ASU

undergraduate

RESEARCH SYMPOSIUM

2023

**Welcome to Angelo State University's 12th Annual
Undergraduate Research Symposium
Friday, April 21, 2023
CJ Davidson Conference Room, Houston Harte University Center**

Schedule of Events

Poster Session……………………………………………………………….noon – 1:30 pm

**The Undergraduate Research Symposium is coordinated by the Office of Research and
Sponsored Projects.**

**Dr. David Bixler, Dean, College of Graduate Studies and Research
Elizabeth Randell, Director of Student Research
Jan Heinen, Assistant Coordinator**

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Effects of Dollarization on GDP in Ecuador-Mia Czarnecki

Faculty Mentor: Dr. Bryan Cutsinger
Department: Accounting, Economics and Finance

This poster examines how dollarization in Ecuador affected GDP per capita. A synthetic Ecuador was created using national resource, gross fixed capital formation, export share, and industry share (all as a percent of GDP) from seven different countries in order to compare the GDP per capita over a 38 year period of actual Ecuador versus Synthetic Ecuador. The results of the synthetic control conducted suggests that the adoption of dollarization in Ecuador increased GDP per capita relative to the counter factual. These results contain implications supporting the adoption of dollarization, especially to economies that are relatively unstable.

Portfolio Construction: Foreign Stocks in the U.S. Market-Thao Nguyen Hoang

Faculty Mentor: Dr. Biqing Huang
Department: Accounting, Economics, and Finance
Sponsorship: Undergraduate Research Faculty-Mentored Grant

According to the Capital Asset Pricing Model, the unsystematic risks can be diversified away by adding a variety of assets, but the systematic risks remain the same regardless of how various the stocks are. Therefore, investors usually construct a portfolio with stocks coming from different industries and different countries to increase the diversity of the stocks and eliminate the unsystematic risks. After diversifying the portfolio and systematic risks remain, adding one or several foreign stocks traded in the US can help reduce risks that affect all the American stocks. Based on this theory, I raise the question that if a portfolio consisting of only foreign stocks can have higher returns than the US market. The conclusion is that a portfolio consisting of 20 foreign stocks traded in the U.S. stock exchanges can generate a better performance than the U.S. market.

What is better, 120 or 150?-Mary Dantzler

Faculty Mentor: Mrs. Renee Foshee
Department: Accounting, Economics, and Finance

The research is a comprehensive study into the comparison of the 120-hour or 150-hour rule to sit for the CPA Examination among the fifty states. The study will show if there is a difference in pass rate success based on sitting for the CPA exam after having the additional requirements.

The effect of Bromelin on the tenderness of beef semitendinosus steaks-Megan Sorenson

Faculty Mentor: Dr. John Kellermeier
Department: Agriculture
Sponsorship: Undergraduate Research Faculty-Mentored Grant

Materials and Methods: USDA Select eye round roasts comprised of the semitendinosus muscle were purchased from a meat purveyor and were randomly assigned to one of 3 treatments. Treatments consisted of no bromelin added, bromelin added at the rate of 1.0% raw weight, and bromelin added at the rate of 2.0% raw weight Steaks measuring 2.54 cm thickness were cut (n = 40/treatment), treated with the bromelin, then vacuum tumbled for 1 hr. Then, steaks were vacuum sealed, placed into cooler storage (4°C) for 3 days, then frozen at $^{-}$5°C. After freezing, samples were removed and thawed at 4°C for 24 hr. After the 24 h thaw period, steaks were cooked on a clam shell grill to a medium degree of doneness (71°C) then chilled at 4°C for another 24 hr. Following the chilling time, Warner-Bratzler shear force was completed on each steak with multiple cores (4 minimum) taken from each to determine tenderness values. Data was analyzed using the MIXED model procedure of SAS as a completely randomized design with the fixed effect as bromelin percentage.
Results: Results of the study indicated a significant increase ($P < 0.05$) in tenderness scores for each treatment. Steaks from TRT2 (3.46-kg) were significantly more tender ($P < 0.05$) than both the CON (4.46-kg) and TRT1 (3.82-kg) as indicated by lower Warner-Bratzler shear force values. In conclusion, these results indicate a positive reduction in shear force values with an increase in bromelin for the semitendinosus muscle in USDA Select beef eye round roasts.

The Effects of Chelated Minerals on Early Conception Rates and Kidding Rates in Boer Spanish Cross Females-Mackenzie Lint

Faculty Mentor: Dr. Audrey Meyer
Department: Agriculture
Sponsorship: Undergraduate Research Faculty-Mentored Grant

The proposed project is geared towards the data collection and analysis on the effects of a chelated mineral on conception rates in nannies. These nannies will be split into two treatment groups; the first treatment group consists of nannies that will receive the chelated mineral beginning 30 days before the breeding season noted as: (C30). The second treatment group consists of nannies that will receive the chelated mineral 15 days prior to the breeding season (C15). The females will be organized based on age and genetic lineage. All females in the project will be exposed to the billies for 50 days. On day -30, a subgroup of females from each treatment group will be selected to gather a blood sample for trace mineral presence. Day 0 will serve as another sample collection day; the subgroup of females will be tested again for their trace mineral presence. Samples for trace minerals require whole blood and serum. Billies will be turned out with all nannies on day 0. On day 50, a blood sample will be collected from the jugular vein of the nannies to test for pregnancy that occurred within the first 22 days of the breeding season. These samples are looking for Pregnancy Specific Protein B that can be detected as early as 28 days into gestation. Another blood sample will be collected from all of the females on day 80 to determine pregnancy occurring in the end of the breeding season. Procedures of SAS will be used to determine if females bred in the first half of the breeding season are significant by treatment group, age or pedigree.

The effects of injectable trace minerals.-Mckenna Benoist

Faculty Mentor: Dr. Audrey Myers
Department: Agriculture

The proposed project is to quantify the effects of trace minerals on the progesterone levels of prepubescent Boer × Spanish goats utilizing the trace mineral supplement Multimin®90.This supplement includes zinc, manganese, copper, and selenium. These females will be split into three groups; Multimin®90treated females at weaning (Day 0). The second treatment group will receive the subcutaneous injection of Multimin®90 at the start of the breeding season. The third is the control group and those females will not receive any Multimin®90. Results will be via blood testing. Progesterone levels will be tested on a small sample group from each treatment at days 0 and 90. All females will have a 2mL sample of blood drawn from the jugular vein on day 135 and again on day 165 to determine pregnancy. Females selected for the progesterone tests will serve as the sample both times.

The Effects of Feeding Chelated Minerals on Conception Rates in Rambouillet Ewes.-Cameron Poole

Faculty Mentor: Dr. Audrey Meyer, Dr. Chase Runyan, Mr. Cody Riddle
Department: Agriculture
Sponsorship: Undergraduate Research Faculty-Mentored Grant, Research Travel Fund

The objective of this project was to quantify the effects of a chelated range mineral on conception rates in a flock of Rambouillet ewes of varying ages. The ewes were split into two treatment groups; the first treatment group received the chelated mineral beginning 30 days before the breeding season (C30) and the second treatment group received the chelated mineral 15 days prior to the breeding season (C15). The females were stratified accordingly to ensure that there was an even distribution of 2-year-old ewes, yearling ewes, and aged ewes. All females in the project were exposed to a mature Suffolk ram and a mature Rambouillet ram for 50 days. On day –30 and Day 0 a subgroup of females from each treatment group was selected to gather a blood sample for trace mineral presence. Rams were turned out with all ewes on day 0, and on day 50 and day 80, a jugular blood sample was collected to confirm pregnancy. Data was collected for the lambing season, the dates spanned from October 20 to December 14. Out of the 67 mothers that were positive for pregnancy according to blood samples and ultrasound, 55 ewes had 96 lambs total.

Imaging parasites using Variable Pressure Scanning Electron Microscopy.-George Ezeokeke, Johnson Awoyele.

Faculty Mentor: Dr. Nicholas Negovetich
Department: Biology

Scanning electron microscopy (SEM) is a technique that has been used by parasitologists to study the anatomical landmarks of various parasites. Conventional SEM requires drying of the specimen and coating them with a conductive material before viewing the specimen in a near vacuum. Specialized equipment is needed to apply the conductive material, and without the coating, specimens would exhibit charging that impairs visualization of the specimens. An alternative method of imaging is variable pressure SEM (VP-SEM), which leaves some air pressure in the image chamber. Consequently, the individual air molecules in the imaging chamber limit or prevent charging of species, and thus, specimens can be imaged without coating with a conductive material. Furthermore, VP-SEM allows the imaging of hydrated samples, thus avoiding artifacts that could appear during dehydration of specimens prior to imaging with conventional SEM. This study will assess the feasibility of obtaining useable images of parasites with VP-SEM. Specimens collected during previous research projects were used in this project. In preparation for VP-SEM, specimens were dehydrated through an ethanol series with a final dehydration step in hexamethyldisilazane (HMDS). Specimens were then air dried and mounted to aluminum stubs using double-sided carbon tape. Specimens were imaged under low-vacuum VP-SEM with a goal of imaging structures not typically observed in light microscopy. Images from VP-SEM were also compared to published, conventional SEM images of similar species to determine if VP-SEM could be a suitable alternative to conventional SEM.

Survey on the Parasite Component Community of Snails from Sunset Pond-Tyler Arnwine, Emily Scott, Sophia Berg

Faculty Mentor: Dr. Nicholas Negovetich
Department: Biology

During the semester of Fall 2022, a survey was conducted in Sunset Pond, San Angelo, TX, to determine the parasite community of freshwater snails. The dominant snail species collected was *Physa acuta*, followed by *Gyraulus* sp. and *Helisoma anceps*. After collection, snails were isolated in plastic jars for 24h to allow shedding of cercaria and observation of patent infections. The shell length was measured, and the snails were observed under a microscope. Metacercaria and oligochaetes were then typed, and their abundance was recorded. Cercariae were removed from the jar and observed under a compound microscope to determine their cercariotype. To date, 290 snails have been sampled totaling 25 *H. anceps*, 95 *Gyraulus sp.*, and 170 *P. acuta*. Cercariotyping revealed that three different cercariae were present. These included echinostome, and both brevifurcocercous and Longifurcocercous cercariae. Although 80.7% of the snails were infected with metacercaria, only 3.5% of the snails produced cercaria. Three different metacercariae infected the snails: echinostome, tetracotyle, and an unknown metacercaria. This study will be compared to research conducted in the Fall of 2021 and Spring of 2022. By comparing my data to theirs, I aim to determine changes in the parasite component community following the drought of 2022.

The Effect of Fructose-1,6-bisphosphatases in Autophagy Upregulation-James C. Bautista

Faculty Mentor: Dr. Emerson Crabill
Department: Biology

Coxiella burnetii is an intracellular pathogen that causes the zoonotic disease, Q fever. During infection, *C. burnetii* manipulates the host cell into forming an environment conducive to its replication. It does this by constructing a lysosome-derived vacuole where the pathogen resides and replicates, termed the *Coxiella*-containing vacuole (CCV). As the CCV expands, it fuses with autophagosomes resulting in the accumulation of microtubule-associated protein 1A/1B light chain 3 (LC3) in the CCV. During its infection, *C. burnetii* will inject more than 130 effector proteins into host cytosol through its Dot/Icm type IVB secretion system that facilitate CCV biogenesis. Among those proteins, Cbu0513 is released. Specifically, *cbu0513* encodes for a protein annotated as a fructose-1,6-bisphosphatase. A transposon mutant of *cbu0513* led to the failure of CCV biogenesis with mature autophagosomes, suggesting that Cbu0513 may upregulate autophagy in the host cell. Consistent with this, expression of Cbu0513 in HeLa cells led to increased LC3 expression. The primary aim of our research is to understand if fructose-1,6-bisphosphatase enzymes induce autophagy or if it is specific to some feature intrinsic to Cbu0513 other than its enzymatic activity. To solve this, we performed tests expressing the Cbu0513 gene from *Coxiella burnetii*, a fructose-1,6-bisphosphatase gene from *Escherichia coli*, and a fructose-1,6-bisphosphatase/aldolase gene from *Thermococcus kodakaranesis,* and quantified the LC3 levels via immunoblotting to determine fructose-1,6-bisphosphatase effect. This experiment shows significant promise in understanding a role of *C. burnetii's* effector proteins and their exploitation of autophagy for *C. burnetii's* benefit, and provide insight on how cells regulate autophagy.

Efficacy of Antioxidant Treatment for Oxidative Stress Contribution to Alzheimer's-Deja Hardy

Faculty Mentor: Dr. Laurel Fohn
Department: Biology
Sponsorship: Undergraduate Research Faculty-Mentored Grant

Oxidative stress (OS) is induced by overexpression of free radicals in the form of reactive oxygen species that can damage tissue and aid in the progression of conditions such as Alzheimer's Disease. The consequences of free radicals are amplified with deficiencies in enzymatic and food-derived antioxidants. In this study, we test the effects of food-derived antioxidants on the development of OS in wild type *Drosophila melanogaster* (fruit flies) and a fly model of Alzheimers where the Appl gene is deficient (Bloomington Appl [d]w[*]). Our study will quantify OS based on respirations (CO_2) as evidence of metabolic function. Respirations will be quantified using two respirometry models. The first method consists of handmade respirometers and the use of gas displacement to quantify volume of gas exchange. The second involves the use of Vernier CO_2 sensors which function to record the amount of infrared radiation absorbed by CO_2 molecules.

Data taken from the respirations of untreated female flies using the handmade respirometers demonstrated variability among groups compared to male flies which maintained stable CO_2 production (µl/hr/fly) among groups. Additional preliminary studies comparing the two respirometry methods for measuring OS are being performed on wild type flies fed a standard diet. We now seek to determine whether supplementation of antioxidants in the media of Alzheimer's model flies versus wild-type flies will result in a difference in OS compared to unsupplemented and to each other. Secondary goals involve comparing the effectiveness of the two respirometry models regarding individual capability and user-friendliness.

DNA barcoding of *Peromyscus* from the Davis Mountains in Texas-Halle Summers

Faculty Mentor: Dr. Loren K Ammerman, Rebecca Scott, Dr. Robert Dowler
Department: Biology

Mice in the genus *Peromyscus* can be hard to distinguish without taking detailed measurements of the animals. Two species documented from the Davis Mountains of Texas, *P. boylii* and *P. nasutus,* can inhabit similar environments with overlapping elevations. *Peromyscus boylii* has been recorded as low as 1295 m but is more common above 1700 m. *Peromyscus nasutus* has been documented ranging from 1585 m to over 2300 m. There is slight color variation within the two species. *P nasutus* has white around its ankles while *P. boylii* does not. Due to the habitat overlap and similar appearance of these mice, the possibility of misidentification is an issue. The status of *P. nasutus* in the Davis Mountains has been questioned in recent decades and there was concern that it had been extirpated from the area. By doing DNA barcoding we were able to identify samples collected around 2250 m in the Davis Mountains in 2021 and 2022. Once sequenced, we compared our samples to known *P. nasutus* and *P. boylii* from Genbank to positively identify eight of each species from the Davis Mountains.

Establishing a Breeding Colony of *Danio rerio* to Explore the Environmental Determinants of Caudal Regression Syndrome Morphogenesis-Karter Morris

Faculty Mentor: Dr. Laurel Fohn
Department: Biology
Sponsorship: Undergraduate Research Faculty-Mentored Grant

Previous research at Angelo State University suggested abnormal caudal development of zebrafish (*Danio* rerio) embryos under exogenous cortisol administration (Farley, unpublished observations). In this study, we seek to determine if cortisol has teratogenic effects in zebrafish that may correlate to Caudal Regression Syndrome (CRS) morphologically or genetically. CRS is a rare congenital disorder characterized by developmental anomalies of the caudal portion of the body and low spine, of which the development seems to be influenced by both genetic and environmental factors. This project requires selecting and establishing the model organism to provide a supply of freshly fertilized eggs for early cortisol treatment. Zebrafish are commonly used in scientific research, which is in part due to their high reproductive output. Proper care and breeding procedures are a requirement for successful experimentation. Optimal breeding conditions depend on many different metrics, including water/tank quality and maintenance, filtration methods, feeding techniques, and light cycles. Moreover, egg collections can prove to be challenging when necessary steps are overlooked. The future objectives of this experiment will be studying the teratogenicity of various compounds, including retinoic acid, cortisol, and glucose, and their potential relationship with CRS. After the initial exposure, morphological and histological assessments will be conducted via proportionality measurements and Alizarin red/Alcian blue staining. Then, Reverse-Transcription Polymerase Chain Reaction (RT-PCR) genetic analysis will be performed to estimate the expression levels of CDX2, Bmp7, or cyp26a1, which may create susceptibility to CRS.

"The Removal of RIG-I in HeLa Cells to Screen for *Coxiella burnetii* Targets of Innate Immunity Suppression"-Jocelyn Bent

Faculty Mentor: Dr. Emerson Crabill
Department: Biology

The Gram-negative intracellular bacterial pathogen *Coxiella Burnetii* causes the zoonotic disease Q fever. Q fever is a disease that usually manifests with flu-like symptoms, but may lead to serious life threatening chronic illness in humans. *Coxiella burnetii* has developed mechanisms to suppress the host cell's immune response to allow fusion with the lysosomes of mammalian cells to form *Coxiella*-containing vacuole (CCV). Mammals have developed mechanisms to protect themselves from bacterial pathogens by being able to detect foreign nucleic acids in the cytosol and then inducing a type I interferon (IFN) response as a defense against potential pathogens. *Legionella pneumophila*, an amoebic pathogen, is a phylogenetically similar intracellular pathogen to *C.burnetii* that induces the IFN pathway after infection of a mammalian host, whereas *C.burnetti* does not induce the IFN pathway at all. *C.burnetii* inhibits the IFN response by suppressing the RNA sensing pathway that is controlled by RIG-I, a cytoplasmic pattern recognition receptor. *C. burnetii* has two effector proteins, EmcA (Cbu1387) and EmcB (Cbu2013) which suppress RIG-I signaling. EmcB deubiquitinates an essential step in RIG-I activation, rendering RIG-I nonfunctional. The function of EmcA is not yet fully known, however, like EmcB it is known to block the activation of RIG-I. The goal of this study is to use CRISPR/Cas to delete RIG-I from HeLa cells and identify whether EmcA, EmcB, or potentially other *C. burnetii* proteins have the ability to block other innate immune pathways in mammalian host cells.

How the innate immune system impacts intracellular bacterial growth-Karen D. Soto Castro

Faculty Mentor: Dr. Emerson Crabill
Department: Biology
Sponsorship: Undergraduate Research Faculty-Mentored Grant

In order for intracellular bacterial pathogens to be successful, they have to overcome host innate immunity. One component of innate immunity is the type I interferon (IFN) pathway which is important as a defense that inhibits the growth of viruses and intracellular bacteria. *Coxiella burnetii* produces two proteins that it injects into host cells that have been shown to inhibit the IFN pathway, named EmcA and EmcB. In this research, we will use *Mycobacterium smegmatis*, to measure its intracellular growth in HeLa cells. *M. fortuitum* is a non-pathogen that replicates intracellularly in HeLa cells under normal conditions. We will compare growth in wild type HeLa cells to cells expressing either EmcA or EmcB. We will determine if suppression of the host IFN response via EmcA or EmcB confers increased growth intracellularly into a non-pathogen in general, or if the benefit is specific to *C. burnetii.* In addition, we will use poly (I:C), an immunostimulant, to activate the IFN pathway and see if it inhibits replication.

Diversity and abundance of aerial insects in a Texas rangeland.-Andrea Burt

Faculty Mentor: Dr. Ben R. Skipper
Department: Biology
Sponsorship: Undergraduate Research Faculty-Mentored Grant

Insects are vital to our ecosystems and many organisms rely on them for survival. Certain species of birds, such as flycatchers and swallows, rely solely on insects as a food source. Recently, research from across the globe has demonstrated that insect populations are declining. Possible reasons for this decline include invasive species, widespread use of insecticides, habitat loss, and climate change. Despite this global body of research, little has been occurred in the U.S. and more research is needed to fully understand trends in insect populations. To facilitate this, I propose to deploy diurnal and nocturnal insect traps at predetermined locations at the ASU MIR center to document seasonal changes to abundance and diversity of aerial insects. The traps will remain open for one week before being taken down. Once taken down, the collected insects will be identified using field guides and then sorted through over the course of two weeks. This process will be repeated at three-week intervals. The data collected will establish a baseline that can be used to determine aerial insect biodiversity and abundance.

The effects of winter storm Uri on Texas birds.-Francisco Fuentes

Faculty Mentor: Dr. Ben R. Skipper
Department: Biology

Winter Storm Uri was a winter storm that occurred in February of 2021 across the United States and Northern Mexico which led to below freezing temperatures and persistent ice and snow for a week-long period. It is believed that this storm had major effects on wildlife populations across the United States. Some of these populations were likely more resilient to the harsh conditions than others. This research aimed to investigate the effects of Winter Storm Uri on avian populations in Texas. In particular, aspects of diet and body size were explored to determine if any particular life history traits conferred advantages. This research utilized data from the North American Breeding Bird Survey for the period between 2000 and 2021 to estimate the impact of this winter storm on resident passerines. From this dataset, 16 bird species with differing traits were selected to investigate the relative abundance of each species in the state of Texas over the time period outlined. Linear models were created for each species using the bbsBayes package in R. These models were then analyzed to determine the rates of change for each species from 2019 to 2021 as a result of the Winter Storm.

Effects of Gravitational Stress and Caffeine on Oxidative Stress in *Drosophila melanogaster*-Ravae Garcia

Faculty Mentor: Dr. Laurel Fohn
Department: Biology
Sponsorship: Undergraduate Research Faculty-Mentored Grant

Significant increases in gravitational force disrupt normal physiological functions. These results are often seen in pilots undergoing gravitational stresses surpassing 1G force of gravity (9.8 m/s^2). The circulatory system is most affected by pulling multiple G's since the needs of the body to maintain blood pressure are significantly increased. Brain ischemia is the leading cause of gravity-induced loss of consciousness (G-LOC). Oxidative stress is directly linked to circulatory failure (Kalns et al., 2000). In *Drosophila*, increased oxidative stress results from hypergravity and decreases fly longevity (Wigman et al., 2019). This research examines the effects of caffeine in conjunction with increased gravitational force on *Drosophila melanogaster* through examining oxidative stress. Flies supplemented with caffeine over the course of a week exhibited higher metabolic stress and death rates than groups without caffeine supplementation, independent of centrifugal exposure. Further, flies subjected to both caffeine supplementation and centrifugal force had the highest metabolic rate when compared to all other experimental groups. These results suggest that caffeine plays a negative role in *Drosophila* health, with greater consequences when combined with increased gravitational stress. Further experiments will be conducted to examine the effects of short term caffeine supplementation as well as RT-PCR to identify changes in expression of stress related genes such as SOD2, Pxd, and TrxR2.

The Molecular Identification of Presidio County Moths-Mariah Martinez

Faculty Mentor: Dr. Loren Ammerman
Department: Biology
Sponsorship: Undergraduate Research Faculty-Mentored Grant

Having DNA sequence information of prey items, such as moths, consumed by bat species can enhance our understanding of the diets of these insectivores. Unfortunately, DNA databases lack the information necessary to study the diet habits of animals in the West Texas region. This research involved extracting DNA using a DNeasy protocol, performing PCR, and sequencing genomic DNA for two different species of moths: *Digrammia californaria* and *Digrammia sentonana*. These moths were collected in Presidio County and are suspected to be a common insect included in the diet of native bats. This project tested two different primer sets to amplify genomic DNA before sequencing. Only one of the two primer sets tested proved to be effective for these species. Additionally, further research will test three "zero-cost" methods of extraction, which simply involve crushing the collected moths in AE buffer, sterile deionized water, and PBS, to determine which extraction method is most cost efficient. Comparing primer sets and various low-cost extraction methods will help establish a sequencing protocol that is not only effective, but allows for larger numbers of samples to be sequenced under limited financial resources. Improving the output rate of DNA data to be added to global databases will allow for the continuation and success of future research projects involving these insects.

Derivatives of the C_{24} fullerene: A theoretical investigation-Seok Woo Jang

Faculty Mentor: Dr. Kyle A. Beran
Department: Chemistry and Biochemistry
Sponsorship: Undergraduate Research Faculty-Mentored Grant, Welch Foundation

Utilizing Density Functional Theory (DFT), the structural, energetic, and kinetic properties of two conformers (D_6 and O_h symmetry) of the C_{24} fullerene and its derivatives were investigated. Several of the Row 3 transition metals in various spin and oxidation states were inserted in order to form metalloheterofullerenes (TMC_{23}), exohedral ($TM–C_{24}$) derivatives, and endohedral ($TM@C_{24}$) derivatives. Electronic, structural, and vibrational analyses were performed at the DFT-B3PW91/6-31G* level and energetics were obtained with DFT-B3PW91/6-31G*//B3PW91/6-311+G**. Preliminary results indicate that the D_6 conformer is more energetically stable than the O_h conformer; however, the O_h is predicted to be more kinetically stable. The computational results predict that the neutrally charged TMC_{23} systems energetically prefer that the metal replaces a hexagon-carbon rather than a pentagon-carbon, except for the neutral CoC_{23} specie. Further data analysis reveals that the endohedral and exohedral derivatives that involve the metals Sc, V, Mn, Co, Cu, and Ga increase the energetic and kinetic stability of the bare D_6 C_{24} fullerene.

Identification of the Affibody that Targets PLA2-Doyeon Kwon, Jiyun Jeong

Faculty Mentor: Dr. Edith Osborne
Department: Chemistry and Biochemistry
Sponsorship: Undergraduate Research Faculty-Mentored Grant, Welch Foundation

Phospholipases A2 (PLA2 s) are one of the main toxin families found in snake venoms. They show a broad range of biological activities such as neurotoxicity, cardiotoxicity, hemolysis, modulation of the hemostatic system and inflammation. Because of their variety of biochemical and pharmacological effects, the study of PLA2 is significant in developing treatment for snakebites and some inflammatory diseases. In order to facilitate research on PLA2, we identified an affibody protein that targets PLA2 isolated from the snake Agkistrodon conanti (Florida cottonmouth). Affibodies are engineered small proteins that bind to their targets with high affinity. The affibody molecules were selected by panning an affibody phage display library against PLA2. After identifying a promising affibody, the affibody was sequenced and cloned it into an expression vector. Finally, the affibody protein was expressed and purified so that it can be used for further testing, including neutralization of PLA2.

Formation of a Silicon-Carbon Hybrid Anode Material for Lithium-Ion Batteries-Sara Yates, Diego Sanchez

Faculty Mentor: Dr. Gregory Smith
Department: Chemistry and Biochemistry
Sponsorship: Welch Foundation

Silicon-carbon hybrid materials have shown promise as an anode for lithium-ion batteries. Silicon has a higher specific capacity (3600 mAh/g) compared to conventional graphite anodes (372 mAh/g). However, upon lithiation silicon expands to 320% its original size, fracturing the anode material after only a few charges. To build a silicon-carbon hybrid anode material, we do so by reacting silicon with acetylene to interconnect the particles. To promote the reaction, sonication and heating was used while acetylene gas flows through the particles. The reaction caused the particles to aggregate into large clumps, the size of which becomes a function of the time spent in exposure to the acetylene gas. Future research includes investigating alternative reactions, compressing the material into a pellet to form a singular solid anode material, and measuring its properties for suitability as an anode material for lithium ion batteries.

Experimentally determining the best methods to oxidize and form monolayers on titania for DSSC research-Gabrielle Blackmon

Faculty Mentor: Dr. Gregory Smith
Department: Chemistry and Biochemistry

In dye sensitized solar cells (DSSC) the interface between semiconducting material and the dye molecule is critically important. Solar cells have become increasingly important to harness solar energy which is a cleaner source of energy. The importance of this experiment is to help move away from fossil fuels and find a cheaper alternative. Titanium has been selected for the experiment due to its cost efficiency and abundance. We are looking at DSSC because they are cheaper and easier to produce than single crystalline silicon solar cells. The dye from the DSSC serves to harness the energy coming in from the sun and will excite the electrons, creating the energy to be used. Here we are looking at the interface between the dye and the titania, which is important in the efficiency of the DSSC. We experimented with methods to form a good oxide layer on flat titanium chips, and then exposed those surfaces to a solution of molecules that have the same binding chemistry as dyes used in DSSC.

Improvement of synthetic pathways for the creation of *f*-Element 2-bromoterephthalate glutarates-Emma Rust, Daniel Rios, Jackson Turner, William Best, Emily Latzke, Braeden Myers, Emory Brandon, Mia Estelle Van Rheede van Oudtshoorn, Aidan Henry, James Jenkins, Matthew Smith, Matthias Zeller

Faculty Mentor: Dr. Ralph Zehnder
Department: Chemistry and Biochemistry

Slow diffusion reactions of trivalent lanthanide ions, Ln^{3+}, with 2-bromoterephthalate (TPBr) and glutarate (Glut) spacer units at room temperature (RT) in tetrahydrofuran (THF), ethanol (EtOH) and H_2O solvent mixtures results in the formation of three-dimensional coordination polymers of formula $Ln_2(Glut)_2(TPBr)(H_2O)_4 \bullet 16H_2O$. The X-ray single crystal structures of these open frameworks show that they are isomorphous for the compounds we obtained with Ln = Ce, Pr, and Nd. Moreover, they exhibit spacious channels along the *b*-direction. Studying extended series of lanthanide compounds across the entire lanthanides and elucidation of their physicochemical properties can prove useful for the creation of similar trivalent actinide counterparts. It is a common challenge that a given experimental procedure may produce a small number of isomorphous lanthanide compounds, but may fail to produce the entire series.
Our current efforts focus on further extending this series to the heavier lanthanide counterparts by altering the experimental conditions.

Attempts to characterize a mysterious plutonium compound-Jackson Turner, Daniel Rios, Braeden Myers, Emma Rust, William Best, Emory Brandon

Faculty Mentor: Dr. Ralph Zehnder
Department: Chemistry and Biochemistry

Due to the chemical similarities between trivalent lanthanide elements and their transuranium counterparts it has been feasible to employ the lanthanides as surrogates for their actinide equivalents. Moreover, the matches between the ionic radii of trivalent lanthanides and transuranium actinides makes this a common procedure when planning experiments with the highly radioactive actinide elements such as Pu, Am, Cm, etc. Experimental conditions are first optimized with the lanthanide elements. Once synthetic protocols are well established replicating the synthesis with the actinide elements commonly leads to the creation of the targeted actinide compounds. Our current attempts follow the reverse order. Our recent endeavors of creating new metal organic frameworks with trivalent plutonium resulted in a purely inorganic plutonium compound. It formed diamond shaped crystals, which were twinned on multiple levels. The X-ray crystallographic data collected did not permit for the elucidation of the compound's structure. It was deduced that the twinned crystal incorporated purely inorganic entities such as sulfate and chloride ions. Our current efforts focus on replicating this compound with the lanthanide ions Ce^{3+}, Pr^{3+}, and Nd^{3+}. We hope that X-ray diffractional studies of these compounds will allow for a re-evaluation of the crystallographic data collected from the twinned Pu-crystal.

Synthesis of Functionalized Metal Nanoparticles and Quantum Dots for Fluorescence Enhancement- Frank Trevino, Byeongchan Jeong

Faculty Mentor: Dr. Saravanan Ramasamy
Department: Chemistry and Biochemistry

The use of metal-enhanced fluorescence to amplify the signal from fluorophores by coupling them to metal nanoparticles is one of the most appropriate strategies to improve the brightness of the fluorescence. With ample development, metal-enhanced fluorescence can be a leading approach in the field of biosensors. As the concentrated electric field forms around the surface of the metal, the surface plasmon resonance increases the brightness of fluorescence dramatically by opening additional pathways for excitation and emission. This is caused by the degree of how robust the linkage is and the distance between the metal nanoparticle and the modified fluorescent quantum dot. We are developing a solution-based method for metal-enhanced fluorescence by aggregating magnetized gold nanoparticles and fluorescent quantum dots using the various organic linker molecules and testing the fluorescence enhancement percentage. To achieve this, we synthesized gold nanoparticles (GNP), and modified the particle surface with different organic linking molecules. Then we synthesized CdSe quantum dot (QD) fluorophores and modified the surface for aqueous compatibility and functionalized with propyl dithiocarbonate (DTC) to bind to gold surface. The metal-enhanced fluorescence of the gold-QD aggregates was studied using UV-Vis and fluorescence spectroscopy.

Development of a Mathematical Model for Calculation of Thin Film Thickness from Ellipsometry Measurements-Alexis Washington

Faculty Mentor: Dr. Gregory Smith
Department: Chemistry and Biochemistry

Ellipsometry is a method of analyzing the optical properties of surfaces using the change of the polarization of light upon reflection. This can be used to monitor changes at the surface, including the growth of thin films on surfaces with an Angstrom level of precision. Here, work is done to calculate the thickness of ultra-thin films on surfaces from data taken from ellipsometry measurements. Since the substrate is almost always opaque, this involves the use of complex numbers to model the changes in the polarization of light upon reflection.

Developing Surface Modified TiO_2 Nanoparticles for Photocatalytic Water Treatment-Weston Wade Wilber

Faculty Mentor: Dr. Saravanan Ramasamy
Department: Chemistry and Biochemistry
Sponsorship: Undergraduate Research Faculty-Mentored Grant

The purification of water via photocatalysis is an effective and promising method for treating contaminated water. Titanium dioxide (TiO_2) nanoparticles (NPs) are the most widely used photocatalyst. They play a crucial role in generating the reactive oxidative species that will ultimately destroy any organic molecules or microorganisms in the water. Although this is a highly effective water treatment method, the recovery and reuse of the NPs is a complex and arduous process which is one of the barriers keeping this method from moving toward larger-scale industrial and human use. Prior research on TiO_2 NPs has shown that amine and carboxylic acid functional groups that could interact with one another can be added to the surface of the NPs. Our research focused on a novel method of TiO_2 NP removal from water by introducing amine and carboxylic acid functional groups to the NP surface that will be used to form cross-links and conglomerate the NPs allowing for easier removal. Easier removal of these nanoparticles will allow this technology to keep advancing and slowly find its way into industries looking to improve their water purification abilities. We are also focused on the reusability of these recovered NPs, the effectiveness of these recovered NPs, and the viability of the surface-modified NPs as effective photocatalysts in the treatment of contaminated water.

Observations gleaned from attending the 2023 TIPA Conference-Arabella Peña, Brittney Jackson, Aaron McGuire, Ethan Purcell

Four members of the Angelo State University's The Ram Page - Brittney Jackson, Arabella Peña, Ethan Purcell, and Aaron McGuire - had an exciting opportunity to attend the 2023 Texas Intercollegiate Press Association's (TIPA) conference in Fort Worth, Texas. Each member participated in live contests provided by the conference, showcasing their skills and passion for journalism. Jackson participated in Critical Review, Peña in Feature Photography, Purcell in News Reporting and News Photography, and McGuire in Copy Editing. Along with attending the conference and participating in a live contest, Jackson completed a gallery entitled "Pockets of Fort Worth" for The Ram Page, detailing a few of the local artists and sights around the city.

Along with the live competitions, members attended panels about various topics within the press and media, including "From War Correspondent to Novelist: The Bridge Between Journalism and Fiction," presented by Sidney Balman, "Lawsuit-Proofing Your Newsroom" and "Gagged: Secret-Keeping in Government…and on Campus," presented by Frank LoMonte, "Embracing the F Word: Fundraising and Student Media," presented by Beth Francesco, and "Advanced Photoshop and InDesign," presented by Ron Edwards. Jackson, Peña, and McGuire also attended the Career Fair, where they connected with multiple colleges and universities, newspapers, radio stations, and other media companies for potential jobs and internships.

McGuire won the second-place award for the Live Competition in Copy Editing. Members of The Ram Page who were absent, Mbulelo Maqungo and Madelyn Mendoza, won Honorable Mention for Previously Published Breaking News and Previously Published Sports News Story, respectively.

Analysis of SEPSES Dataset for Use in Cyber Threat Prediction-Jordan Wade

Faculty Mentor: Dr. Erdoğan Doğdu
Department: Computer Science

The purpose of this project is to analyze the SEPSES (Systematic Processing of Security Event Streams) dataset and determine useful characteristics that can be used in future projects to build a cyber threat prediction model. Using the open-source datasets contained within the SEPSES dataset, a table of characteristics and identifiers for cyber-attacks can be created. This is accomplished by using Python-based tools to analyze the data and display such data in a meaningful way for future researchers. Although this project is only the foundation for future projects in cyber-attack pattern prediction, it is an important first step since a prediction model cannot be created unless there is properly formatted data to train that prediction model. The goal of this project is to transform hard-to-read and scattered data found in the SEPSES dataset into a format that can be used by future researchers attempting to build a prediction model for cyber threats.

Analyzing SEPSES Cybersecurity Knowledge Graph Dataset-Jordan Wade

Faculty Mentor: Dr. Erdoğan Doğdu
Department: Computer Science

In this project, we analyze the SEPSES (Systematic Processing of Security Event Streams) dataset, which is a cybersecurity knowledge graph that integrates and links critical information on real-world vulnerabilities, weaknesses and attack patterns from various publicly available sources. We determine useful characteristics of SEPSES, which can be used in future projects to build a cyber threat prediction model. Using the open-source datasets contained within the SEPSES dataset, a table of characteristics and identifiers for cyber-attacks is created. This is accomplished by using Python-based tools to analyze the data and display such data in a meaningful way for future researchers. Although this project is only the foundation for future projects in cyber-attack pattern prediction, it is an important first step since a prediction model cannot be created unless there is properly formatted data to train that prediction model. The goal of this project is to transform hard-to-read and scattered data found in the SEPSES dataset into a format that can be used by future researchers attempting to build a prediction model for cyber threats.

Predicting Cyber Attacks Using Graph Neural Networks-Esai Barron, Ha Le, Victor Obioma, Suraj Thapa, Long Nguyen

Faculty Mentor: Dr. Erdoğan Doğdu
Department: Computer Science

Knowledge graphs are a recent development in the realm of Artificial Intelligence being put to use in cutting edge technology such as ChatGPT and Google Bard. A knowledge graph, at the most basic level, contains two points and an arrow going from one to the other. The points represent entities, and the arrows represent the respective relationship between said entities. This model can be used in various applications such as networks of friends, the relationship between words in a spoken language, and in our case: the relationship between an offender, a victim, and the type of cyberattack that occurred.

Using the knowledge graph model, we aim to build upon the research that others have begun using said model in a cybersecurity focused manner. Our goal is to use established cyberattack data sets in conjunction with a Python knowledge graph library in an attempt to improve upon the results others have produced.

Additionally, we will be incorporating a neural network into our model, which will utilize the knowledge graph to enhance its understanding of the relationships between entities and the types of cyberattacks that occur. This will allow us to classify new and previously unseen cyberattacks with a higher degree of accuracy.

Overall, our research aims to improve the ability to identify and respond to cyberattacks by utilizing the powerful combination of a knowledge graph and a neural network. The potential impact of this research is significant, as it could lead to better cybersecurity measures and ultimately protect individuals and organizations from the devastating consequences of cyberattacks.

Analysis of Negative Social Factors on Health Outcomes-Steven Womack, Matthew Shaw, Minh Le

Faculty Mentor: Dr. Erdoğan Doğdu
Department: Computer Science

Using publicly available, county-level data on social demographics, behaviors and health outcomes, we are currently exploring select questions and correlations between factors. The questions focus on the possible correlations between socioeconomic factors, race/ethnicity, and health outcomes for counties in which data was provided. Findings are presented with correlational matrices and heatmaps of the US counties for visualizations. Questions to be answered are as followed:

Data Analytics Q's:
- Do areas with higher negative economic factors have worse health outcomes than areas with better economic factors?
- Is there a correlation between educational attainment and health outcomes?
- How does income inequality, childhood poverty, affect health behaviors such as smoking, alcohol intake, etc.?
- How does unemployment and lower insurance rates affect mental health versus physical health outcomes?
- Do areas with higher ratios of primary care physicians and mental health providers have larger amounts of teen births?

Predictive Modeling Q's:
- As unemployment and educational attainment rise or fall, do health outcomes change as a result?
- How does the physical environment of an area (county) affect the health outcomes of the population?

Analyzing Factors Contributing to the State of the US Health-Mitchell Martin, Trevor Smith, Eduardo Palacios

Faculty Mentor: Dr. Erdoğan Doğdu
Department: Computer Science

In this project we analyzed the County Health Rankings & Roadmaps 2022 dataset, which documents health data from all counties in the US. Dataset has both health outcomes, and also the effecting factors including health behaviors, clinical care, social & economic factors, and physical environment. We used the dataset to analyze and visualize results by correlating factors such as "alcohol related deaths", "high-school dropout rates", "years of potential life lost", and also attempting to predict certain factors.

Analyzing County Health Rankings Dataset-Hayden Schindler, Alex Hasmuller

Faculty Mentor: Dr. Erdoğan Doğdu
Department: Computer Science

The project used the UHG County Health Rankings dataset for 2022 as the primary data source to investigate several potential correlations between various socioeconomic factors and important health and social outcomes. the research method involved isolating the relevant information and drawing conclusions based on the findings. Overall, this project highlights the complex relationships between socio-economic factors and health outcomes and underscores the importance of continued research in this field. The project employs data analysis techniques such as correlation analysis and visualization to draw insights from the dataset.

To summarize, the findings indicate that there is no significant correlation between broadband access and suicide rates, but there is a correlation between single-parent households and teen pregnancy and juvenile arrests. Additionally, there is a correlation between insufficient sleep and disconnected youth, as well as a correlation between physically inactive days and frequent physical distress. However, no significant correlation. Finally, while there is a correlation between homeownership rates and suicide rates, the relationship is not definitive.

SMA Soft Finger-Antonio Arreola

Faculty Mentor: Dr. Armita Hamidi
Department: David L. Hirschfeld Department of Engineering
Sponsorship: Undergraduate Research Faculty-Mentored Grant

The adult human hands' complex anatomy is what allows people to perform daily tasks such as gripping a cup full of water. One of the most important parts of the hand for gripping tasks are fingers. Fingers have tendons attached to the forearm that allow for flexion and extension of the various phalanges. Using this principle it is possible to create artificial flexion and extension of soft body fingers with the use of shape memory alloy (SMA) actuators. Like all things, there are limitations that can affect the deformation in soft body robots. Determining the physical limitations of these actuators and determining ways to improve their overall strength is important for the development of robotics. The main goal of this research is to design a soft structure mimicking a human finger and actuate by embedded SMA actuators to determine the correct configuration, materials, and voltages needed to mimic a human finger while establishing the limits of the SMA and soft body structure.

Survey Controllers for ENGR-1307-Wesley Tillman

Faculty Mentor: Dr. Dick Apronti
Department: David L. Hirschfeld Department of Engineering
Sponsorship: Undergraduate Research Faculty-Mentored Grant

The purpose of this project was to take an existing piece of hardware in the university's inventory and research a way to utilize it in its intended role. Previously, all measurements taken on the total station surveying equipment had to be copied down one by one with pin and paper. These coordinates would then be painstakingly reinputted into the desired processing software, such as Microsoft Excel or Autodesk Civil 3D. However, by utilizing the TSC3 survey controller, we have been able to streamline this process. We are now able to send data straight from the total station hardware directly to the survey controller. There it can be analyzed, and basic calculations can be performed. Once the user is satisfied, the data can then be quickly copied onto a USB drive and reopened on the users preferred platform, thereby negating the previous tedious method. This new equipment will be inserted into the students' existing curriculum to supplement the technology already being employed.

Pink Triangle: Oppression to Power-Kaci Wainscott

Faculty Mentor: Dr. Rebekah McMillan
Department: Dr. Arnoldo de Leon Department of History
Sponsorship: Research Travel Fund

The pink triangle began as a symbol of oppression and shame as it was created to signify gay men in concentration camps during the Holocaust. The triangle was reclaimed in the name of protest against oppression by ACT UP (AIDS Coalition to Unleash Power) during the 1980s. The Silence = Death campaign created by ACT UP inverted the triangle and took the symbol of gay oppression to fight against the ignorance perpetuated during the AIDS crisis. More recently, the addition of the pink triangle to a line of pride merchandise by NIKE in 2017 sparked a controversy about the morality of profitization, especially on reclaimed symbols and phrases of marginalized groups by corporations. From its creation to its use in the present day, the pink triangle's meaning has evolved from one of oppression to one of power and its legacy will remain within the LGBTQ+ community.

Chicana Feminism in the 1960s-70s-Betsaida Rodriguez

Faculty Mentor: Dr. Rebekah McMillan
Department: Dr. Arnoldo de Leon Department of History

This project uses primary and secondary sources to discuss Chicana feminism in the 1960s and 70s and the need for its formation. The concept of Chicana feminism was formed to address the race, class, and sex issues that Chicanas faced but that the Chicano and Women's Liberation movements could and/or would not address. Chicanas were a driving force for the Chicana/o Movements and were heavily interested in the Women's Liberation Movement, but these two movements' goals did not always coincide, resulting in misunderstandings between the two groups and leaving the Chicanas to figure out where they fit in this conflict of interests. The sources show the different opinions Chicanas of the time and across the United States had of this movement and how it has evolved as new scholarship on Chicanas was published through the decades that followed.

Divorceland: The Conservative Public Opinion over the Political Battle for Maryland's Secession from the Union-Alexandros Paulson

In the times directly preceding the American Civil War, the question of slavery's place in the United States of America divided the country and dominated both national and local politics. While her southern neighbors were seceding to form the Confederate States of America, Maryland's allegiance still hung in the balance. The Confederacy looked to recruit more members to their cause, while the Union could not afford to have Washington surrounded by rebellious territory. This paper follows a deeply divided state through the perspective of the *Cambridge Democrat*, a conservative, pro-Confederate newspaper, in the six months leading up to the climactic legislative victory that kept Maryland's government loyal to the United States. Through analysis of both the newspaper and the context in which it was written, it becomes evident that the political divide of secession and slavery was just as deep for the public as it was for Maryland's state leaders.

Lesbian and Gay Alliances During the AIDS Crisis and Their Lasting Influence on the Modern LGBTQ+ Community-Kaci Wainscott

Faculty Mentor: Dr. Laura Hooton
Department: Dr. Arnoldo de Leon Department of History

While the LGBTQ+ community is usually seen by those involved and outside the community as a cooperative, welcoming community. However, this was not always the case, especially between lesbians and gay men. Despite the gay liberation movements of the 1970s, gay men and lesbian women rarely saw themselves as a community with similar obstacles and goals. In the 1980s, as the AIDS (Acquired Immunodeficiency Syndrome) crisis began to disproportionately devastate gay men, lesbians began to help and advocate for gay men, despite their perceived differences. Lesbians took on leadership roles in AIDS Coalition to Unleash Power (ACT UP), organized blood drives, nursed afflicted gay men, and advocated for the acknowledgment of AIDS. After AIDS initially devastated the LGBTQ+ community, lesbian women and gay men found a new respect for one another. The most prominent example of this new respect was the change of the original acronym for the community from GLBT to LGBT, honoring the roles of lesbians in the AIDS crisis. The modern LGBTQ+ community is a direct descendant of the actions of lesbians during the AIDS crisis.

Differences in Depressive Symptoms between Childhood versus Adulthood diagnosis of Attention-Deficit Hyperactivity Disorder-Yoo Jean Park

Attention-Deficit Hyperactivity Disorder(ADHD) is one of the most common neurodevelopmental disorders in childhood. Most of them are diagnosed in early childhood, but the symptoms may last into adulthood as well even with medication intervention. Some of the ADHD was not identified and diagnosed until patients' adulthood, which they fairly start their treatment late. That delays the proper access to treatment in childhood meaning ADHD will persist lifelong. Many types of research have shown the prevalence between depressive symptoms and ADHD. However, there is little understanding of the impact of delayed diagnosis, especially adulthood diagnosis on the patients' depressive level. Since ADHD is a chronic childhood neurodevelopmental disorder, the symptoms must present before 12 years old despite the patients are diagnosed as an adult or an adolescent. Patients who were diagnosed with ADHD in adulthood may struggle with their important life stages such as in college, at work, and even the relationship with friends and family without noticing. The study aims to examine and compare the level of depressive symptoms in childhood diagnosis ADHD and Adulthood Diagnosis ADHD.

Does Physical Activity Level Affect Body Composition in College Students?-Chloe Edinburgh

Faculty Mentor: Dr. Adam Parker
Department: Kinesiology

College-age students are at a point in life where their lifestyle habits can affect their long-term health. An active lifestyle can aid in combatting a growing number of negative health issues. The extent to which physical activity affects body composition has been previously studied, and this study aimed to further this research with college-age adults. The primary question this project aimed to answer was whether physical activity level has any correlation to body composition. This study consisted of 28 men and women (20.39 ± 1.14). Body composition was assessed using Dual Energy X-Ray Absorptiometry (DEXA). Participants' physical activity levels were measured using a 10-item survey about physical activity types, frequency, and intensity. There was a significant difference in lean mass ($p = 0.000$) and % body fat ($p = 0.000$) between genders. Individuals that performed approximately 300 minutes of aerobic exercise per week had significantly more lean mass than those that performed only 30 minutes or 180 minutes per week ($p = 0.016$). Individuals grouped in both the 180- and 300-minute resistance exercise group had significantly more lean mass than the 30-minute exercise group ($p = 0.011$). These results suggest that there is a positive relationship between resistance training and lean body mass.

Effect of Task and Seat Position on Trunk Flexion Angles in Healthy Young Adults-Areli Torres

Faculty Mentor: Dr. Heather Braden, Dr. D. Rozena McCabe
Department: Kinesiology
Sponsorship: Undergraduate Research Faculty-Mentored Grant

Objective: This study investigated the effect of task and initial seat position on trunk flexion angle in healthy young adults.

Methods: In this study, 43 young and healthy adults (18-30 years old) performed the following: Task 1: Sit-to-walk, starting position from front of chair; Task 2: Sit-to-walk, starting position from back of chair; Task 3: Sit-to-stand, starting position from front of chair; Task 4: Sit-to-stand, starting position from back of chair. Participants began with their knees at a 90-degree angle and their arms crossed in front of their chests. For each task, participants had tape placed on specific anatomical landmarks. (acromion process, greater trochanter, & lateral condyle of the femur). These landmarks were used to measure the trunk flexion angle. Participants were then videoed while performing each task.

Results: Using the OnForm app, the maximum trunk flexion of each participant was measured. A repeated measures analysis of variance (ANOVA) with one within-subjects factor demonstrated there was a significant difference between a sit-to-stand task starting at the front of the chair compared to a sit-to-stand task starting at the back of the chair. There was also a significant difference between a sit-to-walk task starting at the front of the chair compared to a sit-to-walk task starting at the back of the chair.

Conclusions: Overall, the task an individual performs does not significantly change the trunk flexion angle. However, seat position does influence trunk flexion. Starting at the front of the chair results in overall less trunk flexion.

The practicality behind Physical Therapy videos on YouTube-Abbigail Pritz

Faculty Mentor: Dr. Han-Hung (Floyd) Huang
Department: Kinesiology and Physical Therapy

Background: Physical Therapy is used to help people of all ages with their movement. Movement is one of the most important ways to ensure a healthy lifestyle. While the movement is very important, many people are not properly educated on how to do it. In the past couple of years, YouTube has been one of the most popular online platforms to broadcast health-related information. The objective of this study was to identify if YouTube is a practical avenue for Physical Therapists to convey information about the movement to people. We hoped to identify the characteristics of some of the most popular PT channels and see if it is practical for other Physical therapists to create YouTube channels.

Methods: Systematic search criteria were followed to get the most accurate results. We logged on with the same account each day. Once on YouTube in the search bar, we used the keyword: Physical Therapy. We then went to filters and chose that we only wanted videos that were posted on that day (24 hours), are considered a video, are 4-20 minutes in length, and are sorted by view counts. Once we got all the videos that appropriately follow the filters, we used certain inclusion and exclusion criteria to choose which videos would be eligible for review in the study. The inclusion criteria are: the content must be patient education related, have more than 0 views, and must be English speaking. The exclusion criteria are: it has 0 views, it is used for media press or to promote a certain school, it uses teaching materials, or it is a personal channel.

Results: We found that the most popular channels are the ones that have been making videos for years and they upload frequently (daily or every other day). Those channels can be either individual or clinical channels, and most importantly their channels have a wide range that covers different specialty areas. While the popular channels were accurate and good sources, many smaller channels also had videos that included good quality information.

Conclusions: The more views a channel has the stronger the source. The popularity of the channel may determine whether it is a practical source or not to be able to convey information. The quality of content may not be related to popularity.

Application of Fourier Analysis to Linea Sinuosa of Arvicolid Molars-Anna James

Faculty Mentor: Dr. Andrew Siefker
Department: Mathematics

Fourier analysis has applications that are used extensively in engineering, mathematics, and other sciences. Fourier analysis is used to model functions as the sum of sines and cosines of selected frequencies. There are four major types of Fourier analyses: Fourier Transform, Fourier Series, Discrete Time Fourier Series, and Discrete Fourier Series. In an attempt to mathematically model the enamel-dentine junction of the Arvicolid rodent, *Ogmodontomys Poaphagus*, the Fast Fourier Transform was applied to samples of teeth drawings. Accurate modeling of these junctions using Fourier transforms may assist researchers in differentiating between intraspecies Arvicolid rodents.

An Ultraproduct of the Natural Numbers-Cade Campbell

Faculty Mentor: Dr. Trey Smith
Department: Mathematics

Any structure that models Peano's axioms is a model of the natural numbers. Traditionally we obtain models that correspond to the set {0, 1, 2, 3, . . .}, which is countable and well-ordered. By applying Lôs' Theorem to the ultraproduct of this set, a new model is obtained that maintains the axiomatic properties of the natural numbers while being uncountable and not well-ordered. These properties will be demonstrated.

Graph Undeconstruction-Jonathan Heidema

Faculty Mentor: Dr. Dennis Hall
Department: Mathematics
Sponsorship: Undergraduate Research Faculty-Mentored Grant

In a survey on edge reconstruction of graphs, Maccari, Rueda, and Viazzi wrote, "Since the proof of the four color problem, one of the major challenges in graph theory is the problem of reconstruction of graphs from a collection of subgraphs". Though we did not plan on solving such an important problem in mathematics, we aimed to explore a specialization of the question in the hopes of gaining a stronger understanding of graph reconstructions. Our research focused on *edge* reconstruction. More specifically, the minimum number of subgraphs needed to construct the parent graph when only a small number of edges have been deleted. As no vertices were removed, the number of vertices is known, though the location of the deleted edges and the degree of the vertices is still unknown, so the difficulty lies in connecting the subgraphs together in a way that each subgraph uses and provides new information about the parent graph. For our project we explored edge-decks consisting of edge-cards, which are similarly constructed, but instead of vertex deletion, we used edge deletion. We looked at various classes of graphs and attempted to find the smallest edge-deck.

Mathematical Modeling in Insulin Pumps-Tressa Reading

Faculty Mentor: Dr. Karl Havlak
Department: Mathematics

Diabetes is a chronic, metabolic disease that effects millions of people around the world. Diabetes is characterized by elevated sugar in the patient's blood. Hyperglycemia (elevated blood sugars) is treated by introducing insulin into the blood stream to bring down the glucose levels. There are many different treatments for diabetes, with insulin pumps being a recent popular approach. Insulin pumps are computerized devices that monitor the sugar level in the patient's blood and inject either long-acting or short-acting insulin to keep the sugar level in a safe range, typically between 100-120 mg/d. In this study, a mathematical model is applied to examine insulin pumps. Mathematical models using differential equations are widely applied in almost every field to analyze and predict the behavior of a system. Specifically, mathematical models are used extensively in automated systems using control theory. Insulin pumps can be treated as automated systems because they regulate the glucose levels of the blood and act when it becomes too high. Examining the dynamics of insulin pumps under a mathematical scope provides insight to further understand the process and make predictions about this realworld scenario. The purpose of this study is to apply differential equation mathematical models to analyze if a continuous release system would be ideal for maintaining glucose levels in a safe range.

'I die so that I may not become a kept woman:' Fictional Female Responses to the Commodification of Women and Womanhood during the French Fin-de-Siècle-Katherine Spitzer

Faculty Mentor: Dr. Elisabeth Christine Muelsch
Department: Natalie Zan Ryan Department of English and Modern Languages
Sponsorship: Undergraduate Research Faculty-Mentored Grant

The texts *Yvette* by Guy de Maupassant, *Gigi* by Colette, and *Mrs. Warren's Profession* by George Bernard Shaw offer portrayals of the daughters of courtesans from the turn of the 19th to the 20th century. The texts, mirroring the politics and literary movements to which their authors adhered, depict different life plans available to these young women. At the turn of the century, prostitution was a greatly debated issue in both England and France, although England was much less sympathetic to prostitutes than France was. Simultaneously, the role of women was changing as women received access to better education and broader career choices. Each author responds to these changing roles in different ways: Maupassant by emphasizing social determinism and crafting a protagonist who is unable to create a future where she is not a courtesan like her mother; Colette by turning to a traditional, bourgeois marriage as a means of escape; and Shaw by creating a progressive future where the daughter of a prostitute is able to start a new life and provide for herself, albeit at the expense of cutting off her mother and former way of life. In comparing the options available to the daughters of courtesans portrayed in these three texts and analyzing their relationship to their maternal figures, one notes a distinct commonality: all three daughters are alienated from their selves, their families and lovers, and society—although to differing degrees.

Rhetoric and Usability on Tumblr-Anna Camille Faught

Faculty Mentor: Dr. Nicole St. Germaine
Department: Natalie Zan Ryan Department of English and Modern Languages

Tumblr, a social networking website founded in 2007, is known colloquially as a broken hellsite. Despite a reputation for being broken and unusable, it still has many active users. While some technical usability features of Tumblr could use fine tuning, the site also possesses a rigorous discourse community, and longtime users must explain how to navigate the site to newcomers. Since this is difficult, it gives the impression of bad usability, and the userbase often jokes about how broken the site is. These two factors have contributed heavily to the perception and rhetoric that Tumblr is a broken, dead hellsite and right now cements its status as the forgotten social media.

Tracing Modernist Characters of British Literature from the 17th century to 19th century-Tuan Anh Chau

Faculty Mentor: Dr. Mark Hama
Department: Natalie Zan Ryan Department of English and Modern Languages
Sponsorship: Undergraduate Research Faculty-Mentored Grant

The verticality of urbanization – which explains the tendency of rapid urban spread not in the geographical scale but in the private sector. More specifically, modernity is bound to the efficiency trap in which there always exists the material need to upscale the forms of the contemporary to add in the atoms. However, such a concept of rapid expansion following the laissez-faire economic modality is nothing more than an overrated upscale of traditional hierarchical orders. Hence, the bigger the modern civilization becomes, the easier it becomes for an individual's identity footprint to get lost and be neglected in the grand scheme of the society. The scope of this research seeks to enlarge in terms of analyzing philosophical and psychological factors that contribute to the shift of perspective for the modernist self in various relevant literary texts.

"I Game, Therefore I am": An Exploration of Video Game Epistemology and Its Ethical Implications-Tuan Anh Chau, Tristan White

Faculty Mentor: Dr. Susana Badiola
Department: Natalie Zan Ryan Department of English and Modern Languages

The discussion regarding ethical implications of entertainment and arts has been an age-old story in the world of philosophy, dating as far as Plato and Aristotle. Ancient Rome's citizens during the third century BCE and the fourth century BCE got treated to the format of gladiatorial combat in which prisoners of war and slaves duked it out with deadly weapons to become the ultimate survivors. The spectators of the civilized Rome were indirectly exposed to the gory altercations of violence and endless slaughters. In the modern world, spectacles like gladiatorial combat scenes or fight scenes have been meticulously replicated and rendered realistically in various forms of graphic portrayals and photorealism – specifically in video games; and of course, the themes for video games span beyond historical depictions, taking inspirations from different slices of life. Nonetheless, instead of having indirect exposition to the events depicted, the user – or player – of video games actively act out their part in the happenings of the designated story. The simulated quasi-realism of the game world allows the players, while not being affected directly by the consequences of their actions (by following the story line), to directly experience and influence the actions of the in-game avatars and the environment of the game world. This research firstly addresses how a human's epistemological engagement – the process of meaning-making – in video games is not entirely different from real-world interactions; more specifically, applying the theory of the extend and embodied mind, the video games' simulations extend the human's mind into the game, thus allowing phenomenological interactions. Secondly, this research aims to elaborate on how video games bring up ethical implications by making the player an ethical agent for in-game scenarios.

A Wicked World: The Relationship Between Role-Play and Ethical Gameplay in *Cyberpunk 2077*-Aaron McGuire

Mediums of expressing ideas such as literature, photography, movies, and videos have been used since their initial invention to discuss ethical dilemmas and encourage ethical decision-making in people. As video games have become increasingly popular in the modern world, they have also adopted a role similar to these mediums. One model for encouraging ethical decision-making players, pioneered by game studies scholar Miguel Sicart, advocates for the development of truly ethical gameplay through engaging players' *ludic phronesis*, a term derived from Aristotle's concept of *phronesis* discussed in the sixth book of his *Nicomachean Ethics* literature. Ludic phronesis is then engaged using "wicked problems," problems defined by planning theorists Horst Rittel and Melvin Webber as lacking substantial information, having multiple factors influencing the problem, and being confusing and unclear overall. Using this model, I argue that role-playing is the method by which players' *ludic phronesis* engages the wicked problems put forth by game developers. Following this, I discuss how the dystopian, hyper-corporate world of CD Projekt Red's *Cyberpunk 2077* (2020) utilizes and differs from this model to present the player with a wicked problem that ultimately cannot be resolved - the society of the game itself.

Constructing & Testing a Diffusion Cloud Chamber-Andrew Tom, Garath Vetters

Faculty Mentor: Dr. Kenneth Carrell
Department: Physics and Geosciences
Sponsorship: Undergraduate Research Faculty-Mentored Grant

We have constructed two prototypes of a diffusion cloud chamber and have tested each of them using a set of criteria, such as effectiveness of operation and ease of visibility of charged particle tracks. We will then construct a full-scale version based off our most efficient prototype.

Characterizing a Radioactive Source with a Diffusion Cloud Chamber and a Magnetic Field-Garath Vetters, Andrew Tom

Faculty Mentor: Dr. Kenneth Carrell
Department: Physics and Geosciences
Sponsorship: Undergraduate Research Faculty-Mentored Grant

A diffusion cloud chamber was constructed to visualize the tracks of charged particles resulting from the radioactive decay of elements. Using Helmholtz coils around the chamber, we will verify the decay products of a Pb-210 source. We will also present results on the decay rates and energies of the emitted radioactive particles.

Investigating an Unknown Mineral Within a Texan Pegmatite-Brandon Walters, Matthew Hernandez

Faculty Mentor: Dr. Elizabeth Koeman-Shields
Department: Physics and Geosciences
Sponsorship: Undergraduate Research Faculty-Mentored Grant, Research Travel Fund

In a private quarry named Badu Hill located thirteen miles from the center of Llano Texas there are exposures of pegmatites that contain unique minerals that have been altered from local and regional metamorphism. Within the imposed pegmatite a golden bladed mineral that looks similar to biotite can be found. This mineral is the focus of the project. First hand sample properties identified that it is a phyllosilicate that has a distinctive pseudo-hexagonal crystal habit that is golden in color and vitreous. The next step, five thin sections where made and analyze under cross polarizing microscope and scanning electron microprobe (SEM) to collect petrographic properties and a major element analysis showing that the mineral was high in iron. With the analysis of the petrographic properties and the SEM element analysis the mineral in question was confirmed to be annite. Going to Badu Hill to describe the mineral that was exposed was the next step upon arriving the quarry was used recently to collect potassium feldspar more of annite was exposed than previously discovers. Finding long veins of annite and repeating patterns of the cross bladed pattern in the original hand sample across most of the outcrop. The latest step in this project was to analysis the same thin section that was scanned by the SEM with an ICPMS in order to find trace element percentages and make a rare earth element plot.

Magnetic Bound States Produced by Rotating Magnetic Fields-Christian Cannon

Faculty Mentor: Dr. Eddie (Trey) Holik
Department: Physics and Geosciences

When a permanent magnet is motionless, it is unable to create a local minima or maxima of potential energy in free space. This effect is negated when the magnets are in a non-static configuration. When magnets are spun at high speeds, the magnetic fields are unable to properly align and prevent the attractive force from dominating at small distances. The magnets are able to produce an equilibrium point where the attractive, repulsive, and gravitational forces balance.

Optimizing the flow of granular material through a 3-D Hopper-Noel Marichalar

Faculty Mentor: Dr. Michael Holcomb
Department: Physics and Geosciences

The flow of granular materials through a hopper is slowed whenever jamming occurs at the exit. It has been observed in 2D systems that the flow rate can be enhanced through proper placement of an obstacle above the hopper exit. An optimally placed obstacle limits the flow of particles such that the highest density of particles where no jamming occurs at the exit is achieved. Our work seeks to explore whether flow rate enhancement through proper placement of an obstacle is a phenomenon that can also be observed in 3D systems. We introduce a novel 3D-printed half-hopper with interchangeable obstacles and exit funnels. Using stainless-steel ball bearings as our particles and affixing the half-hopper to plexiglass, we are able to capture and analyze multiple aspects of 3D granular flow. We present our findings on how flow rate through a 3D hopper is affected by the placement of an obstacle. Further, we also discuss how obstacle shape and angle of the exit funnel affect the flow rate.

Detailed Mapping of the Geologic Controls on Karst Development in the Central Edwards Plateau-Cassidy Hill

The Edwards Plateau in west Texas is composed of Cretaceous aged limestone that was deposited when the land was covered by a warm shallow marine. The specific unit for this study, the Edwards Group, is made up of the Segovia, Fort Lancaster, and Fort Terrett Formations. The presence of karst features within the Edwards Group, for example the Caverns of Sonora, have been noted in literature and on maps, however a more comprehensive map of the area has not been created due to lack of public data. Through LiDAR mapping techniques and the use of ArcGIS we have discovered a correlation between the orientation of the dendritic drainage pattern of the draws and karstic features. We have obtained measurements of fractures (n=29), with one set trending northeast, at 045, and the other to the southwest at 315. These measurements, which align with measurements acquired from LiDAR mapping of draws using ArcGIS, have contributed to our explanation of karst formation. Karst development is controlled by fracturing of the Segovia and Fort Lancaster units, and the extremely porous Honeycomb layer within the Edwards Group. Karst features such as large caves are found parallel and adjacent to fracture-controlled stream valleys. These caves are located in paleo stream channel elevations, which are presently in the upper section of the ridges. Future investigations into the lithology could potentially reveal a stronger lithologic control to karst development.

DETERMINING MAJOR AND TRACE ELEMENTS OF LLANITE, A RARE PORPHYRITIC RHYOLITE FOUND IN LLANO, TX-Hayden Bowman

Faculty Mentor: Dr. Elizabeth Koeman-Shields
Department: Physics and Geosciences
Sponsorship: Undergraduate Research Faculty-Mentored Grant nothing

In Llano County, TX, there is an exposed porphyritic rhyolite rock within the geological complex Llano Uplift of central Texas. The dike, commonly referred to as llanite, is unique because of its mineralogy. Specifically, llanite is composed of half centimeter sized potassium-rich alkali feldspar phenocrysts and distinctive bipyramidal blue quartz phenocrysts (3 mm in size). Surrounding the phenocrysts is a fine-grained groundmass composed of quartz, feldspar, and biotite. One thin section was prepared for mineral point count analysis and laser ablation ICP-MS work. Sample was examined using a scanning electron microscope and energy dispersive spectrometry to obtain major element weight percentages of the quartz and the feldspar. Trace element data was collected via laser ablation ICP-MS by ablating 13 different point in one feldspar crystal. This data will help determine the amount of trace elements in different regions of the feldspar sample. The variation of trace elements could be useful in understanding the complexity of the Precambrian history of the Llano Uplift region.

Finite Element Method Modeling and Analysis of Deformable Projectiles in Lorentz Accelerator-Nicholas Swartz

Faculty Mentor: Dr. Michael Holcomb
Department: Physics and Geosciences
Sponsorship: Undergraduate Research Faculty-Mentored Grant

Recent advances in battery and capacitor technology have made the use of electricity for transportation and propulsion more viable in the past decade. One method of electric propulsion uses an electromagnetic phenomenon called the Lorentz Force, whereby an object within a strong magnetic field can be moved by directing electric current across it.

In this project, a deformable projectile was recorded while being accelerated between two rails and image processing was used to analyze the deformation of the projectile during launch. MATLAB was used to create a finite element model of the projectile capable of accurately simulating the forces acting on the projectile while accelerating. Computational analysis is needed here because experimentally measuring the mechanical forces upon, and underlying stresses through, the projectile during launch is not practical.

Evaluating Voronoi Diagram Generation Performance-William Hennig

Faculty Mentor: Dr. Michael C. Holcomb
Department: Physics and Geosciences
Sponsorship: Undergraduate Research Faculty-Mentored Grant

A Voronoi diagram is a geometric map formed by convex tessellating polygons called Voronoi regions, which have associated seed points. Each Voronoi region is defined such that all points within that region are closest to the region's unique seed point. Voronoi diagrams are a natural way to represent nearest-neighbor behavior and have many broad applications. The goal of this research is to test the runtime performance of two Voronoi diagram-generating algorithms: a naïve brute force method and an optimized recursive divide-and-conquer method. In the naïve brute force method, each pixel in a square grid is checked to find its associated seed point. In the recursive brute force method, the grid is recursively split into quadrants, which are assigned the same seed point association if all four corners of the quadrant correspond to the same seed point. We present a comparison of the performance of these algorithms based on varying these initial conditions: area of Voronoi diagram space, number of Voronoi sites, CPU (Mac M1 vs. Ryzen 5950X), and programming language (Python vs. C++). Based on test results, the recursive brute force method generally has a more significant performance boost for computationally slower conditions, where each pixel comparison step is more costly in time.

Ti:Sapphire Laser Crystal-Andrew Long

Faculty Mentor: Dr. David Bixler
Department: Physics and Geosciences
Sponsorship: Undergraduate Research Faculty-Mentored Grant Department of Physics and Geosciences

We have constructed a Ti:Sapphire Laser, using a titanium doped sapphire crystal that is pumped by a 532nm frequency-doubled Nd:YAG laser. The Ti:Sapphire laser is set up as a four mirror ring optical cavity, currently with no frequency or direction selecting elements in the cavity. Ti:Sapphire crystals, when energized by the green light from a pump laser, will dominantly produce near infrared light on the order of 700 to 800 nanometers, though their gain curve extends from 600nm to 1000nm. We expect light that is near the limit, but not beyond, human visual range (depending on the person). We are testing mirror alignment, crystal placement and position, as well as input power to create as stable of an output as we can with our current equipment. We are also using a Helium Neon laser to properly align the pump laser as well as the cavity mirrors. After we have stable Ti:sapphire lasing, we will introduce frequency selection elements. Then we will tune the laser to an atomic transition of rubidium (near 780 nm). The goal is to frequency stabilize the Ti:sapphire laser to the rubidium transition for future studies in atomic physics.

Optimized YBCO pinning-Tyler Joe Dutchover

Faculty Mentor: Dr. Eddie (Trey) Holik
Department: Physics and Geosciences
Sponsorship: Undergraduate Research Faculty-Mentored Grant

Superconductors are materials that display zero electrical resistance and expel magnetic fields entirely from their interior. The expelling of magnetic fields is called the Meisner effect. In a type-II superconductor, the magnetic field can penetrate the bulk of the material through regions that are not in the superconducting state. This then allows the superconductor to achieve stable magnetic levitation via a pinning force. The goal of this research project was to optimize YBCO tape configurations such that the pinning force was at a maximum. To accomplish this, the tape needed to be cooled, and stay cool, below its critical temperature long enough to make consistent pinning force measurements. We have developed a method of measuring the pinning force as well as employing aerogels for insulation. We made a total of four tape configurations and measured the pinning force on each of them. The last design that was put together had the highest average pinning force of $\bar{F}_{pin} = 2.751 \pm 0.076$ Newtons. While the design was not truly optimal, we believe it to be on the right path to optimality.

Understanding Thunderstorm Intensity Around San Angelo Using Rain and Wind Variables-Devin Johnson

Faculty Mentor: Mrs. Jessica Garza
Department: Physics and Geosciences
Sponsorship: Undergraduate Research Faculty-Mentored Grant

The main focus of this proposal is to better understand the development of thunderstorms in and around San Angelo. With this purpose in mind, I decided to use data from the National Weather Service office at SJT, and the storm prediction center to gather rainfall measurements, wind speeds/direction as potential variables to describe what is needed to power cell development.

Observing Trends in Lightning Distribution and Frequency in a Thunderstorm-Katy Herber

Faculty Mentor: Mrs. Jessica Garza
Department: Physics and Geosciences

Lightning is a common hazard associated with thunderstorms that affects people every storm season. However, when and where lightning may strike is unpredictable. Most of the research over lightning distribution and frequency have happened over long periods of time in select locations around the world or in tropical hurricanes and cyclones. However, not much research has been conducted on thunderstorms or mesoscale systems in general. Each year, about 35 thunderstorms occur within the San Angelo vicinity, which brings the threat of heavy precipitation, hail, lightning, and in some extreme cases, tornadoes, to the residents. Knowing how lightning distributes itself both in location and in time can identify areas of higher risk and can more effectively warn the public and potentially save lives. Observing these trends can be the first step to identifying conditions that lightning could occur in and finding zones of elevated lightning risks in order to increase confidence in warning the public.

Can Expecting Rejection Harm Health? Weight-Based Rejection Sensitivity Relates to Unhealthy Eating-Johnny Rodriguez

Faculty Mentor: Dr. Ashley M. Araiza, Dr. Tyler L. Livingston
Department: Psychology, Research Travel Fund

Weight-based stigma and discrimination are prevalent in the U.S. (Puhl et al., 2020). Individuals who experience weight-based stigma and discrimination may develop weight-based rejection sensitivity (WRS), which refers to a sensitivity to the possibility of being socially rejected because of their weight. WRS is associated with negative health consequences such as disordered eating (McClure Brenchley & Quinn, 2016). Extant research has primarily focused on undereating (e.g., restrained eating) and its associated characteristics (e.g., drive for thinness), with little consideration of how WRS may be associated with other maladaptive eating patterns. Additionally, previous research on WRS examined college students exclusively. To address these gaps in the literature, the present preregistered study examined associations of WRS with various maladaptive eating behaviors in a broad sample of U.S. adults. We hypothesized that WRS would be significantly and positively correlated with restrained eating, uncontrolled eating, and emotional eating. Participants were 217 adults 20 to 75 years old (M_{age} = 41.88, SD = 13.12; 56% Female; 75% European American/White) recruited via Amazon's Mechanical Turk data-collection platform. As part of a larger study, participants completed a measure of WRS (McClure Brenchley & Quinn, 2016) and a questionnaire assessing three dimensions of disordered eating (Karlsson et al., 2000): restrained eating (i.e., the tendency to restrict food intake), uncontrolled eating (i.e., the tendency to overeat), and emotional eating (i.e., the tendency to eat in response to negative emotions). We calculated Pearson product-moment correlation coefficients among the variables. As hypothesized, WRS showed significant and positive correlations with restrained eating (r = .27, p < .001), uncontrolled eating (r = .52, p < .001), and emotional eating (r = .47, p < .001), with the sizes of these correlations ranging from moderate to large. Results from this study indicated that WRS was related to maladaptive eating among a broader sample of adults than examined in previous work (see McClure Brenchley & Quinn, 2016). We provided further evidence of an association between WRS and (1) restrained eating. Furthermore, the associations between WRS and (2) uncontrolled eating and (3) emotional eating, each of which reflects eating more than desired, suggest that WRS may have the counterintuitive consequence of contributing to maladaptive eating behaviors that produce weight gain and obesity, which may subsequently lead to further weight-based rejection or discrimination (Tomiyama, 2014). The present work helps to identify varied eating patterns correlated with WRS, which has implications for our understanding of the wide range of negative weight-based experiences that impact people's health and health behaviors.

No Need to Punch Down: The Negative Association Between Self-Perceived Mate Value and Derogation of Competitors-Johnny Rodriguez

Faculty Mentor: Dr. Tyler N. Livingston
Department: Psychology
Sponsorship: Research Travel Fund

Introduction: People with high self-perceived mate value may be less inclined to derogate competitors to attract a suitable romantic partner. This study examined the relationship between self-perceived mate value and competitor derogation in short-term versus long-term dating scenarios.

Method: University students (N = 190, M_{age} = 19.89 years, SD = 3.92) received random assignment to give advice to someone seeking a short-term (52.11%) or long-term (47.89%) romantic relationship. Participants also reported their self-perceived mate value (α = .78; M = 4.85/7) and their endorsement of derogating competitors to attract a romantic partner (α = .97; M = 1.73/7).

Results: Self-perceived mate value interacted with short-term versus long-term dating goals to predict the endorsement of competitor derogation tactics. In the short-term condition, endorsement of competitor derogation tactics increased as mate value decreased (b = -0.25, 95% CI [-0.48, -0.02]). In the long term condition, mate value was not significantly associated with competitor derogation (b = 0.12, 95% CI [-0.13, 0.36]). A significant difference in slopes indicated that the effect of short-term versus long-term dating scenario on endorsement of competitor derogation depended on self-perceived mate value (b(diff) = -0.37, t(182) = -2.17, p = .03). Additionally, at higher levels of self-perceived mate value, there was no difference in competitor derogation between short-term and long-term scenarios.

Discussion: Findings revealed lower self-perceived mate value as a predictor of antisocial competitor derogation, especially in short-term dating contexts. Future research should enhance self-perceived mate value to reduce antisocial derogation behavior.

The Relationship Between Hope for Marriage and Parenting-MaKayla Hunter

Faculty Mentor: Dr. Nicole Lozano, Ms. Lauren Brooks (doctoral student)
Department: Psychology

According to research, young adults are beginning to delay marriage (Amato, 2004; Jones & Nelson, 1996), hold increasingly negative attitudes towards getting married, and engaging in more and more premarital cohabitation (Dennison & Koerner, 2008). At the same time, American's intention to have children has not changed (Benajmin Guzzo & Hayford, 2023). However, there is limited research exploring how the two are intertwined. This study explored the relationship between people's attitude toward marriage and their general hope for future parenting. Using ASU's SONA system, 293 participants were recruited for a survey study. Most participants identified as women (n=216), and most of the sample identified as White (n=132). The average age of the sample was 19.78 (SD = 3.3). To test the hypotheses, participants were administered the General Attitude Toward Marriage (Stacey S. Park & Lee A. Rosén 2013), (a=.79) and the Hope for Future Parenting Scale, developed from the Hope for Parenting Scale (Cole, et.al, in development), (a=.96). Using a Pearson's correlation, results indicated a significant positive correlation between hope for future parenting and an intent to marry (r(276) = .367, p= < .000, general attitudes toward marriage (r(276) = .340, p= < .000), and aspects for marriage (r(276) = .221, p= < .001). This study explored the relationship between attitudes toward marriage and hope for parenting. The results indicate that people who hold positive attitudes toward marriage, also have more hope for their ability to be parents.

The Relationship between Empathy and Perfectionism-Lillie Stephens

Faculty Mentor: Dr. Nicole Lozano, Ms. Lauren Brooks (doctoral student)
Department: Psychology

According to the perfectionism social disconnection model, perfectionism is associated with interpersonal characteristics and behaviors that make it difficult for perfectionists to connect with others (PSDM; Hewitt et al., 2006). However, it is important to note that this model may not apply to all forms of perfectionism. In a study conducted by Stoeber et al. (2017), while individuals who scored high in other-oriented and socially prescribed perfectionism demonstrated behaviors indicative of social disconnection and hostility, those high in self-oriented perfectionism demonstrated a pattern of unique relationships indicating social connection and low aggression. Despite these findings, research on perfectionism and empathy remains limited. This study sought to explore the relationship between empathy and perfectionism. Using ASU's SONA system, 293 participants were recruited for a survey study. Most participants identified as women (n=216), and most of the sample identified as White (n=132). The average age of the sample was 19.78 (SD = 3.3). To test the hypotheses, participants were administered the Basic Empathy Scale (Jolliffe & Farrington, 2006), (a=.84) and the Almost Perfect Scale – Revised (Rice, Richardson, & Tueller, 2014), (a=.56). Results showed a significant, positive relationship between perfectionistic standards and empathy ($r(288) = .359$, p= < .000) as well a significant, positive relationships between evaluation of self and empathy ($r(289) = .433$, p= < .000). Therefore, these results suggest that the more perfectionism one holds, the higher level of empathy they possess.

Examining Weight-Based Rejection Sensitivity and Psychological Distress Among U.S. Adults-Taylor Sherman

Faculty Mentor: Dr. Ashley Araiza
Department: Psychology

Weight-based rejection sensitivity (WRS) refers to an individual's sensitivity to the possibility of being socially rejected because of their weight and it is associated with a variety of maladaptive physical and psychological behaviors and outcomes, including stress and depressive symptoms (McClure Brenchley & Quinn, 2016). The existing research on WRS is minimal, however, and has been conducted solely among college student populations; this is a deficit given that weight issues affect individuals regardless of age. Accordingly, in a preregistered study, we examined associations between WRS and several markers of psychological distress among a broader sample of adults recruited from the United States. We hypothesized that WRS would be positively correlated with stress, depression severity, anxiety, and negative affect. A sample of N = 217 adults (Age: 20 to 75, M_{age} = 41.88, SD = 13.12; Sex: 56% Female; Race: 75% European American/White) were recruited from the United States via Amazon's Mechanical Turk data-collection platform for an online survey study about their social experiences and health. As part of this larger study, participants completed reliable and validated established questionnaires assessing WRS (McClure Brenchley & Quinn, 2016), perceived stress (Cohen et al., 1983), depression severity (Kroenke et al., 2009), anxiety (Spitzer et al., 2006), and negative affect (Watson et al., 1988). Results of correlational analyses showed that WRS was significantly and positively associated with stress (r = .40, p < .001), depression severity (r = .49, p < .001), anxiety (r = .45, p < .001), and negative affect (r = .53, p < .001), supporting the study hypotheses and illustrating large correlations of each psychological-distress variable with WRS. These results provide novel correlational information about the relationship between WRS and markers of psychological (un)health, highlighting negative psychological correlates of experiencing a heightened sensitivity to the possibility of being socially rejected because of one's weight. This is particularly concerning, given that weight-based stigmatization and discrimination are prevalent in society (Puhl, 2018). The present findings have implications for addressing the distressing nature of WRS through teaching individuals the skills necessary to cope with WRS, psychological distress, or both.

Rat Basketball-Halie Brumfield, Anthony Sarmiento, MaKayla Hunter, Lauren Coelho

Rat basketball is a hands-on experiment to help students understand concepts of operant conditioning. The process involves teaching rats how to play basketball through differential reinforcement of successive approximations. Through providing continuous positive reinforcement during each step, the resulting target behavior is for rats to have the ability to pick up a ball, carry it to a hoop, and drop the ball through the hoop. The current rat basketball study investigates how behaviors are influenced by the valence of rewards, specifically sweet versus savory treats. The effectiveness of shaping behaviors depends upon a variety of factors, such as the cognitive capacity of the organism being shaped (Pomerantz, 2009), the reinforcement schedule used (Palya & Powell, 2000), and the valence of the reward (Vroom, 1964). The valence of a reward depends on both affective and sensory factors (Murray, 2007). The effectiveness of shaping behaviors could also depend upon the experimenters themselves (Rosenthal, Rober, Jacobson & Lenore, 1992; Mitchell, Terence, Daniels & Denise, 2003). Experimenter cognitions are often unconscious and uncontrollable (Bohnet, 2016) and are hard to control when double blind methodologies are not feasible.

To our knowledge, research on the effects taste preferences have on behavioral learning is scarce. According to similar research done last year, we examined sweet treats to be more effective than savory treats. This has drawn our interest to evaluate sweet versus savory treats.

Political Affiliation and Perceptions of Gender-Stereotyped Advertisements- Gracie Guy

Faculty Mentor: Dr. Ashley Araiza
Department: Psychology

Advertisements play an integral role in which brands are successful in selling their products, but it can be difficult to determine what kinds of advertisements will have mass appeal. Some advertisements are more popular and trusted than others; one reason may be that advertisements are often gender-stereotyped or perceived to be by consumers, and gender stereotyping can negatively affect advertisement perceptions (e.g., El Hazzouri, 2019). Perceptions of gender-stereotyped advertisements might also be affected by a person's political affiliation or endorsement of traditional gender roles. To study this, this project examined the perceived credibility of a gendered advertisement, specifically through an analysis of advertisements showing social-media "influencers" promoting camping behavior. The aim of this research is to understand the perceived credibility of advertisements featuring either a man or woman influencer and how the political affiliation and gender attitudes of participants relate to advertisement perceptions. A sample of 300 U.S. adults was recruited to view a gendered advertisement and complete self-report measures of influencer and advertisement credibility, political affiliation, gender-role attitudes, and psychological variables. Results from this study can help us understand relationships of political affiliation or gender attitudes with what kind of advertisements people prefer and find credible. Data analysis is underway; results and implications will be discussed.

Examining Perceived Credibility and Motivational Power of Gender-Stereotyped Eating Advertisements-Gracie Guy

Faculty Mentor: Dr. Ashley Araiza
Department: Psychology
Sponsorship: Research Travel Fund

Social media "influencers" play an integral role in how various companies and brands advertise their products and how lifestyles/behaviors become popularized in society. There are numerous women and men who promote health-related content, such as eating, fitness, and other topics, online. Some are more popular and trusted than others, however. One reason for that may be that such advertisements are gendered and often gender-stereotyped, which can influence how people perceive them (e.g., El Hazzouri, 2019). Accordingly, the purpose of the present study was to test whether gender-stereotyped advertisements affect people's perceptions of eating-related advertisements promoted by social-media influencers and eating-related intentions. A sample of $N = 118$ ASU students were randomly assigned to view one of four advertisements illustrating either a man or woman promoting a diet for either muscle gain (a stereotypical health goal for men) or weight loss (a stereotypical health goal for women). After viewing their assigned advertisement, participants completed self-report questionnaires assessing advertisement/influencer credibility, healthy eating intentions, and dieting intentions. None of the predicted outcomes produced significant results. Contrary to expectations, the advertisements were perceived as similarly credible and motivational, regardless of who was promoting them. Exploratory results showed that, among males only, intentions to take the eating advice of an influencer depends on whether the influencer is a woman or a man. Implications will be discussed.

Perceptions of Celebrities Following Weight Loss: Are They Happier? Healthier? More Attractive?-Rocky Ybarra

Faculty Mentor: Dr. Ashley Araiza
Department: Psychology
Sponsorship: Research Travel Fund

Messages encouraging weight loss are pervasive in society. Some of these messages may induce negative effects. For instance, when celebrity weight loss is reported on, the media often include before-and-after images to emphasize the amount of weight lost, but exposure to similar before-and-after weight loss images has been demonstrated to promote weight stigma (Geier, Schwartz, & Brownell., 2003). The present research examined female participants' perceptions of celebrities who have lost weight, including their perceived health, happiness, and attractiveness following their weight loss. After viewing eight before-and-after weight loss images of female celebrities, participants rated their perceptions (e.g., happiness, attractiveness) of each celebrity following their weight loss visible in the images. We hypothesized that considering oneself higher in weight would be negatively associated with perceived health, happiness, and attractiveness of celebrities who have lost weight. We found that considering oneself higher in weight related to viewing celebrity women as less attractive after weight loss, but women's own weight status was unrelated to viewing celebrities as happier or healthier after weight loss. The present results have implications for understanding how perceptions of other's weight loss may provide insight into health motivations, the influence of sources of inspiration (e.g., celebrities), or possible negative consequences for one's own body image.

Perceptions of Other's Weight Loss in Relation to One's Own Physical and Psychological Health-Rocky Ybarra

Messages to lose weight exist in abundance within our culture. Numerous people may feel inspired by these messages and successfully lose weight. These instances of successful weight loss also may influence other people's self-perceptions and behaviors or intentions as they pertain to their own physical and psychological health motivations, goals, or behaviors. The present study seeks to examine the relationships between a person's perceptions of someone who has lost weight and their own physical and psychological health. Participants were undergraduate students recruited from Angelo State University. Participants completed an online survey examining their perceptions of someone who has lost weight, along with psychological and physical health variables, including general health, exercise motivations and reasons for exercise, intentions to engage in healthy eating behaviors, self-esteem, perceived stress, appreciation for their own bodies, dissatisfaction with their own bodies, depression symptoms within the past two weeks, and general satisfaction with life. We hypothesized that a person's perceptions of someone who has lost weight will relate significantly to their own physical and psychological health. Moreover, we hypothesize that these associations are affected by the proximity or nature of the relationshp between the participant and the person they think of who has lost weight (e.g., friend, family member). The results of this study may provide insight into how someone's weight loss may inadvertently affect those around them, which is a phenomenon that occurs relatively frequently yet remains underexplored. Results and implications will be discussed.

Does strength of evidence influence the utility of direct conferencing in Title IX cases?-Miessha Jackson

Faculty Mentor: Dr. Tyler N. Livingston
Department: Psychology

Introduction

Between 1.8%-34% of women and 4.8%-31% of men report unwanted sexual contact during their years at university (Fedina et al., 2018). Recently, some Title IX offices have adopted a *restorative justice* approach to conflict resolution in sexual assault cases that may involve direct conferencing between the alleged victim and offender (James & Hetzel-Riggin, 2021). This study examined students' sentiment toward direct conferencing in sexual assault cases.

Hypotheses

First, we hypothesized that perceptions of evidence strength would be positively related to ratings of the appropriateness of direct conferencing as a means of conflict resolution. Second, we hypothesized that participants' desire to punish the alleged perpetrator would explain this relationship. Specifically, we predicted that stronger perceived evidence would be associated with a greater desire to punish, which would in turn be associated with lower ratings of appropriateness of direct conferencing.

Method

University student participants (N = 157; M_{age} = 19.6 years, SD = 3.8; 85.4% women) read case facts regarding a case of alleged sexual misconduct. Participants responded to measures of perceived evidence strength (α = .90), appropriateness of conferencing (α = .96), and the desire to punish the suspect (α = .74).

Results

We used mediation analysis to test our hypotheses. The direct effect of evidence strength on appropriateness of conferencing was nonsignificant (c-path; b = .07, p > .05). Evidence strength was positively associated with desire to punish the alleged offender (a-path; b = .14, p = .01). Desire to punish the alleged offender was negatively associated with appropriateness of conferencing (b-path; b = -.41, p < .001). The indirect effect of evidence strength on appropriateness of conferencing through the desire to punish the alleged offender was significant (95% CI [-.11, -.002]).

Discussion

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Our first hypothesis did not receive support: Perceived evidence strength was unrelated to ratings of appropriateness of conferencing. Our second hypothesis received support: Greater evidence strength was indirectly associated with ratings of appropriateness of conferencing through desire to punish as a mediating variable. Title IX officers should know that students do not perceive direct conferencing as an appropriate means of conflict resolution when evidence is strong because they do not believe direct conferencing is an adequate punishment for an alleged perpetrator.

Examining the Influence of Like Count and Body Type in Instagram Photos on Women's Body-Sydney Mundkowsky

Faculty Mentor: Dr. Ashley Araiza
Department: Psychology

The overall purpose of this study was to better understand the role of the "Like" feature on Instagram and whether it influences women's body appreciation and appearance concerns. I examined whether Instagram-type images showing a larger versus average body with a higher versus lower number of likes will affect women's body appreciation and appearance concerns. Female students enrolled in Angelo State University who perceive themselves to be overweight and are familiar with Instagram will be randomly assigned to view one of four images: a woman with a larger-sized body with a high like count, a woman with a larger-sized body with a low like count, a woman with an average-sized body with a high like count, and a woman with an average-sized body with a low like count. Then, they will complete self-report measures of self-esteem, internalized weight stigma, body appreciation, and fear of negative appearance evaluation (FNAE). It is hypothesized that undergraduate women who self-identified as overweight presented with a photo consisting of a larger-sized body and high number of likes will report the highest self-esteem and body appreciation scores and lowest FNAE and weight stigma concerns scores, compared to the other three conditions average-sized body with high like count, average-sized body with low like count, and larger-sized body with low like count).Results from this research can help us understand how viewing social-media images of different body types with a different number of likes influences women's body image. Results and implications will be discussed.

Underrepresentation of Girls in Special Education-Avery Edinburgh

Faculty Mentor: Dr. Carlos A. Flores
Department: Teacher Education

This literature review examines peer-reviewed journal articles to discuss the implications of females in special education in special education classroom settings. The articles used span from 1974-2022 to look at past and present disparities in special education placements. The literature review also includes looking at the differences between different countries and the United States of America. Through the literature review, the researcher found the underrepresentation of females in special education programs is due to differences in behavior, camouflaging of the disability, and teacher biases.