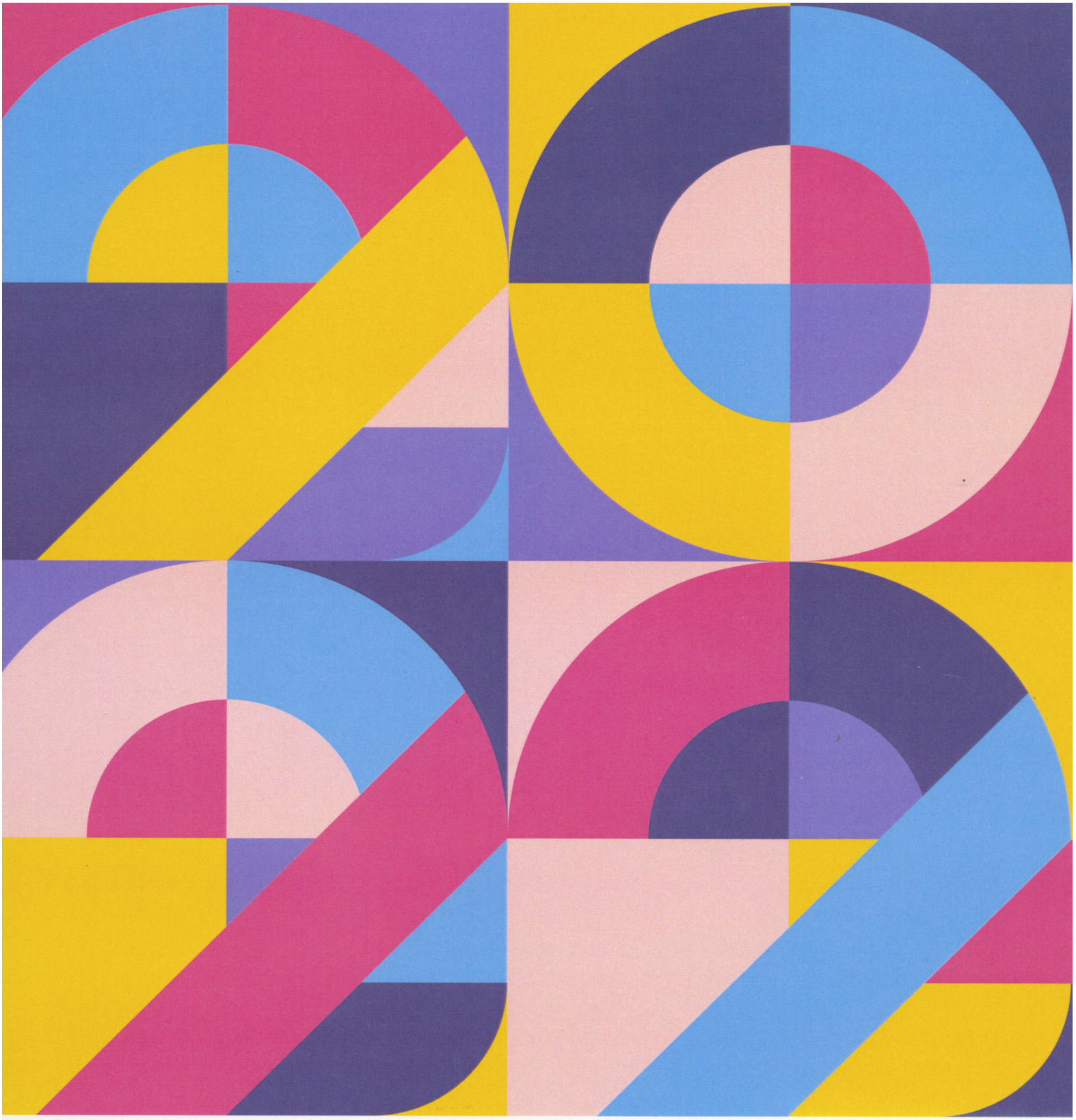
2-15-2022

2022 JSU Student Symposium Proceedings

Shannon Robertson



2022 JSU Student Symposium

February 15-16
Houston Cole Library

Showcasing Student Work

JSU
JACKSONVILLE STATE UNIVERSITY

Contents

1 JACKSONVILLE STATE UNIVERSITY STUDENT RESEARCH SYMPOSIUM

Each year, we showcase some of our students' best work across a wide array of disciplines. This year, our students impressed by advancing science, health, discourse and technology. All this in the midst of a global pandemic. We are proud of their work and hope you will be edified and entertained by it!

Dr. David Thornton, Symposium Chair

2 PROCEEDINGS

2.1 TUESDAY, FEBRUARY 15, 2022

2.1.1 MORNING SESSION (8:15 - 11:55)

8:15 - 8:25 (Demo) Sarah Kate Norris (Ridlen, Mentor), CAH (U)

Kirk's Soap Ad Campaign.

8:30 - 8:40 (Paper) Alexzandria Quintero (Reed, Mentor), CAH (U)

Allegory, Girls, and Intra-racial Conflict.

8:45 - 8:55 (Demo) Sarah Kate Norris (Ridlen, Mentor), CAH (U)

Ceramics & Economics in Early China.

9:00 - 9:10 (Paper) Dakota Heathcock (Gross, Mentor), CSBS (U)

Mapping a New Way: A New Approach to Electoral Polling in America.

9:15 - 9:25 (Paper) Tim Gaskins (Gharehchahi, Green & Sciuchetti, Mentors), CSM (U)

Flood Risk Mapping and Vulnerability Analysis of Anniston-Oxford, Alabama Metropolitan Area.

9:30 - 9:40 (Poster) Samuel Menard (Ridlen, Mentor), CSM (U)

Variant of Unknown Significance V71L in Autoimmune Role of CTLA4.

9:45 - 9:55 (Paper) Ryan Long (Triplett, Mentor), CSM (G)

Molecular Evidence of Cryptic Hybridization in the Japanese Nezasa Bamboos (Pleioblastus section Nezasa).

10:00 - 10:10 (Paper) Arlanda Tyler (Koozehchian & Mabrey, Mentors), CHPW (G)

Benefits of Exercise for the Pregnant Population.

10:15 - 10:25 (Paper) Alexander Webb (Koozehchian & Mabrey, Mentors), CHPW (G)

Varus Torque on the Elbow of Pitchers in Baseball.

10:30 - 10:40 (Paper) Emanuel Fernandez (Koozehchian & Mabrey, Mentors), CHPW (G)

A High-Intensity Training Based Running Plan Improves Athletic Performance by Improving Muscle Power.

10:45 - 10:55 (Paper) Jacob Goss (Clark & Savage, Mentors), CHPW (G)

Short- And Long-Term Effects of Sport Specialization on Youth Baseball Players: A Critically Appraised Topic.

11:00 - 11:10 (Paper) Benjamin Truett (Savage & Clark, Mentors), CHPW (G)

Are Breast Cancer Survivors More Susceptible to Shoulder Pathologies than Healthy Individuals? A Critically Appraised Topic.

11:15 – 11:25 (Paper) Amanda Brunner (Savage & Clark, Mentors), CHPW (G)

How Does Heat Related Illnesses Affect High School and Collegiate Marching Band Members: A Critically Appraised Topic.

11:30 – 11:40 (Paper) Deandrea Stowe (Clark & Savage, Mentors), CHPW (G)

Recommendations And Considerations For Return To Play Protocols For Athletes At Various Levels Who Test Positive For COVID-19: A Critically Appraised Topic.

11:45 – 11:55 (Paper) Kaitlyn Neece (Savage & Clark, Mentors), CHPW (G)

Does a Protein Rich Diet or a Carbohydrate Rich Diet Yield Greater Sports Performance in Athletes?

2.1.2 Break (11:55 – 1:00)

2.1.3 Afternoon Session (1:00 – 4:10)

1:00 – 1:10 (Poster) Bridgette Gray (Turner, Mentor), CSM (G)

Characterization of Anti-microbial Properties of Excrement and Functional Microbiome of New World Vultures in Alabama.

1:15 – 1:25 (Poster) Jordan Peters (Turner, Mentor), CSM (U)

An Exploration of TREX1 Variants of Uncertain Significance and their Potential Impact on Autoimmunity in Systemic Lupus Erythematosus and Aicardi-Goutieres Syndrome.

1:30 – 1:40 (Poster) Trinity Elston (Turner, Mentor), CSM (U)

Into the Unknown: Diving into the Unknown: A Genetic Investigation of Type-2 Diabetes-Associated INSR Variants of Uncertain Significance.

1:45 – 1:55 (Poster) Rachel Bonner, Jaura K. Dease, & Elizabeth A. Hughston (Bagley, Mentor), CSM (U)

Using Ecological Niche Modeling to Predict the Response of Hydrocotyle Bonariensis to Global Climate Change.

2:00 – 2:10 (Poster) Noha Al-Saadi, Grace Mix, Mardasia Thompson, & Elin Zaman (Sauterer, Mentor), CSM (U)

Effects of Specific Blocking Buffers on Histone H2B Antibodies.

2:15 – 2:25 (Paper) Kabita Kunwar (Rayburn, Mentor), CSM (U)

Preliminary Evaluation of the Developmental Effects of Microbeads Using the Frog Embryo Teratogenesis Assay: Xenopus (FETAX).

2:30 – 2:40 (Paper) Kritika Maharjan & Barrett Hester (Rayburn, Mentor), CSM (U)

The Utilization of the Xenopus Embryos for the Determination of the Teratogenic Potential of Methylene Blue.

2:45 – 2:55 (Paper) Lauren White & Deanna Smelley (Ridlen, Watkins, & Prokop, Mentors), CSM (U)

Impact of L282R on PSEN1 Phenotype.

3:00 – 3:10 (Paper) Drake Smith (Tolley-Jordan, Mentor), CSM (U)

The Use of Pheromonal Trail Laying in the Foraging Behaviors of L. niger.

3:15 – 3:25 (Paper) Sushant Chhetry (Ghosh, Mentor), CSM (U)

Effects of Time Spent Playing Video Games on Teens' Psychological and Social Development.

3:30 – 3:40 (Paper) Celia Calhoun (Ghosh, Mentor), CSM (U)

The Past, Present, and Future of Python: An Ever-Expanding Language.

3:45 – 3:55 (Paper) Angel Orozco (Dempsey, Mentor), CSBS (U)

COVID-Related Regrets Among College Students.

4:00 – 4:10 (Poster) Elizabeth Rains, Ashton Boyd, & Lauren Moore (Wickersham, Mentor), CSBS (G)

Mental Health Collaborative.

2.2 WEDNESDAY, FEBRUARY 16, 2022

2.2.1 MORNING SESSION (9:00 – 10:25)

9:00 – 9:10 (Paper) Benjamin Marazzi (Saeki, Mentor), CSBS (U)

The Reasoning Behind the Political Divides in America.

9:15 – 9:25 (Poster) Elin Zaman (Ridlen, Mentor), CSM (U)

An Exploration into the Effect of T147A Clinical VUS in CTLA4.

9:30 – 9:40 (Paper) Zaria Coprich (Ghosh, Mentor), CSM (G)

Client-Server and Peer-to-Peer Architectures in Multiplayer Games.

9:45 – 9:55 (Paper) Rebecca Weaver (Reed, Mentor), CAH (G)

Using Satire to Highlight Gender and Sexuality in Aphra Behn's Poetry.

10:00 – 10:10 (Paper) John Mayfield (Koozehchian & Mabrey, Mentors), CHPW(G)

The Effects of Sleep Deprivation on Muscle Recovery.

10:15 – 10:25 (Paper) Luke Cody (Clark & Savage, Mentors), CHPW (G)

Virtual Reality as an Effective Therapeutic Intervention for Sport Injury.

2.2.2 Break (10:25 - 1:00)

2.2.3 Afternoon Session (1:00 - 4:10)

1:00 - 1:10 (Paper) Harvey Higgins (Ross, Mentor), CSBS (U)

Sociologically, How Can We Explain the Trump Administration and Its Effect on Society.

1:15 - 1:25 (Paper) Jon Eric Frederick (Trifas, Mentor), CSM (U)

Machine Learning.

1:30 - 1:40 (Demo) Mausam Parajuli (Ghosh, Mentor), CSM (U)

Using Z3 Constraint Solver to Solve Systems of Equations and Puzzles.

1:45 - 1:55 (Paper) Sara Morris (Turner, Mentor), CSM (U)

Genetic Assessment of Congenital Stationary Night Blindness-Associated TRPM1 Variants of Uncertain Significance in C. Elegans.

2:00 - 2:10 (Poster) Lia Meadows, Peeper Walker, & Reveca Tomas (Hamissou, Mentor), CSM (U)

Antioxidant Content in Plant-based Diets Versus Meat-Based Diets.

2:15 - 2:25 (Poster) JoAnna LaPoint (Ridlen, Mentor), CSM (U)

Examining the Pathogenicity of CTLA4 VUS R75Q.

2:30 - 2:40 (Poster) Noha Al-Saadi (Sauterer, Mentor), CSM (U)

Cellular Effects of CBD.

2:45 - 2:55 (Paper) Kayla Way & Kabita Kunwar (Rayburn, Mentor), CSM (U)

The Utility in Using Xenopus Frog Embryos to Determine Teratogenic Versus Nonteratogenic Potential of Chemicals.

3:00 - 3:10 (Paper) Megan O'Barr, Makenna Smith, & Asel Richards (Rayburn, Mentor), CSM (U)

The Preliminary Developmental Toxicity of Methylene Blue and Orange G to Grass Shrimp Embryos.

3:15- 3:25 (Paper) Morgan Brown (Triplett, Mentor), CSM (G)

Cryptic Hybridization in the Temperate Bamboos: Is Pleioblastus simonii *a Species of Hybrid Origin?*

3:30 - 3:40 (Paper) Christopher Griffie (Koozehchian & Mabrey, Mentors), CHPW (G)

Positive Effects of Creatine as an Ergogenic Aid.

3:45 - 3:55 (Paper) Kemuel Williams (Koozehchian & Mabrey, Mentors), CHPW (G)

The Effects of Cryotherapy on Muscle Recovery.

4:00 - 4:10 (Poster) Sherron Deweese (Peinhardt, Mentor), CHPW (G)

Advancing Global Health: An Introduction to International Service Learning for Nurses.

2.2.4 BREAK (4:10 - 5:00)

2.2.5 AWARDS CEREMONY (5:00)

3 SYMPOSIUM AWARD RECIPIENTS

A panel faculty and staff judges evaluated the symposium presentations with respect to several criteria. To recognize outstanding achievement, awards were presented for the best presentation in each academic discipline with three or more participants.

Best of Showcase: Mausam Parajuli

Best Graduate Paper: Morgan Brown

Best Undergraduate Paper: Kayla Way

Best Graduate Poster: Elizabeth Rains

Best Undergraduate Poster: Trinity Elston

Best of the College of Science & Mathematics (Undergraduate): Kritika Maharjan

Best of the College of Science & Mathematics (Graduate): Ryan Long

Best of the College of Arts & Humanities (Undergraduate): Sarah Kate Norris

Best of the College of Social & Behavioral Sciences (Undergraduate): Dakota Heathcock

Best of the College of Health Professions & Wellness (Graduate): Luke Cody

Houston Cole Library Award for Research Excellence: Deandrea Stowe

4 COVER DESIGN AWARD RECIPIENT

Students in the Department of Art participate in the cover design competition. An award is given to the student whose design is chosen by the Symposium Committee to be displayed on the program and proceedings.

Conner Gayda, Program Cover Design Award Recipient, mentored by Chad Anderson & Christian Dunn.

5 ABSTRACTS

5.1 COLLEGE OF ARTS & HUMANITIES

5.1.1 KIRK'S SOAP AD CAMPAIGN

Sarah Kate Norris
Dr. Tray Ridlen (Mentor)

For this project, the objective is to create advertising for an existing product. Kirk's soap has a platform based on providing buyers with soap made from "clean" ingredients as well as a wholistic cleaning result for an array of objects. Cleanliness is an idea not limited to gender or specific age so I felt I could solve an advertising issue by alluding to entities not bound by gender, but rather are identified by their immaculacies. Using imagery of gods, goddesses, and the Christian God, creates a parallel of the naturalistic platform of the product as well as the result. This approach hits a wide targeted audience, which would include both men and women as cleanliness is an idea not specific to any one group over the other. The age group is intended for young adults and adults, as the references to major art works such as The Birth of Venus, which would more commonly be perceived by these age groups.

5.1.2 CERAMICS & ECONOMICS IN EARLY CHINA

Sarah Kate Norris
Dr. Tray Ridlen (Mentor)

Ceramics through the ages have served as a window into the worlds of culture, technology, and history. In early China, the making of ceramics was greatly celebrated, calling for kiln towns to produce considerable amounts of ceramic goods. A closer look at textual studies, trade, and the social and religious cultures of China, reveal a complicated duality in the art of ceramics and the business surrounding it. By surveying these topics, it can be said that the role of ceramics served not only as an art, but as a lens into the socioeconomic state of early China. Evidence seen in textual commentary as well as demand for the objects, proves ceramics were ultimately revered as an art in early China. However, treatment of ceramics and ceramicists alike, suggests the reaction towards both was strategic. Denying the art and the artists allows higher-class citizens to secure ceramic making as labor rather than craft, a business rather than connoisseurship, and denying creators the ability to elevate in social class through the title of 'artist'. Implementing kiln towns trains low-class citizens in ceramic making while successfully supplying a continuous demand, ultimately creating a

'perfectly working machine'. A number of religious ideas support the strict social structure enforced by elites, in which a clear working class and a clear administrative class exist in a symbiosis responsible for the success of China's economy.

5.1.3 Allegory, Girls, and Intra-racial Conflict

Alexzandria Quintero
Dr. Teresa Reed (Mentor)

Allegory, Girls, and Intra-racial Conflict" explores how the use of allegory in Karen Russell's "St. Lucy's Home for Girls Raised by Werewolves" allows readers to understand the effects of respectability politics on unity in minority communities. In the story of St. Lucy's, the daughters of werewolves are sent to the titular school where they are taught how to behave like humans and forget their werewolf customs. The girls distancing themselves from their sister - who is failing to assimilate into human culture - are akin to members of minority communities who will dissociate with said community to appeal to the majority population. Understanding Russell's story this way provides further insight into the Black Lives Matter movement and the mixed reception it received from Black citizens during the May 2020 protests. Therefore, the content of this paper is significant because Russell's allegory allows for understanding that can lead to effective discussions and solutions in regard to the issues affecting minority communities.

5.1.4 Using Satire to Highlight Gender and Sexuality in Aphra Behn's Poetry

Rebecca Weaver
Dr. Teresa Reed (Mentor)

Behn is considered a satirist during the Restoration and the eighteenth century, a field traditionally dominated by men. However, Aphra Behn, through her controversial poetry, commented in depth on the role of women and how, especially when it comes to sex and sexuality, they are treated differently than men. This treatment can be seen through the topics of role reversal and consequences, the loving of multiple people, and the loving without regards to gender which are found within Behn's poetry. Her satirical approach discusses different relationships concerning masculine power and authority, challenging the gendered language of her contemporaries as well as the very role of women within satire which is normally excluded. By participating in satire and applying it to her political

content, Behn was able to call behaviors and morals into question. In the three poems discussed, Behn presents ideas such as female desire, polyamory, and gender-nonconforming people. By showcasing the reversal of gender roles in "The Disappointment," examining the biased judgement of being a woman with multiple lovers in "On Her Loving Two Equally," and the refusal to conform to feminine and/or masculine traits as seen in "To the Fair Clarinda," Behn adequately portrays her thoughts regarding women's role within society, specifically when it comes to the all-too-human traits of love and desire.

My presentation will begin with a brief overview of Aphra Behn and her writing, focusing on three of her poems: "The Disappointment," "On Her Loving Two Equally," "To the Fair Clarinda." In discussing these different and seemingly backwards relationships concerning masculine power and authority, Behn challenges the gendered prose of her fellow scholars and the very role of women in both the literary world (satire, in particular) and her contemporary society. In discussing these issues, I hope to aid in the understanding of these subjects and their breadth through time, as well as their relevance to today's dialogue surrounding gender and sexuality within literature.

5.2 College of Health Professions & Wellness

5.2.1 How Does Heat Related Illnesses Affect High School and Collegiate Marching Band Members: A Critically Appraised Topic

Amanda Brunner
Dr. Jennifer Savage & Dr. Chris Clark (Mentors)

Context: Marching band members are exposed to various types of weather and injury conditions that are not always favorable to their performance setting. One concern of weather and injury conditions include heat illnesses, which are one of the leading causes of death in pediatric populations. This leads us to investigate if marching band members are more at risk for heat illnesses in the high school and collegiate populations.

Methods: A computerized search was completed in September 2021. The search terms used were heat illness, marching band, and heat index. Electronic databases used were Jacksonville State University's library database, SportDiscus, and EBSCO Host. Inclusion criteria: Articles were between 2010-2021, published in the English language, marching band population, and heat illnesses. Exclusion criteria: Articles that were not published in English and focused on the athletic or general population. Validity of the selected studies was determined using the Oxford Centre for Evidence Based Medicine Scale. One author independently reviewed the studies, scored each paper, and reviewed the completed appraisals to come to a consensus on study quality.

Results: The literature search retrieved 19 studies. Out of these studies, three met inclusion criteria and the level of evidence suggested by the Strength of Recommendation of Taxonomy was used to identify eligible studies. Both collegiate and high school marching band members experience various types of weather conditions due to the uncertainty of the weather. Emerson et al. found that during competitions and rehearsals, core body temperatures were within 1.1 °C and a majority of participants revealed dehydrated. Vepraskas's study resulted in higher rates of water consumption, as well as an increase in education of heat-related illness symptoms in marching band members. Kilanowskis' study found that of the 378 nurse clinics, high school band members complained of musculoskeletal injuries that were significantly correlated with heat distress.

Conclusion: As an athletic trainer, it has been shown that heat illnesses can arise in high school and collegiate marching band members. It is vital to use proper monitoring of weather conditions and hydration, along with the use of emergency action plans that are set in place for marching band members and athletes to prevent heat illnesses. In addition, proper training and education should be addressed to prepare marching band directors of various signs and symptoms of heat related illnesses. While there is limited research regarding this topic, additional research should be completed to determine future methods to improve patient-centered care and patient outcomes for marching band members exposed to heat illnesses.

5.2.2 Virtual Reality as an Effective Therapeutic Intervention for Sport Injury

Luke Cody
Dr. Chris Clark & Dr. Jennifer Savage (Mentors)

Context: There are numerous therapeutic intervention tools that can provide effective management strategies for sports-related injuries. However, some therapeutic tools do not offer motivational qualities. Virtual reality is an emerging therapeutic intervention tool that is increasing in popularity in numerous areas. Thus, this leads us to investigate if virtual reality can be used effectively as a therapeutic intervention in the clinical setting for sport-related injuries.

Methods: A computerized search was completed in September 2021. The search terms used were "virtual reality", "motivation", and "physical rehabilitation". Electronic databases used were SPORTDiscus and PubMed. Inclusion criteria: Studies published within the last 3 years, published in the English language, and used patients with physical impairments resulting from athletic activity or athletes in rehabilitation for an injury. Exclusion criteria: Studies that focused only on mental impairments and used participants within an education setting. Validity of the selected studies was determined using the Physiotherapy Evidence Database and the Strengthening the Reporting of Observational Studies. One author independently reviewed the studies, scored each paper, and reviewed the completed appraisals to come to a consensus on study quality.

Results: The literature search retrieved 106 studies. Out of these studies, five studies met inclusion criteria. Akbas et al. performed a meta-analysis on competitive athletes using virtual reality and found virtual reality to be an effective tool to analyze sport performance. Ranjbarzadeh Yamchi et al. and Nambi et al. demonstrated how virtual reality can decrease pain perception, decrease fear of movement, and increase balance with physical impairments in low back pain and functional ankle instability. Zhang et al. and Dias et al. examined stroke patients and found virtual reality to be an effective tool in increasing symmetrical posture, balance, walking, self-care, and increased motivation in rehabilitation.

Conclusion: Findings suggest that virtual reality can be an effective therapeutic tool when incorporated in the physical rehabilitation of athletes or athletic patients. Virtual reality is an emerging therapeutic intervention tool that can provide components to improve patient effectiveness, motivation, and engagement during the injury recovery process. As technology is advanced, future studies should develop more specific programs tailored to injuries and conditions, to improve patient-centered care and outcomes.

5.2.3 Advancing Global Health: An Introduction to International Service Learning for Nurses

Sherron Deweese
Dr. Rebecca Peinhardt (Mentor)

Raising awareness of global health issues as well as providing culturally appropriate healthcare through service-learning programs are important components of nursing education. Online education provides increased flexibility, access, and cost-effectiveness in nursing education because attending classes on campus is often difficult for nurses due to their work schedules and family and other responsibilities. Faculty utilize teaching strategies such as online courses to engage students and increase interest levels in service-learning projects. If faculty use these strategies well, graduate nursing students are more likely to participate in global health initiates. The aim of this project was to investigate the interest levels of graduate nursing students in university-community engagement and participation in international service-learning. In order to accurately assess graduate nursing students' interest in international service-learning, an online introductory course related to international service-learning was developed and offered for free enrolment in the course. There are many benefits from graduate nursing student's participation in international service-learning programs as a part of their educational experience, such as serving global community needs, helping those in need, and gaining cultural awareness. This DNP project will effectively allow for the evaluation of the impact of participation in an introduction to international service-learning course on students' interest in global health initiatives. Upon completion of the June 2019 term, a post-course interest survey will be administered to examine the beliefs and interest of graduate nursing students in global health and global health initiatives.

5.2.4 A High-Intensity Training Based Running Plan Improves Athletic Performance by Improving Muscle Power

Emanuel Fernandez
Dr. Majid Koozehchian & Dr. Gina Mabrey (Mentors)

High-intensity Interval Training (HIIT) refers to alternating max effort and low effort exercises or rest periods. This training method aims to do much work quickly while still acquiring similar adaptations as endurance and resistance training alone. For many years, this training method has been incorporated mainly in association with cycling and running; however, despite the broad range of effects reported mainly in the improvement of muscle power in endurance athletes, little data is available to support the physiological and neuromuscular responses to HIIT in endurance athletes. Some HIIT-related investigations have shown improvements in neuromuscular characteristics that were transmitted into an increase in muscle power and volume of oxygen output. This research had an approach that included both pretest and posttest results with thirteen triathletes divided into two groups: the experimental group and the control group.

Furthermore, this study analyzed the implementation of a low-volume HIIT-based running plan on the experimental group combined with their already high training volumes in swimming and cycling. On the contrary, the control group was asked to maintain their regular training routines. Nevertheless, HR was monitored, whereas RPE and BLa were registered after the race. No improvements were shown in the CG, but the EG significantly improved the sprint distance during the triathlon race. The hypothesis from this research has been tested proven to increase performance in cycling, swimming, jumping, and particularly running. However, future research involving HIIT implementation on endurance training may better understand muscular power from neuromuscular and physiological adaptations.

5.2.5 Short- And Long-Term Effects of Sport Specialization on Youth Baseball Players: A Critically Appraised Topic

Jacob Goss
Dr. Chris Clark & Dr. Jennifer Savage (Mentors)

Context. Sport specialization in baseball has been an emerging topic among youth athletes. Specialization is a growing concern because its possible effects on the health and safety of youth athletes. This leads us to investigate what the short- and long-term effects that sports specialization has on youth baseball players.

Methods. A computerized search was completed in September 2021. The search terms used were youth baseball players, sport specialization, youth baseball, high school, club sport, and short- or long-term injury. Electronic databases used was SPORTDiscus, PubMed, and

CINAHL Plus with full text. These databases were all accessible through the Jacksonville State University Library. Inclusion criteria: patients from the ages 8-19 years old, specialization in baseball year-round, upper extremity injury, surgery or rehabilitation, and prevention strategies. Exclusion criteria: patients under the age of 7 and over the age of 19 and lower body injury. Validity of the selected studies was determined using the Physiotherapy Evidence Database or the Strengthening the Reporting of Observational Studies in Epidemiology scale. One author independently reviewed the studies, scored each paper, and reviewed the completed appraisals to come to a consensus on study quality.

Results. The literature search retrieved sixteen studies. Out of these studies, six met inclusion criteria and the level of evidence suggested by the Strength of Recommendation of Taxonomy was used to identify eligible studies. Post et al. and Croci et al. compared the short- and long-term effects that sport specialization has on youth baseball players. These studies suggested sport specialization had worse scores on throwing, arm function, history of shoulder and elbow injury, and long-term complications. DiSanti et al. and Hernandez et al. compared the perception that both coaches and parents of youth athletes found that the highest incidence was in baseball, followed by basketball, soccer, and volleyball in high school and club sports. Sakata et al. and Reintgen et al. looked at if prevention programs worked in limiting sport specialization injuries and found the incidence of shoulder and elbow injuries were significantly lower if they were educated on safe pitching guidelines, however, a majority of youth athletes were unaware of safe pitching guidelines.

Conclusion. As an athletic trainer (AT), it is paramount to ensure that the patient's overall health and well-being are emphasized during sport participation. Youth sport specialization could increase injury risk. Thus, it is critical for athletic trainers to implement communication, education, and prevention programs to assist youth athletes in addressing sport specialization concerns. Future research should investigate the relationship between the parent, coach, and child's decision on sport specialization. In addition, longitudinal studies should be incorporated to examine sport specialization in baseball and other various sports, for its long-term effects concerning health and safety in youth athletes.

5.2.6 Positive Effects Of Creatine As An Ergogenic Aid

Christopher Griffie
Dr. Majid Koozehchian & Dr. Gina Mabrey (Mentors)

In the presentation of "Positive effects of creatine as an ergogenic aid," I am attempting to shed light on the versatility and benefits of creatine use. Creatine is an amino acid located primarily in your body's muscles, as well as in the brain. Though it can be made synthetically, most people get creatine through seafood and red meat. The body's liver, pancreas, and kidneys also make creatine. Your body converts creatine to phosphocreatine and stores it in your muscles, where it is used for energy. As a result, people commonly take creatine orally to improve athletic performance and increase muscle mass. For years,

creatine has been considered a supplement that mostly male bodybuilders use to enhance muscle hypertrophy. This frame of thinking has caused much controversy as to who and what creatine is for. In this presentation, I break down what creatine is, how creatine works, and provide examples from studies that involve a vast population that has benefited from creatine supplementation.

For the college-aged male population group, the purpose of this investigation was to examine the effects of 6 weeks of oral creatine supplementation during a per-iodized program of strength training on preacher curl, bench press, and squat 1 rep max and body composition. Eighteen college athletes' volunteers with at least 1 year of weight training experience were randomly assigned to two creatine and placebo groups. Creatine group received 20 grams of creatine for the first 6 days in 5-g doses, four times daily, followed by 5 grams for the remainder of the study. The placebo group received a placebo (starched, sucrose drink) following the exact protocol as the Creatine group. All subjects' resistance-trained 3 days a week. Measurement of 1RM strength of preacher curl, bench press, and squat and body composition were made pre- and post-training after supplementation while monitoring dietary intakes. Results showed that body mass and lean tissue mass increased to a greater extent with training in the creatine group compared to the placebo group. There were no significant changes in percent body fat for either group. Creatine group demonstrated more significant improvement in 1RM of squat, bench press, and arm flexors than the placebo group. These data suggest that creatine supplementation during strength training may be superior to training alone for enhancing muscular strength and body composition.

The investigation aimed to analyze the isolated and combined effect of resistance training and creatine supplementation on body composition for the older women population. Forty-five healthy women (63 ± 68) were randomly assigned into four groups after 12-weeks of resistance training or static active stretching exercises. Two groups performed 12 weeks of resistance training (one routine, three times/week, eight exercises, two sets of 10-15 RM) associated with creatine or placebo supplementation. The other two groups performed 12 weeks of static active stretching exercises (one routine, two times/week, eighteen exercises, one set of 20 s) associated with creatine or placebo. Creatine or placebo (maltodextrin) was consumed in a daily dose of 5 g associated with 250 ml of carbohydrate drink. Body composition was assessed by dual-energy x-ray absorptiometry, total body water (TBW) was estimated by bioelectric impedance, and muscle mass was calculated by the equation of Kim et al. (2004). A three-day food record pre- and post-supplementation period identified energy intake and macronutrient proportion.

For the Parkinson's population group, the purpose of this investigation was to evaluate the therapeutic effects of resistance training with and without creatine supplementation in patients with mild to moderate PD. Twenty patients with idiopathic Parkinson's disease were randomized to receive creatine monohydrate supplementation plus resistance training or placebo (lactose monohydrate) plus resistance training, using a double-blind procedure. Creatine and placebo supplementation consisted of 20 g/d for the first 5 days and 5 g/d after that. Both groups participated in progressive resistance training (24 sessions, 2 times per week, 1 set of 8-12 repetitions, 9 exercises). Participants performed a 1-repetition maximum (1-RM) chest press, leg extension, and biceps curl. Muscular

endurance was evaluated for chest press and leg extension as the number of repetitions to failure using 60% of baseline 1-RM. Functional performance was evaluated as the time to perform 3 consecutive chair raises.

5.2.7 The Effects of Sleep Deprivation on Muscle Recovery

John Mayfield
Dr. Majid Koozehchian & Dr. Gina Mabrey (Mentors)

High training volume increases the risk of injury, especially for sports such as triathlons where athletes are running for long periods of time. An increase in the popularity of triathlons has increased chronic injuries from running because of the long distances' athletes are running leading up to the race. The need to run to train for the race is necessary, but this study aims to prove that increasing the intensity of the runs while decreasing the overall volume would help decrease injuries while increasing athletic performance. After the 5-week study with 13 participants, it was determined that a HIIT training not only decreased risk of injury but helped improve all three parts of the race, including the swimming and biking portions of the triathlon. This study should help convince triathletes to adjust their training program and incorporate HIIT for at least their running portion of training.

5.2.8 Does a Protein Rich Diet or a Carbohydrate Rich Diet Yield Greater Sports Performance in Athletes?

Kaitlyn Neece
Dr. Jennifer Savage & Dr. Chris Clark (Mentors)

Context: Numerous studies have provided guidelines for the appropriate type, amount, and timing of intake of food, fluids, and supplements to promote optimal health and performance across different scenarios of training and competitive sport. The diet of an athlete could affect and influence their sport performance depending on if it is a carbohydrate rich diet or a protein rich diet. This leads us to investigate whether a carbohydrate rich diet or a protein rich diet leads to a greater sport performance in athletes.

Methods: A computerized search was completed in September 2021. The search terms used were "carbohydrate rich diet", "protein rich diet", and "optimal nutrition for athletes". Electronic databases used were Jacksonville State University Library, Medline, and SPORTDiscus. Inclusion criteria: protein based diets or carbohydrate based diets, participants in the protein studies had to be on an animal based protein diet and have an

active lifestyle, written in English, and the studies must use human participants. Exclusion criteria: People with a sedentary lifestyle and participants with Celiac Disease. Validity of the selected studies was determined using the Oxford Center of Evidence Based Medicine. One author independently reviewed the studies, scored each paper, and reviewed the completed appraisals to come to a consensus on study quality.

Results: The literature search retrieved 18 studies. Out of these studies, six met inclusion criteria and the level of evidence suggested by the Strength of Recommendation of Taxonomy and Preferred Reporting Items for Systematic Reviews and Meta-Analyses were used to identify eligible studies. Antonio, Jager et al., Phillips, and Reguant-Closa et al. suggested that protein rich diets can better enhance body composition, gain weight, and optimize sport performance. In addition, the Nutrition and Athletic Performance state strategies to optimize performance and recovery in training and sport performance in special populations. Podlogar and Debevec results found that a high carbohydrate diet produced a lower heart rate, high-rate perceived exertion level, and resulted in the athlete terminating exercise early during a moderate intensity exercise period.

Conclusion: Findings suggest that macronutrients are vital, and carbohydrates and proteins contribute an important role in an athletes' diet. It is possible to compile a basic diet plan for both endurance and strength athletes. This nutritional plan should consider the athletes personal goals related to their fitness, sport demands, position demands, and current biochemical balance. If an athlete is not fully prepared for competition and is not fueled properly by their diet, the risk of injury could increase. Healthcare providers and dieticians should collaboratively assist athletes to improve patient-centered care and outcomes.

5.2.9 Recommendations And Considerations For Return To Play Protocols For Athletes At Various Levels Who Test Positive For COVID-19: A Critically Appraised Topic

Deandrea Stowe
Dr. Chris Clark & Dr. Jennifer Savage (Mentors)

Context: The Centers for Disease Control and Prevention recommended a minimum 14-day quarantine during the years 2019-2020, after testing positive for COVID-19. Current guidelines advise ill individuals to stay at home for at least five full days. Because the virus is ever changing and evolving, COVID-19 guidelines and protocols to safely return athletes back into sport after testing positive for COVID-19 are currently limited. This leads to the necessity of investigating how testing positive for COVID-19 affect return to play protocols, recommendations, and considerations for athletes of various levels.

Methods: A computerized literature search was conducted during September 2021. The search terms used were COVID-19, athletes, return to play. Electronic databases used were the JSU Library and Google Scholar with full text. Inclusion criteria: Published in the English language within the last 5 years, athletic population, positive COVID-19 test, and return to

play protocols, recommendations, and considerations. Exclusion criteria: General population or other respiratory illnesses. Validity of the selected studies were determined using the Oxford Centre for Evidence Based Medicine Scale. One author independently reviewed the studies, scored each paper, and reviewed the completed appraisals to come to a consensus on study quality.

Results: The literature search retrieved a total of 87 studies. Three studies met the inclusion criteria and the level of evidence suggested by the Strength of Recommendation of Taxonomy was used to identify eligible studies. Ross et al. and Calpino and Morrissette recognized cardiovascular and respiratory damage occurs from COVID-19. It is recommended that the athlete undergoes a cardiac screening before beginning return to play, because of the unknown affects to the cardiopulmonary system of the body. Ross et al. and Biswas et al. recommend a progression through the return to play protocol that should be based on the athlete's individual progress rather than a timeline. Calpino & Morrissette and Biswas et al. stated that the collaboration of multiple healthcare professionals are required due to the involvement of numerous body systems in this illness.

Conclusion: Based on the recommendations and considerations, the recovery and return to play process will vary and should be individualized to the athlete. Because of the nature of this illness and its ability to evolve and adapt to its surroundings, healthcare providers should also be prepared to adapt to the changes in protocols for athletes who suffered from COVID-19. Working together with other healthcare professionals will allow for improved patient- centered care and outcomes. Well-established return to play guidelines are very limited for a vast majority of injuries and illnesses. Future research is needed to properly provide graduated return to play protocols for athletes at various levels who test positive for COVID-19.

5.2.10 ARE BREAST CANCER SURVIVORS MORE SUSCEPTIBLE TO SHOULDER PATHOLOGIES THAN HEALTHY INDIVIDUALS? A CRITICALLY APPRAISED TOPIC

Benjamin Truett
Dr. Jennifer Savage & Dr. Chris Clark (Mentors)

Background
Breast cancer is the most common cancer in the world and is the primary cancer mortality in females around the world. Shoulder and arm morbidity have become significant complications in breast cancer survivors in recent years. Detailed knowledge surrounding upper-limb functional ability is limited in research thus forming the clinical question, are breast cancer survivors more susceptible to shoulder pathologies than healthy individuals?

Methods
A computerized search was completed September 2021. The search terms used were breast cancer survivors, shoulder injuries, shoulder pathologies, shoulder interventions, and upper-limb kinematics. Electronic database used was Google Scholar. Inclusion

criteria: Articles that used a control group to compare to breast cancer survivors, research conducted in 2010 or later, and unilateral breast cancer diagnosis. Exclusion criteria: Articles with no control groups, research before 2010, and survivors with bilateral breast cancer. Validity of the selected studies was determined using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses, Strengthening the Reporting of Observational Studies in Epidemiology, and/or Physiotherapy Evidence Database scale. One author independently reviewed the studies, scored each paper and reviewed the completed appraisals to come to a consensus on study quality.

Results
The literature search retrieved 22 studies and 15 studies were excluded based on exclusion criteria, resulting in seven studies. These seven studies met the inclusion criteria and the level of evidence as suggested by the Strength of Recommendation of Taxonomy used to identify eligible studies. Mafu et al., Giacalone et al., Da Groef et al., and Castro-Martin et al., focused on the role of angiogenesis, therapeutic interventions, and postoperative physical therapy and found radiotherapy and chemotherapy produce a physiological response that starts the angiogenesis process, which results in increased shoulder function in therapeutic interventions. Brookham et al. conducted two different studies, along with Ribeiro et al. focusing on upper-limb kinematics, scapular kinematics, and humeral rotation of the breast cancer population and found muscular compensation, decreased upward rotation of the scapula, shoulder instability, and increased effort contribute to quicker fatigue and decreased functional capacity.

Conclusion
There is strong evidence demonstrating biomechanical factors can play a role in the development of shoulder pathologies in breast cancer survivors. Overall, breast cancer survivors that receive chemotherapy and radiotherapy, can have positive outcomes in shoulder function with the use of therapeutic interventions, and postoperative physical therapy. In addition, breast cancer survivors who have decreased upper-limb kinematics, scapular kinematics, and humeral rotation could show decreased functional capacity of the shoulder. Future research should focus on chemical adaptations in the breast cancer population, as well as long-term therapeutic interventions. As an athletic trainer, it is vital to understand that you will assess and manage a wide variety of patients and injuries/illnesses, which could include breast cancer survivors.

5.2.11 BENEFITS OF EXERCISE FOR THE PREGNANT POPULATION

Arlanda Tyler
Dr. Majid Koozehchian & Dr. Gina Mabrey (Mentors)

Introduction: The purpose of the research is to highlight the benefits of exercise during pregnancy for women. Research also lists the factors and precautions the pregnant population should consider while exercising. Ideally, pregnant women should exercise moderately 3-4 times a week to see benefits for themselves and the baby.

Methods: In the study, there were 11 trials ran over three trimesters and 638 pregnant women with a similar BMI. All physical activity was planned, structured, and repetitive body movements were performed to improve physical fitness. Exercise programs varied between trials, as well as the duration and supervision. Moderate-high intensity exercise in normal pregnancies is safe for the developing fetus; however, the proposed benefits of exercise like preventing gestational diabetes, pre-eclampsia, or perinatal depression were not consistently shown in the research.

Results: Research showed that some benefits of exercise during pregnancy include reduced risk of preterm delivery, acute c-section, macrosomia, and prolonged labor and instrumental delivery. It also showed improved mental well-being and body image, maternal weight gain control, and eased pregnancy symptoms. The best exercises include brisk walking, swimming, prenatal yoga, and stationary cycling during pregnancy.
Discussion: Walking was the most common type of exercise over the course of the 1st, 2nd, and 3rd trimester, with water exercises next. The percentages for walking include 82.9% in the 1st trimester, 75.9% in the 2nd, and 75% in the 3rd. Various stretches, some weightlifting, and Pilates were performed during the study. However, it is noted that the further along the mother was in pregnancy, there was a slight decrease in activity. Preconception BMI was recorded due to the recommended weight gains during pregnancy. If the woman in underweight before conception recommended weight gain is 28-40 point, while women at a healthy weight are recommended to gain 25-35 pounds. Those who are overweight should gain 15-25 pounds, while those who are obese before conception should gain 11-20 pounds. The data acquired through the study is important because it is a guideline of what is and is not safe during pregnancy and recommended exercises. Furthermore, newborns whose mothers exercised during pregnancy may become physically coordinated a little earlier than other babies, for example, the ability to make a fist.

5.2.12 VARUS TORQUE ON THE ELBOW OF PITCHERS IN BASEBALL

Alexander Webb
Dr. Majid Koozehchian & Dr. Gina Mabrey (Mentors)

This literature review aims to gather information regarding the varus torque that baseball players experience during their throwing motions. The ulnar collateral ligament (UCL) tears epidemic has driven professional teams to hire researchers to mitigate the professional ranks' injuries. As baseball is shifting toward more and more velocity, pitchers aim to improve attributes that help them achieve the desired velocity, command, and durability traits. UCL injuries have been linked to increased ball velocity through increased varus torque. Therefore, the "desirable traits" may be leading to an increased risk of UCL injuries. Along with the correlation between varus torque and velocity, researchers have also examined the relationship between throwing mechanics and varus torque. Most athletes will not consider decreasing throwing velocities to protect their arms; therefore,

practitioners looked to find ways to enable athletes to create healthier throwing patterns to potentially protect them against unnecessary varus torque levels. Individual throwing mechanics was observed to provide the researchers with data on the relationship between individual discrepancies and varus torque measures. Biomechanical data allowed researchers to measure a wide array of data points regarding performance and injury indicators. In addition to looking at the professional athlete, the review looked at the varus torque that the youth population experiences. The research shows increased elbow injuries in youth athletes, resulting from youth-level athletes attempting to emulate professional athletes, recently made more accessible with improved technology and increased use of social media. These athletes have increased access to training philosophies and increased and improved game videos of professional athletes. This literature review also looked at the rehabilitation of UCL tears and the effects that different levels of flexion and extension put on the newly reconstructed UCL. Overall this literature review provides information regarding the dangers of increased varus torque to baseball pitchers and ways that researchers have found to help athletes return to play.

5.2.13 THE EFFECTS OF CRYOTHERAPY ON MUSCLE RECOVERY

Kemuel Williams
Dr. Majid Koozehchian & Dr. Gina Mabrey (Mentors)

This work offers an in-depth look into the research, benefits, and applications that come with the different forms of cryotherapy. Utilizing various methods such as ice packs, cold packs, cold water immersion, and even whole body cryotherapy, it has become increasingly apparent over the years that this is a form of therapy that can be used for a wide range of ailments. Many individuals without a history of exercise science or just science, in general, do not know what the best type of response (hot or cold therapy) would be when treating an injury within its first 48 hours. When going through this work, you will see multiple articles referenced where the authors conducted several surveys on individuals in a variety of athletic fields (running, jiu-jitsu, typical gym-goers, individuals recovering from ACL tears, etc.), and this will give you a better look at how effective cryotherapy can when used in the right capacities. Using databases such as Pubmed and SPORTDiscus, the original author used information from solid peer-reviewed case studies to shed light on just how beneficial the different forms of cryotherapy are. Using a variety of case studies ranging from 2011 to as recent as 2020 helps to shine a light on how long this has been an effective form of treatment and how far technology and exercise science have come as a whole. To ensure that their work was as informative as possible, the original author included articles that used cryotherapy and other methods such as passive therapy (control groups) and heat-based therapeutic modalities (infrared). This was an effective way to show the strengths and weaknesses of each type of modality used in these forms of injury/ exercise situations and how quickly/ slowly the participants could recover after their treatments.

5.3 College of Social and Behavioral Sciences

5.3.1 Mapping a New Way: A New Approach to Electoral Polling in America

Dakota Heathcock
Dr. Benjamin Gross (Mentor)

Perhaps one of the greatest components of American Democracy, free and fair elections have been the cornerstone of The United States. In addition to this, electoral polling has served as a means for political scientists to try and measure how and why citizens will vote on specific amendments, propositions, and candidates. In the past, across many years, traditional polling methods (door-to-door visits, mail-in surveys, and telephone calls) have served quite efficiently in predicting the outcomes of elections. Nevertheless, in recent years, this has started to change significantly. In the 2016 U.S. Presidential Election, nearly every major national poll was predicting that Hillary Clinton would defeat Donald Trump. However, when the election occurred, Trump defeated Clinton in a near-landslide victory. Many critics began to question "Why were the polls so wrong in their predictions?" Although polling has been incorrect in previous, isolated years, this was not one of those cases, nor was this incident limited to the United States. Also in 2016, during the UK Brexit Referendum, many polls were predicting that the British people would vote to remain with the European Union. When the votes were cast, the decision to leave the European Union ultimately declared victory. These inaccuracies in traditional polling continue to this day.

So, why are many traditional polling methods so flawed nowadays? This presentation will explain this dynamic, and offer a new, more modern method of polling. This new idea departs from the outdated methods from previous years, and takes an entirely new approach to electoral polling, using Google Trends to measure and track the levels of online activity whenever a candidate's or proposition's name is mentioned in a search. This new approach aims to identify and reduce the "hidden voter" effect, accurately portray, and reflect how people are feeling about issues and candidates, and show that this method has a proven, reliable track record when it is used for polling.

5.3.2 Sociologically, How Can We Explain the Trump Administration and Its Effect on Society

Harvey Higgins
Dr. Jeremy Ross (Mentor)

Foremost, it is important to discuss the elements that contribute to Donald Trump's political defeat of the 2020 Presidential Election. After publicly displayed behaviors of misogyny, racism, ableism, homophobia/transphobia, xenophobia, overall exhibition to deprave individuals of these social status' to the public, attempted removal of rights for many of these individuals, and an inadequate response to the COVID-19 pandemic appropriately provides motivation for lack of public support of Donald Trump. Notably, many supporters of Donald Trump played critical roles in the insurrection of the Capitol. Within this attack upon the Capitol, many of his supporters believed their actions should be deemed patriotic. However, many of the individuals faced criminal consequences for their acts. This information proves crucial relative to the radical influence produced by the Trump administration.

5.3.3 The Reasoning Behind the Political Divides in America

Benjamin Marazzi
Dr. Manabu Saeki (Mentor)

The current American political environment is dominated by two political theories that provide reasoning behind the widening divide between political parties. The polarization theory, supported by Alan Abramowitz, suggests that the American public has become increasingly polarized, or divided, over the years due to racial and sexual issues in the social world which has led to a two-party system that is largely divided along these lines. The party-sorting theory, supported by Morris Fiorina, argues that it is not the public that has polarized overtime but the political parties themselves, forcing most Americans to choose between one extreme or the other. The part-sorting theory suggests that liberal Republicans have changed allegiance to the Democrat party and conservative Democrats have changed allegiance to the Republican party while the American public has stayed relatively moderate. This essay will discuss the differences between the two theories, the scientific data that supports each theory, and the importance of how the Rising American Electorate is evolving both theories.

5.3.4 COVID-Related Regrets Among College Students

Angel Orozco
Dr. Heidi Dempsey (Mentor)

The purpose of the study was to find the most common COVID related regrets among college students. We decided to split up questions on regret by 9 categories of regret: romantic, immediate family, extended family, friends, financial, social life, and college experience. The responses showed that most people believed that the pandemic had negatively affected their lives and put them into stressful situations that made them act in undesired ways. In relationships people tended to end the relationship given the new circumstances they found themselves in. The common theme with family interactions were that people weren't spending as much time with their loved ones as they would have liked. This situation often resulted in people breaking guidelines to see their family members which resulted in their family members getting COVID. Friendships had a similar pattern with the desire to be close to friends but unable to. Often people grew distant with their friends especially the ones that lived in their hometown since COVID guidelines suggested people not to travel. Financially, people were unprepared for the closing of businesses and the sudden availability of more work for others. Some were working more than they ever had while others had a difficult time finding employment and had to budget themselves intensely since they didn't have emergency funds. Social life and college experiences were similar in that people often risked their health in order to participate in social events that were common pre-pandemic. In conclusion, it appears that COVID disrupted students' lives in many domains, and they had lots of regrets, especially related to missing out on the "college experience."

5.3.5 Mental Health Collaborative

Elizabeth Rains, Ashton Boyd, & Lauren Moore
Dr. Kimber Wickersham (Mentor)

Mental Health Collaborative is a project between Jacksonville State University Social Work and Piedmont City Schools. Piedmont City Schools reached out for help as they had issues with their school-based Mental Health. The issues that Piedmont City Schools are experiencing are that the mental health services available through the Piedmont City School system to their student populations are currently reactive in nature due to the limited number of trained providers available. This inhibits students from receiving adequate mental health services which might prevent behavioral and disciplinary occurrences that disrupt classroom learning. Jacksonville State University Social Work Master of Social Work Summer 2021 cohort designed and developed an assessment tool

that looked at the thoughts and perceptions of the stakeholders of the Piedmont City School system. This collaboration took place across multiple classes within the master's program and provided a comprehensive look at how research and policy shape and inform our practice as social workers. The data collected was analyzed and shared with Piedmont City Schools in hopes of determining the need for reactive school-based mental health services.

5.4 College of Science and Mathematics

5.4.1 Effects of Specific Blocking Buffers on Histone H2B Antibodies

Noha Al-Saadi, Grace Mix, Mardasia Thompson, & Elin Zaman
Dr. Roger Sauterer (Mentor)

Mammalian histones have been known to be one of the most highly alkaline proteins found in the nuclei. Their main function is to organize DNA into chromosomes and regulate transcription. An example of a histone would be Histone H2B, which this project focuses heavily on. Histone H2B has been seen to bind poorly to antibodies and result in a weak signal. The goal of this project is to test a multitude of blocking buffers, in triplicate, in order to find a blocking buffer that can obtain the strongest signal from the antibodies being tested. Through the use of protein gel electrophoresis and western blotting procedures, the different blocking buffers could be compared. The blocking buffers used for these experiments consisted of 5% nonfat dry milk in Tris-buffered saline (otherwise known as BLOTTO control), 2.5% Milk + 2.5% Hemoglobin, 7% Hemoglobin, 1% Milk +4 % Hemoglobin, and 5% Hemoglobin. After conducting the experiments, it was concluded that hemoglobin is not a useful blocking buffer.

5.4.2 Cellular Effects of CBD

Noha Al-Saadi
Dr. Roger Sauterer (Mentor)

For many years, scientists have pondered over the Cannabis sativa plant, or better yet known as marijuana. Although to many, marijuana may seem like an unordinary plant to study, one of its isolated components may be the future of medicine. Marijuana consists of two major components, also referred to as cannabinoids: THC (short for tetrahydrocannabinol) and CBD (short for cannabidiol). THC is well known for its psychoactive effects; however, CBD has always been relatively misunderstood. CBD is the

nonpsychoactive component, and until its recent surge in medical research, there was little to no research on its effects. However, within the last two decades, CBD has been tested on a multitude of cell types, and its distinct effects have taken the scientific community by surprise.

5.4.3 USING ECOLOGICAL NICHE MODELING TO PREDICT THE RESPONSE OF HYDROCOTYLE BONARIENSIS TO GLOBAL CLIMATE CHANGE

Rachel Bonner, Laura K. Dease, & Elizabeth A. Hughston
Dr. Justin Bagley (Mentor)

Coastal dune habitats provide valuable ecosystem services but are declining globally due to the interacting effects of multiple stressors, including global climate change (GCC). To explore the potential severity of the effects of GCC on dune plant communities of the Northern Gulf of Mexico and surrounding areas, we modeled the fundamental bioclimatic niche of a dune plant species, largeleaf pennywort (Hydrocotyle bonariensis Comm. ex Lam.), in this region. We then projected its niche to estimate habitat suitability under current and future environmental conditions. Occurrence records were mined from the Global Biodiversity Information Facility, cleaned, then thinned by spatial filtering, and WorldClim bioclimatic variables (30 arc-second resolution) were used as environmental data layers during analyses. Niche modeling was conducted using MaxEnt, and the model was projected onto a potentially accessible area (M) for the species defined by a 200-km buffer zone around the filtered occurrence points. Results suggested that our model had high predictive performance (AUC ≥ 0.9) and the projections indicated that the distribution of suitable habitat for H. bonariensis in the study region will likely be greatly reduced by GCC over the coming decades. Unlike other foredune plant species, H. bonariensis is known from non-dune habitats (e.g. estuaries, sandy coastal plains) up to moderate elevations; accordingly, our models strikingly predict potential refugial areas for this species in Central Mexico and the northern Yucatán Peninsula. Additional analyses of codistributed dune plants in the study area are needed to test the generality of these findings for dune plant communities.

Keywords: climate change; ecological niche modeling; foredune; Gulf of Mexico; North America; plants

5.4.4 Cryptic Hybridization in the Temperate Bamboos: Is Pleioblastus simonii a species of hybrid origin?

Morgan Brown
Dr. Jimmy Triplett (Mentor)

Japanese river bamboo (Pleioblastus simonii, kawadake) is an ecologically important species of temperate bamboo native to Japan. This species is widely known and historically important in Japanese rural farm life. Based on morphological data, Japanese river bamboo is recognized as a major lineage in genus Pleioblastus (section Medakea). However, recent studies suggest that Japanese river bamboo may be a species resulting from previously undetected hybridization (also known as cryptic hybridization). Bamboos in Pleioblastus exhibit overlapping variation in leaf and stem characteristics, making them hard to identify on the basis of morphology alone (a common problem in plant taxonomy). Cryptic hybridization is a potential explanation for this problem. The role of hybridization in natural plant populations has been studied since the 1950s, however little is known about this phenomenon in the evolution of bamboos. The objective of this study is to analyze molecular data (AFLP and nDNA) to test the hypothesis that P. simonii is a cryptic hybrid. Current data provide compelling yet conditional evidence in support of this hypothesis, while also suggesting that ongoing introgression and diversification has obscured that ancestry. We will discuss various analytical techniques from population genetics and phylogenetics that are being used to shed light on this problem. Results of this study provide an example of reticulate evolution in the origin of plant diversity and help reveal why molecular data is an important tool for taxonomic identification.

5.4.5 The Past, Present, and Future of Python: An Ever-Expanding Language

Celia Calhoun
Dr. Arup Ghosh (Mentor)

Software is continuously integrating into all parts of our lives, and programming languages are the backbone of software. Python is one of the most popular programming languages, among others such as C, C++, Java, and JavaScript. With its simple user interface and impressive versatility, the language is used for a broad spectrum of operations. Python has stood the test of time since its debut in 1991, so it surely will not be left behind as

technology advances. The language seems to have a promising future with a lot of potential to expand. This paper will discuss the beginnings of the language, its current uses, and possibilities of ways in which it will be used in the future.

5.4.6 Effects of time spent playing video games on teens' psychological and social development

Sushant Chhetry
Dr. Arup Ghosh (Mentor)

Much research has been done to understand the effect of "violent" video games and children. Presently, there are more genres of video games that are being played by teens and children than just "violent" video games. The amount spent playing these video games increases exponentially each year. It is essential to understand the effects of the amount of time spent playing video games on teens' and children's psychological and social development. In the study, we perform a survey work using the literature and research work of various researchers and scholars to present an analysis of the effect of time spent playing video games on teens' psychological and social development.

5.4.7 Client-Server and Peer-to-Peer Architectures in Multiplayer Games

Zaria Coprich
Dr. Arup Ghosh (Mentor)

When designing a game with an online multiplayer aspect, game developers must choose a network architecture that works best for the game's intended purpose. The network architecture can either be client-server based or peer-to-peer based. But how do they decide which network architecture to use? Developers must understand the benefits and issues each network architecture brings before deciding which one to implement. Client-server architectures are the most common type implemented in multiplayer games, especially in massive multiplayer online games (MMOGs). There are a multitude of resources to help developers implement the architecture and it provides a more profitable business model compared to peer-to-peer architectures. However, they are a susceptible to network failure and bottlenecks on the server-side, which can cause poor playability for

users. Client-server architectures are also more expensive to implement and maintain. On the other hand, peer-to-peer architectures, although less common than client-server architectures, are often implemented in multiplayer games that do not require many players to be connected at once. Thus, they are often implemented in fighting games. Peer-to-peer architecture also provides a lower level of latency. However, their networks are not as secured or as consistent as client-server architectures. And because they are less common than client-server architectures, there are less resources available to help developers implement the architecture within their games. In this presentation, I will cover both architectures and discuss benefits and issues associated with them.

5.4.8 INTO THE UNKNOWN: DIVING INTO THE UNKNOWN: A GENETIC INVESTIGATION OF TYPE-2 DIABETES-ASSOCIATED INSR VARIANTS OF UNCERTAIN SIGNIFICANCE

Trinity Elston
Dr. Ashley Turner (Mentor)

Type 2 diabetes is a complex metabolic disorder with interactions between genetic and environmental factors, making it more complicated to understand the clinical implications of identified genetic variants and disease pathology. Many of the diabetes-associated variants are currently classified as VUS and occur within the genes involved in insulin signaling and regulation, so we turned our focus on the human INSR gene. INSR encodes the insulin receptor protein that plays a major role in insulin signaling. Furthermore, C. elegans provides a simple model system to examine the functional consequences of these diabetes-associated VUS. We examined INSR diabetes-associated VUS through the orthologous C. elegans gene daf-2. Preliminary genetic and evolutionary conservation analyses suggest functional impact for some of these VUS with the potential to impact protein structure and function. Further bioinformatic analysis of pathogenicity predictions supported the conservation we observed across species. I chose the most interesting VUS c.1628C>T (p.Thr543Met) to move forward with based on its genetic loci, level of evolutionary conservation, and predicted pathogenicity. These provided support for further in vivo studies. Next, we designed and tested primers to amplify the VUS region within daf-2. We are currently working to optimize this polymerase chain reaction-based genotyping assay to assess CRISPR-Cas9-engineered C. elegans models containing the VUS. Our goal is to assess the functional impact of the VUS on the daf-2 gene in vivo through phenotyping the mutant C. elegans VUS model. Studies such as this help us to begin to

understand the functional impact of identified genetic variants in diabetes patients, paving the way for personalized medicine.

5.4.9 MACHINE LEARNING

Jon Eric Frederick
Dr. Monica Trifas (Mentor)

In our work, we have explored the principles used in Machine learning and a set of applications of machine learning in the field of probability. Machine learning is used in everyday life. It uses an algorithm to do things that it was not programmed to do, from recognizing typing patterns and predicting what would be typed next to filtering through keywords typed into google to create better ads tailored to its user. Machine learning uses an algorithm like a decision tree and other stats-based algorithms to predict what will happen next while also using the knowledge it can access from in its database. Each time the machine gets an answer right, it can change the algorithm to associate those key phrases with correct answers. Machine learning came to be from the quest for artificial intelligence. In his landmark paper "Computing Machinery and Intelligence, " Alan Turing asked a fundamental question:" "Can machine Think?". That spurred the idea that modern-day machine learning uses today. The two objectives that machine learning is used for now are to make models using data and predict the future.

5.4.10 FLOOD RISK MAPPING AND VULNERABILITY ANALYSIS OF ANNISTON-OXFORD, ALABAMA METROPOLITAN AREA

Tim Gaskins
Dr. Saiedeh Gharehchahi, Jennifer Green, & Dr. Mark Sciuchetti (Mentors)

Nowadays, flood risk in urban areas is one of the main concerns in developed countries. The United Nations (UN) predicts that 68% of the world's population will live in urban areas by 2050. The rapid urbanization processes would lead to the destruction of water distribution lines, the cutting off of natural drainage streams, and the increase of impermeable surfaces. Therefore, urban areas will be more susceptible to flash floods due to the chaos in watershed systems, reduction in water infiltration and increase in surface runoff. The U.S. National Climate Reports indicate that the average annual precipitation rate of the U.S. is currently higher than the average values over the past 35 years. As the

average rate of precipitation rises, city planners should consider the growing rates of urban flooding and the consequent economic losses in the United States. Herein, effective flood response planning requires a better understanding of the flood impact and exposure. As social and environmental settings of an urban area influence urban flood events differently, we need to study human and physical environments in an integrated framework. Thus, this study aims at mapping flood risk areas and assessing the vulnerability of the population in the Anniston-Oxford, Alabama metropolitan area to efficiently respond to future flood events.

Keywords: Flood risk mapping, vulnerability, GIS, Anniston-Oxford, Alabama metropolitan area

5.4.11 CHARACTERIZATION OF ANTI-MICROBIAL PROPERTIES OF EXCREMENT AND FUNCTIONAL MICROBIOME OF NEW WORLD VULTURES IN ALABAMA

Bridgette Gray
Dr. Ashley Turner (Mentor)

Two distinct species of New World vultures are native to North America and inhabit Alabama, black vultures (Coragyps atratus) and turkey vultures (Cathartes aura). They are scavengers that consume decaying carcasses or carrion, which helps reduce the spread of disease. Vultures are susceptible to declining population numbers as they have been trapped and killed due to the belief that they spread disease, additionally contact with poisons and habitat destruction have also led to their decline. Currently, these two vultures are one of the seven vulture species with least concern and stable in Alabama and the world. However, it is important to remember current threats to these vultures exist. It has been observed that vultures will sometimes excrete waste onto their legs. There are two ideas behind this behavior, one is urohidrosis and the other is microbial control. The second idea of microbe control has not been directly studied or tested experimentally. To test this proposed question, we will collect fecal samples from both black vultures and turkey vultures. Antimicrobial properties of both species' excrement will be tested by a Kirby-Bauer test, both from live and heat killed excrement samples. The samples will be screened against 10 bacterial species as well as C. elegans and zone of inhibitions for each will be measured. Microbiome analysis will also be examined with fresh excrement samples through 16S ribosomal RNA sequencing. This study proposes to gain a better understanding of how these scavengers evolved to consume carrion, as it is important to understand their biology, health, and status. We plan to examine the antimicrobial properties of vulture excrement and the microbiome of black vultures and turkey vultures in the Alabama area.

5.4.12 PRELIMINARY EVALUATION OF THE DEVELOPMENTAL EFFECTS OF MICROBEADS USING THE FROG EMBRYO TERATOGENESIS ASSAY: XENOPUS (FETAX)

Kabita Kunwar
Dr. James Rayburn (Mentor)

Microbeads are the tiny pieces of polyethylene plastic added to health and beauty products. It is used as exfoliating and polishing agents in cosmetics like sunscreen, lotions, deodorants, makeup products, toothpastes, and blood flow determination tests. The effects of the concentration of the microbeads, Fluospheres™ polystyrene, 10μm, was determined by using the Frog Embryo Teratogenesis Assay- Xenopus (FETAX). The early stage of South African clawed frog, Xenopus laevis, were exposed to the concentrations of the microplastics with FETAX solution for 4 days from small cell blastula to a free-living tadpole. The small fraction of microbeads was mixed with 20 mL of FETAX solution to make different concentration microbeads solution. Four different test solutions were used in two set of plastic petri dishes of 10 embryos. The control groups consisted of 4 plastic petri dishes of 10 embryos each with 8 mL FETAX solution without microbeads solution. Dead embryos were removed after every 24 hours, and solutions were renewed. The mortality, malformation and length of tadpole were recorded for all petri dishes at the end of 4 days. The results show that higher the concentration of the microplastics, more likely to increase the mortality of the tadpole. The 96-hr LC50 and 96-hr EC50 of approximately 1866.500 and 931.493 microbeads per ml respectively.

5.4.13 EXAMINING THE PATHOGENICITY OF CTLA4 VUS R75Q

JoAnna LaPoint
Dr. Jenna Ridlen (Mentor)

SARS-CoV-2 has proven to cause new and exacerbate pre-existing health conditions in patients across the globe, raising many questions for geneticists and other researchers. Studies are beginning to emerge showing that patients have an increased risk of developing other conditions after being infected with COVID-19. Recently, a study by the Center for Disease Control discovered patient samples exhibit an increase in new diabetes diagnoses within the first 30 days after infection. A link between viral infection and autoimmune disorders is already known. The gene CTLA4, which is located at 2q33.2, codes for cytotoxic T-lymphocyte associated protein 4. This protein is important in immune response to viral

infection. Diseases associated with mutations in this gene include, diabetes type 1, thyroiditis, and multiple other autoimmune disorders. The variant I have chosen to investigate is the variant of unknown clinical significance (VUS) R75Q; a missense mutation at the 75th position that results in the amino acid Arginine being replaced by Glutamine. PolyPhen2 and other bioinformatics software is used to examine the VUS potential for pathogenicity. The variant is shown to be likely pathogenic. The results from the research conducted using multiple bioinformatics platforms will be presented as well as a multiple sequence alignment with various species.

5.4.14 Molecular Evidence of Cryptic Hybridization in the Japanese Nezasa Bamboos (Pleioblastus section Nezasa)

Ryan Long
Dr. Jimmy Triplett (Mentor)

The genus Pleioblastus is a complex group of Southeast Asian temperate bamboos with 7-21 species, depending on the taxonomic authority. We hypothesize that the taxonomic complexity of the group is due to previously undetected occurrences of hybridization and subsequent backcrossing between filial and parental lineages, creating one or more cryptic hybrids. This is supported by recent research on the temperate bamboos that revealed intergeneric hybrids (between species in different genera). This poses the question of where to draw the distinction between species' designations within Pleioblastus. The objective of the current study is to test the hypothesis that Pleioblastus section Nezasa is a mix of parental and hybrid lineages using data from AFLP markers and a combination of tree-building (PAUP) and genotypic assignment analyses (STRUCTURE, NEWHYBRIDS). This is critical to understanding the taxonomy of this group and may have implications in conservation due to hybridization-induced extinction. The current data support the hypothesis that hybridization has had an important role in the evolution of Pleioblastus section Nezasa, and highlight two major lineages (Nezasa I and Nezasa II) and hybrids between these lineages. We will discuss the implications of this research for our understanding of plant evolution and species nomenclature.

5.4.15 THE UTILIZATION OF THE XENOPUS EMBRYOS FOR THE DETERMINATION OF THE TERATOGENIC POTENTIAL OF METHYLENE BLUE.

Kritika Maharjan & Barrett Hester
Dr. James Rayburn (Mentor)

Methylene blue is a compound consisting of dark green crystals or crystalline powder, which gives out a deep blue color in solutions with water or alcohol. Its most common uses are as bacteriologic stain and indicator. It has often been used to treat methemoglobin and is often considered to be a safe drug when used in a moderate dose of <2 mg. In recent studies, methylene blue has been found to cause severe central nervous system toxicity with other results such as nitrogen and ammonia poisoning. To understand the harmful developmental effects of Methylene blue, Xenopus frog embryos under lab conditions were exposed to a range of methylene blue concentrations. For the experiment, fertilized embryos were sorted and allowed to develop in methylene blue solutions made by dissolving solid methylene blue in FETAX (frog embryo teratogenesis assay -Xenopus) solution. FETAX is a 96-hour test that uses early-stage embryos of the South African clawed frog (Xenopus laevis) to measure the potential of substances to cause mortality, malformation, and growth inhibition in developing embryos. The major reason behind Xenopus frogs being the primary subject to tests is due to Xenopus embryos developing outside of the body making them easy to manipulate or treated with chemicals and proteins that have a direct effect on their development. The experiment setup was to expose the embryos to methylene blue concentrations ranging from 0-100 mg/ L with 4 sets of control for each trial. The control consisted of Xenopus embryos kept in only FETAX solutions. The results indicate an LC50 (mortality) of approximately 256.41 and EC50 (malformation) of 135.63. Abnormalities were observed in the abdominal, notochord, gut, eye, brain, and many other body structures including conditions such as edema, hemorrhage, and blisters. The results suggested that methylene blue has slight teratogenic effects.

5.4.16 Antioxidant Content in Plant-based Diets Versus Meat-Based Diets

Lia Meadows, Peeper Walker, & Reveca Tomas
Dr. Mijitaba Hamissou (Mentor)

The result of naturally occurring free radicals in the body are oxidative-stress-related damages to cells, tissues, and biomolecules. Oxidative stress occurs when the balance between reactive oxygen species (ROS) outnumbers antioxidants, producing negative effects. Antioxidants exist as a natural defense mechanism utilized by the body. This defense exists in two distinct forms: enzymatic and non-enzymatic antioxidants. Non-enzymatic antioxidants consist of vitamins and bioactive compounds, such as phenols. In previous studies, plant-based diets showed promising results in reducing damage caused by oxidative-stress. The purpose of this study was to determine the extent to which antioxidant concentration differs between meat-based diet and plant-based diet. This study compared the concentration of three antioxidants (vitamin C, vitamin E, and Total Phenolic Compounds (TPC)) in hamburger meat to plant-based (faux) meat. According to our hypothesis, the plant-based meat will have a higher concentration of non-enzymatic antioxidants than hamburger meat. Our findings suggest that the plant-based meat contains a higher concentration of vitamin C and vitamin E. The plant-based patty also had a mean TPC higher than that of the animal-meat.

5.4.17 Variant of Unknown Significance V71L in Autoimmune Role of CTLA4

Samuel Menard
Dr. Jenna Ridlen (Mentor)

The COVID pandemic continues to cause unforeseen patient health complications and opportunities for genetic inquiry. The CDC has discovered over the course of their extensive research in dealing with the pandemic that there is a significant risk of newly diagnosed DM1 in the 30-day period post- SARS-CoV-2 infection. There are many journals documenting the risk between viral infection and subsequent autoimmunity. CTLA4, located at 2q33.2, codes for cytotoxic T-lymphocyte protein associated protein 4--an important protein in the immune response to viral illness. This protein functions as a brake to slow down and control the action of the immune system by suppressing excessive T-cell

proliferation. Mutations of the CTLA4 gene have been implicated in type 1 diabetes, autoimmune thyroiditis, lupus, celiac, and other autoimmune illnesses. My CTLA4 variant, V71L, is a missense mutation which resulted in amino acid switch from valine to leucine at position 71. YASARA protein mapping was used to analyze the features of this variation. PolyPhen2 and other analysis were completed to assess variation pathogenicity. V71L, which previously had an uncertainty as to how it would phenotypically express, was found to be likely pathogenic and probably damaging. These bioinformatic results will be presented along with cross species multiple sequence alignment and other variant analysis.

5.4.18 GENETIC ASSESSMENT OF CONGENITAL STATIONARY NIGHT BLINDNESS-ASSOCIATED TRPM1 VARIANTS OF UNCERTAIN SIGNIFICANCE IN C. ELEGANS

Sara Morris
Dr. Ashley Turner (Mentor)

Congenital stationary night blindness (CSNB) is a disorder of the eye that impacts the ability to see in low to no light conditions. It occurs in horses and humans. TRPM1 encodes for a member of the transient receptor potential melastatin subfamily of transient receptor potential ion channels. Mutations in TRPM1 have been identified by previous researchers in horses with leopard complex pattern (LCP) suffering also from CSNB. Phenotypic changes in these horses are a loss of spotted coat pattern. An attempt was made to locate variants of uncertain significance (VUS) in TRPM1 that had been previously identified in horses with CSNB and LCP. However, there is a lack of available DNA sequencing information for this gene in impacted horses across equine studies. So, we turned to VUS identified in human patients with CSNB to examine actual VUS identified among another vertebrate causing the same condition. We examined evolutionary conservation analysis of missense TRPM1 variants across horses (E. caballus), humans (H. sapiens), and nematodes (C. elegans). Using Benchling, the human TRPM1 gene, horse TRPM1 gene, and nematode gon-2 gene were imported to examine conservation of 31 VUS through multiple sequence alignments and 3 were conserved across all 3 species. These VUS were at the following locations in human: E1324K, H1195R, and I875V. Conducting a gene mutational analysis revealed the variants at H1195R and I875V were most likely to be pathogenic due to their positioning next to pathogenic or likely pathogenic variants reported through ClinVar. Through Poly-Phen 2 analysis, variant I875V was predicted to be the most damaging and likely pathogenic. The HumDiv results predicted this variant to be possibly damaging with a score of 0.775, and the HumVar model predicted the variant to be benign with a score of

0.230. Primers were designed to amplify this VUS region in C. elegans using polymerase chain reaction (PCR) and gel electrophoresis. Future experimentation includes designing a CRISPR RNA guide to target gon-2, microinjection of CRISPR-Cas9 reagents to generate the VUS-gon-2 C. elegans model, and screening and phenotyping of the identified VUS model. If results are positive and the VUS does impact structure and function of gon-2, then it is expected to impact gonadal and vulva development in the nematode. This study will provide in vivo assessment of this CSNB-associated VUS shedding light on its clinical significance for humans and horses.

5.4.19 THE PRELIMINARY DEVELOPMENTAL TOXICITY OF METHYLENE BLUE AND ORANGE G TO GRASS SHRIMP EMBRYOS.

Megan O'Barr, Makenna Smith, & Asel Richards
Dr. James Rayburn (Mentor)

Abstract: This experiment was formed to determine the effects of Methylene Blue and Orange G oh the eggs of Palaemontes pugio (Grass Shrimp). We extracted the eggs from already gravid female shrimps we acquired in the marshlands from Dauphin Island and submerged the eggs into varying levels of concentrations of Methylene Blue and Orange G. Three experiments were conducted where the eggs were separated into well plates (24 wells per plate) with each plate containing a concentration of dye. We observed the eggs hatch, the coloration of the hatchlings, and mortality rates within the span of a week per experiment. The hypothesis anticipated the higher concentrations of Orange G and Methylene Blue would be more or less toxic to the hatchlings. Our results showed that Methylene Blue was more toxic than Orange G in their respective mL concentrations. These results show the utility of using the Grass Shrimp embryos for assessing the toxicity of chemicals such as Methylene Blue and Orange G.

5.4.20 USING Z3 CONSTRAINT SOLVER TO SOLVE SYSTEMS OF EQUATIONS AND PUZZLES

Mausam Parajuli
Dr. Arup Ghosh (Mentor)

The interest in solving equations and puzzles among people has increased over years, but some problems can be difficult and may take a long time to solve if done on a piece of paper. Using Z3 solver with specialized algorithms is one of many solutions that have been proposed to solve problems efficiently. This demonstration provides a brief introduction to the Satisfiability Modulo Theories (SMT) Solver Z3 and shows how one can use it to solve constraint satisfaction problems in the Python programming language. Although Z3 can be used in many other areas including software/hardware verification and testing, security, and biology, this demonstration will only focus on solving systems of equations and puzzles.

5.4.21 AN EXPLORATION OF TREX1 VARIANTS OF UNCERTAIN SIGNIFICANCE AND THEIR POTENTIAL IMPACT ON AUTOIMMUNITY IN SYSTEMIC LUPUS ERYTHEMATOSUS AND AICARDI-GOUTIERES SYNDROME

Jordan Peters
Dr. Ashley Turner (Mentor)

TREX1 is a gene responsible for encoding a 3'-to-5' DNA exonuclease in human cells. Under normal conditions TREX1 removes bases from the free 3' end to enhance DNA damage and prevent DNA end reannealing and rapid repair. Mutations in TREX1, which result in the absence of the 3'-to-5' DNA exonuclease and the intracellular accumulation of unneeded DNA and RNA, have been shown to trigger immune dysfunction leading to diseases such as systemic lupus erythematosus (SLE) and Aicardi-Goutières Syndrome (AGS). The goal of this study is to determine the potential impact of a TREX1 missense mutation with uncertain clinical significance (VUS). This study relies heavily upon the evolutionary relatedness between humans (Homo sapiens) and nematodes (Caenorhabditis elegans) to examine conservation of TREX1 VUS across species. Thirty TREX1 variants associated with SLE and AGS were screened and analyzed for conservation in the TREX1 nematode ortholog W02F12.4. These variants included those with pathogenic, likely pathogenic, likely benign, and uncertain clinical significance. Variant location and conservation along the W02F12.4 gene was identified for all screened variants. Out of the 30 screened variants, two were found to be conserved in both TREX1 and W02F12.4. These mutations were

c.197A>G (p.Lys66Arg) and c.226G>T (p.Ala76Ser), both of which have uncertain clinical significance. Patient variant c.226G>T (p.Ala76Ser) was selected for further investigation due to its proximity with a likely pathogenic and pathogenic variant. PolyPhen-2 analysis predicted this VUS to be probably damaging with scores of 0.982 (HumDiv) and 0.953 (HumVar). DNA primers have been designed in preparation for the amplification of the specific VUS region within W02F12.4 using polymerase chain reaction. Future experiments including RNA guide design and microinjection and use of CRISPR-Cas9 reagents for gene editing of W02F12.4 to generate this VUS C. elegans model. This will allow us to support or refute the potential pathogenicity of c.226G>T (p.Ala76Ser) in vivo through phenotypic changes we observe in the mutant nematode compared to wildtype. This will help provide important insight into the structure and function of autoimmune-associated TREX1 VUS being identified in patients.

5.4.22 THE USE OF PHEROMONAL TRAIL LAYING IN THE FORAGING BEHAVIORS OF L. NIGER

Drake Smith
Dr. Lori Tolley-Jordan (Mentor)

In ants, one of the most common and significant sources of communication is through pheromones, specifically pheromone trails. For L. niger, one of the main purposes of pheromone trails is to guide foragers to previously found food sources (Czaczkes, et al. 2011). The act of L. niger laying these trails is characterized by them pressing the rectal end of their abdomen down onto the ground, walking a short distance, and picking their abdomen back up (Czaczkes, et al. 2014). These trails are used in many other activities of L. niger—including finding and exploring new nesting sites, recruiting ants to battlegrounds, and having them flee from conflict (Czaczkes, et al. 2015). The complexities of how these pheromone trails work and how they are followed shows how intricate the social systems of L. niger are and how individuals can make large impacts on their colony. L. niger is an example of a species that uses both personal information and social information from their colony to optimize their foraging experience (Czaczkes, et al. 2013). Social information is any information that is publicly available to different members of a colony, such as experienced ants directly guiding naïve ones to a place of interest, pheromone trails, and home range markings, which are the long-term pheromones that are regularly placed around a nest (Forster, et al. 2014). In this paper, we will discuss Lasius Niger, a social species that sees foraging as a group effort. They will make efforts to both lay

pheromone trails to effective food sources and control the amount of crowding to food sources so that optimum efficiency is reached for foraging.

5.4.23 The Utility in Using Xenopus Frog Embryos to Determine Teratogenic Versus Nonteratogenic Potential of Chemicals

Kayla Way & Kabita Kunwar
Dr. James Rayburn (Mentor)

Microbeads are the tiny pieces of polyethylene plastic added to health and beauty products. It is used as exfoliating and polishing agents in cosmetics like sunscreen, lotions, deodorants, makeup products, toothpastes, and blood flow determination tests. The effects of the concentration of the microbeads, Fluospheres™ polystyrene, 10μm, was determined by using the Frog Embryo Teratogenesis Assay- Xenopus (FETAX). The early stage of South African clawed frog, Xenopus laevis, were exposed to the concentrations of the microplastics with FETAX solution for 4 days from small cell blastula to a free-living tadpole. The small fraction of microbeads was mixed with 20 mL of FETAX solution to make different concentration microbeads solution. Four different test solutions were used in two set of plastic petri dishes of 10 embryos. The control groups consisted of 4 plastic petri dishes of 10 embryos each with 8 mL FETAX solution without microbeads solution. Dead embryos were removed after every 24 hours, and solutions were renewed. The mortality, malformation and length of tadpole were recorded for all petri dishes at the end of 4 days. The results show that higher the concentration of the microplastics, more likely to increase the mortality of the tadpole. The 96-hr LC50 and 96-hr EC50 of approximately 1866.500 and 931.493 microbeads per ml respectively.

5.4.24 Impact of L282R on PSEN1 Phenotype

Lauren White & Deanna Smelley
Dr. Jenna Ridlen (Mentor)

Alzheimer's Disease (AD) is a type of dementia, usually affecting the memory, thinking, and behavior of individuals over the age of 65. The average life span after diagnosis is 4 to 8 years, but some can live as long as 20 years after diagnosis. During the COVID-19 pandemic, death related to Alzheimer's and Dementia increased 16%. For our research, we were

interested in the role of genetics in this disease. While most Alzheimer's disease is not usually inherited, in previous studies most patients who developed early-onset AD possessed specific genes or gene variants that were inherited. Our research focused on the mutations in the PSEN1 gene, which codes for the Presenilin-1 protein. Presenilin-1 forms the catalytic subunit of the gamma secretase complex whose primary function is the proteolytic cleavage of the amyloid protein from the Amyloid Precursor Protein (APP). Pathogenic mutations in the PSEN1 gene often lead to an accumulation of the longer, more hydrophobic version of the Amyloid-β peptide. These accumulations are thought to cause the plaques found in the brains of patients with Alzheimer's, leading to cerebral atrophy. We examined a PSEN1 variant of unknown significance (VUS), a missense mutation which resulted in amino acid substitution from leucine to arginine at position 282. We used YASARA protein mapping to analyze the features of this variation and completed Polyphen2 analysis to assess its pathogenicity. These will be presented along with cross species multiple sequence alignment and other variant analysis.

5.4.25 An Exploration into the Effect of T147A Clinical VUS in CTLA4

Elin Zaman
Dr. Jenna Ridlen (Mentor)

Viral infections have always had an impact on health conditions, COVID has been one of the more recent viral infections that has shown the unforeseen health complications which had surfaced after contracting the infection. A recent CDC study had shown a health complication of an increased risk of newly diagnosed diabetes in the 30 days following SARS-coV-2 infection. This allowed for genetic inquiry into the risk between autoimmune diseases and viral infections which had been observed and documented thoroughly. As well as inquiry into the genes of the immune system. CTLA4, located at 2q33.2, is a gene which is also known as cytotoxic Tlymphocyte associated protein 4, is among the immunoglobulin superfamily that produces a T cell inhibitory protein. This gene is a protein receptor that functions as an immune checkpoint and is vital in the immune response to viral illnesses. The mutations of the CTLA4 gene have been implicated in type 1 diabetes (DM1), autoimmune thyroiditis, celiac, lupus, Graves disease and other autoimmune illnesses. My CTLA4 variant, T174A, is a missense mutation which resulted in an amino acid switch from threonine to alanine at position 174. The bioinformatic tools of PolyPhen2, YASARA protein mapping and other analyses were utilized to assess variation pathogenicity, as well as

analyze the features of this particular variant. These bioinformatic results will be presented along with cross species multiple sequence alignment and other variant analysis.

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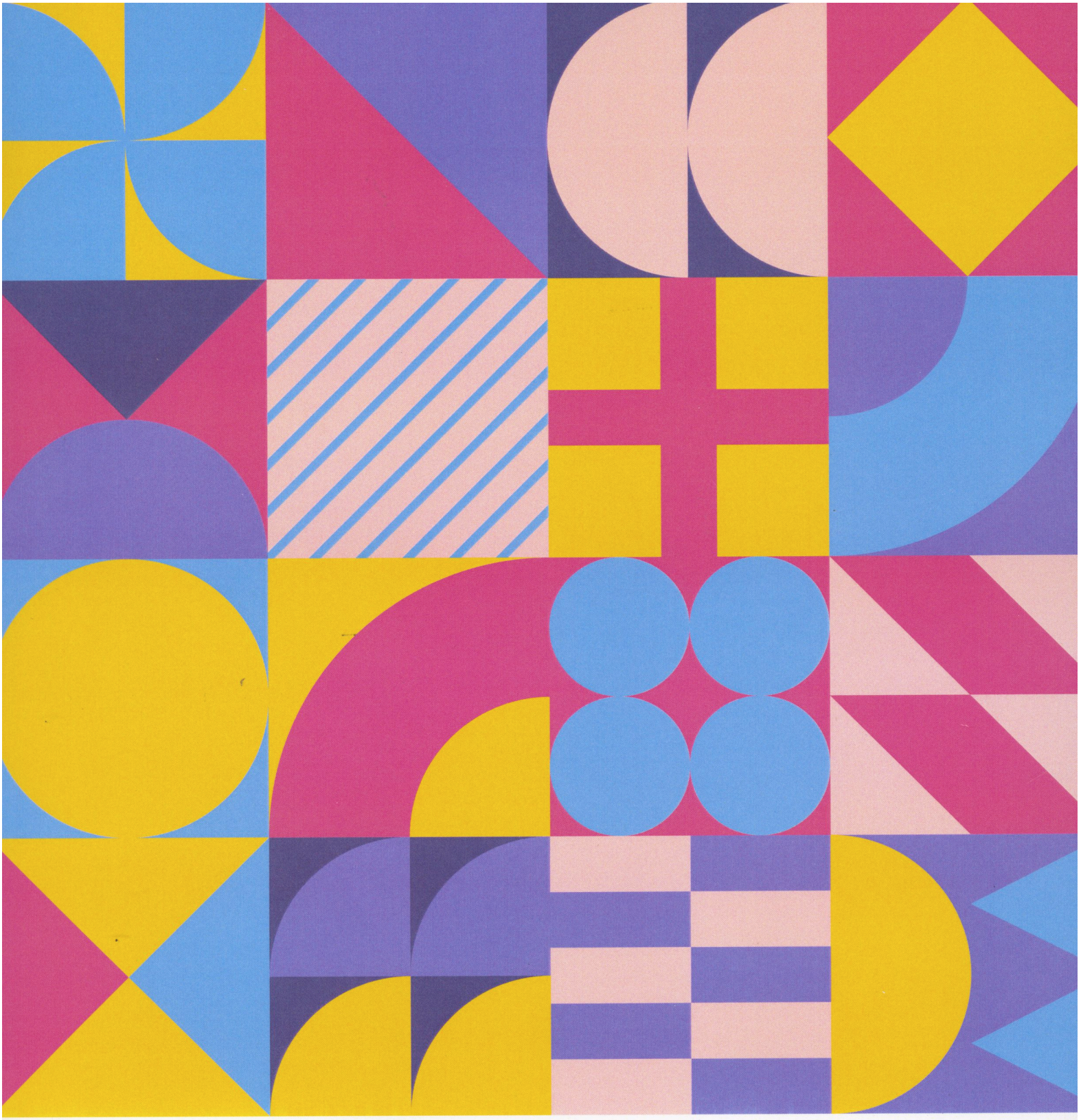

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