland ecosystems to shrublands, impacting soil health and plant community composition. Within central Texas, overgrazing, fire suppression, and urban expansion has enabled native Ashe Juniper to expand beyond its historical niche and encroach on grasslands. Ashe juniper will convert historical grasslands into a monocultural landscape reducing herbaceous layer biodiversity. The loss of native deep-rooted grasses due to juniper encroachment impacts the hydrology of grasslands, impacting surface water percolation by increasing bare ground, eliminating deep rooted native perennial bunch grasses, and increasing surface water runoff and erosion. Ashe Juniper monoculture ecosystem is limiting to wildlife and livestock, reducing forage, browse, and habitat availability resulting in understory vegetation consisting of few fibrous rooted plants. Here, we investigate the efficacy of removing junipers,

reintroducing native grasses using silver bluestem seeded directly into juniper duff for prairie restoration, and minimizing soil disturbance. We hypothesize that silver bluestem, an early successional native grass species, can germinate and thrive in juniper duff piles, restoring the herbaceous grass layer and increasing surface water percolation.

### 3. Efficacy of Minimizing Soil Disturbance on Honey Mesquite Encroached Grassland

#### PERS Recipient

**Research Area:** Grassland Restoration

**Student Presenter:** Lilianan Navar (Lead/Undergraduate)

**Faculty Mentor (Dr):** Jeff Breeden and David M Johnston

**Department:** Wildlife and Natural Resources

**Abstract:** Woody plant encroachment is considered one of the greatest contemporary threats to mesic grasslands of the central United States. Woody encroachment is estimated to result in the loss of 75% of potential grass biomass across the Great Plains. In the western United States, 25% of rangelands experience sustained tree cover expansion; due to rapid urbanization and woody encroachment, Texas has lost its once expansive grasslands. Woody plant encroachment into grasslands reduces forage production and availability and decreases habitat availability for wildlife. Additionally, soil disturbance within grasslands damages roots, modifies soil composition and structure, and has negative impacts throughout the plant community. Overgrazing, urban expansion, and wildfire suppression have significantly impacted native grasslands throughout central Texas. Woody encroachment on Texas native prairies alters grassland ecosystem providing opportunity for exotic invasive grass species to become established and out-compete native grasses resulting in a decline in desirable warm-season native perennial bunch grasses. Native Honey mesquite has become invasive within many grasslands in Texas and worldwide. As the percent composition of Honey mesquite canopy cover increases, so does density and longevity of annual cool season grasses with subsequent decreases in availability and native grasses. Here we investigate the efficacy of minimizing soil disturbance on establishing native grass within a Honey mesquite encroached grassland in central Texas. We hypothesize that native warm season grasses can be successfully seeded into the historical grassland ecosystem, that is, Honey Mesquite encroached with minimal soil disturbance.

### 4. Effects of Minimizing Soil Disturbance on Restoring Woody-Encroached Riparian Grasslands

#### PERS Recipient

**Research Area:** Grassland Restoration

**Student Presenter:** Chloe Delahoussaye (Lead/ Undergraduate)

**Faculty Mentor (Dr):** Jeff Breeden and David M Johnston

**Department:** Wildlife and Natural Resources

**Abstract:** Only 10% of grasslands are intact across the globe. Their alarming decline has threatened many elements, especially in Texas, where prairies comprise 60% of ecosystems and provide a plethora of native plants that are essential for pollinator and wildlife biodiversity. Above ground, the Native grasses are anywhere from 1 foot to 3 feet tall, but their deep and fibrous root systems offer stability in the soil and better water infiltration. Woody encroachment on grasslands is a global phenomenon that is transitioning grasslands to shrubland ecosystems. Historical riparian grasslands within Texas have now become closed canopy hardwood forests with understories dominated by cool seasons, annual grasses, and forbs such as Texas wintergrass, vine mesquite, and invasive hedge parsley. Areas of the cross-timbers and prairies region of Texas have historically shown that once cedar-elm becomes established, it can become the dominant woody plant species creating a monoculture that drastically alters the herbaceous plant community. Management efforts to restore these grasslands include prescribed burning or intrusive soil tilling. Here, we investigate the efficacy of restoring a woody encroached riparian grassland through different seeding methods and minimizing soil disturbance. This research will help develop and inform management decisions for the restoration of historical riparian grasslands within central Texas.



## 5. Improving Seed Germination for the Purpose of Increasing Stand and Genetic Diversity in Rangeland Linked Riparian Ecosystems

### PERS Recipient

**Research Area:** Plant Ecology

**Student Presenter:** Bryan Dunn (Lead/Graduate)

**Faculty Mentor (Dr):** Darrel Murray

**Department:** Wildlife and Natural Resources

**Abstract:** Texas is witnessing exponential growth, which has amplified the human impacts on native ecosystems. This includes the detrimental effects of urban sprawl, land consumption, and alteration of land cover, which affect the biodiversity of both flora and fauna. Moreover, the expanding human population has resulted in the fragmentation of habitats within ecosystems, causing a decline in species richness, population sizes, sustainability, and impeding the natural movement of native wildlife. The issue of urban expansion and the introduction of exotic plant species has further exacerbated the problem by triggering an invasive species epidemic in grasslands. These invasive species pose a severe threat to biodiversity as they outcompete native species for resources. Grassland-embedded riparian ecosystems, which harbor numerous Texas native understory and edge species shrubs, play a vital role in providing ground cover, preventing erosion from surface water runoff, and fulfilling spatial requirements within the riparian tree stands. However, many native shrubs in Texas have unique adaptations that enable them to thrive in harsh environments. These adaptations include protective seed shells, dormancy periods requiring extended stratification, and rigorous scarification requirements. Unfortunately, the limited availability of native shrubs in the ornamental trade industry adversely affects restoration and sustainability efforts. In this study, we aim to investigate the efficacy of different sowing times and embryo treatments in reducing stratification periods and increasing germination success for native buckeye species (*Aesculus* spp.) including the Mexican Buckeye (*Ungnadia speciosa*). By making these shrubs readily available for distribution into ecosystems, we can enhance biodiversity and sustainability. Additionally, we explore the effectiveness of transplanting these species to promote greater species richness and biodiversity within grassland-embedded riparian areas. Increasing the availability of native shrubs not only boosts biodiversity but also strengthens sustainability efforts. By ensuring a readily accessible supply, we can incorporate these shrubs at all stages of sustainability initiatives.

## 6. Impacts of Cedar Elm Density and Canopy Composition on Riparian Flood Plain Grasslands

### PERS Recipient

**Research Area:** Plant Ecology

**Student Presenter:** David Johnston (Lead/Graduate)

**Faculty Mentor (Dr):** David Johnston and Darrel Murray

**Department:** Wildlife and Natural Resources

**Abstract:** Grasslands constitute up to 40 percent of terrestrial ecosystems and are rapidly declining. Woody plant encroachment of grassland is being enabled through land use changes, fire suppression, and grazing practices. Woody plant encroachment transitions historic grassland to shrubland or dense woodlands and impacts ecosystem services such as nutrient cycling and hydrological processes. This transition impacts all grassland ecosystems to include historic riparian flood plain grassland within central Texas. These historic grasslands within central Texas would have deep rooted warm season perennial grasses and a mix of pecan (*Carya illinoensis*) and oak (*Quercus* spp) trees comprising less 25% of overstory canopy. Woody plant encroachment within riparian flood plain ecosystems will transition the ecosystem to a closed canopy woodland state dominated by pecan and elms resulting in greater than 80% canopy cover. Remote sensing, historical aerial images, and field measurements provide indications of transition of these ecosystems and noted increases in Cedar Elm (*Ulmus crassifolia*), a native semi-drought tolerant hardwood species, resulting in densities that further alter the herbaceous understory plant community. Here we seek to quantify the impacts of Cedar Elm on intermittent stream flood plains along a gradient of density and subsequent changes within the herbaceous layer plant community in central Texas.

## 7. A comparison of drivers of woody plant encroachment in Botswana and Texas, USA

### PERS Recipient

**Research Area:** Plant Ecology

**Student Presenter:** David Johnston (Lead/Graduate)

**Faculty Mentor (Dr):** Darrel Murray and T. Wayne Schwertner

**Department:** Wildlife & Natural Resources

**Abstract:** Woody plant encroachment of grassland savannas is currently happening across several continents due to land use changes, fire suppression, and cattle grazing practices. These areas share common social and environmental drivers, but in different social contexts. In this project we explore related social and environmental drivers of woody plant encroachment within developed versus developing countries, specifically the U.S. and Botswana. Texas represents a fenced “western model” approach more representative of private land in economically developed countries, while Botswana represents unfenced semi-pastoralist community grazing found in developing countries. For comparison, we utilized regional and site-specific environmental and social data of comparable study sites in north-central Texas and the Kalahari region of Botswana. Data included vegetation data from field measurements, satellite image data including woody plant cover and fire occurrence, soil, and climate data. This was analyzed in the context of social data gathered. Preliminary results indicate similar environmental mechanisms of woody plant encroachment but differences in species diversity and rate of change related to site history and social context.

## 8. Gray Fox Species Distribution in Big Bend

### PERS Recipient

**Research Area:** Big Bend National Park

**Student Presenter:** Colin Tucker (Lead/Undergraduate)

**Faculty Mentor (Dr):** Hemanta Kafley

**Department:** Wildlife and Natural Resources

**Abstract:** Understanding how a certain species will fare in the future is fundamental to conservation. Part of the understanding comes from knowing the current and future range of the species in a specific area. The gray fox (*Urocyon cinereoargenteus*) is a nocturnal mesopredator that can be found in almost every county in Texas (Schmidly 1994). They can often be found on old roads and trails hunting in the underbrush (Schmidly 1994). They will use brush, holes in rocky outcroppings, snags, and burrows dug either by themselves or another animal (Schmidly 1994). A species distribution model (SDM) can be created due to a similar size, diet, and overlap in range. This tool can be used to describe the suitable to non-suitable areas in the area of interest for a given species based on variables. The variables that we will be using consist of bioclimatic variables 12, 14, 5, and 6. They are the annual precipitation, precipitation of the driest month, max temperature of the warmest month, and the min temperature of the coldest month. Then some other variables we will use are the vegetation, elevation/slope, human habitation, and historical water sources. Maxent Ver 3.4.4 program will be used to create the SDM. We will tweak and reproduce the model until we achieve a strong enough model that matches what can be seen in the field and literature. To acquire some of the field experience we went to Big Bend for a week and drove along roads and walked trails looking for the locations of gray foxes found on Global Biodiversity Information Facility or GBIF. *Citations: Schmidly, D. J., and W. B. Davis. 1994. The Mammals of Texas. Austin, Texas. USA.*

## 9. Impacts of Alternative Production Systems

### PERS Recipient

**Research Area:** Agribusiness and Agriculture Economics

**Student Presenter:** Landry Davis (Lead/Undergraduate)

**Faculty Mentor (Dr):** Edward Osei, Katrina Henson, Syed Jafri, Laura Henson, Selin Guney, Man Yu, and Ashley Lovell

**Department:** Agriculture Education and Communication

**Abstract:** For purposes of this pilot study we assessed students’ emotional intelligence within the scope of a child development internship. Employers have stated that students have the textbook knowledge, but not the skills to deal with

difficult situations in the workforce. According to Goodenough et al. (2020) resiliency and adaptability are shown to increase during an internship. Examining the scope of internship skill building allowed us to examine changes over the course of a semester with pre and post-test data collection. The Schutte Self-Report Emotional Intelligence Test (SEEIT) was used in order to measure emotional intelligence among students who interned at a child development center. There are four sub-scales: emotional perception, utilizing emotions, managing self-relevant emotions and managing others emotions. This is a 33-item, 5-point Likert scale where students are able to self-report emotional intelligence. A paired samples t-test was used to compare emotional intelligence among students in a pre and post-test survey. There was a significant difference in SSEIT scores between the pre ( $M=126.6$ ,  $SD=4.3$ ) and the post-internship scores ( $M=133.8$ ,  $SD=5.7$ );  $t(5)=-5.61$ ,  $p=.002$ . Goodenough, A. E., Roberts, H., Biggs, D. M., Derounian, J. G., Hart, A. G., & Lynch, K. (2020). A higher degree of resilience: Using psychometric testing to reveal the benefits of university internship placements. *Active Learning in Higher Education*, 21(2), 102–115. <https://doi.org/10.1177/1469787417747057>

## 10. Cost Effectiveness of Dairy Manure Management with and without Biochar

### PERS Recipient

**Research Area:** Ag Economics

**Student Presenter:** Ashlyn Ballard (Lead/Undergraduate)

**Faculty Mentor (Dr):** Eun Sung Kan

**Department:** Agriculture and Natural Resources

**Abstract:** Dairy manure management is a significant component of production systems in conventional dairy farms. Manure management augmented with biochar techniques enables current production systems to potentially manage manure in a more cost-effective manner, particularly considering the regulatory climate faced by many dairy herds. This study contributed towards evaluating the comparative cost-effectiveness of manure management systems on dairy herds with and without the utilization of biochar techniques. Results indicate that depending upon the prevailing energy prices, utilizing dairy manure as biochar holds significant promise for current dairy management systems in Texas.

## 11. The Economics of Factors Affecting Dryland Crop Yield in the Texas Southern High Plains

### PERS Recipient

**Research Area:** Agricultural Economics

**Student Presenter:** Cord Brown (Lead/Graduate)

**Faculty Mentor (Dr):** Selin Guney

**Department:** Agriculture Education and Communication

**Abstract:** The Southern High Plains of Texas is a region in the United States that is known for producing over 25% of the nation's cotton crop. Over the years, the Ogallala Aquifer has been rapidly depleting, causing farmers in the area to adopt more water conservation strategies like dryland production. Additionally, the Southern High Plains are known for very adverse weather conditions, making production quite challenging. However, cotton has been a crop that has been successful in these adverse conditions. The objectives of this study are to; 1) estimate how strong the relationship between dryland yield and factors that affect it using regression analysis; and 2) Assess the potential for maximizing profits in dryland cotton cultivation. The investigation will involve gathering data on dryland cotton production, cotton prices, fertilizer application rates and weather information encompassing temperature and precipitation data. The entirety of the data gathered in this research will originate from the Southern High Plains district. We will employ Linear Multiple Regression (MLR) techniques in R to assess the relationship between the dryland yield and temperature, precipitation, and fertilization rates. Additionally, the study will employ a profit maximization function to compare the most favorable combinations of yield and profit.

## 12. Small Mammal Community Characteristics and Habitat Use Along an Herbivory in the Central Kalahari Desert, Botswana

### PERS Recipient

**Research Area:** Wildlife Ecology, Environmental Science

**Student Presenter:** Kaileigh Smith (Lead/Graduate), Ricky Garibay, and Autumn Patterson

**Faculty Mentor (Dr):** T. Wayne Schwertner, Darrel Murray, and Phil Sudman

**Department:** Wildlife and Natural Resources

**Abstract:** The Kalahari Desert ecosystem of southern Africa is one of the largest contiguous conservation landscapes in the world. Rare among the world's arid systems, the region historically has been largely undeveloped and sparsely populated. However, in recent decades, development and encroachment by human communities and livestock have significantly impacted this system. This is especially true in the case of artificial water. By developing artificial water points for livestock grazing, humans have altered the presence and behavior of both domestic and native herbivores, resulting in patterns of herbivory different than those under which the system evolved. This has the potential to alter vegetation structure, which is known to affect mammalian biodiversity. During 26 June – 4 July 2023, we collected small mammal and plant community data at 10 sites near the villages of Bere and Kacgae, Botswana. In order to sample across the livestock herbivory gradient, sites were situated either near (<1 km, n = 6) or far (>4 km, n = 4) from the nearest artificial water point (i.e., cattle post or village). At each site, we sampled small mammal communities using 40 Sherman live traps set in a 40-m X 70-m trap grid, with traps spaced at 10-m intervals. We estimated individual species abundance at each site using mark-recapture methodology and calculated small mammal diversity using Simpson's Index. At each trap point, we calculated woody plant density and canopy coverage using the nearest-neighbor method and herbaceous plant cover using the Daubenmire method. We sampled 160 trap nights per site for a total of 1,600 trap nights. We captured 60 individual small mammals representing 8 species, with an additional 30 recaptures. The most common small mammal species encountered were Namaqua rock rat (*Aethomys* [= *Micaelamys*] *namaquensis*, n = 15) and bushveld elephant shrew (*Elephantulus intufi*, n = 15). We also captured hairy-footed gerbil (*Gerbilliscus paeba*, n = 8), bushveld gerbil (*Gerbilliscus leucogaster*, n = 7), single-striped grass mouse (*Lemniscomys rosalia*, n = 7), multimammate mouse (*Mastomys* sp., n = 5), fat mouse (*Streatomys krebsii*, n = 2), and southern African pouched mouse (*Saccostomus campestris*, n = 1). We are using canonical correspondence analysis to categorize mammal communities according to vegetation community and position on the herbivory gradient, and an occupancy modeling approach to assess habitat use.

### 13. Quantifying and Contextualizing Retaliatory Killings of Lions in Botswana

**Research Area:** Wildlife Ecology, Environmental Science

**Student Presenter:** Kaileigh Smith (Lead/Graduate)

**Faculty Mentor (Dr):** T. Wayne Schwertner and Heather Mathewson

**Department:** Wildlife and Natural Resources

**Abstract:** In Botswana, as across much of their range, the primary threat to adult African lions (*Panthera leo*) is conflict with farmers, who kill them in retaliation for real or perceived livestock depredation. To promote coexistence, Botswana's Department of Wildlife and National Parks (BDWNP) subsidizes a compensation scheme to reimburse farmers for livestock lost to wild predators. However, evidence suggests that unless properly administered, such programs may exacerbate the conflict they are designed to alleviate by leading to increased retaliatory killings of lions by farmers. Our objectives were to 1) contextualize and quantify the patterns of human-caused mortality of lions, and 2) assess thQuantifying and Contextualizing Retaliatory Killings of Lions in Botswanae degree to which Botswana government officials and farmers adhere to the relevant retaliation and livestock compensation legislation regarding lions. We analyzed 10 years of BDWNP records on lion mortalities in western Botswana to extract spatiotemporal and socioeconomic data associated with the retaliatory killing of lions by farmers in response to livestock depredations. For each incident of a farmer killing a lion, we examined livestock depredation history, compensation records, firsthand reports by attending wildlife officers, and mortality accounts. We compared the lethal impact of commercial farmers versus pastoralists, number and demography of livestock lost prior to retaliatory killings, and depredation-retaliation timelines. Our results provide critical insight into drivers of mortality in lions living outside of protected areas and valuable baseline data for the management of this threatened population.

## 14. Effect of Copper Bolus Administration on Circulating Copper Concentration, Parasite Load, and Reproductive Function in Beef Cows

### PERS Recipient

**Research Area:** Beef Cattle Nutrition

**Student Presenter:** Tyler Harmonson (Graduate/Lead) and Catherine Murphy

**Faculty Mentor (Dr):** Kimberly Wellmann, Drew Cassens, Cheyenne Runyan, and Edward Webb

**Department:** Animal Science

**Abstract:** In Texas and Southeastern United States Cu concentration in the soil is in the lower 50th percentile, this leads low bioavailability of copper for livestock. Therefore, a 70-d completely randomized block design study was conducted to determine the effects of Cu and fecal egg count in grazing beef cows (n = 40). Cows were blocked by parity and body weight (BW) then randomly assigned to 1 of 2 treatments: standard offering of copper via free choice mineral (CON; Ragland Sweet Mag Mineral Mix, 425 ppm Cu) and those receiving a 25mg Cu rumen bolus in addition to the standard offering (Santa Cruz Animal Health, Dallas, TX). Cattle were managed as a single herd at the with equal access to water, a grain supplement, and a warm season grass pasture. Fecal samples via rectal grab, blood via coccygeal venipuncture, BW, BCS, hair coat (1 being the healthiest) and shedding (1 being the slickest) scores were all collected on day 0, 10, 24, 38, and 66 relative to treatment initiation. Sera were analyzed to determine circulating Cu, macrominerals, urea, creatinine, and various blood proteins. Fecal egg counts were conducted to determine Coccidial, Moniezia, and Trichostrongyle egg content. Data were analyzed using the GLIMMIX procedure of SAS 9.4 (SAS inst. Inc, Cary, NC). No treatment × day interaction (P = 0.988) was observed for circulating Cu; however, Cu decreased (P < 0.001) in all cattle over time, and TRT tended (P = 0.090) to have increased Cu compared to CON. No interactions or main effects occurred (P > 0.509) for BW. No interaction (P = 0.4389) occurred for BCS, hair, or shedding scores. Hair scores (P < 0.001), shedding scores (P < 0.041), and BCS (P < 0.001) decreased in all cattle over time. Body condition for TRT (5.2 ± 0.056) was greater (P = 0.0024) than CON (4.9 ± 0.057). Hair score by day decreased (P < 0.001) in TRT, while the shedding had a tendency of increasing (P = 0.0411) by TRT. There were no interactions or main effects on Coccidial (P < 0.220) or Trichostrongyle (P < 0.274) egg content. While no interaction (P = 0.673) for Moniezia was observed, TRT tended (P = 0.095) to have fewer Moniezia eggs than CON. No interactions (P > 0.100) were observed for any of the blood metabolites, and while they differed (P < 0.05) day to day for all cows, no treatment effects occurred (P > 0.10). Although Cu bolus administration at this concentration did tend to change Cu copper in the animal, effects resulting from it were minimal.

## 15. NVivo Student Project

### PERS Recipient

**Research Area:** NVivo, interdisciplinary, data analysis tool purpose

**Student Presenter:** Lavender Blackston (Lead/Undergraduate) and Azariah Bates

**Faculty Mentor (Dr):** Therese Pennell

**Department:** English, Wildlife and Natural Resources

**Abstract:** The field of Machine Translation(MT) has been studied for many years. Tarleton students took on MT using AI tools and these two students set out to gain richer insights of the data obtained from MT using the data analysis tool NVivo. Azariah Bates from the College of Liberal and Fine Arts, and Lavendar Blackston from the College of Agriculture and Natural Resources reflect on Nvivo's interdisciplinary use in their research project to share the completed results. They strive to demonstrate how students can use NVivo to gain insights into the different types of research done for any discipline.

## 16. Prairie clovers as a native warm-season alternative to alfalfa hay

### PERS Recipient

**Research Area:** Horticulture & Forages

**Student Presenter:** Alexander S. Plucker (Lead/Graduate)

**Faculty Mentor (Dr):** Mauricio Erazo-Barradas, James Muir, Adam Mitchell, and Trinette Jones

**Department:** Wildlife and Natural Resources

**Abstract:** Dwindling space and water forces agricultural producers and natural resource managers to work in the same space, competing for available growing land and habitat. The domestication of native legumes enables forages capable of supporting both goals of producing drought-resistant feed for livestock and humans, and conserving wildlife and natural resources. The inclusion of a new protein-rich warm-season leguminous forage as a hay source has the potential to provide economic benefits to producers and lower costs of consumers whose primary high-protein hay source is the cool-season legume, alfalfa (*Medicago sativa*). This field project will evaluate the commercial potential for the prairie clovers (*Dalea* spp.) to be used as a native warm-season alternative to alfalfa in baled forage. This project will identify: 1) yields and persistence at various harvest heights and intervals, and 2) identify nutritive values at different harvest height and interval combinations. Pollinator surveys will be conducted solely as a portion of general crop maintenance and resulting data will be provided, however no analysis will be conducted over preference and presence. We will then extrapolate yield values to a per hectare value and compare nutritive values to livestock nutritional needs.

## 17. Development of an Electrical Wiring Experience

### PERS Recipient

**Research Area:** Virtual Reality Development

**Student Presenter:** Samantha Reinhard (Lead/Graduate)

**Faculty Mentor (Dr):** Justin Pulley

**Department:** Ag Education and Communication

**Abstract:** Enhancing educational and training environments using virtual reality (VR) technology has proven effective by promoting safety, efficiency, and impactful learning. Educational technology, like VR, has shown to be impactful because of the level of interaction, and repetition necessary for the development of psychomotor skills. Multiple industries such as medical training, engineering, and welding use VR heavily in skill-based learning. A potential area of skill-based education not using VR extensively is electrical wiring. Electricians perform many skills such as wiring lights, switches, receptacles, and appliances, all which require hands on training. By using VR technology students can be engaged in psychomotor development and actively learning these hands-on wiring skills, all while in a safe learning environment. The purpose of this project was to develop a virtual reality-based electrical wiring instructional activity to support student's development of skill-based competencies. The VR instructional activity developed provides students a "sandbox" mode, which allows students to freely create different types of circuits. Users are provided a virtual shop table, and a box to their left to select the necessary outlet or lighting box, DCO/GFCI outlets, light fixtures, switches, different types of wire, and tools to complete their circuit. Future plans include the implementation and evaluation of the VR activity with pre-service agricultural education students during a pre-service agricultural mechanics course. To date, this VR activity has been developed using undergraduate student labor from an Independent Studies course at Tarleton State University and \$3,200 of undergraduate student labor during a summer session.

## 18. Microplastics in songbirds

### PERS Recipient

**Research Area:** Wildlife

**Student Presenter:** Alex Hoxie (Lead/Graduate)

**Faculty Mentor (Dr):** Heather Mathewson, Adam Mitchell, and Rajani Srinivasan

**Department:** Wildlife and Natural Resources

**Abstract:** Microplastic pollution is a widespread threat to biodiversity and human health, with evidence indicating potential negative impacts to physiology, endocrinology, and behavior of wildlife. Although passerines comprise more than half of all bird species, little is known about the prevalence and effects of microplastics in this group. We initiated a pilot study to better understand the effects of microplastic pollution in songbirds in summer 2023, using house sparrows (*Passer domesticus*) a widespread, human-commensal species. This study explored nonlethal methods of detecting and analyzing microplastics in nestlings and eggs. We collected samples of nestling fecal sacs and unhatched eggs from established house sparrow colonies at farms and dairies in Stephenville, TX, Fargo, ND, and Easton, PA. After collection, we subjected samples to a chemical digestion, vacuum filtration, and identified suspected microplastics under a stereomicroscope. We found that there was no significant difference in the amount of microplastic pollution between

young and old nestlings. By conducting this study on house sparrows, we can obtain broader insight into the burden of microplastic pollution on passerine species.

## 19. Analysis of genetic variability of *Mycoplasma wenyonii* within a single beef cattle herd through 16S V4 sequencing

### PERS Recipient

**Research Area:** Immunology and Reproductive Physiology

**Student Presenter:** Nicole Bloch (Lead/Graduate)

**Faculty Mentor (Dr):** Cheyenne Runyan, Barry Lambert, Janice Speshock, Kimberly Wellmann, Jeff Brady

**Department:** Animal Science

**Abstract:** Bacterial infections are common sources of disease amongst beef cattle. Certain bacterial pathogens, such as *Mycoplasma wenyonii*, can cause chronic, latent, low-level infections within their hosts. Such latent infections have been known to develop into severe cases of disease, presenting with tachycardia, pyrexia, hind-limb edema, and hemolytic anemia. *Mycoplasma wenyonii* is a hemotrophic mycoplasma species living parasitically attached to erythrocytes of cattle. Infections have been detected globally, yet little is known about the species including mode of transmission, virulence factors, best antibiotic class for elimination, and true prevalence rates within certain regions, such as the state of Texas. Considerable genetic variation within a bacterial species leads to classification of different strains. Different strains may cause varying levels of disease. To better understand *Mycoplasma wenyonii* and the differences between strains, 16S V4 sequencing of 120 samples has been performed. This broad survey amplified all 16S ribosomal DNA within the samples, providing a full picture of the blood microbiome. Samples were collected from 61 cows, 55 calves, and 4 bulls from a single herd location in Erath County. Whole blood was utilized for DNA extraction using a silica spin-column protocol before undergoing amplicon PCR, index PCR, and multiple robotic cleanups. After processing, the samples were sent out for 16S V4 NanoSeq Sequencing. Data was analyzed with Microbiome Analysisist. Preliminary raw data analysis from the first 10 adult females has yielded a total of 190 Operational Taxonomic Units (OTU) and 99 non-chimeric OTUs from the group of samples, with 2 phyla, 2 classes, 2 orders, 3 families, 2 genera, and 1 species identified. Sequencing data is awaiting further marker data profiling. The results of this analysis will allow for the creation of a new qPCR Taqman probe to quantitate the prevalence rates of *Mycoplasma wenyonii* in the local area. Future research efforts will identify target specimens for longer Near-Full Length 16S sequencing and Whole Genome Sequencing which will yield more information about the species and its characteristics.

## 20. Assessing the occurrence of large carnivores on pastoral landscapes of the Western Kalahari Corridor, Botswana

**Research Area:** Wildlife Ecology, Environmental Science

**Student Presenter:** Chris Mbisana (Lead/Graduate)

**Faculty Mentor (Dr):** T. Wayne Schwertner and Heather Mathewson

**Department:** Wildlife and Natural Resources

**Abstract:** Agricultural development is one of the major global threats to wildlife in unprotected areas. In western Botswana, the Western Kalahari Corridor (WCC) is a 200-km unprotected gap between the Kgalagadi Transfrontier Park (38,000 km<sup>2</sup>) and the Central Kalahari/Khutse game reserves (55,300 km<sup>2</sup>) and provides critical connectivity between the parks. Although designated as a “wildlife management area,” in recent decades the corridor has seen a significant increase in livestock farming and associated development. To understand the impact of human development on large carnivores, we conducted a camera trap study in the WCC. Our site was an unprotected and mostly unfenced area of approximately 3,500 km<sup>2</sup> centered on the villages of Bere and Kacgae. The sparsely populated area is bisected by a single paved highway and dominated by pastoral farming. Thirty-two boreholes are scattered around the area and provide water to remote cattle posts. We placed 120 camera traps, 60 along roads each paired with a second trap 500-m away from the road. Each consisted of a single motion-triggered infrared camera. We checked traps monthly during February – November 2023. We identified 29 mammal species, including lion (*Panthera leo*), leopard (*P. pardus*), cheetah (*Acinonyx jubatus*), wild dog (*Lycaon pictus*), and brown hyena (*Parahyaena brunnea*). We are using occupancy modelling to identify associations with anthropogenic features including roads, villages, cattle posts, and livestock activities. Our results will inform wildlife managers and conservation as to whether the presence of livestock farming in the area impacts the occurrence of large carnivores in this critical wildlife corridor.

## 21. Social Drivers Affecting Human-Leopard Coexistence

**Research Area:** Human-Wildlife Conflict

**Student Presenter:** Rachel Lane (Lead/Graduate)

**Faculty Mentor (Dr):** Hemanta Kafley

**Department:** Wildlife and Natural Resources

**Abstract:** Predator conservation is only sustainable when communities coexisting with the target species are unharmed and benefit from conservation initiatives. Our study examined local attitudes toward the Common Leopard (*Panthera pardus*) and its conservation in the community forests of Nepal's mid-hill region. We conducted 123 household surveys, employing semi-structured questionnaires to collect data on demographics, socioeconomic status, general attitudes toward leopard conservation, and incidents of human-leopard conflicts. Our results suggest socioeconomic status, education level, and income level strongly influence local perceptions regarding leopards and their conservation. Those with higher socioeconomic status and education levels were more likely to have positive attitudes toward leopards and their conservation. Conversely, those with lower income levels often had a negative perception regarding these large felids; many viewed them as a threat to their safety and livestock, which are crucial to their livelihoods. Though retaliatory killings are common in this area, and many individuals have a negative view of leopards, few respondents had received any education regarding leopards and their conservation. Additionally, though ecotourism is a thriving industry in other areas in Nepal, few respondents felt they could benefit from wildlife in any way. These findings are critical; they suggest that providing education about leopards, involving locals in conservation initiatives, and ensuring local communities benefit economically from wildlife could significantly shift perceptions. This shift is essential to formulating conservation strategies that local communities accept and benefit from, thus ensuring the Common Leopard's protection. Our study highlights community engagement's importance in conservation initiatives. By understanding the socioeconomic factors influencing local attitudes towards leopards, conservationists can tailor strategies addressing these communities' specific needs and concerns. This approach fosters a positive perception of leopards and contributes to conservation programs' long-term success. In conclusion, our research provides a roadmap for future conservation projects. It emphasizes the need for strategies grounded in the socioeconomic realities of communities living alongside leopards. By aligning conservation efforts with local communities' interests, we can ensure coexistence between humans and leopards in Nepal's mid-hills, preserving these incredible felids for future generations.

## **College Of Business**

## 22. Financial Literacy and Student Athletes

**PERS Recipient**

**Research Area:** Financial Literacy and Student Athletes

**Student Presenter:** Matthew Haley (Lead/Graduate)

**Faculty Mentor (Dr):** James E. Goodpasture and Juan Gallardo

**Department:** Accounting, Finance & Economics

**Abstract** College is a special environment to which student-athletes must adjust. Student-athletes are exposed to many outside factors. The new regulations involving the marketing of student-athlete's name, image, and likeness (NIL) provide opportunities for Student-Athletes to increase their income. NIL also provides an opportunity for third parties to take advantage of student-athletes. Student-athletes must learn to control their personal resources. Monitoring their finances creates emotional stress for student-athletes. Financial literacy knowledge will allow student-athletes to better manage their resources, which will reduce instances of emotional stress and harm. Freshmen, low income, and first-generation (FYI) student-athletes may be at greater risk than other athlete groups. These groups, in particular, would benefit from learning more about personal financial literacy and from increased exposure to NIL rules and regulations. Program effectiveness was measured at the student-athlete level, using the "Big FIVE" financial literacy measurement theory. Measurement was performed pre and post intervention.



## **College Of Education**

### **23. 1st year Dual Credit Students' Experiences and Perceptions in Upper-Level Courses**

#### **PERS Recipient**

**Research Area:** College Readiness, Student Academic Success

**Student Presenter:** Morgan N. Ross (Lead/Graduate) and Melissa Baker

**Faculty Mentor (Dr):** Ron Rhone

**Department:** Educational Leadership and Technology

**Abstract:** This study explores the perception and experiences of 1st-year dual credit students taking junior and senior level courses required for their degree. By understanding dual credit students' challenges, needs, and misconceptions, colleges can develop strategic plans to support students' experiences and success, which can impact student retention and degree completion.

### **24. Social Media Engagement: An Analysis of the Impact of Social Media Campaigns on Facebook, Instagram, and LinkedIn**

#### **PERS Recipient**

**Research Area:** Educational Technology

**Student Presenter:** Dana Wise (Lead/Graduate)

**Faculty Mentor (Dr):** Nicole Mishnick

**Department:** Educational Leadership and Technology

**Abstract:** Social media has revolutionized communication and changed how society accesses and receives information. As social media has become more prevalent, it has shifted the advertising and marketing strategies of companies worldwide. To reach their target audience, organizations, including universities, have shifted their marketing plans to include social media campaigns. Research has shown that social media campaigns have enabled universities to build positive relationships with potential undergraduate and graduate students. However, previous research related to post-graduate social media use focuses on social media as a collective tool and does not analyze engagement by each platform. The purpose of this study was to determine which social media platform, LinkedIn, Instagram, or Facebook, will have the largest impact on engagement, as measured by likes, comments, and shares. Welch's NOVA indicated there was a statistically significant difference in the engagement between platforms. However, post hoc analysis indicated the statistically significant difference only occurred between Facebook and Instagram. These findings indicate that while Facebook may yield higher engagement than Instagram and LinkedIn, all platforms should still be considered viable options when utilizing social media as a recruitment tool in higher education.

### **25. Pandemic-Forced Online Learning: Factors Linked to Perceived Learning Outcomes**

**Research Area:** Instructional design; numerical & math cognition

**Faculty Mentor (Dr):** Chenmu Xing

**Department:** Psychological Sciences

**Abstract:** The present study aims to evaluate how learners taking Chinese language courses online during the pandemic perceived their learning and course experiences while alternative (i.e., in-person) class arrangements were unavailable, regardless of students' own preferences. The central goal is to understand the potential associations of multiple learning-related processes (e.g., motivation, learner behavior, course satisfaction) when Chinese language learning was forced into a completely remote and virtual environment. Survey data were obtained from adult Chinese language learners who voluntarily responded to a survey in which they rated their online learning experiences in the given courses taken during the pandemic. Questionnaire items were selected directly or adapted from survey instruments measuring: (1) learner motivation (LLOS-IEA, Noels et al., 2000), (2) online self-regulated learning behavior (OSLQ, Barnard et al., 2009), (3) learner-rated learning climate (LCQ, Williams & Deci, 1996), (4) course satisfaction (adapted Chinese version of OLSS, Chen & Adesope, 2016; Hao, 2004), and (5) need satisfaction (NSS, Chen & Adesope, 2016). In addition, learners also gave ratings to their perceived learning outcomes (e.g., improvement in reading, writing, etc.). Pearson correlation tests revealed that learners' self-regulation, course and need satisfaction as well as positively received learning climate are

positively correlated with each other as well as with students' perceived learning gains. However, students' self-rated motivation was not found correlated with students' perceived learning gains or higher satisfaction at the course. The current findings shed light on instructional and course climate design for online language teaching and learning.

## **26. Investigating the Impact of Acute Pain on Working Memory using EEG**

**Research Area:** Psychology & Neuroscience

**Student Presenter:** Nikki Civitello (Lead/Graduate) and Isabella Casmedes

**Faculty Mentor (Dr):** Amber Harris Bozer

**Department:** Psychological Sciences

**Abstract:** Chronic pain affects about 100 million adults in the United States and has an annual cost of roughly \$300 billion, outweighing the annual costs of heart disease, cancer, and diabetes. Pain is disruptive for cognitive processes, such as memory, encoding, and retrieval. This study aimed to examine how cold-induced acute pain affects working memory in right-handed male and female participants. A total of 16 participants between the ages of 18-23 were randomly assigned into either an acute pain stimulus (cold pressor task-CPT) pain group (n=8) or the control group (n=8). Participants completed two rounds of a working memory task that measured their ability to both recall and recognize the last word of presented sentences. EEG data were recorded with iMotions software and a B-Alert 20-electrode system (10-20 electrode placement referenced to mastoids) after an impedance check in a double-walled and foam insulated sound attenuating chamber (Whisper Room). Galvanic skin response data were recorded using a Neulog system. EEG data were processed in Matlab, Notepad++, and Cartool to filter (.05-50Hz) data, reject artifacts, and compute fast fourier transforms to obtain frequency band data (delta .05-3 Hz; theta 4-7 Hz; alpha 8-13 Hz; beta 14-30 Hz; and gamma 31-50 Hz). ANOVAs were run to compare cortical activity (power spectral density of all EEG electrodes) by group (pain/no pain). Electrodes Fp1, Fp2, and F8 are thought to represent cortical areas that are associated with pain perception and working memory. Previous pain research also suggests most changes in brain activity recorded from EEG result in a decrease in alpha power, but findings have been heterogeneous. This study expected that a decrease in alpha power, and possible increases in delta and beta power, would occur upon administration of cold-induced acute pain. ANOVAs indicated increased frontal lobe activity in the theta, alpha, beta, and gamma bands (f8, fp2, f4) in the no pain (males) group compared to the pain (males) group, increased temporal lobe activity in the delta band (t4) for the no pain (males) group compared to the pain (males) group, and increased parietal lobe activity in the alpha and beta bands (p3, p4) for no pain (females) group compared to the no pain (males) group. Further, working memory task scores were not affected by the presence of acute pain, and there were no significant changes across groups for galvanic skin response. These data suggest more research is necessary to understand the specific cortical effects of pain on working memory, which can be observed even when pain does not elicit differential responses on a working memory task.

## **27. Neural oscillations of the sensory and affective pain dimensions using the electroencephalogram**

**Research Area:** Psychology & Neuroscience

**Student Presenter:** Isabella Casmedes (Lead/Graduate), Nikki Civitello, and Sarah Love

**Faculty Mentor (Dr):** Amber Harris Bozer

**Department:** Psychological Sciences

**Abstract:** Pain is a complex, multidimensional phenomenon and consists of three dimensions: sensory-discriminative, affective-motivational, and cognitive-evaluative. Pain questionnaires such as the widely used McGill Pain Questionnaire contain sections that assess both the sensory and affective dimensions of pain. It is well documented that the pain dimensions are associated with activity in select cortical areas (e.g. primary somatosensory cortex for the sensory dimension and anterior cingulate cortex for the affective dimension), yet the EEG profile of the cortical activity that underlies the pain dimensions is not comprehensively known. Right-handed participants (18-30 years old) were placed into two groups: chronic pain (n=5) vs. no chronic pain (n=7). After an impedance check, cortical activity was recorded using an ABM B-Alert 24 electrode EEG and iMotions software (referenced to mastoids) in a double-walled and foam insulated sound attenuating chamber (Whisper Room) during presentation of previously validated sensory-discriminative and affective dimension questions from the McGill Pain Questionnaire and an experimental pain stimulus (cold pressor task). Frequency band data were extracted in Cartool software (fast fourier transform) after Matlab was used to filter (.05-

50Hz) data and reject artifacts. ANOVAs were run for each frequency band (delta .05-3 Hz; theta 4-7 Hz; alpha 8-13 Hz; beta 14-30 Hz; and gamma 31-50 Hz) and electrode of interest (C3, C4, F7, F8) with group (chronic pain vs. no pain) as the between subjects factor, dimension (sensory vs. affective pain dimension stimuli) and time (baseline vs. cold pressor task) as within-subjects variables. Participants with and without chronic pain had significantly different baseline cortical responses to pain dimension stimuli, specifically in the electrode aligned with somatosensory processing. After application of an experimental pain stimulus, the cortical response within the group with chronic pain significantly increased.

## **College Of Health Sciences**

### **28. Time Course Changes in Muscle Thickness of the Tibialis Anterior Following Blood Flow Restricted Training**

#### **PERS Recipient**

**Research Area:** Neuromuscular Physiology

**Student Presenter:** Renee Gebert (Lead/Undergraduate), Kase Pennartz, Sierra Washington, Calvin Smith, Lindsay Rankin, Jordyn Watson, Bella Zapata, Dakota Harris, and Josh Keller

**Faculty Mentor (Dr):** Mike Luera and Amber Harris Bozer

**Department:** Kinesiology

**Abstract:** Background: Traditional resistance training program require training intensities of at least 60% 1-repetition maximum (1RM) to stimulate muscle growth. Low-load blood flow restricted (BFR) exercise has implications in rehabilitation since this modality has shown enhanced muscle growth at intensities as low as 20% 1RM.

Purpose: To measure temporal changes in muscle size following 4 weeks of BFR training on the tibialis anterior (TA).

Methods: Thirteen untrained participants were randomized into two groups: (BFR; n=8) ( $177.6 \pm 4.1$  cm,  $84.8 \pm 15.1$  kg,  $21.3 \pm 1$  years) or control (CON; n=5) ( $172.6 \pm 8.2$  cm,  $76.7 \pm 11.1$  kg,  $23.4 \pm 2.7$  years). Over a 4-week period, participants underwent twice-weekly sessions of unilateral isokinetic dorsiflexion training at 30% of their daily peak torque at a velocity of  $60^\circ/s$ . Muscle thickness measurements of the TA were obtained prior to both testing sessions and all 8 training sessions. Data was analyzed using a 2-way repeated measures ANOVA (Group [BFR, CON] x Time [pre, day 1-8, post]).

Results: There was no significant interaction or group main effects, however, a significant main effect was found for time ( $p=.025$ ; partial  $\eta^2=.170$ ).

Conclusion: Low-load training with or without BFR induces temporal changes in muscle size following a short 4-week intervention period. This exemplifies the efficacy of low-load training in inducing measurable changes in muscle thickness of the TA.

### **29. Cross-Transfer Effects of Unilateral Blood Flow Restricted Dorsiflexion Training on Muscle Strength, Hypertrophy, and Quality**

#### **PERS Recipient**

**Research Area:** Neuromuscular Physiology

**Student Presenter:** Dakota Harris (Lead/Graduate), Kase Pennartz, Calvin Smith, Sierra Washington, Lindsay Rankin, Jordyn Watson, Bella Zapata, and Josh Keller

**Faculty Mentor (Dr):** Mike Luera and Amber Harris Bozer

**Department:** Kinesiology

**Abstract:** Background: Unilateral training has shown to induce contralateral strength gains in the untrained homologous muscle. Low-load blood flow restricted (BFR) training has also shown to induce increases in muscle strength and hypertrophy compared to low-load training alone. Previous literature has found that BFR has systemic cross-transfer effects of strength in remote active muscle than low-load training alone.

Purpose: To examine the cross-transfer effects of 4 weeks of unilateral blood flow restricted dorsiflexion training on muscle strength, hypertrophy, and alterations in muscle quality.

Methods: Fourteen untrained participants were randomized into two groups: (BFR; n=8) ( $177.6 \pm 4.1$  cm,  $84.8 \pm 15.1$  kg,  $21.3 \pm 1$  years) or control (CON; n=6) ( $173.2 \pm 7.5$  cm,  $77.9 \pm 10.3$  kg,  $23 \pm 2.6$  years). Subjects completed 4 weeks of unilateral isokinetic dorsiflexion training at 30% of their daily peak torque at a velocity of  $60^\circ/s$ . Isokinetic peak torque,

echo intensity (EI), and cross-sectional area (CSA) were taken bilaterally pre and post training. Statistical analyses included 3 separate 3-way repeated measures ANOVAs (Group [BFR, CON] x Time [pre, post] x Leg [right, left]).

Results: For isokinetic strength, there were no significant interactions or main effects ( $p > .05$ ). For EI, there were no significant interactions ( $p > .05$ ); however, when collapsed by time and leg, there was a significant main effect for group ( $p < .05$ ; partial  $\eta^2 = .387$ ). Furthermore, there was no significant interaction for CSA ( $p > .05$ ), however when collapsed by group there was a significant main effect for time and leg ( $p < .001$ ; partial  $\eta^2 = .718, .752$ , respectively).

Conclusion: The BFR group was found to have elevated echo intensity values throughout the study with no changes in muscle quality following the training. Interestingly, low-load training with or without BFR induced hypertrophy in both the trained and untrained legs but did not result in increased isokinetic dorsiflexion strength.

### 30. Neuromuscular Adaptations to Low-Intensity Blood Flow Restricted Training

#### PERS Recipient

**Research Area:** Neuromuscular Physiology

**Student Presenter:** Calvin Smith (Lead/Graduate), Kase Pennartz, Sierra Washington, Lindsay Rankin, Jordyn Watson, Bella Zapata, Dakota Harris, and Josh Keller

**Faculty Mentor (Dr):** Mike Luera and Amber Harris Bozer

**Department:** Health and Human Performance

**Abstract:** Low-intensity blood flow restricted (BFR) training has been shown to induce adaptations in muscular strength and size similar to traditional high-intensity resistance training. However, the reporting of peripheral neuromuscular adaptations is lacking within the current literature. **PURPOSE:** The purpose of this study was to examine the effects of low-intensity blood flow restricted training on motor unit (MU) firing property relationships. **METHODS:** 13 untrained male subjects (age:  $22 \pm 2$  yrs; height:  $175.7 \pm 6.0$  cm; weight:  $81.9 \pm 13.3$  kg) were randomly assigned to either the BFR ( $n = 7$ ) or control ( $n = 6$ ) group. Subjects then completed a pretesting visit which consisted of 3 isometric dorsiflexion maximal voluntary contractions (MVC) and subsequent randomized isometric dorsiflexion MVC% based ramp contractions at 25%, 50%, 75%, and 100% MVC. During all contractions, a 4-pin surface electromyography (EMG) sensor was placed over the tibialis anterior in order to record muscular activation. Following a pretesting session, both groups completed 4 weeks (8 sessions) of isokinetic dorsiflexion training at 30% of their daily peak torque values at a velocity of  $60^\circ/s$ . Following the conclusion of all training visits, subjects repeated the pretesting protocol. For analysis of EMG recordings, the signals were decomposed into their constituent motor unit action potential (MUAP) trains, validated, and assessed for relative behavioral properties. For subsequent analysis of firing behaviors, the relationship (Slopes and intercepts) between MUAP size and mean firing rate (MFR) was calculated. Separate two-way repeated measures analyses of variance (ANOVA) (group [BFR v control] x time [pre v post]) were used to compare slopes and intercepts of MFR vs. MUAP at 25%, 50%, 75%, and 100% MVC. **RESULTS:** In regard to slopes, there were no significant group x time interactions at any of the intensities ( $p > 0.05$ ); however, at the 25% slopes, there was a significant main effect for time ( $p = 0.038$ ). Specifically, the 25% MFR v MUAP slope coefficient increased from pre- to post- ( $-0.105 \pm 0.010$  to  $-0.081 \pm 0.005$ ; mean  $\pm$  SE). In regard to the intercepts, there were no significant group x time interactions or main effects for any of the intensities ( $p > 0.05$ ). **CONCLUSION:** The main effect for time in the 25% slopes, in addition to a lack of differences in the 25% intercepts, indicates MUAP size increased independently from MFR following four weeks of low-intensity BFR training. This shift within the MU pool may be due to the recruitment of MUs at slightly higher thresholds during low intensity contractions, which is common within concurrent literature.

### 31. Beta Band Oscillations in the Human Motor Cortex During Bilateral Isometric Contractions in Untrained Individuals

#### PERS Recipient

**Research Area:** Neuromuscular Physiology

**Student Presenter:** Sierra Washington (Lead/Graduate), Kase Pennartz, Calvin Smith, Lindsay Rankin, Jordyn Watson, Bella Zapata, Dakota Harris, and Josh Keller

**Faculty Mentor (Dr):** Mike Luera and Amber Harris Bozer

**Department:** Health and Human Performance

**Abstract:** The human motor cortex assumes the vital role in movement coordination of limbs and their interaction in motor function. It regulates the facilitation of voluntary movements, and damage to this area can result in weakness of motor function to complete paralysis. Motor cortex signals are involved in movement of the body, and in this study, will be reported as voluntary contractions of the tibialis anterior (TA). The purpose of this study was to examine the relationship between average beta band (13-30 Hertz frequency) power in the human motor cortex while varying muscle contractions occur with Mean Power Frequency (MPF). Following a familiarization session, 4 lower-body resistance untrained males (n=4; age=22.5 ±2.1, height=173.5 ±5.6 cm, weight=79.7 ±20.1 kg) performed three isometric dorsiflexion maximal voluntary contractions (MVCs). The highest MVC was used to establish randomized percentage-based trapezoidal ramp contractions at 25%, 50%, 75%, and 100% MVC. All testing was performed in a custom-built seat using an isometric dynamometer where hip flexion was set to 100 degrees and knee extension to 120 degrees. A 64-channel EEG (OT Bioelectronica; reference on the cervical vertebra C7) was used to record neural activity during the protocol. Signals were recorded, decomposed, and filtered by channel type in Cartool (.02-50Hz), MatLab (EEGLab), and Notepad ++. Subsequent registered EEG signals were processed through Cartool and MatLab which derived RMS values. Two separate 2-way mixed factorial analyses of variance (ANOVA) (location [C5, C3 v C1] x intensity [25% v 50% v 75% v 100%]) (location [C6, C4 v C2 v] x intensity [25% v 50% v 75% v 100%]) were used to compare MPF values of the left and right hemispheres, respectively. There were no significant main effects or location x intensity interactions (.05). This suggests there may be contra-lateralization in isometric contractions in untrained individuals compared to traditional lateralization findings.

### **32. Effects of Tactical Training Education on Knowledge and Physical Performance of Military Personnel**

#### **PERS Recipient**

**Research Area:** Tactical Strength & Conditioning

**Student Presenter:** Jackson Maynard (Lead/Undergraduate), Ruth Caddell, Emma Thornton, Gillian Braden, and Chey Lavendar

**Faculty Mentor (Dr):** Andy Wolfe

**Department:** Health & Human Performance

**Abstract:** As of 2014, the National Strength and Conditioning Association (NSCA) offers a holistic credential, Tactical Strength and Conditioning Facilitator (TSAC-F) that assesses the knowledge and proficiency related to training tactical populations. While this credential has gained popularity within the military community, to the best of our knowledge, the efficacy of the TSAC-F education related to enhanced knowledge and improved physical performance has yet to be empirically explored. Therefore, the purposes of the current investigation were (1) to examine the effect of TSAC-F education on the strength and conditioning knowledge of military personnel and (2) determine the difference in physical fitness results when applying TSAC-F concepts to training compared to training effects obtained from non-certified personnel. **METHODS:** Twenty Reserve Officer Training Corp (ROTC) cadets were recruited and completed a pre-test assessment of tactical strength and conditioning knowledge (TSAC-F Exam) before being randomly assigned to experimental (n = 10) and control groups (n = 10). Experimental group received a 3-week tactical strength and conditioning education program explaining scientific principles of exercise and exercise technique associated with tactical populations. The control group received no formal education. Upon completion of the 3-week education program both groups completed a post-test TSAC-F Exam. Secondly, eighty ROTC cadets, not involved in the education program nor education testing, completed a pre-standardized Army Combat Fitness Test (ACFT) and following, were divided into two groups (experimental, control). The experimental group (n = 40) received 12-weeks of physical fitness training prescribed and delivered by the cadets who received the tactical strength and conditioning education program. The control group (n = 40) received 12-weeks of physical fitness training prescribed and facilitated by the cadets who did not receive the tactical strength and conditioning education program. A post-ACFT was completed by both group upon the completion of the 12-week training programs. A two-way mixed ANOVA (2 group, 2 time) was employed to examine the difference in educational improvement between and within groups. Additionally, multiple two-way mixed ANOVAs (2 group, 2 time) were employed to examine the effects of the educational intervention on the athletic performance (ACFT) of cadets. Bonferroni post hoc analyzes were used when significant main effects ( $p < .05$ ) were observed. **RESULT & CONCLUSION:**

Currently, participants for this project are being recruited and the investigation is scheduled to start and take place during the summer and fall of 2024.

### 33. Enhancing Neurological Recovery: Investigating the Impact of Stroke Rehabilitation Through Static Balance Training

#### PERS Recipient

**Research Area:** Stroke and Balance

**Student Presenter:** Adam Avalos (Lead/Graduate)

**Faculty Mentor (Dr):** Joe Priest and Neil Petroff

**Department:** Kinesiology

**Abstract:** Stroke survivors often face an increased risk of falls due to various physical, cognitive and sensory impairments resulting from stroke. Certain rehabilitative medicine seeks to improve balance but lacks the insight into which domain of balance is being affected by the interventions. This study aimed to investigate the impact of a 6-week static weight shift balance training (WSBT) program on fall risk prone stroke survivors. A secondary purpose was to categorize anteroposterior and mediolateral balance prior to and after balance training. Following a familiarization session, 6 stroke survivors (age =  $68.5 \pm 11.02$ , HT =  $1.75 \pm 0.07$ m, WT =  $81.41 \pm 8.95$ kg) performed 12 static balance training sessions over 6 weeks on the Biodex Balance Training System. Training sessions consisted of a 1-minute visual feedback and weight bearing exercise training program that allowed the subject to see how their weight shifted while standing. Scores accrued from these trainings were dependent on how well the subject-maintained balance without swaying. Data was collected following each session for anteroposterior and mediolateral sway. Paired samples T. Test were used to compare Pre vs Post testing of WSBT. There were significant differences found within overall ( $p = 0.02$ ) and anteroposterior balance ( $p = 0.04$ ). These data suggest that stroke survivors can benefit from visual feedback WSBT. These evidence-based insights into the effectiveness of static balance training indicate a targeted intervention for reducing fall risk among stroke survivors. The finding may inform future rehabilitation protocols and contribute to enhancing the quality of life for individuals recovering from stroke-related impairments.

### 34. Asporin Increases the Extracellular Matrix Cross-links and Inhibits the Cell Migration

#### PERS Recipient

**Research Area:** Solid Cancer (Breast)

**Student Presenter:** Caitlin Nguyen (Lead/Undergraduate) and Kimberly Hernandez

**Faculty Mentor (Dr):** Girdhari Rijal

**Department:** Medical Laboratory Sciences, Public Health, and Nutrition Science

**Abstract:** Migrating strategies of the triple negative breast cancer (TNBC) together with its role in the establishment of tumor microenvironment (TME), supporting metastasis, have been extensively studied. Extracellular matrix (ECM) is a major player for the TME, establishing the 3D spatial networks with interconnected pores necessary for the mechano-physiological function of the cells. Certain collagen aligners and crosslinkers which are necessary for the formation and the stabilization of ECM-networks, however, have not been studied in detail either in normal or in abnormal tissues. Complexities in cell-cell and cell-matrix interactions and different percentile concentration of ECM proteins in a TME challenge to reveal the concentration of certain proteins, exhibited by a particular cell line and their functions if specifically present in insignificant amount. Cancer associated fibroblasts (CAFs) predominantly occupy the major stroma of a solid tumor where they deposit extracellular proteins in the excessive amount compared to other tumor-associated cells. For example, TNBC tumor itself is positive for asporin (ASPN) since CAFs are major ASPN exhibitors, however, TNBC cells express it insignificantly. Here, we studied the expression of collagen type I and ASPN from CAFs and MDA-MB-231 (MM231) and evaluated the role of ASPN in collagen alignment and crosslinking. Results showed that collagen becomes stiff with its deranged fibers with large-size pores in absence of ASPN similar to the outer TNBC core where cancer cells dominate the area, while aligned collagens crosslink and establish small-size pores in the network in the presence of ASPN similar to the inner TNBC core where CAF cell dominate the area. The collagen-aligner and the crosslinker, ASPN, could be an alternative to anticancer drugs to halt the MM231 metastasis.

### 35. Unmasking the Impact of COVID-19 on the Mental Health of College Students

#### PERS Recipient

**Research Area:** COVID-19/Mental Health

**Student Presenter:** Alex Jordan (Lead/Graduate) and Brendan Morrow

**Faculty Mentor (Dr):** Subi Gandhi and Ryan Glaman

**Department:** Medical Laboratory Sciences, Public Health, and Nutrition Science

**Abstract:** Background: The COVID-19 pandemic has ushered in unprecedented challenges among college students. The pandemic not only created barriers for students for academic success but also brought tremendous health challenges concerning physical and mental health.

Methods: In this study, we explored the mental health challenges faced by college students using two validated questionnaires, the General Anxiety Disorder-7 (GAD-7) and the Patient Health Questionnaire-9 (PHQ-9). The surveys were deployed using the Qualtrics platform in the summer of 2021. Data were analyzed to discern patterns and prevalence of mental health issues using the validated questionnaires, and inferential statistics were executed to show correlations between variables of interest.

Results: In our study population, the prevalence of significant depression was 39.4% and anxiety was 40.1%. Among the explored factors, age, race, parent/guardian's level of education, campus residence status, and health insurance status were associated with depression ( $p < 0.05$ ), whereas gender, age, race, and parent/guardian's level of education were associated with anxiety ( $p < 0.05$ ). Furthermore, while the impact of the loss of a job and reliable access to food significantly influenced both depression and anxiety severity, the loss of stable housing only significantly impacted anxiety severity. Academically, the amount of learning difficulties (i.e., staying motivated to learn, finding a quiet place to learn, etc.) was also correlated with both depression and anxiety severity, and the learning difficulties differed somewhat among those with a clinically relevant total score for both depression (PHQ-9) and anxiety (GAD-7).

Conclusion: Our study cannot infer causation, but our results emphasize the growing body of evidence implicating mental illness as an issue of major public health concern among college students. While only time will tell the exact nature of the pandemic's effect on this population, it is imperative to continue researching this topic to understand the measures needed to ensure these students' mental well-being.

### 36. Identifying Barriers to Basic Needs, Academic Success, and the Vaccination Pattern among College Students during the COVID-19 Pandemic

#### PERS Recipient

**Research Area:** Student Health/Basic Needs/Vaccination/COVID-19

**Student Presenter:** Dylan DiChristofaro (Lead/Graduate), Katelyn Clark, Viraj Gandhi, and Jade Smith

**Faculty Mentor (Dr):** Subi Gandhi and Ryan Glaman

**Department:** Medical Lab Sciences, Public Health, Nutrition Sciences

**Abstract:** College students face significant challenges during large-scale disease outbreaks that potentially compromise their basic needs, vaccine confidence, and academic success. Using a cross-sectional design and convenience sampling, we examined the impact of COVID-19 among college students ( $N = 828$ ). The survey was administered using the Qualtrics survey platform to collect data on multiple demographic and health behaviors of students in the summer semester (2021). Our study demonstrated that the most common financial shock experienced by the study participants was job loss, with less remarkable changes in food and housing insecurities. Academically, students had the most difficulty learning online compared to other modalities (face-to-face, Hyflex, etc.) and struggled with staying motivated. They also struggled with group work and finding appropriate learning spaces. However, many did not use university support systems such as career and tutoring services. Exploring the COVID-19 vaccination attitudes, we found that only age, ethnicity, classification, and health insurance status were associated with getting vaccinated ( $p < 0.05$ ). When the learning environment was assessed for various modalities, only college attendance was significantly associated ( $p < 0.05$ ) with the accessible platforms (online, Hyflex, face-to-face, and others); however, nearly 40% of students reported difficulty learning on an online learning platform compared other categories that had much lower proportions. Our findings underscore an immediate need for universities to take measures to improve their preparedness and response strategies to mitigate the negative effects of future large-scale public health emergencies among students.

### 37. Relationship Between Esports Performance and Wellness Factors

**Research Area:** Esport Performance

**Student Presenter:** Patrick Lacey (Lead/Undergraduate), Chad Agor, and Bryson Reagan

**Faculty Mentor (Dr):** Christina Villalon

**Department:** Sport Science

**Abstract:** Introduction: Esports is rapidly growing in revenue, viewership, and opportunities. Given the historical stereotype of the video gamer and the growth of coach and manager roles in this industry, Esport athlete wellness is being considered more critically. Lee (2021), Bauman (2022), and Gonzalez Caino (2022) have previously considered relationships between various lifestyle factors and Esport athletes and their performance; However, none have looked at this relationship over time. The purpose of this study is to examine the relationship between physical wellness and competition performance across a semester. Methods: Participants self-report their personal data related to physical activity, sleep, mental conditioning, nutrition, and lifestyle behaviors on the FitGmr app daily. This data is sent to a dashboard controlled by a member of Texan Esports executive board, who exports it into a spreadsheet. At the end of each weekly competition, this board member also records game performance data from the publicly available website that tracks global rankings on an spreadsheet. Game performance data was linked to performer's data from the FitGmr app and was then de-identified. Data Analysis: Each individual participant's self-reported data is averaged on a weekly basis for their variables related to wellness. Correlations between wellness variables and game performance are calculated. Additionally, a regression is conducted to consider how much of the variance in game performance can be attributed to these wellness variables. Results: This study is still on-going. Discussion: Given the lack of available research regarding impact of wellness factors on esports athletes, positive correlations between game performance and physical activity, sleep, and mental conditioning could strengthen the argument of the importance of these factors for this population's performance and overall well-being.

### 38. Erath County 'State of Play': Available Opportunities

**Research Area:** Youth Sport Development

**Student Presenter:** Chad Agor (Lead/Graduate)

**Faculty Mentor (Dr):** Christina Villalon

**Department:** Sport Science

**Abstract:** Introduction: The trend towards the professionalization of youth sport across the United States may result in: a) children over-specializing in one sport which can lead to injury and overuse or b) children that physically or technically develop more slowly causing them to get left behind, lose interest in the sport, and stop playing. Youth sport 'retirement' can lead to obesity and slower development or lifelong detriment of motor skills. In order to try and overcome these more global health concerns, organizations like the Aspen Institute's Project Play follow a 'Sport for All, Play for Life' model which is supported by 8 strategies or 'plays': a) ask kids what they want, b) reintroduce free play, c) encourage sport sampling, d) revitalize in-town leagues, e) think small, f) design for development, g) train all coaches, and h) emphasize prevention. However, prior 'State of Play' reports have focused on more urban areas. As a first step towards identifying the 'State of Play' for Erath County, this study examined what sport and physical activity opportunities are currently available for children in Erath County. Methods: The convenience sample of organizations (n = 13) was gathered through data mining online public records (e.g., Stephenville Chamber of Commerce and Google maps). Then information from each organization's website regarding sport, location(s), mission statement, ages and gender served was gathered and recorded. Data Analysis: This data was then analyzed using a deductive coding process. Each youth sport opportunity was also coded by league type (recreational (R) or travel/select/club (T)) and age range. Results: In Erath County, a total of 12 non-interscholastic organizations offer 14 different youth sport opportunities. Those sports include: baseball, basketball, cheer, dance, flag football, horseback riding, martial arts, soccer, softball, swim, track, volleyball, wrestling, and multisport camps. Five organizations offer both travel and recreational leagues. Nine organizations offer only recreational activities and one organization offers only travel/select/club activities. Ages for these youth sport programs range by sport; the youngest offered is dance at 18 months and cheer, dance, martial arts, swim, track, & wrestling are offered to at least 18 years old. Discussion: Based on these results, 12 organizations would be serving a county of approximately 8,850 children under the age of 18 (US Census Bureau, 2021). Thus, additional data is needed to know how



many children each organization is serving and how many children are not being served, and why. Given the decreasing numbers of children in youth and interscholastic sport across the nation (NFHS, 2021; SFIA, 2018) and the growing health issues Americans are facing, especially in rural communities, this is an area that warrants further study. Next steps should include conducting a needs analysis and observation and evaluation of organization's programs relative to aspects like health and well-being, skill improvement, coaching behaviors, and athletes' retention in programs.

### **39. Resource Tool to Increase Accessibility to Early Intervention for Neurodevelopmental Behaviors**

**Research Area:** Social Sciences

**Student Presenter:** Mia Smith (Lead/Graduate), Adrianna Ibarra, and Jamie McMillian

**Faculty Mentor (Dr):** Ebony Lang

**Department:** Social Work and Communication Disorders

**Abstract:** Services may be limited because of availability in the area, because of the rural area served. Accessibility and awareness to these services serves as an obstacle to neurodevelopmental individuals. One of the services available to neurodevelopmental individuals is Applied Behavioral Analysis therapy. Applied Behavioral Analysis therapy involves many approaches for understanding and promoting positive or desired behavior. The student researchers conducted an explanatory study assess obstacles presented by neurodevelopmental individuals and their families. This research was to assist with any difficulties presented to receiving resources. The methodology used were mixed methods. The participants sought were any individuals who have children between the ages of 18 months to 10 years of age. The student researchers chose snowball sampling as their method for collecting data needed. The student researchers collected demographics through their anonymous online survey, which included 92 participants. The student researchers utilized bivariate analysis by running cross-tabulations to test how educating families of resources in neurodevelopmental needs and assistance with financial. The results from that were 14 out of 17 participants reported that they are aware of ABA Therapies however, 15.2% of those participants reported that they are looking to find more information about ABA therapies. The student researchers ran cross-tabulations against how many participants acquired 3 or more neurodevelopment behaviors to the participants ever being on a waitlist. Neurodevelopmental behaviors that were presented in the survey were avoid eye contact, avoid physical contact, impulsive behaviors, difficulty with numbers or words, difficulty adapting to change, and speech delays. The results were 53.26% (n=49) out of 92 reported that they presented 3 or more neurodevelopmental behaviors while being on a waitlist. These results helped the student researchers identify a probable factor of individuals not receiving treatment once neurodevelopmental behaviors have been presented. Once data analysis of the survey concluded it presented micro-level factors such as parental involvement, support systems, marital status, number of children the home, behaviors presented, and ability to pay that contributed to ability to obtain services. A mezzo level factor that presented was that distance to services available. The macro level factor that the data analysis concluded was many participants were unaware of ABA therapies. Many responded they would be interested in information about therapies available. If more communities were aware of ABA therapies, they could seek eligibility to services. Student researchers used the results of their data to inform their macro project intervention where they developed a resource folder for families for education and awareness.

### **40. Bringing Awareness to Male Sexual Assault and Stigmas Faced when Reporting**

**Research Area:** Social Sciences

**Student Presenter:** Emmanuelle Seino (Lead/Graduate) and Jacqueline Cummings

**Faculty Mentor (Dr):** Latocia Keyes

**Department:** Social Work and Communication Disorders

**Abstract:** The population of men affected by sexual assault, abuse, and domestic violence has increased over the years, yet very few are being reported. Sexual assault in boys is around one in every six are being sexually assaulted. More children such as boy's assaults are reported more than older males. Even with the current resources available, these males at risk are not reporting as much as women. Men tend to not report cases is that they are afraid or embarrassed by what has happened to them (Patrick, 2020). Men tend to want to handle situations themselves instead of going to the authorities. However, as advocates, we must educate and promote that no one is discriminated against and no matter the gender, abuse should be reported. This study focuses on sexual abuse specifically male sexual abuse. The survey consisted

of 15 questions with 11 being multiple choice questions, three open-ended questions and one question with a scale for understanding. The first four are demographic questions with the last 11 being over people's knowledge of sexual abuse. The sample size was 46 participants. Most of the participants (52%; n=26) were of the ages 18 to 24 years old, 50% male and female, and 34% (n=17) of the participants were White/ Caucasian. There were many participants (26%, n=13) who were not college students, 22% (n=11) who were Freshman, 18% (n=9) who were Sophomores, 16% (n=8) who were Juniors, 8% (n=4) who were Seniors, and 10% (n=5) who were Graduate students. Data results from the survey were coded into an Excel document with each question being labeled as nominal, ordinal or scale. The student researchers use the Pearson Correlation and Non-Parametric test available in the SPSS program to analyze the quantitative data. The student researchers also analyzed the qualitative data and saw what has been recurrently stated by the participants. The student researchers analyzed three open-ended questions from the survey. The student researchers examined the responses from the participants and looked for recurrent ideas the participants had in each question. The total number of responses that the student researchers analyzed ranged from 44 to 46 due to not all participants answering the open-ended questions. From each of the three open-ended questions, the student searcher found one to two themes. This research has relevance to social work because it allows social workers to implement the core ethical values of social work, review value conflicts and meet the needs of individuals who are suffering from sexual abuse/trauma. The results of the study informed the development of an educational brochure with links to articles and videos using QR codes. This brochure assist the community partner agency and similar agencies to provide to their clients resources and educational videos that will help with coping skills and adjusting to what have happened to them. This educational brochure is aimed to let victims know they are not alone.

#### **41. Macro Intervention to Sustain Resources for College Food Pantries**

**Research Area:** Social Work

**Student Presenter:** KC Morgan (Lead/Graduate), Dayja Palma, Shailyn Kendrick-Dickerson, and Tania Reeves

**Faculty Mentor (Dr):** Ebony Lang

**Department:** Social Work and Communication Disorders

**Abstract:** This study explores the factors that contribute to the long-term sustainability of college food pantries. College food pantries are an increasingly popular resource for students facing food insecurity, but many struggle to remain in operation beyond their initial funding period. Using a mixed-methods survey developed and distributed through Google Forms, this study examines the perspectives of 109 administrators, staff, and volunteers from college food pantries in six contiguous states. The student researchers chose a non-probability, purposive, snowball sampling approach to data collection. The instrument used to capture the data was a survey developed through Google Forms. The survey consisted of 22 questions of which one was an identifier for the student researchers, three were participant demographics, and three were institutional demographics. The remaining 15 questions consisted of six checkboxes, seven multiple choice questions, and two long answer questions designed to inquire about food pantry topics. The majority respondents were female (85.3%, n=93), 11.9% (n=13) were male, and 2.8% (n=3) were nonbinary. Most respondents were White (52.3%, n=57), Hispanic/Latino had the 2nd highest number of respondents (25.7%, n=28), followed by African American (12.8%, n=14), and Asian and Pacific Islander had respondents of (n=1). Most of the respondents were ages 18 to 25 (43.1%, n=47) next were ages 25 to 35 (24.8%, n=27), then ages 35 to 50 (17.4%, n=19), lastly ages 50+ (14.7%, n=16). Through data analysis the student researchers identified that pantries are open Wednesday with 90.8% (n=99) reporting being open, followed closely by Thursday with 89.9% (n=98) participants pantries open. The student researchers used bivariate analysis to run cross tabulations, t-tests, chi-square, and correlations to test data against three hypotheses. The student researchers calculated correlations against eight different questions to analyze correlation and significance. The research identifies several key factors that are critical to the long-term sustainability of college food pantries, including financial stability, institutional engagement, community engagement, access to proper facilities, and effective management strategies. The study also highlights the importance of collaboration between college food pantries and external organizations, such as local food banks, and organizations, in ensuring long-term sustainability. The findings provide insights for college administrators, policymakers, and community organizations seeking to establish and maintain effective college food pantry programs. The research focused largely on mezzo level factors that contribute to the sustainability of resources of college food pantries; however, the student researchers

acknowledge that factors at the mezzo level have a direct effect on micro level practice, and macro level factors have a direct effect on both mezzo and micro practice. Researchers concluded that mezzo level factors such as partnerships, donations, and support from the institution and community were common factors attributed to having an impact on the longevity of college food pantries both through contributing and inhibiting their longevity. While food pantries are unable to control these largely external factors, food pantries can work toward building those connections to assist in sustaining themselves to the best of their ability.

#### **42. Two Homes: Using Adults Experiences to Inform Intervention for Children Involved in Child Custody Cases**

**Research Area:** Social Sciences

**Student Presenter:** Miranda Olvera (Lead/Graduate), Emma King, and Hannah Reeves

**Faculty Mentor (Dr):** Ebony Lang

**Department:** Social Work and Communication Disorders

**Abstract:** Throughout the family court process families often face challenges that may consist of stress, role confusion, financial struggles, depression, anxiety and many transitions and changes to their everyday lives. One major obstacle for many families that have to deal with family court orders are the financial overloads placed on families. Private information often causes tension in families and households. This mixed methods study focuses on adults who have experienced a child custody case at any point during their childhood using a pre-developed Perception Survey. The survey consisted of 15 questions including demographic, multiple choice and open ended. Twelve articles were reviewed by the student researchers focused mainly on parental alienation, including factors associated with child custody cases and family court proceedings and how they affect the child involved. The student researchers used the literature review to aid in developing their research. This exploratory study explores the effects of child custody cases on mental development of children. The student researchers plan to study the impact of child custody cases by identifying the mental development outcomes of adults, who were a part of a child custody case. The study includes participants older than 18, who were involved in a child custody case when they were under the age of 18. Through purposive sampling, the researchers survey 75 participants to gain a better understanding of their perception of their childhood experiences during their child custody case. Using SPSS, the researchers ran a correlation, and it was determined that there is a significant moderate relationship ( $r=.384$ ) between what age the participants were during the child custody cases and if they experienced any of the listed behaviors at any point due to the child custody case ( $p=.001$ ). The student researchers determined if a participant selected three or more options, then the child custody case would be a factor in the trauma they endured. Out of the 81 participants, 56 of them selected three or more behaviors, that is 69.1% of our participants. The researchers found that depending on the age groups, participants were less or more affected by the child custody case. Using measures of central tendency, the student researchers found that the majority of the participants believed that the custody that was determined was the best course of action. The student researchers also qualitatively analyzed one open-ended question, the open-ended was optional and only a total of 30 participants answered. The question asked participants to share any information they felt comfortable sharing about their child custody cases. These results led student researchers to understand the effects of divorce/child custody cases on the child can prevent parents/guardians/adults who are part of the custody case from hurting the child mentally. Student researchers used the data outcomes to create a project artifact of an interactive children's book. This book is adaptable and teaches kids about emotions going through a separation or custody case.

#### **43. Black Mirror: Debunking Myths and Developing a Clear Sense of Self**

**Research Area:** Social Sciences

**Student Presenter:** Chelei Doud Brooks (Lead/Graduate)

**Faculty Mentor (Dr):** Ebony Lang

**Department:** Social Work and Communication Disorders

**Abstract:** Mirror, mirror, on the wall; Who's the blackest of us all? Black is multidimensional and beautiful at all stages. Sometimes we can look at ourselves through the image of a shattered Black Mirror, that creates a distorted reality. In this presentation we will untangle the complex intersectionality of Black identity (i.e., African American, immigrant, multiracial, etc.). This presentation seeks to examine the messages received from the media and how they are

interpreted. The student researcher seeks to unpack how Black people see themselves versus how the world sees them using a RECAST method. Ultimately, the student researcher challenges the misconceptions that have been taught about people of color and provides a perspective that encompasses learning to fully embrace Black identity in all their depth. Together, we will build a mosaic that highlights all our blackness and redesign the way we look at ourselves and each other. This new developed sense of self will aid in owning our power, speaking our truth, and leading authentically. Psychosocial identity theory relates communal culture to the identity process. Identity is derived from the various positions we hold within society. Therefore, we must address the intersectionality that exists alongside our Black identities. Nigrescence is a Black Identity Model that consists of four stage-like periods that lead to Black internalization. The student researcher explains the model in its entirety while using intersections to build upon a future study to create intervention to promote racial identity. This presentation is the impetus of a conceptual framework to develop research that explores Black identity. As Black people have walked through the numerous messages received daily, this presentation provides insight to empower students of color on their journey of racial identity. The point of resolving racial identity is to prevent future harm and address racial issues appropriately, not overreacting or underreacting.

#### **44. Obstacles for Senior Citizens Obtaining Basic Needs**

**Research Area:** Social Sciences

**Student Presenter:** Kiara Laverty (Lead/Undergraduate), Estefania Piedra, Jasmine Galvan, and Ashtyn Nadebaum

**Faculty Mentor (Dr):** Ebony Lang

**Department:** Social Work and Communication Disorders

**Abstract:** Poverty has increased among Americans 65 and older from 8.9% in 2020 to 10.3% in 2021. An average of 13.7% of Texas households experienced food insecurity between 2019 and 2021. Texas is one of many states that experience food insecurity above U.S. average prevalence rates. Most Texas residents live in completely rural counties where resources are not easily accessible. Older adults have reported they have had to face the decision between paying for food, medicine, medical care, utilities, rent or mortgage, transportation, or gas for a car. This research focuses on barriers seniors experience to obtain basic needs in rural communities. The study also focuses on the extent transportation impacts the ability to obtain basic needs. The student researchers thoroughly analyzed 15 peer reviewed journal articles to inform their study to advocate for seniors to more easily obtain basic needs. Within the last year student researchers have also participated in volunteering with their community partner, a local church who provides basic needs to seniors. The student researchers developed an English and a Spanish survey with demographics, close ended and open-ended questions. The student researchers target a sample size of 75 participants. This research generates new knowledge of barriers and helps inform solutions to resolve the issue at hand. The student researchers will distribute a hard copy of the consent form to willing participants during the Thursday weekly food pantry gathering. The results will help student researchers to better advocate and support the needs of seniors in rural communities. Our research will provide greater knowledge on the senior population and inform the extent of impact on the Spanish speaking community.

#### **45. Environmental Factors of Reporting Agencies and Their Effect on the Likelihood of Sexual Assault Crimes Being Reported**

**Research Area:** Social Sciences

**Student Presenter:** Megan Crawford (Lead/Undergraduate), Elissa Gowin, and Zoie Jordan

**Faculty Mentor (Dr):** Ebony Lang

**Department:** Social Work and Communication Disorders

**Abstract:** Adolescent girls and young women have the highest rate of intimate partner violence. Females between the ages of 16 to 24 experience a rate of intimate partner violence three times higher than the national average. Women ages 18 to 24 who are college students are 3 times more likely than women in general to experience sexual violence. Of these women, only an estimated 20% report to law enforcement. Because past research has shown this to be the most at-risk population, this research will specifically focus on responses from this age group. When sex crimes go unreported to the police, victims may not be able to obtain necessary services to cope with victimization, offenders may go unpunished, and law enforcement and community resources may be misallocated due to a lack of accurate information about local crime problems. This research focuses on the environmental factors of

government agencies that affect the likelihood of sexual assault crimes being reported. There are a variety of government agency types. A government agency, sometimes known as an appointed agency, is a permanent or semi-permanent institution in the government machinery that is in charge of the oversight and administration of specified responsibilities. For purposes of this study, a government agency focuses on a police environment specifically the rooms where sexual assault crimes are reported. Because the student researchers are examining the different environmental factors in reporting sexual assault crimes, they also observed how the Vulnerability Theory and the Standpoint Theory informed their research. They developed a 41-question survey with demographic, quantitative, qualitative, and 3 are Likert scale questions. This exploratory research included a sample size of 82 participants using purposive sampling techniques. They ran qualitative and quantitative data through Statistical Package for Social Sciences (SPSS). The purpose of this study is to create an understanding of how environmental factors of government agencies affect whether sexual assault crimes are being reported. In the case that sexual assault crimes are not being reported, the student researchers would like to examine if it is the environment of the governmental agency itself that is keeping individuals from reporting. The results of the study are important because it can impact the interventions being created and the accuracy related to the number of crimes that are being reported as well as what could be improved to encourage crimes to be reported. In the case that environmental factors of government agencies are impacting the reporting of sexual assaults, the student researchers would like to encourage government agencies to be mindful of the emotion being cultivated by their agency. This research has the potential to impact interventions that are being created and to get an idea of the accuracy of the number of crimes being reported.

#### **46. Mixed Methods Study of Diversification Factors Affecting Meal Service Recruitment**

**Research Area:** Social Sciences

**Student Presenter:** Savannah Bynaum (Lead/Undergraduate), Sydney Mangold, Vianca Medina, and Erica Duran

**Faculty Mentor (Dr):** Ebony Lang

**Department:** Social Work and Communication Disorders

**Abstract:** Meals on Wheels strives to increase services to community residents of color. The population they serve is mostly elderly over the age of 60 and those under the age of 35 who are significantly disabled and homebound. This exploratory study focuses on the impact of diversity at Meals on Wheels and the factors involved in the limited number of participants of color. There are clients who are unable to communicate with the agency because of language barriers. Many clients call the agency requesting services but are unable to obtain them or must wait long periods of time for a translator. Many employees of Meals on Wheels are unable to speak different languages. The student researchers found the staff and client ratio between ethnic groups does not match the demographics within the community area. The student researchers reviewed a total of 16 journal articles relating to how the diversification of staff at Meals on Wheels affects vulnerable populations. The concepts that were explained and explored in the articles are about home-delivered programs such as Meals on Wheels and the vulnerability of the elderly, the role of the services to the elderly, and the staff of Meals on Wheels which helped form the overall study. Researchers created a 17-question survey that included open ended and closed ended questions to ask 100 community residents of color. Researchers collect data to assess the interest of having a diversified staff at Meals on Wheels. This research aims to understand what accommodation is necessary to have within the Meals on Wheels agency in order to reach more potential clients. The student researchers use the Statistical Package for Social Sciences (SPSS) to perform parametric and nonparametric tests. The researchers ran a measure of central tendency focusing on mean of age and mode of preferred language and gender. The student researchers ran a measure of variability focusing on the range of living arrangements and employment statuses. The student researcher ran correlation between the comfort levels of participants with people of their own race and people from different races. The results indicated there is a small relationship between the two variables ( $r=.181$ ;  $p>.05$ ;  $p=.070$ ). The student researchers ran a t-Test to see if there was a difference between groups who were interested in Meals on Wheels ( $n=27$ ), and those who were not ( $n=74$ ) and how comfortable they reported being with people who were of their same race or ethnicity. Results indicated there was no significant difference between groups ( $t=.081$ ;  $p>.05$ ;  $p=.936$ ). The overall results inform possible accommodations to be implemented within the agency to increase clientele. This study provides knowledge to the Meals on Wheels agency in Erath and many other Meals on Wheels agencies about the effects that diversification of the staff at MOW has on underserved populations. These findings contribute to the importance of

having a diverse staff and supports advocacy for a vulnerable population. This impacts other racial groups in a positive way.

#### **47. The Extent of Trauma-Based Experiences from Foster Youth Peer Relationships**

**Research Area:** Social Sciences

**Student Presenter:** Tristan Dufresne (Lead/Undergraduate), Sara Ratliff, and Leena Siraj

**Faculty Mentor (Dr):** Ebony Lang

**Department:** Social Work and Communication Disorders

**Abstract:** Studies have discussed the impacts of traumatic events on the behavior of foster youth and the quality of their peer relationships. Foster youth aged 7 to 12 are the group who demonstrate the most difficulty creating and maintaining healthy peer relationships. In the immediate aftermath of a traumatic event, emotions such as denial and shock are common. The effects of trauma on behavior include long-term emotional loss, flashbacks, and strained relationships because of trust issues. Traumatic events are defined as situations in which there is actual or looming danger of serious injury, death, or sexual violence. The student researchers observed current peer relationships between foster youth through attendance to organization events and within their respective home placements. This research focuses on the effects that trauma based experiences have on behavior in foster youth ages 7 to 12 in relation to developing and maintaining peer relationships. Maslow's Hierarchy of Needs and Erik Erikson's Stages of Development provide two theoretical frameworks for exploring foster youth peer relationships. Foster youth undergo a fundamental stage of social development from ages 7 to 12 according to these theories. The student researchers conducted an explanatory study to explain phenomena, clarify relationships, and identify causes and effects. The student researchers use non-probability, purposive sampling to obtain a total of 26 participants, 11 youth participants and 15 participants. A total of 57 responses were collected, as some adult participants had multiple corresponding youth participants. They collected and analyzed data from existing predeveloped research. This research incorporates qualitative research methods of focus groups. The student researchers used a variety of statistical and research methods including measures of central tendency, measures of variability, correlations, t-tests, and qualitative analysis. Understanding the basic cause of the problem helps foster youth communicate by enabling them to address the issues at the source. This study provides the student researchers with viewpoints and feelings from foster youth and provides support in discussing solutions to better their relationships within themselves and with others. Significant themes that emerged during the coding process included a variety of emotional responses to foster care placement, coping mechanisms, and positive and negative effects on youth self-esteem and peer relationships. Research on foster youth peer relationships can inform social workers of the importance of preserving and maintaining these connections and support the reunification of siblings and peers whenever possible. Overall, researching foster youth peer relationships in the social work profession is essential for promoting positive outcomes and providing appropriate support for this vulnerable population.

#### **48. The Inclusivity of Dietary Needs for College Students on University Campuses**

**Research Area:** Social Sciences

**Student Presenter:** Korina R. Hilburn (Lead/Undergraduate), Lluvia M. Montes, and Anithe Nkeshimana

**Faculty Mentor (Dr):** Ebony Lang

**Department:** Social Work and Communication Disorders

**Abstract:** With more than 25,500 items being provided to Tarleton students through the Purple Pantry (Impact Report Spring, 2022) and the serving of 3,446 students throughout the Spring 2022 cycle (Impact Report Spring, 2022), being able to launch research on a greater scale will allow for macro level analysis and evaluation. The research aim is to describe the dietary needs for college students at university Campuses. The purpose of the study is to focus on defining and figuring out what the previously mentioned dietary needs are. The second research question developed is how universities are acknowledging and providing for the researched population. Alongside these dietary needs, it will be important to identify the correlation between these needs, student satisfaction, and stress levels. Tarleton's Purple Pantry has been open since 2015 and does not receive a variety of dietary foods. There were 4,000 students using the Purple Pantry during Fall of 2022 and there is difficulty with keeping dietary restricted foods in stock. There are various demographics provided by Purple Pantry impact reports that show the different users of the food pantry. After looking through past impact reports

and comparing them to current statistics, there is a noticeable increase of student entries- these new students could be in need of specific dietary accommodating products. The Purple Pantry has a variety of canned food items, meat products, and side meals. However, many items contain peanut-based ingredients, dairy ingredients, and fish/shellfish products. Students with peanut allergies, dairy allergies/lactose intolerance, or fish/shellfish allergies may face many restrictions when it comes to the supply of food available in the Purple Pantry. Dietary restrictions are not only seen in food allergies, but also stem from the lifestyle that a student embraces, such as being vegan, vegetarian, or pescatarian. This study provides additional insight into various alternative food products that could help students. The targeted sample size is 75 participants. The online survey will be provided to participants through a QR code. The survey includes demographic questions such as their age, major, and student classification level for the student to answer; short answer questions where the student will be able to type in their answer to questions regarding their preferred dietary needs and required dietary needs; Likert scales of 1 to 4 to identify levels of stress, satisfaction, and university acknowledgement. The potential benefits of the study results to the participants will be to describe the dietary needs for college students at university campuses and know if and how their needs are being met. The research results will help determine what food college students need as well as what universities can do to help provide resource options that better fit the dietary needs of all college students. Recognizing and meeting a variety of dietary needs helps to create an inclusive campus community where all students, from all backgrounds, can engage fully in campus life.

#### **49. Impact of Social and Academic Resources in a Low Income and Rural Neighborhood**

**Research Area:** Social Sciences

**Student Presenter:** Taylor Clark (Lead/Undergraduate), LeAnn Haines, and Candyse Johnson

**Faculty Mentor (Dr):** Ebony Lang

**Department:** Social Work and Communication Disorders

**Abstract:** The purpose of the study is to assess the effectiveness of social and academic resources in low-income neighborhoods. Cresson Pods was established in 2019 as housing for low-income households. The housing pods provide a secure living space for 275 households. However, the pressing issue was the houses were in the middle of nowhere and left many families with nothing to do outside of the home. Cresson Pods community has about 1,000 residents and between 400-600 children under the age of 18 years old. The city of Cresson was estimated to have about 993 people in 2020, with a median age of about 40. Their ethnic demographic is primarily White (non-Hispanic) people with 83.4% making up the population of Cresson. In the present day, Cresson now hosts 1,532 people with the White population at 88.12%, two or more races being 8.86%, Black or African American with 1.81%, and other races at 1.21% (Cresson, Texas population 2023). A lack of community activities for youth has been a widespread issue. United Way partners with various agencies to provide youth with resources such as dinner events, game nights, festivals, and spring break camps that are also enjoyable for parents. They wish to create a safe space that also promotes a healthy environment (United Way of Hood County, 2023). Student researchers reviewed a total of 12 scholarly journal articles. The journal articles represent thousands of people who reside in similar size rural areas. All of the articles include how important community centers, and their academic and social activities are to rural neighborhoods and their residents. This research helps our study by highlighting what services are helpful for rural community centers to provide their residents, and how the services can help the population of rural communities. The student researchers will conduct a focus group with 3 to 8 participants to ask about the community center services and how they can be improved. The student researchers use the information gained from the programs to understand the effectiveness of community centers in lower income areas. The study is focused on active members of the Cresson Pod community and their families. The group's research question is, "What is the effectiveness of social and academic resources provided by community centers in low-income neighborhoods?" The student researchers developed a survey with close ended and open-ended questions. Their target sample size is 100 participants. They will use the data to better advocate and support the needs of low-income neighborhoods through community centers. The research is important to the social work profession because the results will provide proof of the effectiveness of community resources. The information found in this project can be used for rural or low-income communities.

## 50. Limited Access for Sensitive-topic Agencies in Rural Community Schools

**Research Area:** Social Sciences

**Student Presenter:** Haley McMurry (Lead/Graduate), Shelby Sanders, and Madison Hill

**Faculty Mentor (Dr):** Ebony Lang

**Department:** Social Work and Communication Disorders

**Abstract:** This mixed methods study with an emphasis on qualitative uses a focus group interview approach to understand impact of community-based resources in a rural community. In 2022, the United States Census estimated that there are approximately 83 million children in the United States of America. Within this number, there is a large percentage of the population who are considered at-risk. One way the effects of being at-risk can be countered is by participating in community-based resources. The student researchers have identified the research topic as what is the impact of community-based resources (CBR) on at-risk children within a rural environment. We define community-based resources as non-profit or for-profit agencies within a certain geographic boundary that provides health services or human services to an individual or group. The specific community-based resource that the student group is researching the effects on is Equine Facilitated Learning (EFL) has on at-risk children. The definition of at-risk children is children who live in poverty, have a disability, have low self-esteem, and/or have been abused. Equine Facilitated Learning (EFL) is one type of therapy. It is defined as a learning approach that involves building a relationship between a horse and a child to help improve the development of life skills. In 2018, there were 4,800 certified equine therapy instructors and 881 registered riding centers. This research aids the student researchers because it provides insight into the impact of community-based resources such as equine therapy and explores the results related to a child's confidence, behaviors, and communication skills. The student researchers reviewed 12 journal articles that related to community-based resources and also identified two theoretical underpinnings of the Life Course Theory and the Problem Behavior Theory to help better understand and explain the phenomena that at-risk children could potentially face. The student researchers identified exploratory as their type of research because their research had not been studied extensively. This research uses a purposive non-probability sampling approach to recruit 34 participants who are receiving services from the community-based resource. The student researchers utilize an online survey for the adult participants. The adult survey has 43 questions for the participants to complete. The second survey is the child survey. The child survey has a total of 30 questions. The student researchers conducted their survey at the community-based resource over a four-week period of time. The student researchers analyzed their data by running different types of quantitative and qualitative analyses. Within the adult and child survey there were 13 qualitative questions. All of these questions were coded manually. The questions in total 250 plus codes to then identify into themes and categories. They will use the results to better advocate and support the needs of at-risk children as well as provide recommendations to community-based resources who serve this population. When social workers see resources being successful, they can advocate for their clients to receive services for their betterment. The research can benefit racial and ethnic groups because diverse populations are more likely be at-risk.

## 51. Qualitative Experiences of Community-Based Resources on At-Risk Children and Families

**Research Area:** Social Sciences

**Student Presenter:** Alicia Ross (Lead/Undergraduate), Emili Oznick, and Alexis Turbeville

**Faculty Mentor (Dr):** Ebony Lang

**Department:** Social Work and Communication Disorders

**Abstract:** This mixed methods study with an emphasis on qualitative uses a focus group interview approach to understand impact of community based resources in a rural community. In 2022, the United States Census estimated that there are approximately 83 million children in the United States of America. Within this number, there is a large percentage of the population who are considered at-risk. One way the effects of being at-risk can be countered is by participating in community based resources. The student researchers have identified the research topic as what is the impact of community-based resources (CBR) on at-risk children within a rural environment. We define community-based resources as non-profit or for-profit agencies within a certain geographic boundary that provides health services or human services



to an individual or group. The specific community-based resource that the student group is researching the effects on is Equine Facilitated Learning (EFL) has on at-risk children. The definition of at-risk children is children who live in poverty, have a disability, have low self-esteem, and/or have been abused. Equine Facilitated Learning (EFL) is one type of therapy. It is defined as a learning approach that involves building a relationship between a horse and a child to help improve the development of life skills. In 2018, there were 4,800 certified equine therapy instructors and 881 registered riding centers. This research aids the student researchers because it provides insight into the impact of community-based resources such as equine therapy and explores the results related to a child's confidence, behaviors, and communication skills. The student researchers reviewed 12 journal articles that related to community-based resources and also identified two theoretical underpinnings of the Life Course Theory and the Problem Behavior Theory to help better understand and explain the phenomena that at-risk children could potentially face. The student researchers identified exploratory as their type of research because their research had not been studied extensively. This research uses a purposive non-probability sampling approach to recruit 34 participants who are receiving services from the community-based resource. The student researchers utilize an online survey for the adult participants. The adult survey has 43 questions for the participants to complete. The second survey is the child survey. The child survey has a total of 30 questions. The student researchers conducted their survey at the community-based resource over a four-week period of time. The student researchers analyzed their data by running different types of quantitative and qualitative analyses. Within the adult and child survey there were 13 qualitative questions. All of these questions were coded manually. The questions in total 250 plus codes to then identify into themes and categories. They will use the results to better advocate and support the needs of at-risk children as well as provide recommendations to community based resources who serve this population. When social workers see resources being successful, they can advocate for their clients to receive services for their betterment.

## **52. Mainline Protestant Clergy Beliefs, Attitudes, and Practices Regarding Mental Health**

**Research Area:** Counseling/Mental Health

**Student Presenter:** Vladyslav Logos (Lead/Graduate)

**Faculty Mentor (Dr):** Ryan Holliman

**Department:** Counseling

**Abstract:** In the United States, 1 out of every five people lives with a mental illness (National Institute of Mental Health, 2021), and 40% of those individuals will seek out help from a clergy member either before or instead of seeking help from a mental health professional. Christian denominations can vary widely in their approach to mental health, with some congregations actively discouraging or prohibiting members seeking help from secular mental health professionals (Bobgan, 2012). In contrast to more fundamentalist denominations, this study focused on the mainline protestant denominations (United Methodist, Evangelical Lutheran, Episcopalian, Presbyterian, American Baptist, United Church of Christ, and Christian Disciples). A nationwide survey was conducted which asked participants questions, about their personal views regarding mental health, attitudes about mental health counseling, and their comfort with ministering to congregation members with mental health issues. The survey results indicated that 98% of those surveyed believed mental health was a key part of healthy spirituality, and furthermore 98% agreed that spiritual counseling alone was not sufficient to address mental health issues. However, despite the importance the clergy placed upon mental health, only 45% agreed that they received adequate training in mental health issues. Furthermore, the survey results indicated that while most clergy with comfortable ministering to congregants with mental health issues, the level of care they could provide was limited often to referring to a mental health professional.

## **College Of Liberal and Fine Arts**

### **53. Blazing New Trails**

**PERS Recipient**

**Research Area:** Wildfire Ecology

**Student Presenter:** Lauren Carey (Lead/Undergraduate)

**Faculty Mentor (Dr):** Hari Katuwal and Hemanta Kafley

**Department:** Geography

**Abstract:** Every year, there are thousands of wildfires that take place across the United States. The objective of this study is to use GIS to evaluate the spatial and temporal aspects of anthropogenic wildfires in the Pineywoods of East Texas. The Anthropocene has had a widespread impact on Texas. In fact, 95% of the wildfires in Texas are related to anthropogenic factors, and in 2011 alone, we lost over 3.7 million acres to wildfire. 12 million acres of East Texas' forest land, also known as the Pineywoods, is responsible for the majority of Texas' water capture, as well as carbon filtration. Valued at almost 1.1 billion dollars in its service to Texas (Texas A&M Forest Service, 2013), the Pineywoods is widely respected as an important part of our beautiful state. That's not the only thing bigger and better in Texas. The East Texas Oil Field is the largest and most prolific oil field in the country. Producing over 5 billion barrels since its discovery in 1930. (Smith, 2022) While there are several studies previously examining the relationship between human activity and wildfire, there is next to nothing on the spatial relationship between oil manufacturing/transportation and wildfire activity in East Texas. We collected open-source data for this project from the following: TxDOT (for highways and interstates), Esri U.S. Federal Datasets (Transmission Lines), Railroad Commission (for oil and gas wells), and the U.S. Department of Agriculture (wildfire data). Kernel Density analysis of the wildfire points showed a concentration of wildfire activity in the county of Upshur, located in East Texas just north of the East Texas Oil Field. We created multiple rasters using the Euclidean Distance tool for the following layers: roads, transmission lines, and oil wells. Then extracted the values from the wildfire points to the raster layer. Following this preparation, we then chose to run the Ordinary Least Squares (OLS) regression analysis. OLS result showed multiple significant values in the Intercept categories as well as a significant p-value of 0.02 for the distance from road raster layer. Although the oil wells, transmission, and pipeline layers did not show significant p-values, the data and combination of variables show no significant redundancy score (VIF). The model suggests that not all anthropogenic factors are attributed to the cause of wildfire, however, the combination of them is more than enough to start a spark. It is becoming newly understood that road infrastructure has a significant impact on the microclimate of the surrounding area, potentially increasing burn severity and influencing ignition in some cases (Rissien, 2020). This study aims to be of use to emergency responders, government officials, and private corporations who wish to identify and reduce their risk of contributing to human-caused wildfires. In the future, this study could be evidence for building up a balanced infrastructure, more emergency response, and boosting preservation efforts.

#### 54. To chat or to cheat? GroupMe in higher education

##### PERS Recipient

**Research Area:** Text-based Chat Platforms in Higher Education

**Student Presenter:** Melanie Lawrence (Lead/Graduate) and Amber Fort

**Faculty Mentor (Dr):** Shun-Yung Kevin Wang, Sarah Maben, and Rhonda Dobbs

**Department:** Criminal Justice

**Abstract:** With widely available apps and online platforms, students are using group text programs more frequently for a variety of reasons, including course-related activities. Accompanied with the convenience, unwanted consequences include netiquette issues and academic dishonesty. Although technology-enhanced and enabled academic dishonesty has been researched for years, text-based chat platforms and collective cheating are understudied in the academic literature. This study aims to explore factors associate with college students' usage, as well as their responses to questionable activities on this type of platforms. In this pilot study, answered the following questions by focusing on a widely popular app GroupMe and survey students from a state university.

Q1. What is the prevalence of usage of GroupMe among college students for course-related communication?

Q2. What is the prevalence of cheating in student-led college course GroupMe accounts?

Q3. What are student perceptions of group texts like GroupMe related to usage and misuse in student-led course-related chats?

#### 55. Crime, Inflation, and Unemployment in American Cities: A Time Series Analysis

**Research Area:** Crime Rates and Economic Development

**Student Presenter:** Heather Lucas (Lead/Graduate)

**Faculty Mentor (Dr):** Olga Semukhina

**Department:** Criminal Justice

**Abstract:** Economic conditions exhibit intricate connections with crime, yet the correlation between inflation and local crime rates remains understudied. This research utilizes monthly data from the Bureau of Labor Statistics (BLS) to assess labor force and unemployment rates, along with specific components from consumer expenditure groups within the Consumer Price Index (CPI). The objective is to delve deeper into the inflation-crime relationship, examining its impact on both property and violent crimes in five U.S. cities: Boston, Chicago, Dallas, Philadelphia, and Seattle.

Police records from these cities provide insights into two property crimes (burglary and motor vehicle theft) and two violent crimes (robbery and assault). Time series analysis is employed to scrutinize the data, covering the period from July 2014 to June 2023, with a sample size of 108 months. Guided by general strain theory, the hypothesis posits that higher inflation rates would correspond to increases in the four crime types studied. However, the findings yield unexpected results, indicating that inflated costs and rising unemployment rates are more frequently associated with decreases in violent crime, presenting statistically significant findings. The influence of the Covid-19 pandemic also emerges as a factor in these unexpected outcomes.

These results underscore the need for additional research utilizing a mixed-methods approach to comprehensively capture the circumstances of the observation period. This study suggests that the complex interplay of economic factors and crime necessitates a more nuanced understanding, encouraging further exploration for a more holistic comprehension of these dynamics.

## **College Of Science and Mathematics**

### **56. Development of plant derived non-toxic adjuvants to control pesticide drift and protect pollinator health**

#### **PERS Recipient**

**Research Area:** Environment

**Student Presenter:** Michael Fowler (Lead/Undergraduate) and Heather Reyff

**Faculty Mentor (Dr):** Rajani Srinivasan and Adam Mitchell

**Department:** Chemistry, Geoscience, and Physics

**Abstract:** Adjuvants have been developed and used in many pesticide formulations to improve application but are equally toxic or more toxic than the active ingredient. The declining health of pollinators, both honey bees and native bees, as evidenced by some studies, pose a serious risk to crop production and food security. The goal of this project is to develop non-toxic plant-based pesticide adjuvant and delivery for agroecosystems to protect pollinator health by reducing pesticide spray drift. The idea proposed in the study is to develop sustainable crop production practices to improve yield while reducing negative impacts to pollinator health in agroecosystems, as well as improve sustainable practices for commercial growers, private landowners, and beekeepers. We have developed plant based non-toxic pesticide adjuvants and evaluated the toxicity of developed adjuvants on honeybees and native pollinators through field and laboratory experiment. Results are encouraging.

### **57. Growing the gut microbiome: an ex vivo approach to studying mammalian gastrointestinal prokaryotic microorganisms**

#### **PERS Recipient**

**Research Area:** Microbiology

**Student Presenter:** Matthew Williams (Lead/Graduate), Caroline Kelly, and Sara Rogers

**Faculty Mentor (Dr):** Janice Speshock and Jeff Brady

**Department:** Biological Sciences

**Abstract:** The gastrointestinal microbiome has been shown to be very impactful on the way that the host immune system develops, how hosts process nutrients and potential toxins, and adequate functioning of the respiratory and neurological systems. However, currently the only way to study the host gastrointestinal microbiome is using germ-free mice, which are very costly to obtain and use, and require specialized housing conditions. My lab has been working to develop a cost-effective way to culture and maintain the prokaryotic species of the mouse gastrointestinal tract using technology originally designed for 3D organoid cultures. By utilizing this technology, we develop an oxygen gradient in the culture to protect the anaerobic organisms, which are the most difficult to study outside of the host, as well as maintain the aerobic

and facultative species. Using massively parallel next-generation sequencing, we have determined that our cultures are not statistically significantly different than the cultures observed directly from the colons or fecal samples of the animals, thus confirming that we are preserving a large percentage of these microbes in culture. It was noted that pH was the most contributing factor to changes in microbial populations, so a fermentable sugar (sucrose) was added in a dose-dependent manner as a stimulus, and assessed for changes in pH and microbial populations. The resulting changes in pH concluded that the microbes are not just present, but are also biologically active. Other stimuli, such as antimicrobial substances, were also added to the microbiome explants to assess any changes in composition or metabolic activity. The goal was to examine the stability, the activity, and any potential factors that alter the presence of microbes in this ex vivo culture. The results obtained from this project could dramatically advance our knowledge of the impacts of specific species of microbes on various disease conditions, as now more labs, including mine, can afford to perform experiments on these difficult-to-culture organisms.

### **58. The effect of intermittent hypoxia conditioning on glucose tolerance and indices of sympathetic neural activity (SNA) in Sprague Dawley Rats fed a high fat diet.**

**Research Area:** Metabolic Diseases

**Student Presenter:** Matthew Williams (Lead/Graduate)

**Faculty Mentor (Dr):** Max Sanderford

**Department:** Biological Sciences

**Abstract:** Obesity is a global concern which often results from the frequent consumption of a high fat diet and is linked to diseases such as type II diabetes mellitus (T2DM) and hypertension. Researchers have observed that consuming high fat decreases glucose tolerance and can lead to T2DM and contribute to hypertension through mechanisms involving elevated sympathetic neural activity (SNA). Previous research has shown that a therapeutic form of intermittent hypoxia conditioning (IHC) can improve glucose tolerance and decrease blood pressure. The aim of this study was to investigate the effects of a 24-day moderate IHC protocol on blood glucose tolerance and indices of SNA in rats fed a short-term high fat diet (45% daily kilocalories from fat). On day 14 of IHC or sham IHC protocol, the rats were chronically instrumented with catheters for measuring heart rate and blood pressure. Oral glucose tolerance tests (OGTT) were conducted before, and at 2 and 5 weeks after starting a high fat diet in animals subjected to 24 days of IHC or sham IHC. OGTT included determination of a fasted blood glucose (BG) sample, administering a glucose load, and determining the BG concentration at 30-minute intervals for the next 2 hours. The results obtained showed that rats which were conditioned with IHC had improved glucose tolerance at week 5 during OGTT compared to non-IHC rats. No differences were observed for indices of SNA between IHC and sham IHC rats suggesting that the 5-week experimental period may be too short to observe the effects of IHC. Future directions for the study involve investigating the effect of IHC on hepatic inducible nitric oxide synthase (iNOS) activity and plasma antioxidant enzymes such as superoxide dismutase. Previous research has shown that IHC may cause its therapeutic effects through modulating reactive oxygen species and lowering oxidative stress.

### **59. Neural Network-Based Bayesian Methods for Parameter Estimation**

**PERS Recipient**

**Research Area:** Mathematical Epidemiology

**Student Presenter:** Kyle Earp (Lead/Undergraduate) and Derek Hopkins

**Faculty Mentor (Dr):** Christopher Mitchell and Scott Cook

**Department:** Mathematics

**Abstract:** Classical models of disease outbreaks rely on systems of ordinary differential equations have been widely successful and are credited with saving millions of lives worldwide. However, ODE models involve parameters that are often poorly understood and difficult to estimate from limited and noisy data. This is especially problematic for Neglected Tropical Diseases (NTD) with unreliable reporting mechanisms. While some parameters can be deduced from biological or social facts, many must be inferred from data. Traditional least-squares point estimates are fragile when applied to low-quality data. This talk introduces a new technique from Bayesian statistics called Amortized Bayesian Inference (ABI) for parameter estimation. Unlike a standard Bayesian posterior, an amortized posterior is a neural network trained on many outbreaks simulated by the ODE under

different parameter values. The neural network is presented with information observable during an outbreak and trained to infer the underlying parameter values. The trained network is, therefore, generalizable to future outbreaks sufficiently similar to training simulations and can generate forecast ensembles of the future course of the outbreak. We present results applying ABI techniques via the BayesFlow Python package to the early phase of the 2020 Covid outbreak. ABI successfully replicates unexpectedly fine details of the outbreak, including weekday-weekend patterns in data collection, reporting lag, and timing of public health interventions. Though highly tuned for Covid, we believe these techniques can be generalized to a much wider set of diseases.

## 60. Modeling Supraventricular Tachycardia Using Dynamic Computer-Generated Left Atrium

### PERS Recipient

**Research Area:** Computational Mathematics

**Student Presenter:** Gavin McIntosh (Lead/Graduate)

**Faculty Mentor (Dr):** Bryant Wyatt

**Department:** Mathematics

**Abstract:** Supraventricular Tachycardia (SVT) occurs when the heart's atria beat rapidly or irregularly compared to the ventricles. Although not immediately fatal, this disharmony contributes to strokes, heart attacks, and heart failure. Catheter ablation is the primary treatment, wherein an electrophysiologist creates a 3D heart map, guiding a catheter to burn aberrant tissue with RF energy. Despite advances, gaps persist in understanding SVT triggers and optimal ablation sites, especially in cases like atrial fibrillation (AF). To address these gaps, our team has created a model of the left atrium that beats in real-time and is adjustable down to the level of individual muscles. Users can implement ablation strategies on our digital twin to quickly gain insights outside of the operating room. Patient data can be imported directly from a CT scan and electro-cardial mapping. This approach accelerates SVT comprehension without endangering lives. Our work holds life-saving potential that could revolutionize cardiac care.

## 61. Context Analysis of NEPA Process

**Research Area:** Climate Change

**Student Presenter:** Annabel Anderson (Lead/Graduate)

**Faculty Mentor (Dr):** Anne Egelston

**Department:** Chemistry, Physics, and Geoscience

**Abstract:** The National Environmental Policy Act (NEPA) was enacted to ensure that environmental factors are considered in the decision-making process of federal agencies. The goal is to bring environmental awareness before an action takes place. An emerging aspect during an NEPA environmental assessment is the integration of a greenhouse gas inventory to account for an increase or decrease in greenhouse gas emissions caused by the potential project. The inventory helps identify current emissions and can serve as a baseline to track increases and decreases over time. Therefore, an important aspect that needs to be considered when implementing a new addition to any significant policy is assessing if the process produces practical and useful information to reduce greenhouse gas (GHG) emissions. To conduct the project, a context analysis will be drawn between two GHG inventories to determine whether the NEPA fulfills its mission in that the GHG inventories bring about actions that help our society mitigate GHG missions adapt to climate change. If a relationship process is identified, an analysis will be drawn to determine how the information is used to determine if the NEPA process creates practical and useful information for GHG emission reductions.

## 62. VM0042: Offsetting Carbon or Blowing Smoke?

**Research Area:** Environmental Policy

**Student Presenter:** David Northup (Lead/Graduate)

**Faculty Mentor (Dr):** Anne Egelston

**Department:** Chemistry, Geoscience & Physics

**Abstract:** Due to the complex nature of both carbon offset markets and agriculture as an industry the intersection between the two represents an area with significantly higher potential to reduce and remove carbon than actually seen. Agricultural land management (ALM) is one of the most popular endeavors when looking at agricultural offsetting as a

whole. Unfortunately, one of the major reasons there is a shortfall on the potential of agriculture to reduce and remove carbon is due to substandard policy writing on behalf of the protocols that dominate voluntary carbon offsetting in the United States. In order to begin the exploration of this niche this research will focus on one ALM offset methodology from the Verified Carbon Standard: VM0042 “methodology for improved agricultural land management” version 2.0. This research will be conducted through the lens of the research question: to what extent does VM0042 present shortcomings in validity of issued credits. Exploring this niche will be facilitated through the use of qualitative case study with specific regard to seven major areas, the shortcomings in the three accepted MRV methods, shortcomings in additionality prescription, shortcomings in baseline assumptions, shortcomings in leakage protection, and shortcomings in uncertainty allowances.

### **63. K-Prototypes Anomaly Detection for Health Insurance Claims**

**Research Area:** Data Science

**Faculty Mentor (Dr):** Troy Thorne and Jesse Crawford

**Department:** Mathematics

**Abstract:** Clustering algorithms have consistently shown their effectiveness in uncovering the underlying structure of high-dimensional datasets. Among these, K-means is well suited to quantitative data with approximately spherical clusters, but its applicability is limited when dealing with categorical data. This gap is bridged by K-modes, which substitutes the Euclidean distance metric with a matching dissimilarity metric to better handle categorical features. The K-prototypes algorithm is a hybrid of these methods, capable of handling mixed data types (quantitative/categorical), which occur frequently in health insurance data.

This presentation will explore an adaptation of the K-prototypes algorithm, designed for anomaly detection in health insurance claims. A significant challenge in this domain is multi-valued diagnosis and treatment codes, where multiple codes of each type may appear on a single claim. This obstacle is overcome using market basket data analysis with a careful choice of data formats to optimize computational efficiency of the anomaly detection algorithm.

### **64. Supraventricular Tachycardia: Insights and Advances in Management Through Computational Modeling**

**Research Area:** Computational Mathematics

**Student Presenter:** Leah Rogers (Lead/Undergraduate)

**Faculty Mentor (Dr):** Bryant Wyatt

**Department:** Mathematics

**Abstract:** Supraventricular Tachycardia (SVT) encompasses irregularly fast heart rhythms originating from the atria. Although SVT seldom directly leads to death, its various forms, including atrial fibrillation, stand as the primary cause of strokes and heart attacks worldwide. SVT also contributes significantly to preventable heart failure cases through tachycardiomyopathy and can trigger myocardial infarction by increasing oxygen demand while reducing cardiac output. While medication plays a crucial role in SVT management, cardiac ablation has emerged as the most effective long-term solution. In this procedure, an electrophysiologist employs tiny catheters to create a 3D map of the heart's electrical activity. Advanced computer software helps identify the source of the irregular heartbeat, allowing targeted radiofrequency ablation of specific areas to restore the heart's normal rhythm.

Despite significant advancements in cardiac ablation over the past two decades, the causes and optimal ablation methods for the most prevalent and problematic cardiac arrhythmia, Atrial Fibrillation (Afib), remain a modern-day mystery. Understanding the underlying mechanisms for Afib remains limited. To address this, we conducted an in-depth review of current literature and utilized a computational model of the Left Atrium to explore theories related to Afib's cause and mechanisms. Through these efforts, we aim to shed light on this challenging arrhythmia and enhance treatment approaches.

## 65. Modeling Dust Crystals in Complex Plasmas using GPU Acceleration

**Research Area:** Computational Mathematics

**Student Presenter:** Zachary Watson (Lead/Graduate)

**Faculty Mentor (Dr):** Bryant Wyatt

**Department:** Mathematics

**Abstract:** A complex plasma is a plasma that contains nanometer to micron-sized dust. Dust accumulates more electrons than ions, causing it to become negatively charged. This phenomenon reverberates across various domains, including self-assembly of nanostructures, dust mitigation in semiconductor fabrication, and control of dust in fusion reactors. Experimentalists charge dust in electric fields, illuminate it with lasers, and track its motion using high-speed cameras. These setups incur substantial costs, often exceeding hundreds of thousands of dollars, and demand extensive labor and time. To address these challenges, computational models are increasingly guiding research. Here, we present our dynamic modeling innovation, utilizing NVIDIA GPUs, to predict intricate dust crystal formations within a complex plasma. Employing simulations to guide and validate laboratory experiments is reshaping our understanding of complex plasma, driving interdisciplinary breakthroughs.

## 66. Purification of Osajin and Pomiferin for Testing in Pancreatic Tumor Cell Proliferation Assays

**Research Area:** Biochemistry/Molecular Biology/Biomedical Research

**Student Presenter:** Luke Reynolds (Lead/Undergraduate), Troyce Mays, Ryan Wood, and Anne M. Wood

**Faculty Mentor (Dr):** William Whaley

**Department:** Chemistry, Geoscience & Physics

**Abstract:** The Osage orange (*Maclura pomifera*) is a species that is native to the Bosque River Valley in Erath County, TX. The mature fruit tissue of this species contains two prenylated isoflavones, osajin and pomiferin, that together account for about 5% of the dried tissue mass. Osajin has been reported to inhibit the growth of cultured prostate cancer cells, while pomiferin has been reported to inhibit the growth of cultured breast cancer cells. Pancreatic cancer tends to be resistant to many currently used chemo-therapy agents. Osajin and pomiferin were obtained from Osage orange fruit in a diethyl ether fraction using a Soxhlett extractor. The isoflavones were separated by two sequential rounds of normal phase column chromatography using silica adsorbent and a step-gradient elution with hexane and ethyl acetate. The preparations of osajin and pomiferin were assessed to be 98% pure by assays based on <sup>1</sup>H-NMR spectroscopy and HPLC. Further purification was achieved by using an Alumina-B cartridge column to bind traces of pomiferin while eluting osajin with ethyl acetate. The collected osajin was greater than 99% pure osajin. Pomiferin and osajin were separately dissolved in dimethyl sulfoxide, with and without conjugation to Fenugreek carbohydrate (microwave technique) and diluted to 5 μM in the culture media of actively growing Panc5 cells. After 48 hours, the cultures treated with only pomiferin exhibited 50% dead cells; whereas, cultures treated with pomiferin conjugated to carbohydrate polymer exhibited 98% dead cells. The cultures treated with osajin exhibited less than 10% dead cells. These results demonstrate an effective method for delivery of very hydrophobic anti-tumor agents into aqueous cultures of tumor cells. Many flavonoids have been reported to have anti-tumor activity; however, low water solubility has limited their use as chemo-therapeutic agents. The isoflavones and carbohydrate polymer have very low toxicity and may represent a novel future approach for treatment of some cancer types. (This research was financially supported by the Welch Foundation Departmental Research Grant #AS-0012 and the Tarleton Presidential Excellence in Research Scholar Program.)

## 67. Comparison of Logk', LogPoct (pH=1.5) and LogDoct (pH=6.5, 7.4 and 7.8) values for the catechol flavones

**Research Area:** Medicinal Chemistry

**Student Presenter:** Marcus Gregory (Lead/Undergraduate), Taryn Gibbs, Sara Tuck, and Ekua M. Okosoamaa

**Faculty Mentor (Dr):** William Whaley

**Department:** Chemistry, Geoscience & Physics

**Abstract:** Catechol flavonoids such as fisetin (3,7,3',4'-tetrahydroxyflavone) and 7,8-dihydroxyflavone (7,8-DHF) have exhibited efficacy in preclinical models for several neurological diseases. For ingested catechol flavonoids to benefit brain conditions they must be absorbed in the small intestine, transported by the blood stream, and partition across the blood-brain barrier. The octanol-water partition coefficient (Poct) is a parameter for predicting the absorption, distribution,

metabolism and excretion (ADME) properties of drugs. It is represented as LogPoct which is an index of the lipophilic character of a compound. A value of LogPoct between 1.38 and 1.80 is ideal for intestinal absorption, while a value near 2.00 is ideal to cross the blood-brain barrier. For phenolic compounds, LogPoct must be measured with an acidic aqueous phase to maintain the analyte in a single neutral form. Distribution coefficients (Doct), measured at pH values relevant to the digestive system, are also used to predict ADME properties. Flavone, the catechol flavones and 3,2'-dihydroxyflavone (3,2'-DHF) were assayed for chromatographic retention factor (Logk'), LogPoct (pH=1.5 and 3.0) and for LogDoct (pH=6.5, 7.4 and 7.8) values. The LogPoct values ranged between 2.87 (7,8-DHF) and 3.45 (flavone). Self-association was observed for 3,2'-DHF; however, estimates of LogPoct and LogDoct were obtained. LogDoct values for 3,2'-DHF and 7,8-DHF were lower than the LogPoct values due to ionization of hydroxyl groups with unusually low pKa1 values. These LogPoct and LogDoct values should facilitate the prediction of ADME properties for catechol flavonoids. (This research was supported financially by the Welch Departmental Research Grant Program #AS-0012 and the Tarleton Presidential Excellence Research Scholar Program.)

## **Mayfield College of Engineering**

### **68. Batch Systematic Evaluation Analysis for Bioreactor Performance Monitoring and Control Strategies**

#### **PERS Recipient**

**Research Area:** Renewable Energy

**Student Presenter:** Zachary Dulany (Lead/Undergraduate) and Austin McKee

**Faculty Mentor (Dr):** Hoe-Gil Lee

**Department:** Mechanical, Environmental and Civil Engineering

**Abstract:** Mathematical modeling is an exceptionally cost-effective approach, offering the ability to anticipate outcomes in advance, consequently reducing the overall expense associated with system modeling. The modeling of a system is an intricate, cyclic process that encompasses numerous facets necessitating vigilant monitoring. These facets encompass biological, physicochemical, and technological constraints, as well as data derived from databases. The current research encompasses two distinct components: firstly, the modeling analysis of single batch bioprocesses utilizing a simulation tool, and secondly, the design of a fermenter system, integrating 3D prototypes and bioprocess monitoring reliant on experimental data acquisition from a measurement system.

The construction of a simulation model demands an extensive collection of information concerning the biological process at hand. Key prerequisites for modeling a bioprocess fermentation system encompass the delineation of processing steps, their durations, performance parameters, and sequencing. It is imperative to identify the available equipment for each processing step, materials consumed or generated by the process, and any additional resource requirements.

In the bioreactor design and control strategies, a meticulous investigation is paramount. This includes the assessment of sensor types, sensor resolution, process control methodologies, and performance monitoring techniques such as artificial intelligence-based optimization for enhanced bioreactor performance. Furthermore, the development and analysis of fermenter behavior is pivotal, encompassing the close monitoring of critical reaction parameters such as pH, dissolved oxygen, and bioreactor temperature. The production of biogas through bioreactors relies on diverse configurations and circuit designs integrated with sensors, playing an indispensable role in industry-grade equipment. Essential design parameters include dissolved oxygen (DO) sensors, pH sensors, temperature sensors, and agitator motor speed feedback mechanisms. These components constitute the core of a comprehensive control system. The control center for this system comprises an Arduino microcontroller and a standalone proportional-integral-derivative (PID) temperature controller. The Arduino maintains constant vigilance over pH levels and applies necessary corrective measures to keep pH within the predefined working range, ensuring efficient biogas production. To regulate temperature, a thermocouple, PID controller, solid-state relay, and heat tape are employed. Agitator blades stir the biomass's lower portion, while the DO and pH sensors are suspended within the upper part. By optimizing pH, temperature, and agitator speed, the innovative bioreactor design aims to showcase the efficacy of biogas production, ultimately yielding high-quality biogas energy. Comprehending and simulating bioprocess mechanisms within a bioreactor promises improved designs, enhanced operational efficiency, and advanced modeling tools, all contributing to elevated reaction rates and cost-effective optimization. Furthermore, a comparative evaluation of the energy efficiency of commercial natural gas and biofuels



produced from the bioreactor will be conducted, shedding light on the sustainability and environmental impact of this innovative bioprocess.

## 69. Hybrid Cooling Method for Lithium-ion Battery Utilizing Phase Change Material, Heat pipes, and Fins

### PERS Recipient

**Research Area:** Thermal-Fluid Science

**Student Presenter:** Christian Millard (Lead/Undergraduate), Ugochukwu Etufugh, and Griffin Darosa

**Faculty Mentor (Dr):** Nourouddin Sharifi

**Department:** Engineering Technology

**Abstract:** Lithium-ion batteries are well-known for their use in electric vehicles because of their high energy capacity and power density. However, they tend to suffer from an elevated temperature increase due to the heat generation within the battery itself, which causes deterioration and lowers their life span. This highly detrimental process can be managed with various temperature regulation methods known as Battery Thermal Management (BTM). BTM is the process of controlling a battery or pack of batteries' temperature. Through BTM, a battery's lifespan can be extended. In this work, a hybrid cooling technique that consist of heat pipes (HPs) and fins integrated with a phase change material (PCM) are investigated experimentally. The experimental setup consists of a heater section, PCM reservoir, HPs, fin jackets, and an air flow channel. In the heater section, a cartridge heater is inserted inside a cylindrical aluminum housing concentrically to mimic the heat generated by the battery. The dimension of aluminum housing is the same as an 18650 lithium-ion battery. HPs length are subdivided into three sections: Section of the HPs which are in contact with the heater (evaporator section of the HPs), section of the HPs which passes through the PCM reservoir (condenser section of the HPs), and section of the HPs which are located inside the air flow channel (also condenser section of the HPs). Heat transfers from the heater to/from the PCM and then to the air flow channel by HPs. To improve heat transfer rates in the PCM reservoir and the air flow channel, aluminum fin jackets are used on the HPs surfaces. Local temperatures are measured for different heater powers and air velocities. Impacts of HPs, PCM, and air flow are investigated to regulate the battery temperature.

## 70. Sustainable bioinspired concrete

### PERS Recipient

**Research Area:** Sustainability

**Student Presenter:** Trevor Pierce (Lead/Undergraduate) and Tanna Morquecho

**Faculty Mentor (Dr):** Lynal Albert, Fei Wang, and Eunsung Kan

**Department:** Mechanical, Environmental and Civil Engineering

**Abstract:** The construction industry is indispensable to the growth, development and progress of our communities, states and nation. With several crucial infrastructure projects worldwide, concrete production and use is critical to major advancement. Despite the many benefits that concrete provides including durability, affordability and resistance, the environmental impacts of continued concrete use are inescapable. According to the Global Carbon Project, cement production and use in concrete accounts for approximately 8-10% of global CO<sub>2</sub> emissions from human activities.. Concrete is the most widely used building material in the world, and its use is projected to continue growing as global population and urbanization rates increase. Therefore, reducing the carbon footprint of concrete production is an important area of focus for reducing greenhouse gas (GHG) emissions. Following the lead of the United Nations, the construction industry has set ambitious goals to reduce its carbon footprint by achieving net-zero carbon emissions by 2050. Working towards the goal necessitates a significant reduction in emissions associated with building materials and construction processes. Our research goal is to sequentially replace cement partially in the conventional concrete with biochar to develop biochar stimulated biomineralized concrete (BSBC). The project focuses on developing an alternate cementitious material in concrete through utilization of chemical precipitation an microbially induced precipitation processes thereby allowing the reduced use of conventional cement in concrete. We were able to test for different conditions using different formulae for the concrete. We investigated different amounts of two different biochar sources with two methods of curing of concrete. The findings show that the method is promising and that the improved (BSBC) concrete can significantly contribute to reduced emissions.

## 71. Toward a Cost-Effective Smart Crop Health Monitoring System

### PERS Recipient

**Research Area:** Smart Crop Health Monitoring for Precision Agriculture Management

**Student Presenter:** Kyle Boatright (Lead/Undergraduate), Sean Wallinger, and Joseph Meier

**Faculty Mentor (Dr):** Haitham Abu Ghazaleh

**Department:** The agricultural community seeks innovative and modern solutions for sustaining the growing demand for food and natural resources. In this project, our objective was to investigate and implement “smart-connected” and cost-effective technologies that can aid with efficient crop management, while focusing on the agricultural processes that are local to Texas. Such solutions can further enable smart decision-making and aid in the automation of certain operations in the agricultural process. The activities involved in this research included developing a monitoring system using wireless sensor networks and precision cameras. The project also focused on the types of sensors and imagery data needed for this monitoring system, at minimum, and tailored to the type of crop used in the experimentation. The overall monitoring system further included a central access node for accumulating the sensory data that can also be accessed remotely for further analysis. The data collected in this project will support our efforts in determining the appropriate set of sensors and information needed for the crop health monitoring system, along with establishing a strategy for the optimal placements of these sensors within the crop field, in our future work. The project can subsequently be extended to investigate the appropriate data analytic and computational methods for efficiently analyzing the data, employ machine learning for smart detection and decision-making, along with establishing a platform for visualizing the data to the agricultural producers (e.g., farmers) in a meaningful format. In this work, we developed and implemented a smart crop health monitoring system that consisted of 12 sensor nodes that were deployed at a working crop site, namely Eden Green. The cost per sensor node in our system was found to be significantly less than many of the existing solutions that are available for commercial use, and is further capable of monitoring for 6 different measurements at the crop site. The current setup will remain at the crop site for as long as possible, and data will continue to be collected and analyzed for supporting our future research related to precision agriculture management. Even though the on-site trial is limited in scale, the purpose of this small setup is to extensively test our proposed solution that will help identify any refinements toward improving the system’s performance and efficiency before expanding the setup at the crop site. This work is part of our broader research for exploring and applying newer solutions for modernizing the agricultural industry, which would effectively contribute to the sustainability and well-being of society.

## 72. Machine Learning in Real Estate: A Comparative Study on House Price Prediction Techniques

**Research Area:** Machine Learning and Real Estate

**Student Presenter:** Patric Hill (Lead/Undergraduate)

**Faculty Mentor (Dr):** Thejas Gubbi Sadashiva

**Department:** Computer Science and Electrical Engineering

**Abstract:** As of the past few years, machine learning (ML), a subfield of study in artificial intelligence (AI), has significantly impacted the growth of the future of technology. ML has been used extensively in various industries, including real estate. It helps analyze market conditions, evaluate property value, and predict housing prices. With access to vast amounts of data, ML algorithms can identify patterns that might be difficult for humans to detect. Considering housing prices depend on many variables, such as the number of floors, the year it was built, and the surrounding area, choosing a machine learning algorithm that produces the most accurate results is crucial. In this study, we focus on testing multiple ML algorithm techniques and various combinations of ML algorithms using one controlled dataset to determine which algorithm produces the most accurate results for predicting housing prices. Experiments are evaluated based on the RMSLE (Root Mean Squared Error) and R Squared metrics. In conclusion, by finding the most accurate ML algorithm, predictions of housing prices will become much more reliable, and using ML efficiently will provide a further level of accuracy and scalability to the real estate industry.

### 73. Analog circuits could improve the efficiency of AI game bots compared to digital circuits

**Research Area:** Circuits for Artificial Intelligence

**Student Presenter:** Emily Kelley (Lead/Undergraduate)

**Faculty Mentor (Dr):** Eric J. Wyers

**Department:** Computer Science and Electrical Engineering

**Abstract:** AI applications and programs currently use digital circuits to operate. However, digital circuits have limitations when it comes to solving deep neural network problems since they can operate in only 2 states, on and off. Analog circuits could increase the functionality by using signals where the input is the voltage, and the weights are represented in resistance, and the current would be the output. The ability to represent a wider range of values from signals allows analog circuits to represent more complex information quickly, which can improve the accuracy of an AI application.

## **Texas Institute for Applied Environmental Research**

### 74. Using environmental DNA-extraction to understand soil microbiomes in coastal TX including analysis of biodiversity and pathogen risk

**PERS Recipient**

**Research Area:** Soil Science

**Student Presenter:** Aimee Byington (Lead/Graduate)

**Faculty Mentor (Dr):** Dorothy Menefee and Victoria Chraibi

**Department:** TIAER

**Abstract:** This study aims to better understand how contaminants influence microorganisms in the soil near streams in Jefferson County, TX. Specifically, this study addresses the issue of pollutant, pathogen, and nutrient fate and transport during standard watershed processes and flood events of different intensities, such as tropical storms, hurricanes, and more localized storm events. The DNA extracted from the soil samples will provide an overall view of the microbiomes of soil and how the structure of these communities is affected by extreme weather. Soil samples for the DNA extraction were collected near streams in Jefferson County, with six replicates taken from each of the seven assigned sites and landscape position combinations. Each site included 3 landscape positions: the streambed, streambank, and upland. The six replicates were taken as soil cores to 15 cm along a transect of the stream. The samples were enclosed in sterile whirlpaks and quickly placed on ice during traveling. On return to Tarleton State University, the samples were kept in a freezer in the TIAER laboratory at approximately -80 degrees Celsius until processed. When the samples were ready for extraction, a DNeasy PowerSoil Pro Kit (QIAGEN, Venlo, Netherlands) was used. After completing the extraction, the samples were labeled and stored in the laboratory at -80 degrees until shipping. Upon completion of all the samples, the samples were securely shipped to Texas A&M University-Corpus Christi AgriLife Genomics lab under dry ice for further processing using the qPCR (quantitative polymerase chain reaction) method. Results will be presented at the symposium.

### 75. Using environmental DNA- extraction to understand water microbiomes in coastal TX including analysis of biodiversity and pathogen risk

**PERS Recipient**

**Research Area:** Soil Science

**Student Presenter:** Namraj Jaishi (Lead/Graduate)

**Faculty Mentor (Dr):** Dorothy Menefee and Victoria Chraibi

**Department:** TIAER

**Abstract:** Microorganisms are the important components of aquatic ecosystem. The abundance, distribution and prevalence of microorganisms is an indicator of the health of aquatic ecosystems, particularly in nutrient dynamics. Anthropogenic contamination in waterbodies favors the growth of pathogenic microorganisms which can be a hazard to human health. The aim of this study is to assess and compare the microbiomes and pathogenic contamination before and after a storm event. Also, it will help to generate the baseline data of microorganisms which would be helpful for future work. In this study, multiple water samples from seven different bayou sites in Jefferson County, TX were collected in June 2023 for microbial source tracking analysis. Microbial source tracking (MST) is one of the ways of determining the

origin of pathogenic microorganism affecting a water body. DNA from those samples were extracted using Qiagen's DNeasy water extraction kits. The extracted DNA samples were sent to Genomic Core lab, Corpus Christi, TX for genomic sequencing to detect the source of pathogenic microorganisms which might be from humans, livestock animals, or wildlife. The results will help to adopt the best management practice to reduce the fecal and pathogenic contamination in those bayous which will eventually reduce risk to human health. Also, this study will help to assess the microbial abundance and biodiversity in those bayous by including comparative relationship between microorganisms and industrial effluents, since some sites are close to industrial effluents zone.

## **76. Nitrogen and Tillage Effects on Irrigated Continuous Corn Yields using Nutrient Tracking Tool (NTT) program**

**Research Area:** Environmental Science

**Student Presenter:** Kennedy Harris (Lead/Undergraduate)

**Faculty Mentor (Dr):** Ali Saleh

**Department:** TIAER

**Abstract:** Nitrogen and Tillage Effects on Irrigated Continuous Corn Yields using Nutrient Tracking Tool (NTT) program  
Ali Saleh and Kennedy Harris

The Nutrient Tracking Tool (NTT) is a free and simple program developed by the Texas Institute for Applied Environmental Research (TIAER) at Tarleton State University in cooperation with USDA's Office of Environmental Markets (OCE), Natural Resource Conservation Services (NRCS), and Agricultural Research Service (ARS) (Saleh et al., 2011 and 2015). NTT allows the user to simulate various cropping systems to determine the most effective management to maximize crop production and improve water quality and quantity. NTT quantitatively estimates the nitrogen, phosphorous, and sediment losses at field and regional scales (e.g., watershed and County) along with crop yields under various management and environmental conditions. Having this tool accessible for the general population will open a new door for future farming practices by saving money, maintaining a healthy environment, and maximizing crop yields all at the same time. In this work data from field study by Ardell. D. Halvorson et al. (2006) was used to compare and evaluate NTT program. They studied the impact of Nitrogen and Tillage on Irrigated Continuous Corn Yields during the 2000-2004 period. The management treatments in Ardell. D. Halvorson et al. study, including six N application rates, conventional tillage (CT), and no till (NT) practices, were simulated in NTT. The crop yield simulated by NTT under different management scenarios, were compared to those obtained from Ardell. D. Halvorson et al. study. The NTT results showed a similar pattern with the measured values. For instance, the highest predicted corn grain yield of 12.5 Mg/ha was very close to measured value of 12.0 Mg/ha under CT and 202 kg/ha N. Also, the predicted maximum yield by NTT for NT treatment with 202 kg/ha N was 11.4 Mg/ha as compared with measured value of 10.6 Mg/ha for similar treatment. The results obtained by NTT were verified by measured values by Ardell. D. Halvorson et al. This study showed the reliability of using NTT databases (e.g., weather and soil) without any tedious calibration process for similar cropping systems. We will show the detailed result of this study during our presentation.