2025 OneUSF Undergraduate Research Conference

UNIVERSITY of SOUTH FLORIDA

Welcome!

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ACKNOWLEDGMENTS

The Undergraduate Research Conference Organizing Committee would like to acknowledge the contributions and scholarship of USF faculty and instructors who are committed to mentoring undergraduate students. Because of you, those students are transformed into scholars! Thank you for your support! And a special thanks goes out to our valued sponsors:

Dear Undergraduate Researchers, Faculty Mentors, and Members of the USF Community,

Welcome to the 2025 OneUSF Undergraduate Research Conference!

This event stands as a vibrant celebration of curiosity, creativity and the spirit of innovation that defines the University of South Florida. It is a powerful reminder that research is not confined to the walls of laboratories or limited to seasoned scholars. It begins with bold ideas, fresh perspectives, and the desire to explore the unknown.

Your contributions are vital to USF's research mission. They enrich our institution, elevate our impact, and help advance our reputation as one of the nation's leading public research universities. You are a key part of our research enterprise, and your voice and vision matter.

I am continually inspired by the energy, commitment, and intellect of our student researchers. Your work, spanning disciplines, formats, and fields of study, reflects not only your academic excellence but your courage to ask meaningful questions and seek transformative answers. This is the essence of research. This is the foundation of innovation.

I extend my sincere gratitude to the faculty mentors, staff, and supporters who guide and champion our student researchers. I also want to recognize the Office of Student Engagement in Research & Innovation for their dedication to fostering high-impact learning opportunities for our students and organizing this university-wide event.

Thank you.

Sylvia W. Thomas

Sylvia Wilson Thomas, PhD
Vice President, USF Research & Innovation
President/CEO, USF Research Foundation

Dear Students and Colleagues,

On behalf of the University of South Florida, I welcome you to USF's annual Undergraduate Research Conference. This special event is a celebration of the curiosity, dedication, and hard work of our undergraduate researchers and the incredible faculty mentors who support and guide them.

Today's conference is all about innovation, perseverance, and the drive to discover. It's a chance for students to share their research, spark new ideas, and connect with peers, faculty, and others who share a passion for learning and exploration.

Our student researchers represent the spirit of discovery and academic excellence. With the support of their mentors, they are tackling real-world challenges, diving deep into meaningful questions, and helping to shape a better future through their work.

To all of our student presenters and their teams—congratulations! Your commitment, creativity, and collaboration are inspiring. You embody the heart of USF's mission, striving for excellence that uplifts our university, strengthens our research, and makes a difference in our communities.

A heartfelt thank you goes to the Office of Student Engagement in Research and Innovation (SERI) for organizing this event and creating such valuable opportunities for our students to grow and shine. And to our faculty and staff volunteers—thank you for your time, guidance, and continued support. Your contributions are vital to the success of our students and the strength of USF's research community.

Thank you all for being part of this celebration of student achievement.

Prasant Mohapatra

Dr. Prasant Mohapatra
Provost and Executive Vice President

An Analysis of the Viability of Artificial Intelligence Tools for Reliable Investment Research

Aamir Dabiedeen

Faculty Mentor: Dr. Jared Williams (Muma College of Business)

The advent of predictive artificial intelligence seems to present a significant crossroad to financial analysis with such tools' data processing capabilities employed in investment research. With these systems being informed by online sources, this study sought to explore whether stock prediction accuracy is positively correlated with the 'popularity' of a firm with the public. By tasking artificial intelligence tools to generate predictions for numerous firms and comparing the accuracy of forecasts with a 'popularity' metric assigned to firms based on trend data of internet searches. The findings suggest that 'popularity' of a firm may not be a greatly significant factor in prediction accuracy, rather that artificial intelligence tools are less accurate with firms of volatile performances between periods. Implying that the reliability upon artificial intelligence tools for investment research remains uncertain.

An Exploration of the Factors Behind Gender Disparities in Healthcare Access in India

Aayush Kadiwar, Surya Banda

Faculty Mentor: Dr. Holly Donahue Singh (Judy Genshaft Honors College)

Gender disparities in healthcare access remain a critical issue in India which limits women's health outcomes and overall well-being. Systemic inequalities, cultural norms, and economic barriers disproportionately restrict women from receiving medical care. This research investigates the factors contributing to these disparities by exploring literature that examines gender biases in healthcare utilization, societal expectations, and economic constraints. Current literature demonstrates that women face limited access to healthcare due to lower literacy rates, economic dependency, and ingrained gender norms that prioritize male health. Studies indicate that women account for only 45% of hospital visits under government health insurance programs, reflecting systemic biases in healthcare accessibility. Cultural practices, such as malnutrition due to discriminatory food distribution and restricted autonomy in reproductive health decisions, further exacerbate these disparities. Additionally, geographic constraints and safety concerns disproportionately affect the ability of women to travel for medical care. Findings suggest that while increased female political representation has improved healthcare access, gender disparities still exist. Future research should evaluate the effectiveness of gender-inclusive health policies and address socio-cultural barriers that limit women's healthcare access which is necessary for achieving social development and equal access to healthcare in India.

Evolutionary Optimization of Biologically-Inspired Mechanistic Input-Output Neural Circuit Models in the Auditory Pathway

Abdul-Malik Zekri

Faculty Mentor: Dr. Ankur Mali (Bellini College of Artificial Intelligence, Cybersecurity and Computing)

Understanding how to compute specific functions from neural architecture is a fundamental challenge in neuroscience, with profound implications for artificial intelligence, neuromorphic computing, and neurological health. This study employs evolutionary meta-heuristic algorithms to optimize a mechanistic input-output spiking neural network (SNN) model of the cochlear nucleus, a key circuit in the auditory pathway. The research integrates biologically inspired initialization, iterative optimization, and data-driven validation to explore how connectivity and topology influence input-output relationships in neural circuits. Synthetic input-output spike train pairs are generated using a computational model of the cochlear nucleus. SNNs are initialized, and their synaptic parameters are refined using spike-timing dependent plasticity (STDP) while connectivity and cellular properties are evolved over generations. Fitness is evaluated based on the accuracy of replicating experimentally observed input-output patterns and the optimization is performed in parallel across a population of networks. This approach not only seeks to replicate the computations of biological circuits but also provides insights into the principles underlying neural circuit architecture. Preliminary findings are expected to demonstrate that SNNs can accurately mimic biological computations, offering a scalable methodology for computational neuroscience. SNNs are particularly promising for energy efficient models capable of reducing AI's carbon footprint by mimicking the sparse, event driven nature of biological neural activity. This work also has the potential to expedite traditional connectomic reconstruction, inform the design of energy efficient neuromorphic hardware, test hypotheses about auditory processing, and guide neural architecture search (NAS) for artificial neural networks.

Recognizing Race: Examining Suspicion and Salience Across Defendant and Mock-Juror Characteristics

Abigail Heffner

Faculty Mentor: Dr. Christine Ruva (College of Arts and Sciences)

The study explored differences in suspicion (guessing the study's purpose) and salience (perceptions that race, age, and/or gender featured prominently in a trial) across manipulated defendant variables (age, gender, race) and mock-juror characteristics (political-orientation, age, gender) in an intimate partner homicide trial. Jury-eligible participants (N=1146; Mage=41.50; 48.9% women) first read a trial transcript, gave verdicts, and were asked to answer an open-ended suspicion probe, asking if they knew what the study was about. If they answered yes, they were prompted to briefly describe what they thought the study was about. These responses were coded by two coders for content pertaining to race, gender, and age. After completing manipulation checks, participants answered age/gender/race salience questions. As predicted, defendant race affected suspicion and salience responses. Specifically, when the defendant was Black (vs. White), mock-jurors were more likely to rate the trial as racially salient and suspect the study was about race. That said, very few mock-jurors indicated a racial purpose when the open-ended prompt was used. Interestingly, when the defendant was Black, liberals (vs. moderates or conservatives) were more likely to indicate greater levels of racial salience. However, contrary to our predictions, we did not find many differences between suspicion and salience probes; this may be due to the small percentage of participants who mentioned race in the open-ended probe. These results suggest that the simple presence of a Black defendant in an otherwise ambiguous trial may create racial salience, and participant political-orientation may impact ratings of racial salience.

U.S. Human Rights Rhetoric vs. Reality: American Foreign Policy in Argentina in the Early Years of the Dirty War

Abigail Sanders

Faculty Mentor: Dr. Arturo Jimenez-Bacardi (College of Arts and Sciences)

The Dirty War, a period from 1974 to 1983 during which a right-wing military junta seized control from the civilian government of Isabel Peron, was a time of abject-terror and nearly-indiscriminate violence against the so-called 'subversives' within Argentina. At the height of the Dirty War in 1977, the government was disappearing an average of 400 people a month. The Dirty War occurred with implicit permission from the Nixon and Ford Administrations, as is exhibited in countless pages of newly declassified documents from before the junta deposed Peron through to the height of the Dirty War. These documents provide vivid details that help explain a United States policy of indifference toward human rights violations in Argentina. This stance contrasts sharply with the rhetoric of the United States Congress through legislative measures such as the Harkin Amendment to the charter of the Inter-American Development Bank, which sought to address and condemn these violations. This research was conducted through the use of the Foreign Relations of the United States volumes, as well as declassified documents on the Central Intelligence Agency's Freedom of Information Act reading room website. The presented findings raise questions about the legality and morality of tacit consent between the United States executive branch and foreign violators of human rights.

Molecular Insights into Lyme Disease: Identifying Peromyscus Mice and Assessing Borrelia burgdorferi Infection

Adam Kwon

Faculty Mentor: Dr. Lynn Martin (Morsani College of Medicine)

Lyme disease, caused by the bacterium Borrelia burgdorferi, is transmitted to humans through bites from Ixodes scapularis (black-legged ticks) that have previously fed on infected hosts. Two primary reservoir hosts for this spirochete are Peromyscus leucopus (white-footed mouse) and Peromyscus maniculatus (deer mouse). These two closely related species exhibit ecological and morphological similarities and co-occur in the upper Midwest of the United States, a region increasingly recognized as a hotspot for tick-borne diseases. However, their relative capacities to host and transmit B. burgdorferi to ticks (i.e., host competence) differ, highlighting the need for accurate species identification in disease ecology studies. This study aimed to genetically differentiate these two Peromyscus species and assess their infection status using molecular tools. In collaboration with the National Ecological Observatory Network (NEON), we analyzed ear tissue samples from mice across seven sites in the Eastern and Midwestern United States. Ear tissue was

selected for analysis due to its common role as an attachment site for ticks. DNA was extracted from the samples and analyzed using Polymerase Chain Reaction (PCR) followed by gel electrophoresis for species identification. Additionally, Droplet Digital PCR (ddPCR) was employed to detect B. burgdorferi DNA, allowing us to determine infection status and bacterial load in individual mice.

Addressing Health Inequities in Stress-Induced Cardiomyopathy: Strategies to Improve Outcomes in Acute Care Settings

Adam Mansoor, Zia Huh, Mark Mori Acosta, Sara Erally, Gianna Robertson, Caitlin Moyer
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Stress-induced cardiomyopathy (SIC), also known as Takotsubo cardiomyopathy, is characterized by transient heart muscle weakening due to acute stress and is associated with severe complications such as cardiogenic shock and arrhythmia. Despite having morbidity and mortality rates comparable to acute coronary syndrome, the etiology of SIC remains poorly understood. This review hypothesizes that racial and ethnic disparities in SIC outcomes are driven by social determinants of health and inequities in healthcare access, disproportionately impacting Black and Hispanic populations. To test this hypothesis, a systematic review was conducted using databases including Web of Science, JSTOR, PubMed, and ScienceDirect. Studies were screened, organized, and analyzed using Rayyan software, focusing on outcomes stratified by race, ethnicity, and socioeconomic factors, and gender. The review also examined intersections of chronic stress (weathering), hormonal influences, and comorbidities with SIC progression. Evidence revealed that systemic inequities contribute to delayed recognition and poorer outcomes in marginalized groups, particularly for secondary SIC associated with conditions like sepsis, and COVID-19.

Maternal Risk-Management elucidates the Evolution of Reproductive Adaptations in Dolphins by means of Natural Selection

Adeline Snyder
Faculty Mentor: Dr. Deby Cassill (College of Arts and Sciences)

The maternal risk-management model is the study of how breeding females allocate resources between offspring size, offspring number, and offspring diversity to achieve reproductive success, i.e., replacement fitness. Maternal investments in offspring size, number, and diversity are shaped independently by diverse risk factors: the extent of gaps during seasonal resource cycles, rates of predation/parasites, and unpredictable catastrophes such as disease, floods, fire, or anoxic events. Here, in dolphins, we show that maternal investments within and across species agree with the predictions of the maternal risk-management model. Within dolphin species, larger females invested in larger offspring and larger litters. We show that offspring size and offspring number per litter were independent maternal investment strategies. The risk of starvation favored investments in larger offspring. The risk of predation favored investments in larger litters. In conclusion, our study showed that dolphins are predation-selected species. If empirical studies continue to confirm its predictions, maternal-risk management may yet emerge as a unifying model of diverse reproductive adaptations by means of natural selection.

Novel 1st Carpometacarpal Joint Replacement Ensemble Procedure Compared to Existing Suspension Arthroplasty

Aditya Taiwade, Shreyas Sathya, Jay Garvey
Faculty Mentors: Dr. Scott Gargasz and Dr. Rahul Mhaskar (BayCare and Morsani College of Medicine)

Osteoarthritis is a common condition that affects the joints within the hand, specifically the first carpometacarpal joint (1st CMC joint). It is a degenerative disease in which there is loss of the cartilage leading to decreasing joint space and osteophyte formation. In advanced cases, there may be bone contact and deformity of the joint Osteoarthritis presents with pain, deformity, loss of function and decreased range of motion and is initially managed with anti inflammatories, PT/OT, and symptomatic management Surgical interventions are reserved for severe arthritis to provide pain relief. The standard

procedure, a trapeziectomy and suspension arthroplasty, currently leaves the patient with reduced grip strength and permanent subluxation of the 1st CMC joint due to the removal of the trapezium A brand-new procedure, the Ensemble pyro carbon joint spacer, aims to provide pain relief from 1st CMC osteoarthritis by adding a novel spacer within the joint which has shorter recovery time, and preserves grip strength and range of motion. The Ensemble procedure compared to the standard suspensionplasty procedure gives patients a new option for treatment of 1st CMC osteoarthritis, and with further research could become the new standard of surgical intervention. In this poster we aim to compare the two treatments and raise questions which could guide further investigation.

After the Nest: How Work-Family Conflict and Well-Being Mediate the Relationship between the Degree of Empty Nesting and Work Effort

Adriana Gonzalez
Faculty Mentor: Dr. Claire Smith (College of Arts and Sciences)

The prevalence of empty nesters continues to rise, making it crucial to understand how this life transition impacts various aspects of their lives. While much research has focused on early parenting stages, which are associated with lower well-being and higher work-family conflict, less has been done examining later parenting stages like empty nesters. As the workforce continues to age, it is important for organizations to understand what to do to sustain their employees' well-being, health and commitment throughout their career. The study aims to explore how well-being and work-family conflict mediate the relationship between the degree of empty nesting and work effort. We will use data from the MIDUS II (2004-2006) & III (2013-2014) datasets. The main objective was to identify various factors and how they play a role in good health, psychological well-being and social responsibility during individuals' adult years. We hypothesize that the degree of empty nesting will be positively associated with their work effort. We also hypothesize that work-family conflict mediates the relationship between degree of empty nesting and work effort, such that more extensive empty nesting is linked to higher work effort through lower work-family conflict. Lastly, we hypothesize that well-being mediates the relationship between the degree of empty nesting and work effort, such that more extensive empty nesting is linked to lower work effort through lower well-being. This research will contribute to understanding the impact empty nesting has on individuals' professional lives and what organizations can do to support them during this transition.

Maternal Health and Caste in North India and Nepal

Adriana Gutierrez
Faculty Mentor: Dr. Holly Donahue Singh (Judy Genshaft Honors College)

One of the Sustainable Development Goals (SDGs) declared by the United Nations calls for an international decrease in maternal mortality rates and an increase in maternal healthcare access; Nepal and north India are two regions that have each made strides in these areas. However, both of these regions continue to have socioeconomic and cultural classes that may unequally impact mothers' mortality rate and access to healthcare: the caste system. While caste is not governmentally recognized, it persists in the cultural environments of Nepal and north India. In this research project, the aim is to compare the maternal mortality rates and availability of healthcare between each of these regions and investigate the impact of caste level. Upon gaining understanding of the circumstances of lower caste women and the factors that lead to high maternal mortality and low maternal healthcare access, the next step is to identify potential solutions to boost Nepal and north India into the parameters set in the SDGs.

Evaluating Impact of Congenital Zika Virus Infection on Reproductive Health and Neonatal Outcomes in Latin America

Adrianna Soto, Maria Ivanova, Amanda Chinea, Daniela Davila, Ana Laura Alcantara Nascimento, Michelle Rodriguez
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Congenital Zika virus syndrome (CZS) represents a severe and multifaceted outcome of Zika virus (ZIKV) infection during pregnancy, with far-reaching implications for both maternal and neonatal health. ZIVK, transmitted through the Aedes aegypti mosquito vector, has been linked to a range of birth

defects, most notably microcephaly. CZS also increases the risk of other complications such as stillbirth, miscarriage, neonatal death, and a spectrum of congenital malformations. Between 2015 and 2016, over 2,000 confirmed cases of microcephaly linked to ZIVK were reported in Brazil, underscoring the epidemic as a public health crisis, particularly in Latin America, where environmental and socio-economic factors exacerbate infection rates. A systematic literature review was conducted using databases such as PubMed, CDC and BMJ Journal, to assess the impacts of CZS on reproductive health and neonatal outcomes. Publications between 2015 and 2024 were screened and chosen based on the criteria. Articles highlighted that infants are likely to develop central nervous system abnormalities, which include calcification and ventriculomegaly. Findings also revealed significant barriers for effective CZS diagnosis, such as the incidence of asymptomatic infections, narrow detection windows, and scarce resources. For maternal health, key issues identified include lack of adequate education about the long-term effects of ZIVK, limited access to contraception and pregnancy prevention resources, and increased requests for abortion medication, driving changes in reproductive behavior. Recommendations to lower adverse outcomes include strengthening prenatal care, increased early detection through routine ultrasounds, and implementation of prevention efforts through health education.

The role of estrogen in lung health

Aishwarya Aggarwal
Faculty Mentor: Dr. Narasaiah Kolliputi (Morsani College of Medicine)

Estrogen, a key sex hormone, significantly influences lung health by modulating inflammation, immune responses, and disease progression. It impacts over 50% of women worldwide, yet the precise mechanisms underlying these effects remain misunderstood. This study evaluates how estrogen influences inflammation and disease progression in lung health, focusing on hormonal imbalances. A systematic review of PubMed and Scopus peer-reviewed literature (2000–2024) was performed. Thirty studies were selected considering their relevance for the role of estrogen in asthma, inflammation, lung cancer, and fibrosis. Studies that were included were experimental models to study estrogen receptors and hormonal effects on disease severity. Experiments also investigated the effect of estrogen receptors on immunity and the hormonal component in the severity of disease. Findings revealed that 50% of women with lung adenocarcinoma are non-smokers, and premenopausal women have lower survival rates. Experimental models revealed that estrogen exacerbated lung fibrosis, particularly in women with low gut microbial diversity. Estrogen metabolism was also linked to the development of lung cancer, revealing its impact on inflammatory and disease results. These findings align with previous studies showing that estrogen receptors modulate inflammatory pathways in lung cancer. Future research should explore estrogen receptor-targeted therapies and the interplay between hormonal and microbial factors in lung disease management.

Curating Playlists for a Group Music Intervention for Dementia: Association Between Customization and Engagement among Memory Care Residents

Alaina Chacko, Margarita Peña Ochoa, Gabriela Rivera
Faculty Mentor: Dr. Hongdao Meng (College of Behavioral and Community Sciences)

Music-based interventions (MBIs) offer a multi-sensory, non-pharmacological approach to managing neuropsychiatric symptoms in individuals with dementia, particularly through personalized playlist curation within group settings. This case study assesses the impact of iterative playlist modifications on agitation and related symptoms, as assessed using the Cohen-Mansfield Agitation Inventory (CMAI), among residents of an assisted living facility. Baseline CMAI assessments were conducted prior to the music-based intervention sessions, with follow-up evaluations at weeks 4 and 8 to track changes in symptoms throughout the intervention period. This group-based intervention centered around personalized playlists, with adjustments made based on group preferences, resident feedback, engagement levels, and observed behavioral cues. Modifications to the playlists prioritized group preferences, including changes in song selection, tempo, artist, and duration, aimed at optimizing emotional and cognitive responses. The findings suggest that personalized playlist curation significantly reduces agitation and enhances overall resident engagement. When evaluating the CMAI responses, a notable reduction in agitation was observed from baseline to week 4, with some participants no longer displaying agitation and others showing a decrease in symptom severity. This was sustained through week 8, as follow-up assessments indicated reductions in agitation compared to baseline, reinforcing the long-term effectiveness of the intervention. While limitations exist in exploring the broader effects of personalized playlists on neuropsychiatric symptoms of dementia, this research underscores the potential of personalized playlist curation to mitigate agitation and other neuropsychiatric symptoms while sustaining engagement within a group setting.

Comparing Book Bans in the United States During the 1950s and the 21st Century

Alana Frazier
Faculty Mentor: Dr. Cayla Lanier (Judy Genshaft Honors College)

This paper compares book bans in the United States during the 1950s and the 21st century. The available literature on the topic clearly outlines the motivations for each era's book bans. In the 1950s, the American public censored books that were deemed communist in nature due to the weariness of the Cold War. Books connected to social justice causes, including the Civil Rights Movement and the LGBTQ+ community, were deemed dangerous by United States politicians, recognizably Senator Joseph McCarthy. Moving into the 21st century, modern-day book bans similarly target books that discuss sexuality, gender identity, and race. However, recent bans differ in motivation from those of the 1950s as 21st century politicians are not concerned about communism but instead want to protect children from themes deemed too mature for the classroom. Censorship in both eras was led by conservative politicians who feared the indoctrination of the next generation. Though the motivations for each era's book bans are clearly found in the current scholarly conversation, the outcomes of the book bans are widely unknown. Individual interviews with librarians and students affected by each era's book bans are not adequately present in the current literature. Evidence is similarly lacking on how the quality of education available to students changes with book bans. From this gap, a proposed research question is formed to guide a future case study on the topic: how do the educational environments under book bans in the United States during the 1950s and the 21st century compare?

Impact of STAT3 Inhibition on Tumour Progression and Immune Evasion in Non-Small Cell Lung Cancer

Alejandra Santos Ginorio, Anjali Mukkamalla, Saranya Nallamothu, Sandy Henin
Faculty Mentor: Dr. Hector Gomez (Morsani College of Medicine)

Signal Transducer and Activator of Transcription 3 (STAT3) is a critical transcription factor that regulates cell growth, survival and immune responses. It is implicated in Non-Small Cell Lung Cancer (NSCLC), the most prevalent form of lung cancer categorized by aggressive tumour progression and high metastatic potential. NSCLC's aggressiveness stems from the overactivation of STAT3, promoting cancer cell proliferation, survival, and invasion through mechanisms including genetic mutations, cytokine signalling and inflammatory pathways within the tumour microenvironment. This heightened STAT3 activity not only supports tumour growth but also suppresses anti-tumour immune responses and fosters an immunosuppressive environment. Currently, treatment for NSCLC patients involves cancer therapies that reduce tumour cell proliferation. This study investigates the impact of STAT3 inhibition in NSCLC that suppresses the anti-tumour immunity and epithelial-mesenchymal transition in the cancer cells. This article utilizes the PubMed database to retrieve a total of twenty articles regarding the effects of STAT3 on cell growth and metastasis, specific STAT3 inhibitors such as W2014-S, IL-37, MicroRNA-148a, RITA and WP1066, and investigating their effects on NSCLC. Inhibiting STAT3 reduces tumour cell proliferation while enhancing T-cell activation and reducing immunosuppressive factors within the tumour microenvironment. Some studies observed the role of STAT3 inhibitors with both in vitro and in vivo samples, highlighting the therapeutic potential. STAT3 clearly has a crucial role in aggressive pathogenesis seen in NSCLC due to increased immune evasion; thus, the inhibition would help reduce the tumour invasiveness, offering a promising therapeutic approach to mitigate NSCLC progression and enhancing the efficacy of existing treatments.

mRNA Vaccines Through the Ages: Design, Development, Application, and Reception

Alexa Tierney, Jonah Blankenbaker, Reese Mumbauer, Tanisha Nahata , Ananya Ranganagoudar, Marie Kolombia
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

The development of mRNA vaccine technology offered a pivotal advancement in modern medicine — rapid and effective solutions to infectious diseases like the recent COVID-19 pandemic revolutionized the field. Understanding the development and evolution of this treatment would bridge the gap between biomedical innovation and societal acceptance. It would provide actionable insights to inform vaccine development, public health campaigns, and policy initiatives. This research employed the PRISMA method to study both the physical and social responses to this type of treatment. The analysis yielded an initial 400+ articles which was ultimately narrowed down to 50 articles through an intensive screening process. The results of the mRNA based Covid-19 vaccines (Pfizer-BioNtech and Moderna Vaccine) demonstrated a broad range of physiological responses including headaches, muscle pain and cutaneous symptoms. The vaccines induced strong immune responses using lipid nanoparticles delivering mRNA throughout the body. The novelty of the mRNA Covid vaccines was among the most serious causes of hesitation among medical professionals with regard to their willingness to recommend the vaccine to their

patients. It was found that the novelty of the mRNA Covid vaccines proved a salient factor in the risk assessment of patients deciding how to respond to the Covid-19 Pandemic. The findings underscore the need for ongoing education and transparent communication targeting both healthcare providers and the public to address concerns and foster greater trust in biomedical advancements. By identifying the physiological responses and societal challenges associated with mRNA vaccines, this study highlights critical areas for improvement in vaccine rollout.

Investing ISG15 Variants and Their Influence on Immune Modulation and Disease Susceptibility

Alexander Cox
Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

Following the SARS-CoV-2 pandemic beginning in late 2019, there is increasing necessity for understanding human immune responses and developing viral treatments that can better protect the population. The Interferon-Stimulated Gene 15, known as ISG15, modulates these responses, covalently bonding proteins intracellularly and extracellularly producing interferon-gamma cytokines (IFN-) to enhance natural killer (NK) cells and T cells. The process of binding ISG15 to target proteins is a process of ISGylation which can trigger the innate immune responses of the individual. Limited intracellular protein production increases susceptibility to bacterial infections, however, elevated extracellular free ISG15 can enhance anti-viral and anti-cancer effects. The primary germline disease associated with this gene is immunodeficiency 38 in which the IDG15 gene is deficient. Individuals experience vulnerability to mycobacterial diseases, low responses to viral infection, and intracranial calcification. However, various single nucleotide polymorphisms (SNPs) are documented having unknown significance, particularly around gene interaction sites and conserved lysines. This research analyzes pathogenic SNPs in ISG15 through databases such as NCBI and USCS, assessing their potential impact on ISG15 expression. This aims to further the understanding of ISG15 variants for better detection of disease potential and individual treatment.

Evaluating the Prevalence of Waterborne Diseases in Sosua, Puerto Plata, Dominican Republic

Alexander Huynh, Adam Mansoor, Kai Penalosa, Arshita Singh, Ava Badiei, Sara Mansoor
Faculty Mentor: Dr. Lindy Davidson (Judy Genshaft Honors College)

Water quality and waterborne diseases represent critical public health challenges in the Dominican Republic, where rapid urbanization and inadequate sanitation compromise the safety of drinking water for both tourists and citizens. In particular, persistent outbreaks of cholera, typhoid fever, giardiasis, leptospirosis, and diarrheal diseases continue to affect rural communities, such as the Sousa, Puerto Plata Region. This is especially dangerous for the development of the Dominican Republic with tourists fearing water safety and citizens suffering from these aforementioned diseases. Previous studies have addressed isolated aspects of water quality and disease surveillance, yet few have comprehensively linked environmental contamination with the sustained transmission of these illnesses across urban and rural areas in the Dominican Republic. This project aims to evaluate the prevalence of waterborne diseases in the DR and assess possible interventions for improving water quality. A systematic review of databases such as PubMed, Sciencedirect, and JSTOR was conducted to identify studies examining water quality and existing sanitation methods. Data extraction focused on evaluating existing protocols during previous outbreaks, highlighting their strength and limitations and assessing the potential for novel preventative measures. Findings suggest that existing conditions are inadequate to maintain water quality and measures that focus on primary prevention are necessary to prevent outbreaks of waterborne disease. Future studies should be conducted to test the water quality and obtain an accurate view of how much work needs to be done in rural regions like Sosua, Puerto Plata, and implement interventions to improve the situation.

Impact of AI and Telemedicine on the Emergency Department by Optimizing Patient Management and Resource Allocation

Alexandra Baker, Sophia Martinez
Faculty Mentor: Dr. Keith Dombrowski (Morsani College of Medicine)

Modern healthcare relies on interconnected digital systems, making emergency departments prone to disorganization. Consequently, overcrowding and resource misallocation negatively impact patient outcomes. Artificial Intelligence (AI) and telemedicine have emerged as promising solutions for triage

in the emergency department (ED). This review highlights the efficiency of integrating technology into the ED for patient management and resource optimization. A systematic literature review was conducted, and articles on AI integration in triage, remote monitoring, and emergency department workflow optimizations were gathered and evaluated. The group reviewed 80 articles and selected the most relevant based on the above criteria. Hospitals integrating AI and telemedicine, such as remote devices and online consultations, were found to have high patient satisfaction (92.8%), with a 60% reduction in patient wait times. The assistance of AI for decision-making and medical data retrieval resulted in reduced ED congestion and lower mortality rates for critical cases. Half of the articles reviewed (20/40) suggested that AI in telemedicine optimizes patient management and resource allocation in the ED and other settings, while others highlighted a need for stronger studies. The implementation of this technology demonstrates high patient satisfaction and reduced overall costs associated with high CERQual ratings. This improvement relieved hospital burdens and refined the organization of the ED. Our findings highlight clear trends supported by extensive data. Future research should focus on larger datasets and real-world trials to optimize technology-driven triage. However, we did not include statistical testing; future research should further accurate statistical testing and focus on expanding datasets.

The Ladder of Escalation: The Cuban Revolution and Bay of Pigs

Alexandria Barnes

Faculty Mentor: Dr. Arturo Jimenez-Bacardi (College of Arts and Sciences)

By 1957 a socialist revolution was taking form in Cuba, at which time the United States became wary of its foreign policy and national interests with the State. A radical shift toward relation deterioration occurred in 1959 as an urban resistance movement against the United States backed Batista Regime in Cuba took place. It was believed that the opposition, led by Fidel Castro Ruz, was heavily influenced by communism, earning the attention of U.S. policymakers as the fear of imperialism, later communist influence, has been at the center of U.S. foreign policy in the region since its rise as a great power. The possibility of such marked the start of heating tensions between the two within the broader premise of the Cold War in Latin America, friction between the U.S. and the U.S.S.R. The United States hoped to limit or expel communist forces from the region through a series of covert action, ultimately resulting in the failed Bay of Pigs operation. The goal of my research will be to analyze the dynamics between the U.S. and the communist ideology and how that translated into the states relations with Cuba during this time. There will be two questions at the center of my research: How did ideological differences influence U.S. policy during the Cuban Revolution and the failed Bay of Pigs invasion? And how did the enacted economic policies determine the deterioration of relations between the United States and Cuba moving forward?

How can Teachers Maintain Student Engagement throughout the School Day?

Alexandria Harrison

Faculty Mentor: Dr. Tammy Sommers (College of Education)

This study investigates strategies teachers can implement to help students maintain engagement throughout the school day, particularly during reading and writing instruction, as well as writing interventions. The issue of student engagement has been observed consistently in both regular class sessions and specialized writing interventions. Despite varying times of day, students seem unable to sustain attention for extended periods. The goal of this research is to identify and evaluate effective methods that support student engagement, ensuring they remain engaged and attentive throughout the entirety of their school day. The findings aim to provide practical solutions that can be incorporated into instructional practices to foster sustained attention and improved learning outcomes.

The Green Thumbs Up: How does user-generated content (UGC) and primarily Gen-Z participation in sustainability messaging and campaigns spread across popular social media platforms? How does this content affect the mass perception of sustainability efforts and willingness to make a real-world impact?

Alexis Agnew
Faculty Mentor: Dr. Carol Osborne (Muma College of Business)

"We cannot solve problems by using the same kind of thinking we used when we created them." — Albert Einstein

Sustainability today remains a complex and subjective concept, shaped by political and social discourse, corporate influence and public perception. This paper examines the role of social media, as user-generated content (UGC) is reshaping modern communications around sustainability initiatives and discovering how it can be leveraged to influence consumer attitudes. As Gen Z contributes to developing online activism, social media channels like TikTok, Instagram and Facebook have become essential platforms for bringing awareness to center stage and mobilizing action on environmental issues. According to a compilation of peer-review literature and primary data from a survey, this study examines how UGC, specifically creates engagement, increases perceived authenticity and employs virality in sustainability discourse. Findings demonstrate that social media is not only a space for public dialogue, but it is also a key tool for creating real-world action and bridging the gap between awareness and impact. This study also illustrates how bottom-up online movements and user-generated content inform evolving sustainability conversations, impacting marketing strategies that emphasize transparency, education and audience engagement. Through combining this understanding from academic literature and primary data findings, this paper showcases the potential of social media for revolutionizing sustainability communication and engaging collective action.

SRGAP2C and the Human Mind: A Genetic Key to Cognitive Evolution

Alexis J. Zayas
Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

The SLIT-ROBO Rho GTPase Activating Protein 2C (SRGAP2C) gene is a human-specific ortholog of murine SRGAP2 and paralog of SRGAP2A, playing a pivotal role in cortical development and neural plasticity. Unlike SRGAP2A, SRGAP2C arose through segmental duplications unique to the Homo lineage approximately 3.4, 2.1, and 1 million years ago. These duplication events coincide with the divergence of early Homo species from Australopithecus and the emergence of increased cognitive abilities and tool use. SRGAP2C functions as a dominant-negative regulator of SRGAP2A by inhibiting its activity. This results in delayed synaptic maturation and increased density of dendritic spines, key factors thought to enhance information processing and storage in the human brain. In this study, the nucleotide and protein sequences of SRGAP2C were analyzed and compared to their orthologous sequences in Pan troglodytes. Results demonstrate high conservation between the species, yet distinct mutations in the SRGAP2C paralog contribute to its inhibitory effect on SRGAP2A. Importantly, two potential AP2_Q3 transcription factor binding sites were identified within the conserved introns of the SRGAP2C sequence, suggesting a regulatory mechanism that may influence the expression of SRGAP2C during cortical development. These sites are hypothesized to enhance the gene's role in modulating neural differentiation and maturation. These findings offer insight into SRGAP2C's evolutionary significance and its potential impact on the molecular mechanisms underlying human cognitive evolution.

The Caste System in India

Ali Ebrahim, Addison Wiggins
Faculty Mentor: Dr. Holly Donahue Singh (Judy Genshaft Honors College)

In this project, we will provide an in-depth review of the different ways in which the caste system in India is interpreted. We will examine it through many philosophical lenses as well as through a healthcare lens in order to provide understanding regarding how it is interpreted and how it can affect the lives of low, middle, and high caste individuals and groups in the Indian urban centers and countryside. Many outlets would seek to diminish the impact that the caste system is having to this day in India, but hopefully this paper could seek to explain the very real consequences this systematic way of thinking still has to this day.

Impacts of Methicillin-Resistant Staphylococcus aureus (MRSA) on Pediatric Patient Illnesses

Alina Godin, Chelsea Gabarron, Camille Eason, Sergi Aragones Torne, Silviya Dimitrova, Husena Rajkotwala
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Methicillin-resistant Staphylococcus aureus (MRSA) poses a significant threat to pediatric patients. Fear of fatality has been linked to several MRSA-related illnesses including pneumonia, surgical site infection (SSI), sepsis, and bacteremia. As a result, the rising concern of pediatric hospitalizations have been globally reported. This review aims to identify preventative methods and antibiotics that will reduce MRSA exposure and determine the most effective recovery plan for future patients. It can be hypothesized that the implementation of sterilization protocols can lower contraction rates of MRSA. It can also be assumed that the administration of antibiotics other than Vancomycin can be applied to manage existing colonization of MRSA in hospitalized pediatric patients. A systematic literature review was conducted over the course of four months. Articles were gathered from public scientific databases with the use of key terms like "pediatric," "MRSA," and "illnesses." A total of 239 articles were imported to the Rayyan interface for thorough review. In-depth article filtration performed through Rayyan found 27 studies to contain relevant research supporting the initial hypothesis. Upon review, treatment options, early infection detection and associated illness contractions were revealed. Vancomycin remains the best antibiotic, however, Daptomycin and Linezolid are alternative antibiotics that lower the risk of nephrotoxicity. Intra-abdominal, respiratory, and skin infections are among the most prevalent MRSA-related illnesses. Additionally, preoperative risk assessments and nasal swab testing effectively contribute to MRSA prevention. Conducting further research on the detection, prevention, and spread of MRSA will help expand future understandings of its impacts on pediatric patients.

The Effects of Music Therapy on Pain Reduction in Pediatric Surgery

Alina John, Gisselle Contreras, Amal Daas, Pimnipa Panngarm, Sonya Patel, Gia Rodio
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Music therapy is an evidence-based method for managing pain that addresses both physical and emotional aspects. By stimulating the brain's reward system, it releases endorphins and dopamine to reduce pain and enhance mood. It also regulates physiological functions such as heart rate, blood pressure, and breathing, promoting relaxation. Music therapy helps manage both acute and chronic pain, reducing the need for medication, and is particularly beneficial in pediatric settings, creating a healing environment. This study reviews existing literature to examine the role of music therapy in pain reduction in pediatrics, focusing on both physiological factors (e.g., heart rate, blood pressure, respiratory rate) and psychological factors (e.g., anxiety, mood). Research from PubMed and JSTOR was analyzed to explore the effects of music therapy on pain management before and after surgery. Findings indicate that music therapy significantly reduces anxiety pre-operatively, decreases pain perception, and enhances coping mechanisms. Physiological factors, including heart rate and blood pressure, also improve following music therapy post-operatively. By stimulating brain areas related to emotion and pain modulation, music therapy promotes psychological distraction and physiological relaxation. The body's rhythms synchronize with the music's tempo, fostering a calming effect that reduces pain. Building on this literature, we aim to extend our research by investigating pain management and perception in the geriatric population, exploring potential differences in the effects of music therapy between pediatric and geriatric groups.

Media Analysis - Gilmore Girls, Season 6 Episode 19

Alison Frate
Faculty Mentor: Dr. Cayla Lanier (Judy Genshaft Honors College)

This media analysis will identify and explain the cultural symbols and portrayals present in season 6, episode 19, of the TV show Gilmore Girls. By providing cultural context and representation on a popular television show such as Gilmore Girls, this project identifies how this episode's portrayal of American and Korean culture and identity can impact large viewer perceptions and potential stereotypes.

Discipline in a Time of Disaster: Rethinking Student Success in the Wake of a Hurricane

Aliyah Miller, Estela Najera
Faculty Mentor: Dr. Heather O'Leary (College of Arts and Sciences)

In 2024, Hurricanes Helene and Milton made landfall onto the coast of Florida, causing widespread devastation across the Tampa Bay region. Our ethnographic research examines how students at the University of South Florida were affected by the two storms, and how they made sense of life in the disaster's aftermath. Increasingly frequent and catastrophic weather events interrupt the lives of students in many ways. At USF, students were left without power for extended periods of time, ordered to evacuate from their dorms, or returned to damaged and flooded homes. We look at such moments of disruption, displacement, and loss to explore how college students navigated academic life and responsibilities while living through a catastrophe.

Uncovering Novel Dimerization of Putative HTH Binding Domain Proteins in Genes 31-34 of Temperate Phage Alatato

Alvin Varghese, Nihal Anantoji, Shilen Abraham, John Coleman
Faculty Mentor: Dr. Richard Pollenz (College of Arts and Sciences)

Temperate bacteriophages contain genes that encode: integrase, excise, cro, and immunity repressor proteins. Phage Alatato, a temperate phage, infects Arthrobacter globiformis. However, no immunity repressor and cro genes were identified. Typically, these regulatory proteins contain helix-turn-helix (HTH) DNA-binding domains and dimerization domains. Interestingly, there is a cassette that encodes four <80 amino acid putative HTH proteins that could function as transcriptional regulators but lack the expected dimerization domain. The research goal was to determine if these four proteins interact with each other or bind Alatato DNA sequences. The AI program Alpha-fold was used to model the predicted structures and determine the potential to form homodimers or heterodimers. AlphaFold scores above 0.7 pTM and ipTM are considered confident. The data show that gp32 and gp33 formed homodimers with pTM scores of 0.89 and 0.87 pTM. While gp31 didn't meet this threshold for both homodimers and heterodimers, gp32 and gp34 also showed high dimerization potential, with a pTM score of 0.93 pTM for the gp32:gp33 heterodimer and 0.90 score for gp33:gp34 heterodimer. Analysis with upstream DNA sequences revealed strong binding: the gp32:gp33 dimer had a 0.83 pTM to Gene 33's upstream, while the gp33:gp34 dimer showed a 0.85 pTM to Gene 34 upstream and a 0.83 pTM/0.79 ipTM to gp33 upstream. These findings suggest functional dimerization domains in these small proteins and a potential regulatory role for gp32:gp34 in the lytic-to-lysogenic switch of phage Alatato.

Influencing or Misleading? A Study of Consumer Perception of Beauty Influencers Amidst the Rise of Deceptive Advertising on TikTok

Alyssa Riccio
Faculty Mentor: Dr. Timothy Heath (Muma College of Business)

As beauty companies shift promotional strategies toward influencer marketing, a new approach leveraging social media personalities to promote products, concerns have emerged over influencers' use of deceptive advertising tactics that violate trade laws. This project explores these practices used by beauty influencers on TikTok, gauges consumer trust in response to these concerns, and examines their ability to identify dishonest endorsements. Insight is gained through a survey that assesses consumers' perceptions of influencer content and asks them to identify a non-deceptive TikTok beauty ad. While consumers should be reducing their trust in popular beauty influencers due to continuous dishonesty, it is not expected they will easily recognize deceptive practices, as advertising regulations are not common knowledge. Ideally, the findings will encourage skepticism during viewership, as consumers may be unaware of deceptive tactics influencers use, while underscoring a need for deeper education on advertising laws in an era dominated by digital content.

The Humoral Theory and its influence on Indian Medicinal practices

Alyssa Russell

Faculty Mentor: Dr. Holly Donahue Singh (Judy Genshaft Honors College)

Every country has important cultural foundations that have shaped the structure and capabilities of its medicinal practices. Traditional Chinese medicine is recognized for its use of the Five Elements Theory. While early Americans implemented purification through prayer and detoxing in folk medicine. Like these notable foundations, Indian medicinal practices can be traced to the ancient Humoral Theory. Developed by the Greek physician and philosopher Hippocrates, this widespread concept consisted of four humors tying mental and physical health problems to a deficiency in one or more bodily groups (blood, yellow bile, black bile, and phlegm). This system worked by assigning each group its own qualities, organs, personalities, etc. The Humoral Theory is tied to the principles and systems of two prominent Indian Medicinal practices. These include both Ayurvedic and Unani medicine. Laying the foundation for these practices, this theory has shown significant influence on topics like the choice and use of medicine, lifestyle recommendations, and approaches to integrating modern medicine. The research will explore the significance of this theory in the evolution and history of Indian healthcare. Additionally, these ideas will take into consideration the major themes of the origins of sickness, specific ideas about the body, and the environmental/climate roles in health. Finally, this project will explore the humoral theories importance in diagnosing and treating illness amongst Indian and other populations.

Community-Based Disaster Preparedness and Chronic Disease Resilience in Caribbean Islands

Amal Daas

Faculty Mentor: Mary Cook, MSNA (College of Arts and Sciences)

Hurricanes not only devastate infrastructure but also threaten the health of individuals with chronic diseases by limiting access to essential healthcare services. Research from the Pan American Health Organization (PAHO) highlights that natural disasters exacerbate noncommunicable disease (NCD) management challenges, leading to increased morbidity and mortality due to medication shortages and healthcare disruptions. Using case studies from hurricanes Maria, Irma, and Dorian, as well as data from the New England Journal of Medicine on post-disaster health system failures, this study examines the role of community-led initiatives in improving resilience for patients with chronic conditions such as cardiovascular disease, kidney disease, and respiratory disorders. Public health assessments and interviews with community leaders further provide insight into the effectiveness of grassroots disaster preparedness strategies, including neighborhood emergency response teams, decentralized medical supply distribution, and culturally relevant health education programs. Findings from past disasters suggest that community-driven interventions significantly reduce hospital burden, enhance self-management of chronic diseases, and provide faster recovery for vulnerable populations. By emphasizing localized preparedness efforts, this research advocates for integrating community health networks into formal disaster response frameworks, aligning with recommendations from the World Health Organization (WHO) on strengthening community-based health resilience in disaster-prone regions.

Water Scarcity and Its Impact on Public Health in Palestine

Amal Daas

Faculty Mentor: Mary Cook, MSNA (College of Arts and Sciences)

Water scarcity remains a critical public health issue in Palestine, where restricted access to clean water contributes to widespread health disparities. This study investigates the relationship between water scarcity and public health outcomes, focusing on waterborne diseases, malnutrition, and overall quality of life. By analyzing existing literature from PubMed and WHO reports, as well as on-the-ground surveys, we assess how limited water infrastructure, geopolitical restrictions, and climate change exacerbate health risks. Findings indicate that water scarcity disproportionately affects vulnerable populations, leading to increased cases of gastrointestinal infections, skin diseases, and dehydration-related complications. The study also highlights the psychological stress associated with water insecurity, particularly among children and low-income families. By identifying public health consequences and potential intervention strategies, this research aims to inform policies that enhance water security and improve health outcomes in water-stressed regions.

Evaluating the Impact of Group Music-Based Interventions (MBIs) on Neuropsychiatric Symptoms among Memory Care Residents

Amanda Chinea, Aidan Sheehan, Ying Min Tan, Allison Bollow

Faculty Mentor: Dr. Hongdao Meng (College of Behavioral and Community Sciences)

Dementia is a progressive neurological condition that affects cognition and behavior. Nationally, approximately 42% of assisted living residents are living with dementia. Neuropsychiatric symptoms (NPS) like agitation and hallucination are common associations with dementia and have a significant impact on the well-being of patients and their caregivers. While evidence regarding the effects of non-pharmacological interventions such as Music-Based Interventions (MBIs) in reducing NPS has been accumulating, there is a paucity of research on quantitative measures of the MBIs' impact on NPS. This study aims to examine the relationship between observational measures of session engagement and changes in NPS. A total of 10 residents with dementia in one local assisted living community participated in the study between September and October of 2024. The Engagement of a Person with Dementia Scale (EPWDS) was completed by trained team members during each session (during Weeks 1-4) to measure participants' engagement levels. Staff completed the Neuropsychiatric Inventory Questionnaire (NPI-Q) to assess symptom severity in Weeks 0, 4 and 8. The average age of participants was 86 years (SD=7). Descriptive statistics and correlational analysis were conducted to examine trends and preliminary analyses demonstrate an association between MBI engagement and NPS. Findings indicate that engagement levels remained stable or increased among the majority of the participants, with a corresponding decrease in NPS. Further statistical analyses will include more participants to confirm these relationships. This study provides quantitative insights into the impact of music engagement on dementia-related NPS. Findings may help inform future MBI intervention design and implementation.

Participants' Feedback and Recommendations for Intervention Materials via Exit Interviews in a Pilot Randomized Controlled Trial, "Autism Eats": A Qualitative Study

Amanda Perez

Faculty Mentor: Dr. Heewon Gray (College of Public Health)

Children with Autism Spectrum Disorder (ASD) often exhibit feeding and eating behavior problems. The Autism Eats nutrition intervention was designed to improve problematic mealtime behaviors and diet quality in children with ASD under 3 years. This study aimed to analyze qualitative data from exit interviews in a pilot randomized controlled trial (RCT). Data was collected from semi-structured exit interviews conducted with early intervention (EI) providers and parents of toddlers with ASD after completion of either the Autism Eats intervention or the Enhanced Usual Care (EUC) control group. Interviews were completed virtually and took up to 50 minutes with questions on overall program, lesson structure/design, content/materials, delivery format, family involvement, intervention acceptability, and feeding and eating behavior changes. This particular analysis focused on participants' feedback on intervention benefits, materials, and recommendations to improve the program. Interviews were recorded, transcribed verbatim, and analyzed for emergent themes and thematic codes using a general inductive approach. Results showed that parents in both groups wished to see more recipes for "quick and easy dinner ideas", as well as a support group where parents could "share the experiences of other mothers who go through this". Providers expressed interest for additional fun and interactive activities, "this way, [the toddler] could also learn at mealtime, things like the location of the nose and eyes". These findings informed possible modifications to the Autism Eats intervention, including the addition of a parent support group and more interactive mealtime activities tailored to children's developmental needs.

The Impact of Nutrition and Patient Empowerment on Type I Diabetes

Amanda Perez

Faculty Mentor: Dr. Janice Zgibor (College of Public Health)

Type 1 Diabetes (T1D) is a lifelong autoimmune disease that can be challenging for patients to manage. This study explores the role of dietary factors and theoretical models in improving T1D outcomes. Key dietary recommendations include maintaining a consistent carbohydrate intake, increasing fiber and copper-rich foods, and reducing ultra-processed foods and high-caloric baked desserts. Patients who adhere to these recommendations demonstrate better HbA1C control and reduced long-term complications. In addition to dietary interventions, theoretical models such as the Health Belief Model (HBM) and empowerment theory have been shown to enhance disease management. The HBM suggests that patients who perceive their condition as severe and

recognize their risk are more likely to adopt beneficial health behaviors. The empowerment theory emphasizes an equal partnership between healthcare providers and patients, fostering sustainable relationships and improving adherence to treatment plans. This research also examines socioeconomic and cultural factors that influence diabetes management. Interviews with dietetics students highlighted the impact of socioeconomic status on dietary choices and healthcare access, reinforcing findings from the literature review. Additionally, students emphasized the importance of a holistic healthcare approach, advocating for coordinated care among providers to prevent gaps in treatment. Overall, this study underscores the significance of both nutritional strategies and patient-centered care models in optimizing T1D management. By integrating these approaches, healthcare professionals can enhance patient outcomes and support long-term well-being.

"When I Warp Time and Space - I Use My Words:" Representation and Bullying in the Comic Book Community

Amber Barrett
Faculty Mentor: Dr. Anna Dixon (College of Arts and Sciences)

Comic books and graphic novels appeal to a wide variety of people, including many people from marginalized communities. Oftentimes, these people will gravitate towards comics that have representation for people like them, where they can have a role model to look up to that they can relate to. These characters, and the people that read them, can often be subjected to harsh treatment from other people within the community who dislike these characters, being the target of bullying, harassment, and hate speech. For this project, I'll be using online forms and chat rooms to analyze discussions happening within them, looking at instances of bullying and hate speech within them, focusing on Billy Kaplan, also known as "Wiccan", while also looking at the role that comics and graphic novels have played in cultural and historical events throughout history.

Comprehensive Perspectives of Labor in Hurricane Aftermath

Amber Barrett, Ajalina Anglero, Jac Schaefer
Faculty Mentor: Dr. Heather O'Leary (College of Arts and Sciences)

Anything can be a cultural artifact, and therefore, anything can be examined and discussed through the lens of anthropological theories. Hurricanes and natural disasters often have devastating results for their communities, especially for marginalized communities impacted, which can be seen in 2005's Hurricane Katrina in New Orleans. In this presentation, we looked at hurricanes in the Southern US through the lens of different anthropological theories. These include Feminist theory, looking at pregnant women and single mother's experience in Hurricane Katrina, Marxist theory, Boasian theory, and Functionalism. To achieve this, we studied pillars and peers of each anthropological theory, as well as researching impacts from specific hurricanes, and performing auto and duo-ethnographies based on our own experiences. This research has allowed and will continue to aid us to examine how Southern US cultures respond following a hurricane, the perspectives that can be used to aid various communities in need, and how we can better prepare and assist in future hurricanes.

Limulus Amebocyte Lysate: Advancements, Ethical Challenges, and the Future of Endotoxin Detection

Amber McGhee, Sara
Faculty Mentor: Dr. Marlius Castillo (College of Arts and Sciences)

Limulus Amebocyte Lysate (LAL) is a crucial biological reagent derived from the blood of horseshoe crabs, primarily Limulus polyphemus. It is widely used in the pharmaceutical and medical industries to detect endotoxins—harmful bacterial contaminants that can cause severe immune reactions in humans. Before the development of LAL, endotoxin detection relied on the rabbit pyrogen test, which was time-consuming, costly, and often yielded inconsistent results. The introduction of LAL in the 1970s revolutionized the field by providing a more sensitive, rapid, and reliable method for ensuring the safety of vaccines, injectable drugs, and medical devices. Despite its advantages, the reliance on horseshoe crab blood raises ethical and ecological concerns, as harvesting can impact crab populations and the marine ecosystem. To address these issues, scientists are exploring synthetic and recombinant alternatives, such as recombinant Factor C (rFC), a laboratory-produced substitute that mimics the endotoxin-detecting ability of LAL without requiring

live animals. These alternatives promise a more sustainable and ethical approach to endotoxin testing while maintaining high sensitivity and accuracy. As regulatory agencies increasingly support these innovations, the future of endotoxin detection is shifting toward synthetic solutions that reduce dependence on wildlife, ensuring both scientific progress and environmental responsibility.

Marine Medicine: Exploring the Antimicrobial Capabilities of Bacillus velezensis Isolated from a Marine Sediment Sample

Amelia Taggart
Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

Antimicrobial resistance (AMR) is a critical medical challenge with significant implications for public health and the future of reliable healthcare. In response to this issue, the search for previously undiscovered sources of antimicrobial microorganisms, as well as the validation of findings from previous studies is essential. This study examines a sediment sample collected from the back bay on North Beach in Fort de Soto Park, Florida—an area characterized by low water flow, high levels of dissolved organic matter and anaerobic sediments. Bacterial plating, colony isolation, Kirby-Bauer and disc diffusion assays, selective and differential media analyses, DNA extraction, and 16S PCR identified the isolate as Bacillus velezenis, which exhibited antimicrobial activity. These findings highlight the importance of exploring unrecognized microbial environments for novel antibiotic compounds.

Effects and Risks of Pediatric Malnutrition on Neurodevelopmental Disorders and Cognitive Decline

Aminata Thiam, Ana Beatriz Melgar, Katie-Linn Poindexter, Mandy Jiang, Maxx Struhs, Valerie Vargas Ardila
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Malnutrition during early childhood is a significant risk factor for neurodevelopmental disorders (NDD) and cognitive decline (CD), with lasting effects into adulthood. Deficiencies in essential nutrients, such as vitamins, minerals, and fatty acids, hinder the proper development of the brain, leading to issues such as attention deficits, cognitive delays, and neurological disabilities. This project aims to examine the effects of pediatric malnutrition on neurodevelopmental outcomes and assess the metrics used to analyze cognitive outcomes in pediatric patients. Utilizing electronic databases such as PubMed and JAMA Network, a systematic literature review was conducted to evaluate the impact of CD and NDD in children under 5 years old. Based on whether NDD and CD were assessed in malnourished children in developing countries, peer-reviewed publications published between 2010 and 2024 were chosen and analyzed. Studies demonstrate a mild to strong association between early childhood malnutrition and changes in brain structure and function, including reduced brain volume, low maturation rate and impaired myelination. Nutritional interventions, including micronutrient supplementation and early dietary support, have been shown to improve cognitive outcomes in malnourished children. However, the effects are particularly pronounced in low-income populations, where malnutrition is prevalent. Addressing these challenges through targeted, culturally-sensitive interventions is crucial for mitigating the long-term developmental consequences of early life malnutrition. By refining intervention strategies and identifying biomarkers for early detection, targeted policies can be developed to enhance neurodevelopmental outcomes and improve quality of life across populations, particularly in resource-limited settings.

Cancer Coaching and Remote Education for Self-Empowerment (CARES): A Single-Arm Feasibility Study

Amruta Bollineni
Faculty Mentor: Dr. Karim Hanna (Morsani College of Medicine)

Pancreatic cancer is the fourth-leading cause of cancer-related deaths, and its treatment negatively affects the quality of life for both patients and caregivers, including high symptom burden, with caregivers experiencing concerns such as navigating the role of providing support. As a result, maneuvering through cancer treatment often requires a high level of self-management. There is limited research on interventions designed to help pancreatic cancer patients and their caregivers self-manage common concerns that arise during cancer treatment. Therefore, the goal of this study was to assess the feasibility, acceptability, and usability of a digital coaching program (CARES) for individuals with pancreatic cancer and their caregivers (n = 10 dyads or 20 participants). Participants were assigned online and paper-based education about common concerns encountered during cancer care and

four 1-hour cancer coaching sessions led by Osara Health© over the course of 12 weeks, with each session targeted by role. Participants completed study assessments and had the option to participate in an optional exit interview. There was a 100% consent rate with participants ranging from ages 55 to 77 (avg. 62). As of now, six dyads have received and completed the 12-week survey, and all participants (n =12) have rated the CARES program as excellent or good. This preliminary data suggests that the program is on track to reach a priori benchmarks for feasibility and acceptability among pancreatic cancer patients and caregivers. Further study will be needed to evaluate the impact of the program on patient outcomes in a larger randomized controlled trial.

AI Meets Aesthetics: Leveraging Unsupervised Learning to Decode 12 Seasonal Color

An Pham

Faculty Mentor: Dr. Ning Wang (Bellini College of Artificial Intelligence, Cybersecurity and Computing)

Traditional model of personal color analysis typically relies on a four-season model, limiting the accuracy of individual color recommendations. This research proposes an innovative approach using unsupervised machine learning to classify individuals into 12 distinct seasonal color subtypes, enhancing precision and inclusivity. By extracting key facial features such as skin tone, hair color, eye color, and overall contrast from celebrity images aligned with expert analyses, the model analyzes color composition through factors like hue, value, and chroma. The dataset is constructed by labeling images with their corresponding seasonal subtypes, and color extraction methods assess undertones, saturation, and brightness. Clustering algorithms such as K-Means and Gaussian Mixture Models are applied to identify unique patterns within the data. Preliminary findings demonstrate that this method effectively distinguishes between warm and cool tones, as well as subtle differences across all 12 seasonal subtypes. The precision of this model offers valuable insights for beauty, fashion, and personal styling, enabling individuals to better understand which colors complement their natural features. This research expands traditional seasonal color analysis frameworks, allowing for improvement in accessibility and personalization in style recommendations. Future work may refine the model with more balanced datasets and improved feature extraction techniques to improve accuracy and inclusiveness across diverse skin tones and ethnic backgrounds.

Neural Mechanisms of Intrinsic Motivation: Exploring Dopaminergic Pathways and Brain Networks

Ana Beatriz Melgar

Faculty Mentor: Dr. Ruthann Atchley (College of Arts and Sciences)

Intrinsic motivation refers to the drive to engage in activities for their inherent satisfaction rather than external rewards. It enhances engagement in mentally challenging tasks, decision-making, and overall well-being. Through a comprehensive analysis of over 40 research and review articles from sources including PubMed, Frontiers, and Neuron, this review explores the neural mechanisms underlying intrinsic motivation to better understand its role in decision-making and well-being, focusing on the involvement of dopaminergic systems. Intrinsic motivation is supported by the SEEKING system, which drives exploration and learning. Brain regions such as the VTA, NAcc, and vmPFC exhibit heightened activity during states of curiosity, reinforcing the link between intrinsic motivation and knowledge acquisition. Self-determined choices also enhance intrinsic motivation, linked to increased vmPFC activation. Dopamine, primarily released via the mesocortical and mesolimbic pathways, plays a pivotal role in learning and outcome evaluation. The salience network, involving the AI, dACC, NAcc, and VTA, detects contextually significant stimuli and mobilizes cognitive resources. Elevated activity in regions like the ACC, amygdala, and caudate nucleus has been linked to intrinsic motivation, particularly during tasks requiring problem-solving and creativity. Intrinsic motivation is driven by dopaminergic activity and the dynamic interplay of brain networks. Promoting autonomy and focusing on the process of tasks, rather than their outcomes, can enhance intrinsic motivation and contribute to well-being. Further research is needed to explore the direct influence of intrinsic motivation on the dopamine system and its implications for conditions such as Parkinson's disease, characterized by dopamine deficiency.

How the German Innovations in the 19th - 20th Century Influence the Modern Chemical Industry

Andrea Barrios Rivas

Faculty Mentor: Dr. Peter Funke (College of Arts and Sciences)

The Germans have long been known for their contributions to the industrial world with their inventions in the aerospace, manufacturing, and automotive sectors. Many modern innovations in these industries can trace their foundations back to the rapid industrialization of Germany in the 19th – 20th century.

While these inventions are widely known and acknowledged, not much is known about the groundwork that the Germans laid for the practices seen in the modern-day chemical industry. The methodology for this study involved gathering and reviewing relevant research papers and articles that provided historical insight into the 19th – 20th Century German chemical industry and then cross-referencing them with the practices seen today. The existing literature and, by extension, this research, suggests that while many factors contributed to Germany's monumental feats in the chemical world, the main reason can be credited to World War I. These findings can provide historical context for the practices seen in today's chemical industry and can be applied to many other industries to find patterns and trends. These can then be viewed alongside our current practices to predict how future industries will be influenced by the present day.

Kinetic Study of Zeolite and Biochar as Adsorbents in Novel In-Ground Hybrid Adsorption Biological Treatment System (HABiTS) for Enhanced Onsite Wastewater Treatment

Andrea Barrios Rivas
Faculty Mentor: Dr. Sarina Ergas (College of Engineering)

Approximately 32 million US households use Onsite Wastewater Treatment Systems (OWTS), with approximately one-third located in Florida. OWTS have a limited removal of nitrogen (N), phosphorus (P), pathogens, and trace organics. Eutrophication, sea grass mortality, and harmful algal blooms have prompted Florida to convert septic to sewer systems in many areas; however, this is not feasible in rural and suburban areas. Advanced OWTS are often complex and energy intensive, while "layer-cake" processes, using sand and wood chip layers for biological N removal, are prone to geotechnical failures, and their long-term effectiveness has not been proven. This research aims to perform a kinetic study to investigate the adsorption capacities of zeolite and biochar for ammonium and nitrate for use in onsite wastewater treatment to enhance biological nutrient removal. Zeolite can potentially adsorb ammonium and facilitate microbial growth. In addition, biochar's microporous structure increases moisture retention and can create an anoxic environment for denitrification. The research will also assess complementary or conflicting influences between zeolite and biochar adsorption of ammonium and nitrate. The novel In-Ground HABiTS prototype is being operated at a laboratory scale to optimize N and organics removal compared with a conventional OWTS control. The novel In-Ground HABiTS will improve onsite wastewater treatment in rural, suburban, and marginalized communities, protecting ground and surface waters from impairment.

Campus, Choices, and Confidentiality: College Affiliation's Impact on Roe v. Wade Perspectives

Andrea Camila Marcano-Rodriguez, Natalie Andrade Brin, Muhamed Muntaser Jaber
Faculty Mentor: Dr. Donna Lee Ettel-Gambino (Judy Genshaft Honors College)

Roe v. Wade (1973) guaranteed federal abortion (AB) rights until a 2023 ruling shifted control to the states. While studies link religion, politics, and finances to abortion views, little research examines how academic focus affects students' reproductive choices. This study aimed to explore whether university students' academic concentration influenced their reproductive healthcare decisions, particularly their views on AB access and policies. A Multivariate Analysis of Variance (MANOVA) was performed to examine group differences. The independent variable was the university student's academic concentration. The dependent variables measured students' agreement with these survey statements: 1) AB may be used as birth control; 2) I would discuss the possibility of abortion with my significant other; 3) I would discuss the possibility of abortion with my parents; 4) I support the 2023 U.S. Supreme Court decision removing federal abortion protections; and 5) There should be a federal law allowing abortion that overrides state laws. Statistically significant results were found, as indicated by $(42, 923)=0.72$, $p < 0.05$. One-way MANOVA contrasts revealed three key differences: 1) students (46%) believe AB can serve as birth control ($p < 0.05$); 2) students (15%) support the 2023 Supreme Court ruling revoking federal abortion protections ($p < 0.05$); and 3) students (78%) favor a federal law ensuring abortion access over state restrictions ($p < 0.05$). Consensus is lacking on mandatory termination policies, revealing key factors. Nearly half of college students view termination as birth control. Some fields support access; others, restrictions. Examining campus culture and networks may further clarify these choices.

Point of Care Ultrasound (POCUS): No HOCUS Among Anesthesiologists

Andrea Camila Marcano-Rodriguez, Natalie Andrade Brin, Muhamed Muntaser Jaber, Grace Victoria Faberlle, Ryan Singh
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An anesthesiologist's ability to recognize the intrinsic utility of Point of Care Ultrasound (POCUS) as a diagnostic tool may improve patient safety, decrease anesthesia time, and maximize patient outcomes.1 Evidence suggests that POCUS is a safe, inexpensive, non-invasive, portable, and easily accessible perioperative tool. The purpose of study was to identify the anesthesiologists' systems and processes for clinical decision-making utilizing POCUS for patients during the perioperative phases of care. A MANOVA was conducted to identify differences across groups. The independent variable was the type of POCUS scan performed [GU, Cardio, Gastric, Pulmonary]. The dependent variables were the anesthesiologists' processes for clinical decision-making: 1) Perioperative status of patient; 2) Formulation of clinical question; 3) Ability of scan to answer the clinical question; 4) Changes to plan of care; and 5) Intervention required. There were statistically significant findings (Wilks' $\Lambda = 0.30$ (30, 26) $F=1.98$) between scan type and clinical decision-making ($p<0.0001$). One-way ANOVA contrasts identified one statistically significant difference: patients (64%) who received scans during the preoperative phase of care. Differences by scan type showed that patients in this stage were more likely to undergo a GI scan (100%) than Pulmonary (66%), Cardiac (45%) or GU (0%) scans ($p<0.05$). POCUS provided an additional layer of protection for patients during the preoperative phases of care, especially for patients with gastric etiologies. Evidence supports POCUS is easy, portable, sensitive, and specific for identifying various anatomical landmarks. POCUS examinations during the perioperative phases of care facilitate patient monitoring, along interventions to improve patient outcomes.

Perioperative Infection Control and Antibiotic Prophylaxis for Ventriculoperitoneal Shunt insertion

Andres Coll, Luis Diaz, Ana Zurita, Maxx Struhs, Aishwarya Aggarwal
Faculty Mentor: Dr. Keith Dombrowski (Morsani College of Medicine)

Infection associated with ventriculoperitoneal (VP) shunt insertion is a problem faced by many hydrocephalus patients, often caused by gram-positive bacteria. Research has identified infection rates in neonatal and pediatric patients, and frequent procedural errors that raise the risk of infection; but the effectiveness of specific antibiotic treatments and protocols requires further exploration. This study evaluates antibiotic prophylaxis and perioperative infection control to determine the most effective preventative measures in reducing the infection rate in VP shunt insertion procedures by analyzing existing literature and comparing infection outcomes in patients. A literature review was conducted to examine the success of perioperative procedures implemented for VP shunt insertion among neonatal and pediatric patients. A total of 80 articles from PubMed were screened and 35 were selected for detailed analysis based on relevance, success rate, patient outcome, and infection incidence rates. Findings suggest that infections remain the primary complication of VP shunt insertion, but standardized protocols, antibiotics, and perioperative procedures can significantly reduce infection rates. Cephalosporin prophylaxis has been particularly effective, with a lower infection rate (3.8%) compared to cloxacillin (12.7% infection rate), due to its broad-spectrum activity against gram-positive bacteria. Patients undergoing revision surgeries experience a higher infection rate (4.8%) due to increased exposure, allowing bacteria to colonize open shunts. Cephalosporin targets Staphylococcus aureus, while cloxacillin targets Staphylococcus epidermidis, providing antimicrobial activity against these pathogens responsible for shunt-related infections. Implementing effective antibiotic treatments and protocols in insertion surgeries is crucial in reducing complications and improving long-term patient outcomes.

An Analysis of Culture, Identity and Coming of Age through the Young Adult Science Fiction Novel Cinder

Angelicia Anderson
Faculty Mentor: Dr. Cayla Lanier (Judy Genshaft Honors College)

Science fiction is often used to depict individual challenges and global issues through the use of metaphors and fictional worlds. This can allow readers to visualize themselves in the role of the characters and provide a relatable medium for young adults to see themselves through. This presentation will examine how science fiction novels present coming of age themes and societal issues and how it may affect young adult readers.

Parental Internalizing Symptoms and Parenting Behaviors: The Moderating Role of Social Support

Anh Van Nguyen

Faculty Mentor: Dr. Jennifer Bosson (College of Arts and Sciences)

"It takes a village to raise a child". Social support is vital to parents in carrying out child-rearing duties. Moreover, parents who experience more internalizing symptoms (e.g., depression, anxiety) tend to exhibit more negative parenting behaviors. Therefore, it is important to examine whether receiving more social support attenuates the negative association between parents' internalizing and negative parenting behaviors. This question is especially important now, for several reasons. First, the COVID-19 pandemic introduced new, ongoing stressors (e.g., financial stressors) that may impact parents. Second, today's diverse parenting arrangements (e.g., same-gender, single-parent) can influence the level of social support available. Data will be collected online through Prolific, using a correlational design. In contrast to past studies, which sampled only married parents, this study will sample any parents of a child aged four to six, regardless of marital status. Hypothesis 1 states that there will be a positive correlation between parental internalizing symptoms and negative parenting behaviors. Hypothesis 2 states that social support will moderate this association, such that this link should be weaker among those with higher perceived social support than those with lower perceived social support. From a research standpoint, this study is an essential replication of previous research on similar constructs with modifications to facilitate effect detection and improve generalizability to the current parent population. From a clinical standpoint, mental health professionals can apply these results to strengthen the social network of clients who are parents, thereby ensuring healthy fulfillment of parental responsibilities and reducing risks of child maltreatment.

Frameshift Mutations in Breast Cancer Gene 1 (BRCA1)

Annabella Koppi

Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

BRCA1 or breast cancer gene 1, critical tumor suppressor gene, plays a pivotal role in maintaining genomic stability, yet frameshift mutations can disrupt its function leading to devastating consequences. Homologous recombination repair, preventing cells from dividing or growing too quickly, and tagging proteins for demolition are several of BRCA1's functions. Hereditary mutations within this gene are linked to the significant increased risk of ovarian and breast cancer. Though it is primarily associated with breast and ovarian cancer, BRCA1 mutations can also be found within other cancers such as pancreatic and prostate cancer. To further understand this gene and its essential role in our genome one can examine pathogenic frameshift mutation variants which have been found to have a strong correlation to hereditary breast and ovarian cancer. Frameshift mutations correlate to insertion/deletion in the amino acid sequence thus disrupting the reading frame, creating premature termination codons. Specific pathogenic frameshift mutations lead to specific types of cancer risks (early-onset or life-time cancer risk in some cases). Some of these pathogenic frameshift mutations include the deletion of 2 nucleotides resulting in a truncated protein (185delAG) and the insertion of a single nucleotide leading to premature stop codon (5382insC). These mutations lead to a higher lifetime risk of both breast and ovarian cancer, thus emphasizing the importance of furthering our understanding of these mutations.

Anchored in History: Barnacles and the Changing Waters of Tampa Bay

Arabella Williams, Candace Bacon

Faculty Mentor: Dr. John Arthur (College of Arts and Sciences)

The historical ecosystem of Tampa Bay varies greatly from its modern counterpart due to many factors; such as habitat destruction, pollution and invasion of non-native species. Barnacles, though often overlooked, play a crucial role in the waters of Tampa Bay. As a filter feeding sessile marine crustacean, barnacles illustrate this shift well through their archeological record, as can be observed in the lab research of Weedon Island's ancient shell mounds. So, by comparing both the proliferance and type of barnacle species present in Tampa Bay from the Weedon Island era to present, it can be inferred how the health of the estuarine habitat has changed overtime due to various ecological pressures.

Developing an Intervention Program Focused on Combating Cardiovascular Disease in South Asian American Populations

Archana Rao

Faculty Mentor: Dr. Lindy Davidson (Judy Genshaft Honors College)

South Asian Americans face higher risks and burdens associated with cardiovascular disease compared to other ethnic groups in the United States. A wide range of biological and non-biological risk factors, including a lack of awareness surrounding cardiovascular disease and its risk factors, contribute to this issue. Intervention programs, such as the American Heart Association's Go Red for Women campaign, can be beneficial in addressing cardiovascular disease in the general population. For South Asian American populations specifically, developing intervention programs that offer culturally-competent care in addition to medical and preventative services is essential. For this research project, three pre-existing cardiovascular disease programs catering to South Asian Americans were identified — the Stanford South Asian Translational Heart Initiative, the South Asian Cardiovascular Clinic, and the South Asian Heart Center. The intervention strategies used by these programs were grouped into four categories - preventative services, clinical resources, education and community-based strategies, and website information and resources. The strategies used by each of the three programs were analyzed and compared with each other. While all three programs made use of primary and secondary preventative strategies and offered clinical resources, differences were seen in terms of the programs' focuses on clinical resources vs. education and community-based resources. Based on the information obtained through this analysis, a literature review, and the culture and community of the Tampa Bay area, a new intervention program catering to South Asian Americans in the Tampa Bay area was proposed.

Candida Crushers: Discovering Novel Antifungal Metabolites from Endophytic Fungi via a Bioassay-Guided Approach

Arshia Esmaeilian

Faculty Mentor: Dr. Bill Baker (College of Arts and Sciences)

The global rise in fungal resistance to conventional antifungal treatments has led to an increase in antifungal resistant infections such as Candidiasis and Candidemia. According to the CDC, approximately 7% of tested Candida blood samples have developed resistance to fluconazole, a common antifungal prescription. Additionally, 90% of Candida auris isolates, a highly fatal fungal strain, have shown resistance to this drug. This underscores the urgent need for novel anti- fungal agents. Endophytic fungi, known for producing diverse secondary metabolites with antifungal properties, offer a promising avenue for drug discovery. This study focuses on TAP14- 269D-4, an endophytic fungus from the genus Talaromyces, isolated from the root of a pine tree in Tapachula, Mexico, that exhibits strong antifungal capabilities against Candida albicans and Candida auris. The primary objective is to explore the bioactivity of its secondary metabolites against Candida spp. through a bioassay-guided approach. For this, metabolite structures were elucidated using high-resolution mass spectrometry (HRMS) and nuclear magnetic resonance (NMR) spectroscopy. Additionally, artificial intelligence-driven dereplication tools, such as SMART NMR and DeepSAT, will be used to identify nuisance or known compounds, streamlining the metabolite identification process and accelerating the discovery of potentially novel antifungal metabolites with therapeutic applications.

Integration of Pre-Exposure Prophylaxis Programs in Tampa Emergency Departments: A Literature Review

Arun Roy

Faculty Mentor: Dr. Jason Wilson (Morsani College of Medicine)

HIV is a significant public health concern in the United States with approximately 1.2 million people at high risk for infection. As of 2022, the state of Florida ranked third in HIV diagnosis rates, having an incident rate of 19.3 compared to the U.S. national average of 11.3. Tampa, Florida represents a focal point for HIV prevention due to high rates of new diagnoses, prevalence of human trafficking, and a population of high-risk individuals such as men who have sex with men (MSM), people who inject drugs, racial/ethnic minorities, heterosexual individuals, and the homeless. In response to this epidemic, our research focuses on Pre-Exposure Prophylaxis (PrEP); a biomedical intervention used to prevent HIV infection through daily doses of Truvada (300 mg tenofovir disoproxil fumarate and 200 mg emtricitabine) which reduces the risk of HIV transmission by over 90% and by over 70% for persons who inject

drugs. Our research aims to implement and evaluate the feasibility of a PrEP program within Tampa General Hospital's Emergency Department with an overarching goal of using the ED as a community HIV screening apparatus. Phase 1 of our study conducted a literature review on existing PrEP programs, evidence-based screening protocols, use of electronic medical records, follow-up scheduling strategies, and barriers to PrEP uptake. Findings suggest that EMR-integrated screening tools, staff training, same-day PrEP, and community partnerships enhance PrEP delivery. Our goal is to establish an ED workflow model that offers PrEP consultations, linkage to care, and a scalable model for local and national efforts.

Evaluating the Health and Ecological Dynamics of Florida's Snake Populations: The Impact of Ophidiomycosis and Internal Parasites

Ashby Barbee
Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

Snakes are essential to Florida's ecosystems but are increasingly threatened by habitat loss, emerging diseases, and road mortality. This study seeks to assess the health status and ecological dynamics of Florida's snake populations to guide effective conservation strategies. Our research focuses on the impact of ophidiomycosis, an emerging fungal disease caused by Ophidiomyces ophidiicola, and the presence and effects of internal parasites discovered in brown water snakes (Nerodia taxispilota). Correlation of ophidiomycosis and presence of parasites was evaluated. Data was collected through necropsies of road-killed snakes submitted by researchers and community members within Florida. The necropsy procedure included testing for ophidiomycosis, measuring specimens, documenting external abnormalities, and performing internal examinations. Identification of nematode species was performed by PCR testing and DNA analysis. Our findings describe methods for identification of nematodes, including targeting the 18s rRNA gene and cox1 gene. Exploration of potential invasive nematodes is critical in disease management and monitoring the health of Florida's snake populations.

Exploring Antimicrobial Activity from Fungi: Experimental Insights from Agaricus bisporus

Ashby Barbee
Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

Antimicrobials are essential medicines used to prevent and treat infectious diseases. The rise of antimicrobial resistance (AMR)—where bacteria, viruses, and parasites no longer respond to existing treatments—has created a need for novel and effective antimicrobial agents. Fungi represent a promising but underexplored source of antimicrobial compounds, offering potential solutions for both human and animal health. Although progress has been made in identifying antimicrobial properties in certain fungal species, significant knowledge gaps remain regarding the mechanisms, experimental methods, and scalable production of such treatments. This study investigates an experimental approach for isolating and cultivating fungi, evaluating their antimicrobial effectiveness, and proposing preliminary steps for drug development. It examines the antimicrobial activity of Agaricus bisporus, detailing the successes and limitations of the applied methodology. The findings contribute to the growing body of research on fungal-derived antimicrobials and highlight the potential of unexplored species in addressing the AMR crisis.

Robotics in Dentistry

Ashley Herbert
Faculty Mentor: Dr. Zhao Han (College of Engineering)

As robotic surgeries, diagnoses, and assistive techniques are expanding, this paper reveals the human perspectives behind them. Dental workers are at risk of back, eye, and respiratory problems from the uncomfortable or strenuous conditions they work in [1]. Worsening the problem, patients can have failed procedures and expensive visits which cause patients to be dissatisfied or non-compliant [2]. While robotics have shown to improve precision, success, and speed in dental care, there is a lack of research in the area of what patients and dentists expect out of digital dentistry. This paper analyzes the implications of robotics in a dental setting by providing a literature review on current robots in healthcare followed by survey analysis collected from dentists and patients. The results have yielded moderate comfortability of dentists in terms of implicating robotics into practice. The main benefits for dentists reside in sterilization and treatment planning. Their main concerns are decreasing patient-doctor interactions and the lack of adaptability in unforeseen

circumstances. For patients the main concerns are that the robot is something unknown to them and potentially harmful. Patients saw the main benefit as potentially more accurate procedures that would produce desired or lasting results. These findings are important to the current field of dentistry as they reveal current perspectives on dental robotics and can help dentists and patients communicate to find the best treatment and incorporation of robotics into dental care. These findings enhance the knowledge of dental robotics and suggest future improvements to dental robotic technology.

The United States' Secret Warfare against Democracy

Ashtyn J. Smith
Faculty Mentor: Dr. Arturo Jimenez-Bacardi (College of Arts and Sciences)

This study examines the methods used by the U.S government to orchestrate the overthrow of the democratically elected Guatemalan president Jacobo Árbenz in 1954, by focusing on declassified CIA and State Department documents. Through operation PBSUCCESS, the U.S employed a combination of psychological warfare, economic pressure, diplomatic isolation, and paramilitary operations to destabilize the Árbenz administration. CIA documents reveal the role of propaganda campaigns, assassination proposals, and the arming of opposition forces to create internal chaos. By using primary sources such as CIA memos, and the Foreign Relations of the United States (FRUS) archives, this research will outline the step-by-step execution of the coup, including the use of radio broadcasts, diplomatic maneuvering, and military deception. The findings illustrate how cold war fears of communism drove Washington's decision making and set a precedent for future covert regime changes in Latin America. This research contributes to a deeper understanding of the mechanics of U.S. led interventions and their long-term consequences on regional stability.

Exploring Resource Access for Sex Workers and Trafficking Survivors: A Community-Led Approach

Asmitha Darapaneni
Faculty Mentor: Dr. Jill McCracken (College of Arts and Sciences)

We present findings from a community-based participatory research project that explores how sex workers and trafficking survivors face systemic barriers in accessing resources, often encountering stigma, criminalization, and inadequate support structures. Through a series of semi-structured qualitative interviews, 69 participants of diverse backgrounds shared their perspectives on these challenges and the broader political implications of resource accessibility. This project was created and led at all stages by current and former sex workers and trafficking survivors, including the research team and the participants. Participants described the absence of long-term, survivor-centered programs, the failure of the legal system to provide meaningful support, and the limited recognition of diverse experiences within available services. Many emphasized the need for structural changes, including community-based interventions, shifts in law enforcement practices, and policy reforms that prioritize harm reduction over coercive approaches. Rather than focusing solely on legal changes, participants advocated for a reallocation of resources toward direct support systems that address immediate needs. These findings underscore the urgent need to rethink current approaches to sex work and trafficking, centering the voices of those most impacted in policy decisions and resource development.

Evaluating the Impact of Antifibrotic Therapies of IPF Patients

Asrita Kandukuri, Ali Mohamed, Abhilasha Tammineedi, Catherine Ibrahim, Varena George, Marina Hanna
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Idiopathic pulmonary fibrosis (IPF) is a progressive lung disease characterized by scarring and stiffening of lung tissue, dyspnea, irreversible loss of lung function, and eventually respiratory failure. Although its etiology remains uncertain, IPF is associated with immune response abnormalities influenced by risk factors like mutations in the 5b mucin gene, smoking, age, and exposure to pollutants. IPF most commonly affects men between the ages of 50 and 75 and tends to appear with a variety of pulmonary and extrapulmonary comorbidities. Nintedanib and Pirfenidone have been approved for treatment and are proven to reduce PF progression by 50% over a 5-year period, thereby increasing patient survival. The objective of this systematic review is to assess the efficacy and safety of antifibrotic treatments, particularly pirfenidone and nintedanib, in managing IPF. After a thorough screening process of 200 articles from the database PubMed, 50 articles were selected based on their significance to IPF and their antifibrotic treatment. Patients are often faced with the difficult decision to continue with treatment or endure unbearable GI side effects. The evaluated research investigated how the immune system contributes

to the development of IPF as well as the effects of antifibrotic medications such as pirfenidone and nintedanib. In patients with IPF, elevated immune cell populations, such as Tfh and Th17 cells, imply that nintedanib may aid in restoring normal immunological responses, which would enhance its therapeutic effects. Comparatively, Pirfenidone targets the TGF-β and TNF-α pathways, which aids in decreasing the collagen synthesis and fibroblast proliferation.

Harnessing Molecular Docking for Drug Discovery in the Galectin-3 Protein

Attallah Innis

Faculty Mentor: Dr. Leon Hardy (College of Arts and Sciences)

Molecular docking is a fundamental technique in drug discovery, used to predict how a ligand interacts with a target protein or enzyme. This research focuses on the Galectin-3 (G-3) protein, a key factor in excessive scar tissue formation, which is prevalent in pulmonary fibrosis patients. One of the greatest challenges in drug discovery is accurately calculating the binding energy between a potential drug candidate and its target. By constructing drug-protein complexes, binding affinities can be determined using Amber. The selection of the best drug binding affinity corrects the malfunction of the G-3 protein.

Utilizing Metal Halide Semiconductors as a Novel Treatment for Pulmonary Cancer

Audrey Babcock

Faculty Mentor: Dr. Ioannis Spanopoulos (College of Arts and Sciences)

Pulmonary cancer, a leading cause of death from cancer in the US, has very limited and often dangerous treatment options. Phototherapeutic treatments offer a safer alternative to traditional options with their ability to be localized and selective in response to light. Phototherapy is typically much less invasive and results in fewer harmful side effects than other methods. Metal compounds can be used in the medical field for a variety of treatments, specifically as semiconductors. Bismuth in particular is cheap, biocompatible, and relatively low in toxicity as compared to other heavy metals. In addition, bismuth has optical properties making it ideal for photocatalysis. We have developed a novel metal halide semiconductor, (PC15H34,)Bi2I8 that is effective in treatment of pulmonary cancer. This compound has broad, band-edge emission, is water stable, and has thermal properties making it a semiconductor. This treatment works by generating reactive oxygen species (ROS) when exposed to light in the visible-IR spectrum. This class of hybrid inorganic-organic semiconductors has the potential to foster innovative approaches for phototherapy in the treatment of cancers.

Fostering Engagement and Meaningful Dialogue: The Impact of Accountable Talk on Classroom Conversations

Ava Applebee

Faculty Mentor: Dr. Tammy Sommers (College of Education)

This research project investigates the impact of using accountable talk in fostering more meaningful educational conversations among students. Accountable talk, which involves structured dialogue that encourages students to listen, question, and build on each other's ideas, is explored as a strategy to enhance communication in classroom settings. The objective of this study is to understand how accountable talk promotes deeper engagement, critical thinking, and collaborative learning among students. Through qualitative analysis, including classroom observations and student interviews, this research will assess the frequency and quality of interactions that involve accountable talk techniques. By exploring accountable talk, I aim to uncover ways to help students move beyond simply answering questions to truly participating in thoughtful, reflective conversations that encourage active learning. Expected outcomes include an increased ability for students to articulate their thoughts, demonstrate respect for diverse perspectives, and engage in constructive discussions that lead to a deeper understanding of academic content. This study contributes to the growing body of research on effective communication practices in education, offering practical insights for educators seeking to cultivate more dynamic and educational classroom conversations.

The Role of Social Media in Destination Marketing: A Study of Social Media Strategies in Pinellas County and Comparable Destinations

Avery Siwinski
Faculty Mentor: Dr. Philip Trocchia (Muma College of Business)

With the exponential rise in social media usage over the past decade, travelers increasingly use it to discover, choose, and plan travel destinations. This study examines Pinellas County's destination marketing organization (DMO) social media strategies compared to the strategies of comparable destinations. Visit St. Pete-Clearwater (VSPC), the county's DMO, describes tourism as "the economic engine for Pinellas County," highlighting the extreme importance of effective marketing for the area. This study analyzes how VSPC and comparable destinations use Instagram to engage potential visitors by evaluating visual content and engagement strategies. A content analysis of 24 Instagram posts each from VSPC, Charleston (Explore Charleston), and Santa Barbara (Visit Santa Barbara) was conducted to determine whether viewer traits influence engagement with specific content features. Respondents assessed posts based on visual elements and engagement appeal to identify which styles of content most caught their attention. The study was conducted using Qualtrics survey software, incorporating bot detection and answer choice randomization to ensure valid responses. Additionally, an interview with VSPC's Director of Digital and Data, Eddie Kirsch, provided insights into the organization's strategies and goals. Findings can help VSPC and other tourism organizations optimize future social media content. Future research could explore AI's role in destination marketing.

Role of Cadmium Toxicity: A Critical Target in Oxidative Stress?

Awab El Ghissassi
Faculty Mentor: Dr. Narasaiah Kolliputi (Morsani College of Medicine)

Cadmium, a heavy metal associated with manufacturing and construction as well as cigarette smoke, is a known human toxin and pervasive environmental pollutant. Exposure induces oxidative stress and inflammation from PANoptosis, which includes apoptosis, pyroptosis, and necroptosis. This inflammatory mechanism involves ROS overproduction, mitochondrial dysfunction, and cytokine release. This literature review aims to evaluate cadmium's impact on human health, focusing on its prevalence in cigarette smoke. Twenty-four sources were found on PubMed by filtering articles from 2019 to 2024 using keywords "cadmium toxicity", "cigarette smoke cadmium exposure", "PANoptosis", "ROS overproduction", and "cadmium-induced oxidative stress". The review found that chronic cadmium exposure induced ROS overproduction, leading to oxidative DNA damage, cellular dysfunction, and apoptosis in human cell models. Cadmium-driven autophagy was dual-faceted with low exposure driving protective mechanisms, while high exposure drove destructive apoptosis pathways. Chronic conditions including cardiovascular disease, cancer, diabetes, and neurodegenerative disorders, as well as skeletal and renal dysfunction were found to be caused by these mechanisms. Liver and kidney cells were especially vulnerable as these organs' metallothionein defenses were overwhelmed by chronic exposure. Cadmium was also implicated in neurotoxicity, causing neurodegeneration through disruption of oxidative and inflammatory pathways. The findings of this review highlight cadmium's role in mechanisms of oxidative stress and their impacts on human health. Despite cadmium's classification as a carcinogen, its impacts on many aspects of human health are not fully understood. Further research into the specifics and extent of cadmium's mechanistic role in oxidative stress is needed for potential therapeutic strategies.

Symptoms, Searches, and Skepticism: Honors Students Cross the Quality Chasm with Health Information Technology

Bayla S. Jordan, Edxander Perez Cruz, Grace W. Chang, Caeden Joseph Dirksz, Oslow Odegaard, Grace Victoria Faberlle
Faculty Mentor: Dr. Donna Lee Ettel-Gambino (Judy Genshaft Honors College)

The Internet is a major resource for health information. Health information-seeking behavior (HISB) directly impacts well-being and facilitates goal-oriented behavior that influences decision-making. Students of different sexes have shown varying HISB patterns. Current research exploring this topic is limited but demonstrates that sex plays a nuanced role. Sex also impacts trust in Internet searches of topics including weight, health, and sexual information. This study explored whether sex impacted students' trust in online health information and the types of health information students searched. A MANOVA was conducted to identify differences across groups. The independent variable was the students' sex [Male, Female]. The dependent variables were: 1) trust online health information; 2) search online health information; 3) weight supplement information; 4) skin conditions; 5) sexual information; and 6)

medication information. There were statistically significant findings as evidenced by Wilk's lambda (6, 285) = 0.93, $p<0.001$. One-way ANOVA contrasts identified three statistically significant criteria: 1) students (94%) who searched online for health information ($p<0.01$); 2) students (25%) who searched online for weight supplement information ($p<0.001$); and 3) students (57%) who searched online for skin condition information ($p<0.0001$). Understanding how sex influences online health information searches and behaviors is essential to maximizing healthcare outcomes. Female students (73%) sought online health information, searched for weight supplements, and skin conditions more than their male (27%) counterparts. Increasing access and quality for these topics facilitates online health literacy, diminishing sex-based disparities in healthcare outcomes. Further studies are necessary to determine the effectiveness of sex-based health information.

Increasing Comprehension in a 3rd Grade Class

Bennitt Barnes
Faculty Mentor: Dr. Tammy Sommers (College of Education)

The topic of my research is developing comprehension skills with students who are leveled MTSS tier 2 and 3. My guiding question is, "How can I increase my tier 2 and 3 students' comprehension?" I created this question after observing an issue. Many of my students can decode words and read independently, but they don't always comprehend what they read. From my research, I've learned that students comprehend content that is culturally relevant, and they learn best through genuine interaction within instructional experiences. Currently, I have 2 students who scored proficient on the FAST, 6 on grade level, and 9 who are below grade level. My goal is for every student to perform on grade level or higher by our final FAST test. To meet this goal, I will follow routines such as meeting in small groups, reviewing benchmark assessments during whole group, and completing genuine lessons on the author's purpose, authors' claim, and text structure during our ELA block.

Genetic Engineering of Soil Bacteria for Enhanced Biohydrogen Production

Bhaveshsai Reddy, Mebaliah de Almeida Torres, Eshan Baig, Xinyue Hao, Paula Torbay, Ryan Chowdhury
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

This review focuses on two major microbial pathways for biohydrogen production, dark fermentation and photofermentation. Hydrogen is a promising alternative fuel with a high energy density, only emitting water as waste when burned. Consequently, it has potential in decarbonizing transportation. Given their innate metabolism, bacteria naturally anaerobically break down organic substrates to produce volatile fatty acids, carbon dioxide, and hydrogen during dark fermentation. This is enhanced by photofermentation, using light energy and photosynthetic bacteria to further break down organic waste products and produce hydrogen. However, both methods are hindered by low efficiency and competing metabolic pathways that consume reducing equivalents or divert carbon flow away from hydrogen production. The ability to engineer the natural metabolic pathways of bacteria to enhance hydrogen production has great implications in the renewable energy sector- and is our primary focus. To overcome these limitations, we investigated genetic engineering with a two-fold approach, 1) enhancing the activity of key enzymes and 2) eliminating key alternative pathways that consume electrons. Enhancing the activity and oxygen tolerance of key enzymes like hydrogenase and nitrogenase significantly boosts hydrogen output. Mutations in regulatory genes like NifL and FixL demonstrate derepressing nitrogenase activity, even in the presence of oxygen or fixed nitrogen, extending hydrogen production conditions. Additionally, the introduction of oxygen-scavenging pathways protects sensitive enzymes, while the inhibition of competing pathways (ethanol and lactate formation) ensures more electrons are channeled toward hydrogen generation. These biotechnological approaches bring us closer to realizing microbial hydrogen as a viable, sustainable, and clean energy solution.

Parental Substance Abuse and its Effect on Children

Brenda Guajardo
Faculty Mentor: Dr. David Diamond (College of Arts and Sciences)

As the opioid crisis has continued to rise in the Tampa Bay community, many families have been affected. Millions of children across the country are experiencing the negative effects of living with a parent suffering from a substance abuse disorder (SUD). Although interventions for opioid users have been developed, less attention has been given to the children who are affected by the issue. The purpose of this literature review is to further investigate these

effects and determine viable solutions for children and their families. Multiple studies have shown that children in these situations will experience anxiety, social isolation, neglect, and violent behaviors. To combat this rising problem, various variables were evaluated. By training pediatricians to properly screen and aid families suffering from parental substance abuse and increasing Naloxone accessibility many children will be able to receive the proper care they need for their proper psychological and social development.

Identification of Potential Regulatory Factors of the BMP2k Gene in Hydra vulgaris

Brenden Phillips
Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

Humans have an incredible ability to heal from traumatic injury. However, they are unable to regenerate complex tissues in the event that a limb or organ was removed. This is in contrast to other animals, such as Hydra vulgaris. Hydrozoans are a group from cnidaria that present some of the most incredible regenerative powers in nature, able to completely reform their bodies after being torn apart and being virtually immortal in a lab setting. Understanding the cell-signaling mechanisms that allow hydra to both reconform and regenerate tissue may allow human medicine to achieve the same degree of regeneration. The BMP2k gene is present in both hydrozoans and Homo sapiens that encodes for proteins used in axial patterning in Hydra. Identifying potential regulatory elements in the human BMP2k gene that are conserved in H. vulgaris may allow for the manipulation of the gene in H. vulgaris so that the expression of BMP2k can be better understood. A number of regulatory factors were identified through genome comparison: ARNT, PAX9_B, SPZ1, and YY1. The partial similarities in the sequences may be enough to allow these same factors to bind with the elements of the hydra genome.

Little Learners, Big Choices: Leveraging Play Preferences Among Pediatric Patients

Brianna Morgan Tully, Trinity Maria Coris, Serene Khdair, Grace Victoria Faberlle, Ryan Singh
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Play is an acclaimed, fundamental part of children's mental wellness and development. Evidence shows that play assists in relieving anxiety, reducing post-operative pain, improving problem solving skills, and shaping self-expression in addition to many other social capabilities in pediatric patients. However, few studies identify what type of play therapy is best for patients of different ages and grade levels. Play preferences are crucial in developing targeted therapeutic strategies. The purpose of this study was to explore if patient grade level impacts play modality preferences among pediatric patients. A MANOVA was conducted to identify differences across groups. The independent variable was the grade levels of pediatric patients. The dependent variables were the patients' agreement with the following: 1) enjoys reading books regularly; 2) prefers to play alone; 3) favors playing outside; 4) requested access to a computer at home; and 5) engaged during provided entertainment. There were statistically significant findings as evidenced by Wilk's L (30, 242) = 0.43, $p<0.0004$. One-way ANOVA contrasts identified two statistically significant criteria: 1) patients (69%) who enjoy reading on a regular basis ($p<0.005$); and 2) patients (23%) who prefer playing alone ($p<0.05$). Recognizing the influence of grade level on play preferences is crucial to enhancing therapeutic play intervention. Patients need to be holistically revitalized through engaging play practices, not just medical ones. Researching the play habits of patients in different grade levels can assist in providing appropriate play resources for them. Further research is necessary to explore the specifics of play and health relationships.

A Comparative Analysis of Recycled PET and HDPE Filament Production Using Pultrusion for Sustainable 3D Printing

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Global plastic production surpassed 400 million tons in 2021, and if current consumption and disposal trends persist, it is projected to double by 2050—stressing the urgent need for sustainable waste management solutions. In response, this research evaluates a cost-effective pultrusion process to produce 3D printing filaments from recycled polyethylene terephthalate (PET) and high-density polyethylene (HDPE). Using the Polyformer, recycled PET and

HDPE plastic bottles and containers were transformed into 3D printing filaments. Key production parameters, including strip width, temperature, and pull speed, were optimized using the Taguchi method and full factorial experiments. For PET, optimal conditions were identified as a 7 mm strip width, 220°C processing temperature, and 2 mm/s pull speed, yielding filaments with minimal splitting, uniform diameter, and well-formed cross-sections, as confirmed through microscopic inspections. The mechanical properties and print quality of the filaments, such as tensile strength, durability, and printability, will be evaluated and compared to assess their performance. Additionally, a life cycle assessment (LCA) will quantify the carbon footprint, energy consumption, and overall environmental impact of the filament production process. Expected outcomes include a comprehensive understanding of the mechanical performance of recycled PET and HDPE filaments, insights into the environmental benefits of recycled materials, and LCA data to assess the sustainability of the pultrusion process. By providing an accessible and sustainable solution for both small-scale users and industries, this research seeks to promote circular economy principles and advance sustainable manufacturing practices through the transformation of plastic waste into high-quality 3D printing filaments.

Thriving or Surviving: How Hospital Training Leverages Employee Satisfaction and Retention

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There is an upward trajectory of healthcare employees' dissatisfaction in the workplace. The human workforce is the cornerstone of the United States healthcare system. Evidence shows that a plethora of factors affect employee retention including a positive work environment, the overall culture, renumeration, and relationships with managers. The purpose of this study is to analyze how the onboarding processes impact the employee experience at a multihospital system in the Midwest. A MANOVA was conducted to identify differences across groups. The independent variable was the employees reported status (clinical/non-clinical). The dependent variables were the employee's agreement with the following survey statements: 1) Position is challenging; 2) Had necessary resources; 3) Comfortable within the organization; 4) Positive productivity; 5) Need more specific training; and 6) Receiving supervisor feedback. Findings from the MANOVA identified statistically significant differences as evidenced by Wilks' λ=0.94(6, 267) F=2.46 ($p<0.05$). One way ANOVA contrasts identified one statistically significant difference: conducted on each dependent variable. One criterion 'Need for more specific training' to be statistically significant ($p<0.005$). Overall employees (33%) reported they needed more specific training to effectively work. Differences by 'status' identified that clinical employees (37%) were more likely to need specific training than non-clinical employees (0.08%) to effectively work ($p<0.005$). The employees of today want more than just a paycheck. Identifying the key drivers that influence employee satisfaction and retention is crucial in maintaining a competitive edge in the marketplace. The best healthcare leaders are those who recognize that their most valuable resources are their human resources.

Timing of Mental Events

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This study investigates the timing of information processing, or mental order, in auditory priming. Rosch (1975) demonstrated that priming effects diminished as the stimulus onset asynchrony (SOA) decreased through her Same-Different experiments. However, Rosch confounded SOA with the way subjects processed the auditory prime—either actively or passively. In the present study testing distinctions in Passive and Active priming, reaction times (RTs) were slower in the Active condition than in the Passive condition, with priming observed only in the Active condition. Moreover, priming emerged in both same and different stimulus conditions under Active processing. The results of the Active-Priming condition replicate Rosch's findings when stimuli were identical, but unlike Rosch, this experiment also found priming for different stimuli. Additionally, a non-linear effect of SOA on RTs was observed, as actively processed primes presented 0.25 s before the target had a disrupting priming effect compared to longer SOAs. These findings suggest that active processing influences priming in a way that depends on both timing and stimulus similarity.

Implementation of Collaborative Strategies to Increase Engagement and Participation

Caitlyn Maszak
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This wondering investigates the impacts of incorporating strategies into whole group lessons that can increase engagement and participation. The classroom that this question is based on is a first-grade classroom at a public title one elementary school. The learners' range in age from six to seven and there are sixteen students on the classroom total. Current research to increase student engagement includes strategies such as turn and talk, partner reading, group work, and flexible grouping. The goal of this research is to increase engagement and participation in whole group lessons through the implementation of these strategies. These strategies will be incorporated into lesson through differentiation to help meet the needs of all the learners. The exploration of this wondering is significant because creating a collaborative classroom environment where every student has a voice is important to increasing engagement and participation. This environment where participation and engagement are key will be created through collaborative learning and strong peer relationships. My findings aim to increase engagement and participation during whole group instruction through the incorporation of collaborative learning and strategies.

Environmental Bacteria: A Reservoir of Potential Antimicrobial Agents

Cameron Rieg
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Bacteria can be found in a variety of natural environments, with some of these isolates having significant potential in the development of new antimicrobial agents. In this study, bacteria obtained from environmental samples were tested to determine their potential to inhibit pathogenic bacteria. The Kirby-Bauer test was used to assess antimicrobial properties using the two isolates LA white and MMkillerz, both isolates showed inhibition against S.aureus. The 16s RNA sequencing showed highly significant matches for both species, LA white was identified as Staphylococcus warner which was confirmed by an E-value of 0, subsequent microbial and biochemical tests showed LA white is a gram positive bacterium that's able to adapt to various conditions, this bacterium also showed positive urease activity and the ability to ferment mannitol as well as exhibiting alpha-hemolysis on the blood agar, showing motility, and UV resistance. MMkillerz was identified as Pseudomonas aeruginosa which was confirmed by an E-value of 1e-173. This bacterium is gram negative, has weak urease activity and cannot ferment mannitol, it is also non-motile and has limited tolerance to UV and salt. The 16s RNA sequencing showed highly significant matches for both species. The results indicate that bacteria from various environmental habitats may contain important antimicrobial qualities, offering a promising source for new therapeutic agents. Additional research is required to further assess the potential of these isolates in combatting resistant pathogens.

The Effect of Diaphragm Relaxing Incisions on Recurrence Rate and Complication Rate of Paraesophageal Hernias: One Academic Center's Experience, and a Review of the Literature

Carol Agaiby
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There is strong evidence to suggest that diaphragm relaxing incisions correlate with lower recurrence rates of paraoesophageal hernias. However, there is disagreement as to how and where to carry out the relaxing incisions, and standardization is necessary to effectively combat recurrence. Previous studies mention starting with right-sided incisions and switching to the left if failure occurs. In contrast, other studies may not perform the right-sided incision at all, skipping directly to the left-sided based on the patient's anatomy. Gaps in the literature are present in terms of how to determine the amount of tension present, how to decide to start with a right-sided or a left-sided incision, which mesh is the most suitable when bridging the crura, and whether or not patients that have to undergo redo paraoesophageal hernia surgery have worse quality of life than those who do not.

The Relationship between Narrative Language and Vocabulary Predicting Math Achievement in Children with Autism Spectrum Disorder

Caroline Kelley, Carole Wadie, Alyssa Gill

Faculty Mentor: Dr. Matthew Foster (College of Behavioral and Community Sciences)

Mathematical difficulties are common among children with autism spectrum disorder (ASD), yet we know little about how early language skills contribute to mathematical achievement in this population (Raúl Fernández-Cobos et al., 2025) (Tonizzi & Usai, 2024). In this longitudinal study, we investigated whether narrative language and vocabulary skills predict mathematics performance in school-age children with ASD. Understanding these relationships may inform more targeted, language-based interventions to support academic development. Using linear regression analysis, we explored the association between children's narrative retelling and vocabulary competencies and their subsequent math computation performance on the Wide Range Achievement Test (WRAT). We followed a sample of 35 English-speaking children with ASD over time, collecting data on their narrative and vocabulary abilities in the first wave and their mathematics performance at two waves. The children are predominantly male (67.6%%), Caucasian (56.7%), and enrolled in public schools (69.7%). Regression analysis showed that prior mathematics performance was the strongest predictor of subsequent mathematics performance ($\beta = 0.88$, $R^2 = .77$, $p < .001$). When narrative retell and vocabulary were included in a model, vocabulary ($\beta = .71$, $p = .004$) but not narrative retell ($\beta = .30$, $p = .15$) emerged as a significant predictor, accounting for 59.4% of the variance in mathematics performance. In a final model with all three predictors, prior mathematics performance ($\beta = .56$, $p = .016$) and vocabulary ($\beta = 4.86$, $p = .025$) were statistically significant predictors of mathematics performance, but not narrative retell ($\beta = .16$ $p = .39$). The three predictors accounted for 82.8% of the variance in subsequent mathematics performance. By focusing on children with ASD, these findings offer a novel contribution to literature, suggesting that vocabulary is an area that school personnel should assess and design for instruction. (Wang et al.)

A Comparative Analysis of Healthcare Systems: The United States and Germany

Catherine Ugwu, Belinda Solis

Faculty Mentor: Dr. Peter Funke (College of Arts and Sciences)

Healthcare systems around the world can differ significantly in areas such as their structure and accessibility. This study compares key aspects of the German and American healthcare systems, focusing on an unbiased comparison of the two. Germany's healthcare system, grounded in its Basic Law of "Grundgesetz", ensures universal access to medical care using their main system of statutory health insurance (SHI) and private insurance. In contrast, the U.S. operates a fragmented healthcare system characterized by a mix of private and public insurance, leading to significant disparities in coverage and costs. By analyzing these differences, this study highlights the strengths and weaknesses of each model, offering insights into how healthcare policies impact patient outcomes and overall system efficiency.

Assessing the Clinical Effectiveness of Cologuard Versus Colonoscopy in Early Detection of Colorectal Cancer

Chandler Castillon, Lauren Song, Amanda Martin, Shriya Anand, Samia Khan, Riya Pandey

Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

In the past ten years, there has been a rise in the implementation of non-invasive colon cancer screening such as multitarget-stool DNA tests (MT-sDNA), also known as cologuard, fecal immunochemical tests (FIT), and tumor/blood-based markers. This literature review aims to assess the clinical effectiveness of multi-target stool DNA tests (cologuard) versus the clinical effectiveness of a colonoscopy. Thirty-six articles were obtained using the reference management software, Endnote, and the National Institute of Health's medical database to locate articles relating to cologuard/MT-sDNA and colonoscopies. This review found that cologuard was more effective at detecting precancerous and cancerous growths at a higher specificity but lower accuracy than colonoscopy. Additionally, adherence to preparation levels affected colonoscopy detection rates. Conducting a MT-sDNA test followed by a colonoscopy is far more effective at reducing colorectal cancer (CRC) incidence and mortality. The results obtained demonstrate that MT-sDNA tests are slightly more effective at detecting colon cancer and precancerous growths, however, without a follow-up colonoscopy, growths that were detected cannot be removed. By combining both MT-sDNA tests and colonoscopies together, CRC incidence and mortality can dramatically decrease.

Revolutionizing Cardiovascular Care: Generative AI Enhancing Predictive Medicine

Charlotte Dotson, Sevara Badriddinova, Farangis Buranova, Bismar Casal, Ton Le, Aaryan Shah
Faculty Mentor: Dr. Markum Reed (Muma College of Business)

Generative AI has become a disruptive force in the healthcare industry that is propelling efficiency and accuracy in cardiovascular screenings. During the exploration of machine learning and deep learning techniques, we identified ways to leverage generative AI to our advantage in predictive medicine for cardiovascular diseases. DL techniques, including convolutional neural networks, approximate nearest neighbor, and recurrent neural networks have proven successful in predictive analytics applied to cardiovascular risks in athletes. Convolutional neural networks have specifically proven successful in analyzing electrocardiograms (ECG) and identifying atrial fibrillation. Our model was developed using TensorFlow, a machine learning convolutional neural network model, and fed ECG data with the goal of efficiently and accurately reading ECG data and identifying underlying cardiovascular conditions. This research, done to support Florida Blue Cross Blue Shield, aimed at identifying where generative AI can be a cost and time saver as well as improve patient experiences. We know the continuance of this model would improve physician efficiency, in turn supporting Florida Blue Cross Blue Shield's processes. Developed further, our goal would be to apply AI models to at-risk patients' medical records, including blood work, genetics, familial history, ECG results, and biosensor data. The continuance of this work through advanced deep learning techniques and application to patient data to find hidden neural networks is crucial to the success of identifying at-risk patients.

The Posthumous Body Politic: A Tale of Two Popes

Chelsea Wigington
Faculty Mentor: Dr. Anna Dixon (College of Arts and Sciences)

The story of the Cadaver Synod provides a compelling window into the intersection of Roman life, politics, religion, canon law, and theatre at the end of the powerful Carolingian dynasty in the 9th BC. In essence, the event in question is a golden example of the anthropological concept of court as theatre in both practice and public perception. The proceedings provided the succeeding pope, Stephen VI, a platform to air both his personal and canonical grievances in an attempt to destroy Formosus's holy mortal coil. After death, a corpse retains two lives; the physical and the metaphysical. This rings especially true within the Catholic Church, specifically concerning the preservation of holy individuals as conduits of divinity in the form of relics. Deviation from this practice holds great significance, no event demonstrating this more blatantly than the posthumous trial of Pope Formosus.

The Basic Cyber Hygiene Education in Health Care Practices in the Tampa Bay Area

Chloe Duncan
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Health care practices have become the primary target for threat actors to extort money due to lack of basic cyber security hygiene practices. Some research has attempted to understand why health care practices lack basic cyber security knowledge; however, recent research has not targeted exactly to what extent health care practices have knowledge of basic cyber security hygiene. The study gained insight by asking the demographic these things: the confidence of knowledge in cybersecurity practices, the amount of cyber hygiene training and cybersecurity resources in the Tampa Bay area. The study's findings suggest that health care practices do not have the resources, the confidence in cyber security hygiene knowledge and cyber security training to prevent extortion from threat actors. These findings suggest that there needs to be more research in seeing change in providing proper cybersecurity hygiene training and resources to health care practices.

Encouraging Effective Communication During Partner Work in English Language Arts

Chloe Knopf
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This study examines how to encourage students to have effective communication with their partners during ELA instruction. Observations reveal that many students struggle to engage in productive conversations with their partners, often failing to stay on topic or ask clarifying questions, which hinders their learning. Effective communication consists of staying on topic, speaking with a partner and asking questions or clarifying information. Studies have shown that when students communicate, they are able to build on each other's ideas and learn new information. It is important for students to have these communication skills because they will continue to do it as they get older, and it is a skill they will use for future jobs. Methods that I am putting in place are modeling how to communicate effectively, Kagan strategies and an anchor chart for guidance. The goal of this research is to encourage students to effectively communicate with their peers during ELA instruction to promote growth and learning.

Mortality and Incidence Disparities in Breast Cancer: Socioeconomic Influences Across Ethnic Groups

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Breast cancer is the second leading cause of cancer deaths among women in the U.S., with over 42,000 deaths expected in 2024. Socioeconomic status (SES) affects access to preventive care, treatment quality, and healthcare costs, particularly for racial and ethnic minorities. This study reviews how SES acts as a social determinant of health, influencing breast cancer incidence and mortality in U.S. women. We conducted a systematic review using the AI tool Elicit and databases like PubMed, NIH and Google Scholar, focusing on studies from 2020 to 2025. Our analysis included clinical trials, cohort studies, and case-control studies on breast cancer outcomes in U.S. women under 30. Our results indicate that African American women face the highest rates of breast cancer incidence and mortality compared to Hispanic, White and Asian women, which may be largely due to financial barriers. Low SES often leads to limited access to healthcare, late-stage diagnoses, and gaps in insurance coverage, further contributing to higher incidence and mortality rates. Statistical analyses from SEER and State Cancer Profiles show significant racial disparities in diagnosis and survival rates, highlighting the urgent need for targeted interventions. To address disparities in breast cancer outcomes, a multifaceted approach is needed, including improved healthcare access and policy interventions to lessen financial and systemic barriers. Future research should prioritize comprehensive data on minority populations, incorporating genetic, environmental, and psychosocial factors. Our findings highlight the necessity of addressing healthcare inequities to reduce racial disparities in breast cancer mortality and enhance health outcomes for underserved communities.

Analysis of Pharmaceutical Wastes and Organic Analytes in Water Samples across the Tampa Bay Area

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Faculty Mentor: Dr. Madhu Pandey (College of Arts and Sciences)

This study examines the presence of pharmaceutical contaminants in wastewater by analyzing treated water samples from the Tampa Bay region. Monitoring the quality of water is essential for protecting public health and ecosystems since human activities frequently introduce harmful substances into freshwater systems. Despite improvements in wastewater treatment processes, pharmaceutical residues can still be found in treated water, indicating that existing methods are inadequate at eliminating these pollutants. This research utilizes solid-phase extraction (SPE) to filter out pharmaceutical wastes and organic compounds from the water samples collected. By employing SPE alongside gas chromatography-mass spectrometry (GC-MS), the study identifies and quantifies organic compounds in eight wastewater samples, while also assessing pH and salinity to investigate changes induced by pharmaceutical pollutants. The results are intended to improve wastewater treatment techniques and tackle the persistent challenge of chemical pollution in aquatic environments. Acknowledgements: Christina Mitsotakis, Paul Lennon, Matthew Constant, Aayusha Giri, Dr. Madhu Pandey, and Dr. Mahmoud Mohammed

Comparative Genomics of NEIL1: Implications for Longevity and DNA Repair

Christopher Sanchez
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The Nei-like DNA Glycosylase 1 (NEIL1) gene encodes a DNA glycosylase enzyme essential to the Base Excision Repair (BER) pathway, a critical mechanism for maintaining genome integrity. Genes involved in DNA repair and maintenance play a significant role in longevity, as they protect against telomere deterioration, interstrand cross-links, and oxidative lesions. The Galápagos tortoise (Chelonoidis abingdonii) is known for its remarkable lifespan of 100–175 years. Understanding the differences in NEIL1 between humans and tortoises could provide insights into mechanisms that promote longevity and their applications to human health. To compare the NEIL1 orthologs, various bioinformatics tools were utilized. Pairwise and multiple sequence global alignments were used to identify similarities between orthologs and paralogs. Protein structure and biochemical properties were examined using Expasy Swiss-Model and UCSF Chimera, allowing visualization of structural differences, hydrophobic core variations, as well as properties such as volume and sequence hydrophobicity. This comparative analysis of NEIL1 in humans and the Galápagos tortoise provides a foundation for future research into longevity-associated genetic factors and potential therapeutic strategies for enhancing human lifespan.

Analysis of CA 19-9 in Prognosis and Diagnosis of Pancreatic Cancer

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CA 19-9 is a carbohydrate antigen tetrasaccharide that is highly expressed in many cancer cells, and it has been used to detect malignant tumors. The tumor marker is primarily used to detect pancreatic cancer, but it can also be used in diagnosing other forms of cancer such as ovarian cancer and gastrointestinal cancers. This biomarker can also advance cancer symptoms by either suppressing the immune system or allowing proliferation of cancerous cells. This review aims to evaluate the accuracy of the CA 19-9 biomarker in pancreatic cancer to better link it to survivability. In this project, Endnote was used to search for sources on PubMed and Rayaan helped in screening of the sources. CA 19-9 is generally used with other tumor markers to improve the accuracy of tumor detection because it is not extremely specific and sensitive in testing alone, which is a limitation of the biomarker as a tumor marker. Some other limitations with this biomarker are that it can be raised in benign conditions, be low in malignant conditions, and can come from multiple organs. Regardless, higher concentrations of CA 19-9 are generally linked with lower survivability.

Do Changes in Probabilities and Outcomes Matter When Making Risky Choices?

Clayton Spencer, Heleana Bentley
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How do changes in options affect our preferences? We explored influences on people's willingness to take risks based on expected value (EV; i.e., average outcome), probability, and monetary outcome amounts. In this pilot study, participants made choices involving trios of lottery options: a high-risk (HR), a low-risk (LR), and a sure thing (ST) option. Control lottery trios had a mixture of gain and loss outcomes of equal EV. Manipulation trios involved one of four conditions: a positive or negative shift in probability (and thus EV) for the HR option only, or a constant shift in monetary amounts for all three options that made all outcomes gains or all losses. Participants saw ten control lottery trios, followed by 10 trios in their randomly assigned manipulation with the same control lottery trios intermixed throughout. When the HR probability (and EV) was shifted, participants preferred the HR option more in the beneficial condition and less in the detrimental condition compared to the control. When all monetary amounts were shifted, participants chose the HR option slightly more often in the loss condition but had no significant change in the gain condition compared to the control. These results suggest that people similar to our participants may have risk preferences that are sensitive to one option becoming better or worse than the others in the set but may change risk preferences less as a function of mixed options shifting to become all gains or all losses.

A Comparative Study of Arthropod Diversity in Urban Agricultural Spaces of Tampa Bay

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The composition and richness of arthropod diversity was measured at fourteen agricultural spaces in Tampa Bay and the USF Forest Preserve. Arthropod diversity acts as a biological indicator for the ecological health of urban agricultural spaces. This project is a replicate study and represents the first quantitative analysis of local and landscape-level drivers of arthropod biodiversity in subtropical urban habitats. The sites were chosen randomly and assessed for local and landscape habitat factors via vegetation data and six passive pitfall traps were placed at random within each site. Four collection events across the year of 2024 were conducted, with two events in the rainy season and two in the dry season. Our preliminary data shows a high abundance of the order Hymenoptera, with the site most abundant in individual samples being Sweetwater Farms. There is also an overrepresentation of the pollinator functional group across all sites sampled. The next stage of our research at present includes refining the identifications of individual samples. In the future, a comprehensive data set will be created that combines vegetation and arthropod data to conduct extensive statistical analysis.

Characterization of Virulence Phenotypes and Antibiotic Resistance in Staphylococcus aureus Clinical Isolates

Connor Moynihan
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Staphylococcus aureus remains one of the most significant microbial threats in both hospital and community settings, causing approximately 120,000 bloodstream infections and 20,000 deaths each year in the United States. Its prevalence is due to the employment of a wide range of virulence factors, including secreted exoproteins such as hemolysins and proteases, as well as the pigment staphyloxanthin, that defends against oxidative stress. In addition to these potent virulence determinants, infections are increasingly difficult to treat due to widespread antibiotic resistance, which occurs via bacterial evolution and antibiotic misuse. In this study, we characterize a group of clinical S. aureus isolates from patients at Tampa General Hospital from 2017 to 2019, assessing pigmentation, hemolysis, proteolysis, and resistance to mupirocin. Upon analysis, nearly three-quarters of all pigment-lacking isolates demonstrated complete resistance to mupirocin, a prevalence twice that of pigmented isolates. Despite this, they demonstrated diminished lytic activity compared to pigmented counterparts, exhibiting 42% less hemolysis and 24% less proteolysis. Strikingly, the absence of pigmentation was nearly six times more prevalent in bacteremia isolates versus respiratory infections. Our findings suggest a unique population of S. aureus within TGH that display significantly enhanced antibiotic resistance yet lack trademark virulence traits observed in other isolates, suggesting a trade-off between acute toxicity in favor of evading antibiotic treatment. Future directions will include genetic analysis to shed light on the evolution of these clinical occurrences, revealing epidemiologic trends of S. aureus infection that will allow for improved patient outcome.

Exploring the Longitudinal Predictors of Affect Recognition in Autism: The Influence of Inferencing and Theory of Mind

Coral Morley, Emma Barney, Zara Khan, Conner Peltier
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Autistic children often face social communication challenges linked to cognitive and linguistic deficits (Mughal et al., 2022). Affect Recognition (AR), the ability to interpret emotional cues, is crucial for social interactions. Therefore, understanding the cognitive mechanisms behind AR is essential for improving interventions. This study examines how Inferencing and Theory of Mind (ToM) predict AR in autistic children over six months, aiming to inform intervention strategies (Fletcher-Watson et al., 2025). The study included 34 autistic children (M = 104.81 months, SD = 32.42; 67.6% male, 32.4% female), with 50% Caucasian, 18% African American, 18% Asian, 9% Multi-Racial, and 3% Hispanic. Inferencing was assessed using images and storybook passages, ToM through mental state attribution tasks, and AR via facial, vocal, and body cue interpretation. Inferencing and ToM were assessed at Wave 1, while AR was assessed six months later at Wave 2. SPSS was utilized to examine their predictive relationships. Results indicated that inferencing ($B = 0.40$, $p = .024$) and ToM ($B = 0.57$, $p = .007$) significantly predicted Wave 2 AR ($R^2 = .617$, $p < .001$). However, when controlling for Wave 1 AR, only prior AR

remained a significant predictor of Wave 2 AR (R^2 = .744, p < .001). ToM and Inferencing contribute to AF but do not exceed the predictability of Wave 1 AR, reinforcing that prior behavior predicts future behavior (Aarts et al., 1998). This suggests that interventions strategies should intentionally focus on AR to strengthen these skills in autistic children.

The Role of NOTCH1 Mutations in Adams-Oliver Syndrome

Daiana Ochomogo
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The NOTCH1 gene is involved in cell proliferation and apoptosis in early fetal development. Mutations in NOTCH1 can lead to Adams-Oliver syndrome (AOS), which is characterized by skin, limb, and vascular defects. NOTCH1 has been linked to several single-nucleotide polymorphisms (SNPs). Amino acid sequence substitutions from amino acid 15 to 53 are associated with Adams-Oliver syndrome. Amino acid sequence alignment was then used to define the impact of the SNPs on NOTCH1 structure. This study aims to investigate the specific role of NOTCH1 mutations in AOS and enhance screening methods using bioinformatics techniques.

Challenges and Innovations in Pediatric Anesthesiology

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Pediatric anesthesiology is a field that must account for the physiological and drug metabolic differences between children and adults. Previous studies acknowledge the challenges posed by pediatric airway management and brain health risk. This literature review aims to address advances in pediatric airway management via videolaryngoscopy and brain health innovation via near infrared spectroscopy in the field of pediatric anesthesiology. This study evaluated research on key technological advancements in NIRS and videolaryngoscopy to examine promising advances for the related persistent challenges in pediatric anesthesiology. The literature suggests that advances in the use of NIRS, can measure cerebral oxygenation and lower neurologic injury risk. Low cerebral oxygenation levels after a cardiac surgery have been linked to poor neurodevelopmental outcomes, thus making NIRS an effective tool for anesthesiologists to monitor and adjust factors such as ventilation, perfusion, or blood pressure as needed. The more routine use of videolaryngoscopy has also provided a potential method of combating uncertainties in navigating pediatric airways, particularly when combining two video enabled devices—a laryngoscope and a fiberscope. This advancement provides a live visual to ensure proper and less traumatic placement of the endotracheal tube, reducing esophageal intubations and airway trauma. The ability to manage and care for children continues to evolve, and the ability to assess tissue oxygenation of tissues deep to the skin and to more reliably and easily access and control pediatric airways represent two noteworthy advances for patients and the providers who care for them.

The Ongoing Evolution of ACLS

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The utilization of Advanced Cardiac Life Support (ACLS) within hospitals saves thousands of lives annually due to continuous practice that is evolving the advancement of medicine. However, ongoing research has highlighted limitations of current ACLS methods. ACLS and its training process is evolving continuously to optimize the settings in a medical environment including complications during CPR, medicine administration, prioritizing post-resuscitation care, and timely intervening when factors such as pre-existing conditions arise. A literature review of 80 peer-reviewed papers examined ACLS instruction retention, evolving ACLS guidelines, and modern ACLS methods such as extracorporeal cardiopulmonary resuscitation and cardiac ultrasound during resuscitation. This review identified key trends in the evolution of ACLS, including improvements in training retention, adaptations of ACLS guidelines, and the integration of newer resuscitation methods. Studies show that while ACLS-trained personnel demonstrate better short-term outcomes, up to 35%-45%, overall post-resuscitation discharge rates remain relatively low, reflecting the limitations of current protocols. Training advancements like simulations have shown to improve skill retention and provider performance by 20%-40%. Additionally, a major shift in recent years has been the incorporation of artificial

intelligence into ACLS training, offering promising opportunities to enhance patient outcomes and strategies. Updates to ACLS guidelines have focused on refining administration, optimizing CPR techniques, and prioritizing post-resuscitation care to improve long-term outcomes. While the long-term impact on knowledge recollection remains inconclusive, these findings emphasize the importance of research in AI technology, simulation courses, and evaluating in-hospital methodologies to enhance both ACLS learning and skill remembrance.

The Tampa International Gay and Lesbian Film Festival: The History of a Film Festival and a Community

Danny Bartolo
Faculty Mentor: Dr. David Johnson (College of Arts and Sciences)

The Tampa International Gay and Lesbian Film Festival, or TIGLFF has been a consistent pillar of the Tampa Bay LGBTQA+ community, as since its inception in June of 1990, it has been held annually in October, although 2024 and 2025 seem to be exceptions. Despite the amount of primary sources available pertaining to TIGLFF and its past years, there has not yet been an attempt to record the event's full history. Utilizing a variety of primary sources such as programs provided by the festival and news articles from the likes of the Tampa Tribune, Tampa Bay Times, and The Gazette I was able to construct a detailed timeline the likes of which have not been recorded prior. Despite its youth in comparison to other queer film festivals, TIGLFF's impact on the Tampa Bay LGBTQA+ community and the Tampa Bay area cannot be understated, as it's showcase of queer feature-length, short, and documentary films as well as filmmakers helped to bring together people who share similar experiences, while also crucially providing a space for these films to be seen and celebrated, as well as discussed, enforcing community among all who are able to attend.

Understanding the Variation in the Amount of Microplastics Consumed by the Body Size of Eucinostomus spp.

David Nadler, Lauren D'Amore
Faculty Mentor: Dr. William Ellis (College of Arts and Sciences)

Microplastics (MPs) are small particles of plastic less than 5 mm in size that have found their way into ecosystems. Fish consume microplastics from sediment and the water column which then end up in the GI tract, where they cause physiological harm. Previous research studying the uptake of MPs in demersal fishes found a positive correlation between body mass and amount of MPs consumed. Mangrove ecosystems are a sink for microplastic accumulation; we are focused on the acquisition of MPs in the GI tract of the mangrove fish Eucinostomus spp., to determine if these trends are consistent with prior studies. Knowing that MPs are present, this research is key for predicting the amount of plastics that are consumed. Eucinostomus is a valuable species that is abundant in Florida's mangroves, and it is a bottom feeder that comes into contact with MPs in the substrate. We dissected the GI tract from fish caught from Florida's Tampa Bay and Rookery Bay and digested them in peroxide, the organic matter was vacuum filtered, followed by dehydration, then MP counts were calculated using ImageJ. Preliminary research suggests that the average mass of plastic in each fish was positively correlated with fish size (mass,length). Fish with smaller body size require less energy than larger fish, thus they should consume less food and thereby less MPs. Determining a potential correlation between microplastics and the mangrove fish species Eucinostomus aids in furthering our understanding of bioaccumulation to higher trophic level species that are then commercially fished.

Impact of Subclinical Hypothyroidism on Cardiovascular Health and Quality of Life

Dea Fejzo, Nikhil Chainani, Trisha Pitchala, Edison Johnson, Jalal Jamil, Zein Hamdan
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Subclinical hypothyroidism (SH) is characterized by elevated Thyroid-Stimulating Hormone (TSH) levels while free thyroxine (T4) remains normal, affecting approximately 3%-15% of the population, thus warranting further research. Method triangulation was employed to review studies from various databases, including PubMed, using targeted keywords to identify relevant research. Often caused by Hashimoto's Thyroiditis, SH is prevalent among older adults, women, and certain ethnic groups. It contributes to cardiovascular disease (CVD) through mechanisms such as dyslipidemia, endothelial dysfunction, and increased arterial stiffness, which lead to hypertension and cardiovascular strain. Research reveals a significant association between SH and an increased

risk of congestive heart failure (CHF) and coronary heart disease (CHD). In children, untreated SH is linked to higher blood pressure, elevated lipid profiles, and increased arterial stiffness, emphasizing the need for monitoring and treatment to mitigate cardiovascular risks. Untreated SH patients often have high levels of total and LDL cholesterol, increasing their CVDrisk. Levothyroxine treatment can improve lipid profiles, lower blood pressure, and reduce arterial stiffness, thereby mitigating cardiovascular risks. However, treatment does not consistently enhance quality of life (QoL), with patients frequently experiencing persistent fatigue, cognitive impairment, and reduced well-being. Long-term data suggest that younger patients, males, and those with lower baseline cardiovascular risk benefit more from treatment. Understanding the complexities of SH treatment is crucial for improving long-term health and QoL in affected individuals. Further research is necessary to establish best practices for managing SH to mitigate cardiovascular risks and enhance patient outcomes.

Maternal Risk-Management Elucidates the Evolution of Reproductive Adaptations in Testudines by Means of Natural Selection

Deyana Stokes
Faculty Mentor: Dr. Deby Cassill (College of Arts and Sciences)

The maternal risk-management model is the study of how breeding females allocate resources between offspring size, offspring number, and offspring diversity to achieve reproductive success, i.e., replacement fitness. Maternal investments in offspring size, number, and diversity are shaped independently by diverse risk factors: the extent of gaps during seasonal resource cycles, rates of predation/parasites, and unpredictable catastrophes such as disease, floods, fire, or anoxic events. Here, in Testudines, we show that maternal investments within and across species agree with the predictions of the maternal risk-management model. Within the Testudines species, larger females invested in larger offspring and larger clutches. We show that offspring size and offspring number per clutches were independent maternal investment strategies. The risk of starvation favored investments in larger offspring. The risk of predation favored investments in larger clutches. In conclusion, our study showed that Testudines are weak selected species. If empirical studies continue to confirm its predictions, maternal-risk management may yet emerge as a unifying model of diverse reproductive adaptations by means of natural selection.

Evaluating Extreme Weather and Climate Adaptation Concerns for Corn and Soybean Farmers

Dharsh Saravana
Faculty Mentor: Dr. William Schanbacher (College of Arts and Sciences)

Corn and soybeans are the most economically valuable crops in Minnesota and represent significant land usage in the state with farmers reporting 14.5 million acres of corn and 7 million acres of soybeans planted in 2024. Continued warming and fluctuations between extreme weather events driven by climate change are expected to increase pest pressure, flood damage, and risk of heat stress for crops and farmworkers. Six climate-conscious commercial corn and soybean farmers located predominantly in southern Minnesota were interviewed to understand their perceived extreme weather and climate impacts, farm management responses to these conditions, and risk management concerns for their farm's future. These semi structured interviews were recorded, transcribed, and underwent a preliminary analysis of key concerns to ground the development of an interactive decision-making tool. The goal of this research is to help farmers and their agricultural advisors assess their agricultural risks due to climate change and the actions they can take to prepare for Minnesota's extreme weather and climate impacts. We expect that findings from our research will inform our ability to advise on best climate preparedness practices for short term (in season), mid-term (1-3 years), and long term (10-15 year) time horizons.

What Happened to Puerto Rico

Diego Andres Lozada Irizarry
Faculty Mentor: Dr. Cayla Lanier (Judy Genshaft Honors College)

Puerto Rico exists under US jurisdiction under special circumstances that keep it a territory while the people have citizenship. However since the island is not a state, Puerto Rico still exists as its own independent nation as well. This is evident when observing the culture and norms of people on the island.

The island also has a beautiful landscape of lush green forests and clear beaches. After hurricane Maria however, the island experienced degradation of the island and many homes. The island enacted the Act 60 to incentivizes foreign investors to buy land and invest in tourism to help the island. However as the years have gone by, the over tourism in the island and the excessive establishments of Airbnb and vacation homes have created a housing crisis, leaving many to pay higher prices for their homes or causing gentrification and displacement of people. The pop-urban artist, Bad Bunny, has released an album in the prior year. The album was made to elude to the puertorican audience and traditional music of the island. Most importantly it spoke out against the Bertram of the island and its effect on the people, stated most loudly so in his song "Lo Que Le Paso A Hawaii". In this song Bad Bunny calls out the US for the abuses of over tourism and colonization of island like Puerto Rico and the Island of Hawaii. Most importantly the message in the song calls Puerto Ricans to remember who they are no matter where they live now.

Does Urbanization Affect Microplastic Concentrations in Benthic Mangrove Fish

Diego McKenzie, Seth Bates

Faculty Mentor: Dr. William Ellis (College of Arts and Sciences)

Mojarras are a common prey species of fish in the estuarine mangrove communities of West Florida. This study investigates the relationship between urbanization and microplastic consumption in mojarra. Microplastic contamination in marine sediments correlates significantly with urbanization, and we expect a similar relationship between urbanization and fish microplastic ingestion as mojarras frequently feed on benthic invertebrates. Our work is the first of its kind to compare plastic consumption by fish in different estuaries in West Florida. Mojarras were sampled from three sites in non-urbanized Rookery Bay (n= 43 fish), and three sites in urbanized Tampa Bay (n= 37 fish). After removing the gastrointestinal tract of the fish and digesting organic material with hydrogen peroxide, the microplastic particles were dyed with Nile Red, photographed under UV light, and enumerated using ImageJ image processing software. Preliminary findings show microplastic contamination across sample sites. If subsequent analysis of these data shows a significant relationship between urbanization and gut microplastic concentration, this would suggest a lack of selectivity against microplastic consumption in mojarras. On the other hand, consistent microplastic gut concentration between estuary types could warrant further investigation in the foraging selectivity of mojarras. Additionally, understanding the link between terrestrial development and plastics in fish may be useful information for future investigations on the potential of trophic transfer and human consumption.

Impact of Class, Social Hierarchy, and Socioeconomic Barriers to Maternal Healthcare in India.

Diyana Shah

Faculty Mentor: Dr. Holly Donahue Singh (Judy Genshaft Honors College)

Access to maternal healthcare in India is influenced by factors like class, social hierarchy, and economic status, leading to significant disparities in antenatal care, institutional deliveries, and other maternal health outcomes. Women from lower socioeconomic backgrounds have always faced multiple barriers during their pregnancy due to financial constraints, inadequate healthcare infrastructure, and discriminatory social practices. This paper examines the extent to which these factors hinder pregnant women's access to quality maternal care and evaluate the effectiveness of government interventions aimed at addressing lacks in access to care. Programs like Janani Shishu Suraksha Karyakram (JSSK) and Labor Room Quality Improvement Initiative (LaQshya) aim to improve access to maternal healthcare by providing free services and financial incentives. Moreover, they provide community-based education for healthcare workers and women and their families to seek to better their living conditions. However, institutional deliveries among pregnant women in lower-income household and rural areas remain low compared to urban areas. Factors like access to education, age at pregnancy, economic stability, access to water and food sources, are primary factors for pregnant women. The infrastructural deficiencies in India have also led to a lack of understanding related to these issues, causing a nuanced issue difficult to overcome. Further efforts are needed to strengthen healthcare infrastructure, enhance the training of healthcare workers, and integrate digital health technologies for better outreach. This research aims to emphasize the necessity of a multi-faceted approach to ensure maternal healthcare access for all women in India, regardless of class, caste, or economic standing.

Can Student-Driven Action Acquire Student Legislative Approval of at Least One Food Allergy Accommodation on the University of South Florida Tampa Campus?

Dora Rodriguez

Faculty Mentor: Dr. Kimberly Chism (College of Public Health)

Navigating a food allergy while in college can impact a student's social growth and educational journey. This research investigated whether student driven action could acquire student legislative approval of at least one food allergy accommodation on the University of South Florida Tampa campus. Through a partnership with the USF Student Government a survey was distributed to students gathering information on student demographics, current satisfaction with food options and desire for allergy friendly changes. The results showed that students desired more plentiful and culturally diverse allergen friendly food options. With the data from the survey a report was generated and sent to USF Dining Services and the USF Residential Education Office. Meetings were scheduled to discuss the data from the survey and the feasibility of introducing these allergen friendly changes. Next, a student resolution was developed and passed unanimously through the Student Government Relations Committee and Senate floor. The passage of this resolution represents the support of the whole student body in the development and implementation of additional allergy accommodations on the USF Tampa campus. Success at the University of South Florida supports the implementation of similar changes at other universities around the country. Similarly, USF students can build off this initial success to advocate for more support and accommodation at the university.

The Science of Spices – Health Benefits and Cultural Beliefs in Indian Cooking

Edgar Baez Ortega, Khadijah Nayeem

Faculty Mentor: Dr. Holly Donahue Singh (Judy Genshaft Honors College)

This project investigates the health benefits and cultural significance of spices such as turmeric, ginger, cumin, and cardamom in Indian cooking. Spices have been integral to Indian culinary and medicinal traditions for centuries, often serving as both flavor enhancers and natural remedies. This research explores the role of these spices in digestive health, drawing from Ayurvedic and Unani traditions while incorporating modern biomedical perspectives. Through a comparative literature review spanning historical, anthropological, and scientific sources, this project examines how traditional beliefs about spices persist in contemporary Indian communities and their growing influence on global health trends. The analysis focuses on the intersection of food, medicine, and culture, highlighting how Indian healing systems view digestion as a foundation of well-being. By bridging traditional knowledge with modern science, this study aims to contribute to broader discussions on integrative health practices and the cultural relevance of dietary habits. Findings from this research will provide insight into how Indian dietary traditions continue to shape health perceptions, self-care practices, and holistic wellness approaches both regionally and globally.

Towards a Drug-Resistant-Free Future: Discovering Antimicrobials to Tackle Resistant Pathogens

Edith Galicia

Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

Discovering antimicrobial agents is crucial in the defense against antibiotic-resistant pathogens that are harmful and pathogenic to humans. In this study, there is a focus on the antimicrobial properties of a discovered bacterium isolated from a soil specimen. This bacterium exhibits potent inhibitory activity against certain clinically relevant pathogens. Using a combination of traditional microbiological techniques and advanced molecular methods, identification of the bacterium was able to be completed. The results demonstrate that the bacterium produces bioactive substances that target bacterial cell wall synthesis and disrupt membrane integrity. This discovery offers promising potential for the development of new antimicrobial therapies, especially considering the growing concerns surrounding antibiotic resistance. Further investigation into the bacterium's microbial properties will provide deeper insights into their therapeutic applications and the bacterium's role in natural antimicrobial processes.

Impact of Background Music in Information Retention Techniques on Short-Term Memory in Engineering Students

Eduardo Barbosa Sanchez, Beatriz Primo e Silva, Ana Carolina Rezende Neves

Faculty Mentor: Dr. Trung Le (College of Engineering)

The relationship between background music and memory retention is a growing area of interest, particularly among students who frequently use music during study sessions. According to the Journal of Higher Education Theory and Practice, around 75% of students listen to music while studying. Based on a Harvard publication, understanding short-term memory is essential for study efficiency, as it is influenced by word exposure modes, auditory environments, and individual factors. This study investigates the impact of auditory environments on short-term memory retention in College of Engineering students aged 18–25. Using a within-subject factorial design combined with a Randomized Complete Block Design, the study collected 168 test results across two blocks (morning and afternoon) of fourteen participants each to evaluate the effects of background music on different word exposure methods. The analysis included two approaches: estimating the percentage of words recalled across six memory tests - combinations of writing, listening, and reading with and without background music - using ANOVA, Tukey tests, and Linear Regression; and predicting the impact of music presence for each scenario through Ordinary Logistic Regression, Decision Trees, and SVM. The results revealed that writing and background music significantly improve short-term memory retention, highlighting opportunities to optimize learning environments. Recommendations include incorporating these strategies into educational practices and exploring additional factors influencing short-term memory retention through further research.

Post-Hurricane Pathogens: Waterborne Infections in Immunocompromised Hematology Patients

Edwin Cruz, Alvin Varghese

Faculty Mentor: Dr. John Greene (H. Lee Moffitt Cancer and Research Institute)

Hurricanes can increase waterborne infections due to potable water contamination such as cholera, hepatitis A and norovirus, vector borne infections such as dengue, malaria and skin/ soft tissue infection (SSTI) from skin abrasions in contact with contaminated water. The cleanup after a hurricane includes contact with salt and fresh water and debris from vegetation and home debris which can cause SSTI and includes Vibrio, Aeromonas, other water borne Gram negative bacilli (GNB), and molds. These infectious diseases cause varying symptoms such as swelling, pain, fever, blisters, etc. Immunosuppressed cancer patients, especially those with hematologic malignancy, are particularly vulnerable to the water pathogens that can enter through the skin barrier disruption. Other risk factors such as diabetes, vascular diseases, and neuropathy can lead to higher susceptibility due to depressed immune response, and impairment of the body's natural care for wounds. We present cases of hematologic cancer patients with invasive SSTI's after cleanup from damage from the 2024 hurricanes that affected the state of Florida. We illustrate the seriousness of water borne GNB infections and primary cutaneous mold infections in patients with prolonged neutropenia and iron overload that can develop after minor skin injuries. Review of the literature along with our cases will illustrate the need for early recognition and prompt management and suggest prevention measures when immunosuppressed cancer patient experience the aftereffects of a hurricane.

Emerging AI in Oncology: Evaluating High-Potential Models for Cancer Diagnostics and Therapeutics

Elena Spall

Faculty Mentor: Dr. Markum Reed (Muma College of Business)

Artificial Intelligence (AI) in oncology has the potential to transform cancer diagnostics and therapeutics by enhancing accuracy, efficiency, and personalization. This thesis evaluates the potential effectiveness of emerging AI models in oncology through a comprehensive literature review and a novel scoring framework. With the focus on four cutting edge, emerging models designed for clinical support in general, brain, colon, and ovarian cancer, the research assesses each model's technical merit, clinical relevance, and future feasibility. By systematically evaluating these models, this thesis identifies key trends and favorable indicators that signal high-impact AI models. The findings highlight the importance of explainability, population applicability, and ethical considerations as pivotal factors for successful AI implementation. Furthermore, the study exposes gaps in current AI development, providing guidance for researchers and developers on optimizing model design and accelerating real-world adoption. Ultimately, this work aims to inform both AI developers and healthcare stakeholders to create more effective and trustworthy AI solutions for oncology.

Healing the Environment - Improving the Environment in South Asia

Ella Champ
Faculty Mentor: Dr. Holly Donahue Singh (Judy Genshaft Honors College)

The environment plays a major role in the health of people. This paper discusses the environment throughout South Asia and compares it to the most sustainable country in South Asia, Bhutan. Bhutan has a negative carbon output, which very few countries in the world do, and that makes Bhutan one of the most environmentally healthy countries to live in. That brings up the question of: what does Bhutan do that none of the other countries do?

Biochemical Pathway Mapping to Investigate the Role of Prostaglandin Pathways in Primary Dysmenorrhea

Emaan Niaz
Faculty Mentor: Dr. Hector Gomez (Morsani College of Medicine)

Primary dysmenorrhea (PD) is characterized by intense, painful pelvic menstrual cramping without identifiable clinical pathology, distinguishing it from secondary dysmenorrhea. Increased uterine activity, manifested as myometrial hypercontractility, leads to vasoconstriction, ischemia, and hypoxia of the uterine muscle. This compromises blood flow to the uterus, promotes sensitization of nerve fibers, and ultimately results in dysmenorrheic pain. Elevated intrauterine synthesis and secretion of prostaglandins, including PGF2α and PGE2, have been observed in PD patients. This systematic review aims to map a comprehensive biochemical pathway that elucidates the role of prostaglandin-related pathways in PD. To construct this pathway, we review the literature on arachidonic acid metabolism, the COX pathway, and prostaglandin synthesis in relation to the pathogenesis of dysmenorrheic pain. PD affects up to 29% of menstruating women, with 10% experiencing incapacitation. Due to its association with significant reductions in quality of life and school and work absenteeism, a detailed understanding of the biochemical basis of PD could lead to improved pharmacological and non-pharmacological treatments, particularly for patients who do not respond to typical methods, such as COX-inhibiting non-steroidal anti-inflammatory drugs (NSAIDs).

Variant of OCA2 Gene

Emily Chism
Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

Melanin, a pigment produced by melanocytes, is essential for determining the coloration of hair, skin, and eyes while also providing protection against ultraviolet (UV) radiation. The OCA2 gene encodes the P protein, which plays a crucial role in melanin synthesis and transport within melanosomes. Variants in OCA2 can lead to disruptions in melanin production, resulting in various pigmentation disorders. One such condition is tyrosinase-positive oculocutaneous albinism (OCA2), an autosomal recessive disorder characterized by reduced pigmentation in the skin, hair, and eyes. While individuals with OCA2 retain some tyrosinase activity, leading to partial melanin production, they often experience visual impairments such as nystagmus, reduced visual acuity, and increased sensitivity to light. Understanding the genetic and molecular mechanisms of OCA2 mutations can provide insights into melanin biosynthesis and potential therapeutic approaches for pigmentary disorders. This study of the OCA2 gene showed the variant of the Tyrosinase-positive oculocutaneous albinism through specific genomic databases. A few of these databases showed detailed explanations of the different variants of the OCA2 gene. This variant is located on the 15q12-13.1 chromosome.

Systematic and Cultural Influences on Women's Healthcare: A Comparative Analysis of the U.S. and Germany

Emily Meeker, Rocio Esquivel
Faculty Mentor: Dr. Peter Funke (College of Arts and Sciences)

Women's healthcare in the United States and Germany is significantly influenced by both systematic healthcare structures and prevailing cultural factors. Existing research highlights disparities in access and utilization of women's healthcare across the two nations, yet a comprehensive comparative analysis

between the U.S. and Germany, specifically focusing on the correlation of healthcare insurance, gym culture, and mental health, remains limited. This research commentary will investigate the question: How do systematic and cultural factors in women's healthcare differ between the United States and Germany? This study aims to address this gap by exploring how these factors intersect to shape women's health experiences by gathering quantitative and qualitative data. Quantitative data would be gathered from national health statistics and databases to differentiate the coverage and access, as well as the system efficiency and equity in their health and wellness policies. Qualitative data will be obtained through sociological research and media portrayals to evaluate the cultural dynamics of gym culture and mental health. Inspecting existing data and the framework of the healthcare policies in each country allows for a comprehensive understanding of both systematic and cultural influences. As this commentary can inform policy recommendations aimed at improving women's healthcare access and equity in both countries, future research should explore the long-term impacts of these disparities and cultural influences on women's health outcomes. Ultimately, this can allow both countries to benefit from learning and implementing the strengths of one another to affect future women's healthcare policies for the better.

Evolutionary Conservation of the Transcription Factor NPAS4 and Its Relationship to Traumatic Brain Injuries

Emma Schumann

Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

Neuronal Per Arnt Sim domain protein 4 (NPAS4) belongs to the basic helix-loop-helix PAS protein family and is predominantly expressed in the brain. It plays a crucial role in regulating inhibitory synapses in response to excitatory synapses. The balance between inhibitory and excitatory functions in brain circuits is essential for proper neural function and is associated with various human developmental disorders, such as attention deficit hyperactivity disorder (ADHD), particularly following traumatic brain injuries (TBIs). Multiple sequence alignment reveals that orthologs of NPAS4 are closely related, as shown in phylogenetic trees. However, their distance from NPAS4 suggests that mutations over evolutionary time could have caused changes to NPAS4. Further research into evolutionary conserved regions between Mus musculus and Homo sapiens has led to the discovery of predicted transcription factor binding sites (TFBS) that regulate NPAS4 expression. Identification of highly conserved regions across multiple species can highlight its functional significance in TBI-related conditions.

Evaluating Informal vs. Formal Title IX Resolutions for Sexual Violence and Harassment

Erica Chong

Faculty Mentor: Dr. Caralin Branscum (College of Behavioral and Community Sciences)

The Title IX of the Educational Amendments (1972; Title IX) requires all institutions of higher education (IHEs) receiving federal government assistance to investigate allegations of sexual misconduct – a form of gender-based violence – and are mandated to provide "prompt and equitable" resolutions for such complaints. Failure to effectively respond to sexual misconduct not only violates the complainant's institutional trust in the institution but also exposes institutions to legal and financial consequences while risking long-term credibility damage. Though prior research has examined Title IX reports at IHEs, there is a paucity of research on differences in resolution outcomes and the broader implications for sexual misconduct case processing at IHEs. To fill this gap, the current study investigates all sexual misconduct allegations at a single, large 4-year IHE in the Western United States during three academic years (2020-2023). Preliminary analyses identify potential predictive case-level factors differentiating in formal resolutions. Findings are anticipated to have implications on what differentiates cases that result in informal resolutions compared to formal resolutions. Policy implications will inform institutional responses to sexual misconduct.

The Role of Body Shape and Size on Burst Swimming Performance in Marine Reef Fishes

Erica Molnar

Faculty Mentor: Dr. Bradford Gemmell (College of Arts and Sciences)

One of the most important behaviors many animals possess is the ability to flee or escape from predators. In fishes, burst swimming is one of the most common strategies during a predation event. With such strong evolutionary pressure, it is noteworthy that reef fishes from the same habitat exhibit such a wide range in body and fin morphology. For the first time, studies focused on fast-start acceleration have been documented in the field, which offers a more realistic and comprehensive look at natural prey escape response to stimuli. With this level of understanding and observation of more realistic escape responses, the connections between specialist morphological traits have been re- examined and provide clearer insight into the connections between morphology and swimming performance. Field data was collected for escape responses using two orthogonally mounted cameras across multiple reef sites encompassing over 40 distinct fish species from 12 taxonomic families in their natural habitat. Body centerlines were extracted from 96 individual fish using Image J software, permitting interspecies comparison of maximum velocity, acceleration, tail beat amplitude, and tail beat frequency. Elongate body forms tended to outperform deeper body forms when comparing the extremes ($p=0.011$, $n=17$, $df = 23$) however generalist body forms tended to vary widely between species with insignificant correlation to body shape. Aspect Ratio (standard length / body depth) was positively correlated with maximum velocity ($slope=8.73$, $p<0.001$, $df=94$) and mean acceleration ($slope=48.53$, $p=0.02$, $df=94$) supporting the Webb's hypothesis that elongate body forms accelerate more rapidly than deeper, laterally compressed morphologies.

Examining Associations of First-Generation College Students' Mental Health and Belongingness with Their Academic Performance

Erica Moran

Faculty Mentor: Dr. Jay Michaels (College of Arts and Sciences)

The importance of mental health has gained recognition, with the American Psychological Association defining it as emotional well-being, good behavioral adjustment, and the ability to cope with life's stresses. This research investigates the relationship between mental health, specifically anxiety, depression, and belongingness, and the academic performance of first-generation college students (FGCS). The central research question is: "Does Mental Health Impact Academic Performance in First-Generation College Students?" It is hypothesized that FGCS with a stronger sense of belonging will show better academic outcomes, while those facing mental health challenges, such as anxiety and depression, will experience lower academic performance. FGCS often encounter unique stressors, like financial difficulties and lack of support, which contribute to higher levels of anxiety, depression, and lower belongingness. These factors can detract from academic focus and achievement. The study will involve FGCS completing a survey with questions on demographics, GPA, and measures of anxiety, depression, and belongingness. The goal is to better understand how these factors impact FGCS' academic success and provide insights into the broader implications of mental health in educational settings.

Influence of Social and Cultural Factors on E-Cigarette Risk Perception Among Vapers in College

Erika Nguyen

Faculty Mentor: Dr. Byron Miller (College of Arts and Sciences)

Within the past decade, there has been a growing prevalence of e-cigarette use among adolescents and young adults. Yet, few studies have investigated the factors that impact how youth and young adults form risk perceptions about vaping. The study looks at this public health issue through a medical sociology lens to identify the social and cultural factors that influence e-cigarette risk perceptions in young adults enrolled in college. Qualitative data about the experiences and perceptions of current and former e-cigarette users were collected via face-to-face interviews with participants who were recruited via convenience sampling and snowball sampling. This data was analyzed for reoccurring themes and subthemes that emerged across all interviews. Common reasons that influenced the decision to vape include social factors such as peer pressure, social norms, and social desirability as well as cultural factors such as heritage, upbringing, and family dynamics. Contrary to existing literature which suggests that e-cigarette users tend to have decreased risk perceptions, most of the participants of this study were very aware of the risks of vaping and felt strongly about its harmful nature. These participants

cited social and cultural factors such as social media and positive peer role models as catalysts for this shift in beliefs. These findings suggest that greater importance should be placed on social and cultural influences when creating public health programs to improve risk perceptions about vaping among youth and young adults.

Impact of Diabetic Retinopathy Severity on Primary Open-Angle Glaucoma Progression

Esha Haque, Anvitha Makkena, Trisha Pitchala, Megan Watters, Vasco Sanchez-Cornejo Sr.), Esha Haque
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Diabetic retinopathy (DR) and primary open-angle glaucoma (POAG) are common ocular conditions that frequently coexist, contributing to preventable blindness. This systematic review explores the relationship between DR severity and POAG progression, focusing on their shared pathophysiological mechanisms. DR, a microvascular complication of diabetes, progresses through stages classified by the ETDRS scale, with factors such as hyperglycemia, hypertension, and diabetes duration accelerating microvascular and retinal damage. POAG, a chronic optic neuropathy, is characterized by progressive retinal nerve fiber layer (RNFL) thinning and is often linked to elevated intraocular pressure (IOP) and visual field deterioration. The review synthesizes evidence from PubMed, Scopus, and other sources, highlighting how advanced stages of DR may exacerbate POAG progression. Shared mechanisms, including IOP fluctuations, retinal blood flow changes, vascular dysfunction, and optic nerve head alterations, contribute to the worsening of both conditions. Understanding the link between DR and POAG is crucial for early detection and intervention. This review emphasizes the need for integrated management approaches, improved diagnostic strategies, and timely treatment to prevent further ocular complications. By addressing shared risk factors, healthcare providers can help reduce preventable blindness and improve patient outcomes globally.

L-Ergothioneine Shows Benefits in Reducing Age-Related Hearing Loss: Improved Signal-in-Noise Detection in Mice

Evin Roji, Muhammad Hassam Amir
Faculty Mentor: Dr. Joseph Walton (College of Behavioral and Community Sciences)

The amino acid, L-ergothioneine (EGT), has gained attention as a potential therapeutic for age-related conditions due to its antioxidant and anti-inflammatory properties. EGT is naturally found in various foods and shows promise in protecting against oxidative stress, inflammation, and neurodegeneration. Recent studies have highlighted its role in improving physiological functions in aging models, particularly in mitigating age-related declines in sensory and neurological systems. In this study, we aimed to investigate whether long-term oral administration of EGT via gavage could improve hearing function in aged mice. Hearing sensitivity and signal-in-noise detection were measured to determine the therapeutic potential of EGT for treating age-related hearing loss (ARHL). Over a 4-month period, aged CBA/CaJ mice received weekly EGT treatment, with hearing performance assessed at the end of the period. We used behavioral and neurophysiological measures, including acoustic startle reflex (ASR), signal-in-noise detection tasks (SIN-PPI), and auditory brainstem response (ABR) thresholds. While EGT did not prevent age-related decreases in startle amplitude or influence ABR hearing thresholds, it significantly improved signal-in-noise detection at 16 kHz and 32 kHz but not at 8 kHz. These findings suggest that EGT may improve auditory processing in complex acoustic environments and that these improvements in signal-in-noise detection are mediated in the central auditory nervous system. To our knowledge this is the first study that indicates the therapeutic potential of EGT as an intervention for improving auditory signal detection in aging populations.

The Impact of Fentanyl and Xylazine on Respiratory Control Mechanisms

Fatima Emran, Pavithra Sankar, Ananya Prakhya, Joy Yang, Jimmy Zheng
Faculty Mentor: Dr. Narasaiah Kolliputi (Morsani College of Medicine)

The co-administration of fentanyl, a potent opioid, and xylazine, an alpha-2 adrenergic agonist, poses a significant concern within the US opioid epidemic due to its severe impacts on respiratory control mechanisms. This review synthesizes current literature to examine their individual and synergistic effects on central nervous system (CNS) pathways regulating respiration. Respiratory control centers in the brainstem, including the medulla oblongata and

pons, play critical roles in modulating breathing rhythms. Fentanyl suppresses respiratory activity by activating mu-2 opioid receptors that decrease brainstem function, impairing responses to elevated CO2 levels, and hyperpolarizing neurons in the pons, leading to upper airway dysfunction. Xylazine activates alpha-2 adrenergic receptors, disrupting rhythmic breathing patterns mediated by the medulla oblongata. A systematic review of studies on fentanyl and xylazine was conducted, focusing on their individual and combined effects on respiratory control. Findings suggest that co-administration of these substances exacerbates respiratory depression by altering mitochondrial activity, adenosine triphosphate (ATP) production, and the excitability of brainstem neurons. Notably, fentanyl and xylazine appear to synergize in targeting key CNS mechanisms, increasing the risk of overdose and mortality. This review identifies critical gaps in understanding the long-term effects of fentanyl-xylazine interactions on CNS function and respiratory physiology. Future research should explore targeted therapies to restore respiratory function and mitigate risks associated with this potent drug combination. Understanding these mechanisms is essential for informing clinical strategies and improving outcomes in affected populations.

Dietary Intake in Toddlers with Autism Spectrum Disorder Using the NOVA Food Processing Classification

Felize P. Ginampos

Faculty Mentor: Dr. Heewon Gray (College of Public Health)

Objective: Children with autism spectrum disorder (ASD) commonly exhibit food selectivity and problematic mealtime behaviors, potentially contributing to poor nutrition and diet quality, persisting into adulthood. This study aimed to assess dietary intake of toddlers with ASD based on food processing, using the NOVA classification. Methods: Three-day food records were completed by parents of toddlers with or at risk for ASD (n=50). Data were entered into the Automated Self-Administered 24-hour (ASA24) dietary assessment tool. Food processing was assessed with the NOVA classification. The percentage of energy from ultra-processed food (%UPF) and unprocessed food was calculated. Diet quality was measured with the Healthy Eating Index (HEI), where higher scores always indicate desirable diet quality. Demographic characteristics, mealtime behaviors, and parental feeding practices were assessed. Descriptive and correlation statistics were performed. Results: The mean %UPF was 57.4% and mean unprocessed food was 29.4%. UPF intake was significantly associated with lower HEI scores for greens and beans ($r=-0.329$; $p=0.02$), total fruit ($r=-0.399$; $p=0.004$), and added sugar ($r=-0.479$; $p<0.001$). Restrictive feeding was negatively associated with UPF intake ($r=-0.387$; $p=0.005$). UPF intake was correlated with more problematic mealtime behaviors ($r=0.272$), especially a limited variety BAMBI score ($r=0.238$), lower HEI scores for refined grain ($r=-0.276$) and protein ($r=-0.246$), but higher fatty acid ratio ($r=0.243$), significant at $p<0.1$ level. Conclusion: Children with ASD may consume a high %UPF at an early age, which can contribute to the development of poor dietary habits and obesity. Early nutrition education may help reduce UPF intake in toddlers with ASD.

Exploring Hearing Health Beliefs in Hispanic/Latine Populations Suing the Hearing Beliefs Questionnaire

Fiorella Giuliana Wu Cam

Faculty Mentor: Dr. Michelle Arnold (College of Behavioral and Community Sciences)

Hearing loss (HL) is a widespread chronic condition in the United States, impacting 37.9 million adults (11.6%) aged 35 and older. Hispanic/Latine individuals, who make up 19% of the U.S. population and are projected to increase to 29% by 2050, experience a higher prevalence of hearing loss (15%) compared to the national average. However, research focused on hearing healthcare within this growing population remains scarce. The Health Belief Model (HBM) has been applied to hearing health behaviors, demonstrating its effectiveness in predicting hearing aid uptake and outcomes. The Hearing Beliefs Questionnaire (HBQ) was developed to assess HBM constructs in relation to hearing health, showing significant associations with hearing health behaviors. Studies have found that HBM constructs, particularly cues to action and perceived burden on communication partners, are significant predictors of pursuing hearing evaluation. Research suggests that tailoring interventions based on an individual's stage of change and HBM constructs may improve hearing help-seeking behavior (Gilliver et al., 2015). The HBQ had been translated and has yet to be validated with this population. Data analysis includes descriptive statistics to evaluate score distributions and patterns across demographic groups. Group comparisons and correlations will examine associations between HBQ scores, hearing loss severity, and related variables. These findings will support culturally tailored interventions to improve hearing help-seeking behaviors in this underserved population.

How Timing of Pitocin Affects Maternal Complications

Gabriela Martinez-Juarez
Faculty Mentor: Dr. Marlius Castillo (College of Arts and Sciences)

Pitocin is a man-made form of oxytocin used to start or speed up labor. It helps shorten labor and prevent complications after birth, such as heavy bleeding. However, the timing of Pitocin administration plays a big role in the risk of maternal complications. If given too early or in high doses for too long, it can cause overly strong contractions. This can increase the risk of uterine rupture and severe bleeding. This literature review examines research on the timing of Pitocin use to better understand its effects and highlight the latest findings on safe administration. By analyzing recent studies and medical guidelines, this review aims to identify best practices that minimize risks while ensuring effective labor induction. Studies suggest that starting Pitocin at low doses and adjusting it based on labor progression helps lower these risks. Careful monitoring by healthcare providers is essential to ensure safe use. More studies and better training for healthcare professionals can improve Pitocin use and prevent complications.

Parental Influence on the Development of Social Anxiety Disorder (SAD) on Children and Adolescents: A Systematic Review

Gabriella Boykin, Dhenu Senthil, Isabella Kasper, Aalexis Knight, Nigar Sadigzade, Isabel Abreu
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Social Anxiety Disorder (SAD) is one of many anxiety disorders that are common in adults and children, affecting over 30% of youth aged 6 to 14. Often unnoticed and untreated, this condition can significantly disrupt children's social and academic lives, and may even persist into adulthood. The causes of this specific anxiety disorder are still in question for psychologists. Understanding potential cause factors is critical for developing targeted interventions to prevent long-term consequences of SAD. This systematic review synthesizes existing literature to examine the interplay between specific parental behaviors and genetic predispositions contributing to SAD's onset and persistence. Articles were systematically extracted using EndNote and Ryyan from databases such as PubMed, ScienceDirect, and Springer. Key findings indicate that both maternal and paternal parenting styles significantly affect children's anxiety levels, with maternal overprotection and criticism linked to increased anxiety symptoms, while paternal anxiety-related cognitions uniquely predict child anxiety. Genetic factors, including behavioral inhibition and family history of anxiety disorders, further compound the risk of developing SAD. Additionally, the review highlights cross-cultural differences in parental impact on anxiety, revealing that cultural context significantly influences perceptions of parenting behaviors. Other contributing factors include socioeconomic status and parental mental health. Despite the robust findings, limitations exist regarding the underrepresentation of paternal influence and the nuanced understanding of genetic versus environmental effects. Regardless, this review underscores the critical role of parental engagement in shaping children's social anxiety and advocates for targeted interventions, to improve treatment outcomes.

Knife Fights, Gunslingers, and Social Warfare: The American Western as Political Ideology

Gabrielle Whyte
Faculty Mentor: Dr. Todd Jurgess (College of Arts and Sciences)

The empire of United States democracy was arguably built on the pillars of classical liberal ideology which constitute the building blocks of a uniquely American political identity. The American western and its discourse on the project of the frontier is similarly positioned as the quintessential repository for elements involved in the formation of a uniquely American culture. Through a comparative analysis between the tenets of classical liberal ideology and the aesthetic conventions of the American western genre, this project seeks to investigate the nature of the relationship between American political and cultural identity. It argues that there is an inextricable and reciprocal link between the two, so that the conventions of the western necessitate an invocation of constituent political connotations. It seeks to explain how the alleged "death" of the American western in its classical form and the nature of its contemporary emergence are linked to change in American political behavior as a case study for understanding if and how cultural communication and political behavior affect and shape one another.

A Systematic Review of the Impact of Various Demographic Factors on CAM Usage and Physician Disclosure among Immigrant Populations

Gayathri Mannem

Faculty Mentor: Dr. Prashanth Ramesh Rao (College of Arts and Sciences)

Since the 1990s, complementary and alternative medicine (CAM) practices have been on the rise in the United States with many studies demonstrating increasing usage of both herbal and non-herbal treatments either alongside or in place of conventional allopathic medicine. At the same time, studies have reported low rates of CAM disclosure to physicians which is concerning due to the possibilities for drug interactions between herbal remedies and prescription medications. There is also a belief that usage of CAM increases for immigrant and ethnic minority populations who are more likely to face barriers to accessing conventional medicine, thus encouraging alternative medicine utilization. This systematic review was conducted to therefore identify individual and population factors encouraging CAM use among U.S. immigrants along with rates of CAM disclosure. As a result, some tentative positive correlations to CAM use were identified for age, immigration status, and lower income. The review also demonstrates the concerning rates of nondisclosure of herbal remedies. However, the lack of studies investigating CAM use limits the conclusions that can be derived.

AI-Driven Adaptive Authentication: Integrating Multimodal Behavioral Biometrics for Enhanced Security

Ghanaviyadav Anand

Faculty Mentor: Dr. Giti Javidi (Muma College of Business)

Adaptive authentication systems are becoming essential in scenarios requiring persistent identity verification throughout a session. This study focuses on the development and integration of a multimodal behavioral biometric system based on a theoretical model that posits unique behavioral patterns as reliable identity indicators. This work presents a system that leverages fingerprint biometrics for continuous identity verification, employing advanced preprocessing techniques. Leveraging a hybrid approach that integrates machine learning and artificial intelligence, this study explores the combination of Support Vector Machines (SVM) and Convolutional Neural Networks (CNN) to improve both accuracy and robustness. These AI-driven models allow for dynamic adaptation to user behavior, enhancing continuous authentication by detecting anomalies that signal potential security threats. The integration of explainable AI techniques provides transparency, making the system more trustworthy and compliant with industry standards. This study outlines the application of this framework in sectors like financial markets and healthcare, where security and user experience must be delicately balanced. By offering insights into the development, deployment, and ethical considerations of adaptive authentication, this work pushes the boundaries of identity and access management, contributing to the growing body of AI-driven cybersecurity solutions.

Investigating the Opioid Epidemic in Detroit Using Hotspot Analysis

Gian Vallejo

Faculty Mentor: Dr. Kim Lersch (College of Arts and Sciences)

The opioid crisis remains a significant public health challenge in major U.S. cities, such as Detroit. This study explores the application of hotspot analysis in crime mapping data to detect spatial patterns of drug overdoses in Detroit. By utilizing Geographic Information Systems (GIS), it is possible to locate areas of concern, by analyzing where crimes happen more often than expected. What is aimed to be understood is this: how can the location of opioid overdoses be determined to be statistically significant for the area? Identifying high-risk areas where targeted prevention and intervention strategies can have the greatest impact is where this report can shine. Additionally, integrating hotspot analysis with real-time crime and overdose reporting can enhance predictive analytics, allowing for quick interventions before overdoses escalate. As previously mentioned, this research displays the importance of spatial analysis in addressing the opioid epidemic and demonstrates how data-driven approaches can improve public health outcomes. Thus, implementing hotspot analysis as part of a comprehensive overdose prevention and intervention strategy can lead to more effective resource allocation, reduced mortality rates, and improved community safety in not only Detroit, but around the world.

Resilience in the Face of Cultural Constraints: An Autoethnography of a Hispanic Immigrant's Pursuit of Independence

Gianeylla Martinez
Faculty Mentor: Dr. Jay Michaels (College of Arts and Sciences)

This autoethnography (what presentation will be about)explores the experiences faced by a first-generation immigrant college student navigating the complexities of familial expectations, cultural values, and the pursuit of independence in an American-individualist context. Drawing on a pivotal moment in the author's life, where her aspirations to attend college conflicted with her father's emotional manipulation and familial responsibilities, this narrative reflects on how cultural roles and family dynamics shaped her identity and sense of self. Through an examination of her upbringing in a Hispanic household marked by emotional distress, financial instability, and the pressures of parentification, the essay delves into the emotional and psychological impact of these formative experiences. It also considers how the author's pursuit of autonomy in the face of cultural and familial constraints contributed to feelings of isolation, burnout, and self-doubt. This narrative ultimately serves as a reflection on resilience and self-efficacy, providing insight into the broader challenges faced by immigrant youth in higher education. By sharing her story, the author aims to empower others, particularly first-generation immigrant daughters, to reclaim their narratives, assert their independence, and break generational cycles of emotional and psychological strain.

A Comparison of Microplastics in the Digestive Tract Eucinostomus spp. and Sediments in Tampa Bay, Florida

Grace Harris, Daryn O'Malley
Faculty Mentor: Dr. William Ellis (College of Arts and Sciences)

In Tampa Bay, the genus Eucinostomus, (mojarra), is a fish that feeds primarily on invertebrates living in or on sediments, causing accidental or intentional consumption of microplastics within sediments. These microplastics can be transferred to organisms that prey on mojarra, spreading microplastics, and their harmful effects, through the food web, causing a trophic cascade of physiological and ecological harm. We hypothesize that the amount of microplastics in the digestive tracts of mojarra from Tampa Bay correlates with the amount of microplastics found in the sediments from the same area. To test this hypothesis, fishes and sediments were collected from three sites with differing degrees of urbanization with the expectation that sediment microplastic levels are increased by urbanization. Sediment samples collected were dried, subsampled, sieved, digested, and density separated. Mojarra collected were identified, weighed, and their digestive tracts were removed and digested. All samples were filtered, stained, photographed, and quantified. A positive correlation between the amount of microplastics in sediments and mojarra would indicate that sediment microplastic levels influence the quantity of microplastics consumed. No correlation may suggest selective feeding, requiring further research into whether mojarra avoid or prefer sediment-borne microplastics. The results of this study could provide a preliminary insight into sediments' role in microplastics exposure for other bottom feeders and benthic organisms. A positive correlation between urbanization and microplastics levels would suggest increased development contributes to a higher input of microplastics. This data could be used to inform Tampa Bay water system management to reduce microplastics in the environment.

Isolation and Characterization of Rossellomorea Bacterial Species from Drainage Ditch in St. Petersburg, Florida

Grace Holland Davis
Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

Microbial discovery resulting from the exploration of different environments is pivotal to understanding human pathogens, biogeochemical cycles, and environmental processes. A drainage ditch in St. Petersburg, Florida was sampled and high-density bacterial plating/isolation, Kirby-Bauer, selective and differential media testing, and 16S rRNA PCR was performed. The National Library of Medicine's Basic Local Alignment Search Tool (BLAST) was utilized for classification of the isolate to the Rossellomorea genus, an aerobic, endospore forming group, more specifically R. vietnamensis. R. arthrocnemi and R. aquimaris also displayed high alignment and were additionally considered for characterization. The species was experimentally determined to be Gram (+), mildly halophilic, and weakly able to ferment glucose and sucrose. The species also consistently presently bright orange pigmentation when grown at cooler

temperatures, but pale orange/dark yellow coloration at warmer temperatures. Upon literature review some Rossellomorea species produce carotenoid pigments during spore formation, making those species photoprotective in harsh environmental conditions, leading to intense orange pigmentation. Rossellomorea are regularly found in marine sediments, tidal flats, and soil environments. Various species within this genus have demonstrated phytoremediation tendencies within heavy metal polluted soils, agar degradation capabilities, and benefits to aquaculturing, leading to many potential applications.

What's Up, Doc? Discovering Where Students Seek Care Beyond the PCP

Grace Victoria Faberlle

Faculty Mentor: Dr. Donna Lee Ettel-Gambino (Judy Genshaft Honors College)

Although college students have a range of options when it comes to seeking healthcare, evidence shows that only a small portion opt for on-campus health centers and primary care physicians (PCPs). Limited studies have explored the role of PCPs in health-seeking behaviors of college students. A clearer understanding of the influence of PCPs is essential in elucidating the motivations behind health seeking behavior. The purpose of this study was to explore whether students' relationships with PCPs influence how they primarily seek medical information and care. A MANOVA was conducted to identify differences across groups. The independent variable was the students' establishment with a PCP [Yes, No]. The dependent variables were the students' agreement with the following: 1) preference for the Internet for healthcare information; 2) preference for Internet for medication information; 3) preference for emergency room if ill; 4) preference for PCP if ill; 5) preference for a free clinic if ill; and 6) preference for an on-campus health facility if ill. There were statistically significant findings as evidenced by Wilk's L (5, 224) = 0.89, ($p < 0.0001$). One-way ANOVA contrasts identified two statistically significant criteria: 1) students (43%) who sought their PCP as their primary point of care ($p < 0.001$); 2) students (32%) who sought their clinic as their primary point of care ($p < 0.05$). Access to PCPs does not necessarily ensure that college students will seek appropriate medical care. Identifying the influence of PCPs on health-seeking behavior is crucial to tailoring healthcare strategies to prioritize student's unique situations.

Bioinformatical Comparison of Phage Alatato to FB Cluster Phages

Gregory Lin, Bao Ngan Le, Nisarg Kumar, Angel Chau, Lucy Thomas, Ryan Barstys

Faculty Mentor: Dr. Richard Pollenz (College of Arts and Sciences)

Phages are grouped into clusters based on gene content similarity that is approximated based on amino acid sequence identity. The goal of this project is to utilize bioinformatic approaches to compare the functional genes of Alatato to other FB cluster phages and identify commonalities and unique genomic regions. Alatato was compared to the FB cluster phages Pigu, Sarge, Shoya, BrayBeast, Kumotta, and MargaretKali using gene content similarity analysis, average nucleotide identity analysis, and specific regional comparisons utilizing PhagesDB, EZBioCloud's ANI tool, and Phamerator. The gene content (pham or "family") analysis shows that Sarge is most similar to Alatato at 49.9%, and MargaretKali is most dissimilar with 31.3%. The average nucleotide identity analysis shows that BrayBeast is most similar to Alatato at 78.18%, and MargaretKali is most dissimilar at 71.44%. Regional genomic comparisons showed that Alatato has possible unique functions such as peptidoglycan glycosyltransferase, which distinguish it from other phages. A unique sequence of orphams (genes with <35% amino acid identity to other genes) is seen in Alatato, BrayBeast, and Shoya, which all assign the function of the first genes as an esterase or hydrolase. In Alatato and Shoya, this region also contains multiple orphams encoding membrane proteins, suggesting it may play a role in a novel membrane-associated mechanism in these phages. These distinctions are crucial for phage diversity and pharmaceutical potential, including phage-specific therapies. The next steps for this project could be functional assays to explore effects of the knockout/knockdown of these unique genomic regions.

U.S. Relations With Argentina During The "Dirty War."

Guilherme Fumio Ninomiya

Faculty Mentor: Dr. Arturo Jimenez-Bacardi (College of Arts and Sciences)

The U.S. government developed strong relationships with most Latin American countries during the Cold-War period. Recently Declassified CIA documents show how close the relationship between U.S. government officials and high-ranking Argentine military generals was during the peak violence and

repression of the so-called Argentine "Dirty War." My presentation will highlight U.S.-Argentine cooperation during the "Dirty War." My goal is to understand the power dynamics behind this relationship and expose the human rights violations that were committed during this dark period of Argentina's history. I will use historical evidence and declassified documents in order to write my analysis while also incorporating political science concepts related to human rights and transnational repression that help us better understand the motives for U.S. participation and their policies in the region. Finally, this will be a great opportunity to remind readers of the more than 22,000 people who were either killed or disappeared and the menace that authoritarian institutions represent.

The Use of Art in Providing Trauma Relief for Veterans

Hannah Butterfield, Gabby Haid
Faculty Mentor: Dr. Catherine Wilkins (Judy Genshaft Honors College)

Military veterans often struggle with trauma and PTSD following combat. Research shows that combining Visual Thinking Strategies (VTS) tours with art-making can improve mood and relieve symptoms. This study reviews existing literature on how VTS and art creation can aid trauma recovery for veterans, while also conducting interviews with museum docents to understand the needs of specialized visitor groups. These interviews provided valuable insights into the resources, budget constraints, and training requirements of museums.

Maintaining Student Engagement in a Second Grade Classroom Through Kagan Strategies

Heather Knight
Faculty Mentor: Dr. Tammy Sommers (College of Education)

My research focuses on my wondering of maintaining a class's full attention for the duration of a lesson in a second-grade classroom. Understanding student engagement will help to improve multiple areas in the classroom including academic performance, classroom management, and increased motivation from both students and the teacher. I will discuss several approaches to this goal including whole group activities, small group work, centers based learning, and multiple Kagan Strategies. The aim of this research is to understand how to incorporate a variety of strategies in the second-grade curriculum to foster a love of teaching and learning.

Enhancing Visitor Experiences Through Multisensory Atmospherics in Museums

Helin Kaymaz
Faculty Mentor: Dr. Luana Nanu (Muma College of Business)

Museums play a crucial role in cultural preservation, education, and entertainment, attracting millions of visitors globally (Conti et al., 2020). According to Azoth Analytics (2023), "The global museum market is on a remarkable growth trajectory, projected to reach a staggering USD 17.23 billion by 2029." With this expanding market, institutions are continuously seeking innovative ways to enhance visitor engagement (Kolb, 2013). As digital technologies advance, museums are integrating multisensory atmospherics such as scent, sound, and tactile elements, to create immersive and memorable experiences (Luo & Nys, 2024). Existing research highlights the significance of atmospheric elements such as lighting, temperature, and exhibition aesthetics in shaping customer experiences across various industries (Conti et al., 2020; Han et al., 2019; Huo, 2024). However, research on the impact of non-visual sensory cues such as scents, soundscapes, and tactile elements on museum experiences remains limited. Therefore, the purpose of this study is to explore how different sensory cues influence authenticity, memory retention, visitor satisfaction, and intention to revisit. This research addresses a critical gap in understanding individual differences in responses to multisensory museum environments. This study adopts a multifaceted approach, incorporating experimental design with VR goggles, controlled lab experiments, and field surveys to ensure a comprehensive analysis. The findings will contribute to both theoretical and practical discussions of how sensory engagement enhances learning outcomes and emotional connections with exhibits. Practically, the results will guide museum curators and designers in developing more engaging, accessible, and inclusive environments.

Validating A Scientific Algorithm for Visual Acuity Testing

Hendranie Henry, Phoebe Almero, Skye Hughes, Hendranie Henry
Faculty Mentor: Dr. William Arthur Monaco (College of Behavioral and Community Sciences)

Visual acuity, a measurement of how well a person can see, is measured using Snellen notation (e.g. 20/20) or LogMAR units (e.g. .02). Snellen notation is a method of scoring visual acuity that does not account for any letters missed and instead scores the number of lines gained or lost. We have developed an algorithm that incorporates the use of LogMAR which unlike Snellen, is a mathematical value. Our algorithm assigns a given value to each letter which is then used to determine a final visual acuity score based on the number of letters missed, allowing for a more accurate score. Participants of the study will be evaluated for both near and distance visual acuity. These tests will be conducted twice using Snellen charts, once for corrected and another for uncorrected vision. Letters missed will be noted, and the tests will conclude when the participant has incorrectly read 50% of the letters in the line. The amsler grid test, swinging light test, ocular motility test, and confrontation field test will also be performed on each participant to rule out the presence of ocular diseases. Visual acuity scores determined by the algorithm will provide a more accurate means to assess vision loss than those measured by current clinical means using the standard Snellen charts. Once the efficacy of the algorithm has been validated the algorithm may be employed in future clinical research to assess the degree and speed of progression of visual loss due to progressive ocular disease.

RAirQuality – An Automated, Low-cost, Secure Data Processing System for a Community Air Quality Network

Hung Manh Nguyen
Faculty Mentor: Dr. Amy Stuart (College of Public Health)

Accurate air quality monitoring is essential for public health and environmental research. Commonly, higher-tier networks, e.g., EPA monitoring stations, usually have automated (although antiquated) data management (e.g., the EPA AQS - Air Quality Management System). However, researchers working with lower-tier community sensor networks often utilize manual processes. This project addresses that gap by automating data collection, analysis, and reporting of Clarity and Purple Air sensors in Hillsborough County, Florida. Beyond this specific application, the system can potentially be generalized for broader Research Data Management (RDM) systems. Researchers today face evolving expectations for data management, yet there are few user-friendly guides to help them navigate best practices. Leveraging industry solutions, such as SQL database for data storage/protection, or R for data analysis, all aspects of responsible data management (Ownership, Collection, Storage, Protection, Retention, Analysis, Sharing, and Report) can be fulfilled efficiently, while leaving room for heavy customizations. Using API-based retrieval, automated quality checks, and RMarkdown report generation, we reduce manual intervention and improve efficiency. Our architecture integrates Kubernetes for scalable orchestration, Cloudflare for secure, low-cost web access, and GitLab CI/CD for deployment. Initial results confirm stable 24/7 operation with minimal resource usage, as tracked by Grafana. This framework ensures continuous, reproducible air quality analysis with virtually no downtime, enabling researchers to focus on exploration and analysis rather than infrastructure.

Health in the Aftermath of Natural Disasters: A Systematic Literature Review of Physical and Mental Challenges for Coastal Communities after Hurricanes

Husena Rajkotwala, Isabelle Caayon, Summer Nguyen, Tori Nguyen, Minh Pham
Faculty Mentor: Dr. Shabnam Mehra (College of Public Health)

This project explores the complex health impacts on costal communities affected by hurricanes, focusing specifically on post-disaster conditions. Hurricanes are known to negatively impact living conditions, worsen pre-existing health issues, and create new health challenges where they didn't previously exist, these conditions make it more critical than ever to understand their full impact. This project looks at two categories of health in post-hurricane coastal communities, these are physical and mental health. Physical health issues include respiratory problems, infections, and diseases made worse by unsanitary conditions that arise after natural disasters including mold and other environmental risk factor related issues. Mental health challenges, including anxiety, depression, and post-traumatic stress, are equally significant and often overlooked or overshadowed by the physical health issues people in these communities face but they are just as important. The research reviews literature in peer-reviewed academic journals on health impacts from past hurricanes over the last two decades. The literature will be analyzed to identify how socio-economic, environmental, and psychological

factors contribute to issues in costal populations. The goal of this project is to emphasize the importance of a holistic approach to disaster relief, addressing not just immediate physical health needs but also mental health challenges. This project aims to provide insights into the effectiveness of past relief efforts and offers recommendations for improving future disaster response strategies on both the physical and mental fronts.

Preceptions of Artificial Intelligence in Radiology

Ian Murray, David Moon, Jacob Delikat, Husena Rajkotwala
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Artificial Intelligence (AI) has been integrated into several subfields of medicine, AI technology is often used to make the work of healthcare professionals easier by identifying anomalies in imaging and streamlining workflow, allowing more time to be spent on patient care and complex decision making. However, in the field of radiology there are concerns of job security and patient satisfaction related to AI technologies fulfilling the workload of radiologists. In this literature review we analyze 26 studies found through USF's Web of Science using keywords such as "AI in radiology perception" that examine the perception of AI in radiology from the perspective of radiologists and patients. Our findings support AI in radiology, as evidence indicates it improves diagnostic outcomes and streamlines workflows, though patient concerns about the lack of human touch should be addressed in its implementation.

The Effects of Sleep Deprivation on Cognitive Function of University Students

Ikshita Achanta, Anthony Hamati, Vanessa Singh, Rebecca Pothen, Joanne Nguyen, Reneta Pothen
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Sleep is vital for college students, directly influencing their cognitive, emotional, and physical health, which are crucial for academic success and overall well-being. Sleep deprivation affects memory consolidation, learning, focus, problem-solving, and decision-making, all of which are essential for retaining knowledge, applying it in assignments, and excelling academically. By strengthening neural connections, adequate sleep enhances critical thinking and productivity, while its absence leads to reduced concentration and impaired cognitive performance. Sleep deprivation tends to affect multiple areas of the brain in regard to neural activity, alertness, and cognitive function. Our investigation examines the impact of sleep deprivation on undergraduate cognitive function through a literature review, focusing on its effects on the hippocampus, amygdala, and cerebral cortex. The literature used for this review was derived from multiple research sources including PubMed and JSTOR. Research shows an inverse relationship between sleep deprivation and cognitive function, with significant reductions in brain activity in these regions as measured by various cognitive tests. College institutions often exacerbate sleep deprivation with demanding schedules, late-night study expectations, early morning classes, and environments that encourage irregular sleep patterns, such as 24/7 libraries and social activities. To further this research, we aim to study a sample of students at the University of South Florida by administering questionnaires to explore sleeping habits, factors contributing to sleep deprivation, and natural ways to improve sleep. This research seeks to guide interventions that enhance cognitive function and promote healthier sleep habits among students.

The Role of SNPs in the Adiponectin Gene in LDL and HDL Metabolism and Cardiovascular Health in Type 2 Diabetes

Iman Ahmed, Reeva Kotha, Denny Rinaldi, Vansh Patel, Paige Lehrer, Siddharth Yerrajennu
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Type 2 Diabetes Mellitus is a chronic illness due to the inability to properly regulate insulin. A low concentration of adiponectin polypeptides can predict it. Single nucleotide polymorphisms, or SNPs, are instances for which there is a single nucleotide inconsistency in a particular DNA sequence from the template and are accurate indicators of metabolic and cardiovascular diseases as well. With SNPs' ability to predict metabolically implicated diseases, they can also connect to the diagnosis of T2DM. The purpose of this review is to determine if the adiponectin gene along with their respective pathways in HDL and LDL concentrations can be a driving factor in both the diagnosis of T2DM and in cardiovascular health. This systematic review followed the PRISMA protocol, identifying # relevant articles from an initial pool of studies. The single nucleotide polymorphisms (SNPs) rs2241766 and rs1501299

within the ADIPOQ gene are associated with various medical conditions, such as diabetic dyslipidemia, a condition characterized by abnormal lipid levels in individuals with diabetes. Rs2241766 is statistically linked to both diabetes and dyslipidemia, resulting in elevated triglyceride levels, reduced HDL cholesterol, and increased LDL cholesterol. Similarly, rs1501299 has been associated with reduced adiponectin levels. A major limitation of the studies is that the role of rs1501299 is not fully identified in the development of T2DM. Furthermore, the studies used have been found to have a specific population size, which can cause differing results in diet, lifestyle, and environment.

Mental Health Care in South Asian Communities

Ira Kamath
Faculty Mentor: Dr. Holly Donahue Singh (Judy Genshaft Honors College)

Recognizing the various values and ideals across South Asian cultures is crucial to improving mental health care and creating effective, respectful interventions. Chadda and Deb (2013) highlight how traditional Indian families rooted in collectivism shape mental health treatment in their way. In Indian cultures, shared responsibility and family-centered care can have complex impacts, while in Western medicine, a family-centered approach usually results in better outcomes. This highlights how psychological disorders manifest differently and why different treatments must align with the South Asian community specifically. A similar study done by Rao, Feinglass, and Correia (2017) emphasizes how South Asian immigrants face further stigma, not only within their community but also the healthcare system, making it harder for those individuals to get access to mental health care. Additionally, Shahar, Durgampudi, and Krishnan (2022) explore Hindu–Indian cultural ideals on mental health. It depicts how traditional beliefs like atman (self) and dharma (righteousness) influence healing practices, which differ significantly from Western frameworks. Additionally, the caste-based discrimination and social hierarchies outlined in the Asia Society's panel continue to impact mental health care access and outcomes for marginalized communities, specifically in India. The caste system exacerbates mental health struggles, specifically for Dalits and lower-caste groups, illustrating how social inequalities are ingrained in society and complicate treatment. Incorporating more culturally competent care, which accounts for these factors, is important to improving mental health care. By considering cultural values like family structure and spiritual beliefs, treatment can become more effective and culturally respectful across various South Asian communities.

Functional Evolution of SCN4Aa in Electrophorus electricus: Role in Electric Organ Development

Isabella Gallos
Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

Electrophorus electricus (electric eel) possess two paralogs of a voltage-gated sodium channel gene (SCN4A) due to the teleost genome duplication event, this gene is often expressed as a form of muscle in its orthologs. Paralog SCN4Aa has contributed to the development of electric organs due to its ability to express as both muscle cells and modified muscle cells that are capable of electrical output but incapable of contraction. Multiple sequence alignments of the orthologs found in other teleost identified conserved regions throughout the gene. The resulting unconserved regions are the prospective areas of variation within the gene that control the different cell type expression and location of expression throughout Teleosts that contribute to the development of functional electrical organs in select species.

Evaluating the Effects of a Narrative Language Intervention on Dual Language Learners' Spanish-English Language Skills

Isabella Rios, Alys Jimenez, Valeria Gonzalez
Faculty Mentor: Dr. Matthew Foster (College of Behavioral and Community Sciences)

Research indicates that explicit narrative language interventions can enhance language proficiencies among Spanish-English speaking dual language learners (DLLs; Spencer et al., 2019). However, teachers often lack access to evidence-based curricula. In this study, we build on prior research focused on Story Champs, evaluating the efficacy of a low dosage implementation of its bilingual version. Participating DLLs were in kindergarten, first, or second

grade (n=16) who attended a Title I charter school in rural Florida. Story Champs was delivered to small groups of students (2–5 students) for 20 minutes a week, for 10 weeks (total=200 minutes). To measure students' response to Story Champs, we used both the Spanish and English versions of the Narrative Language Measures, including subtests for language complexity, story comprehension, and vocabulary. Descriptive statistics and correlations were examined within and between languages. Then, a series of ANOVAs were investigated. There were significant improvements for Spanish language complexity ($F(1)=8.39$, $p=0.01$, $R^2=.38$) and story comprehension ($F(1)=14.71$, $p<0.01$, $R^2=.51$), but not vocabulary ($F(1)=1.36$, $p=0.26$, $R^2=.09$). For English, there were significant improvements for language complexity ($F(1)=7.53$, $p=0.02$, $R^2=.35$), story comprehension ($F(1)=6.42$, $p=0.02$, $R^2=.31$), and vocabulary ($F(1)=12.21$, $p<0.01$, $R^2=.47$). Together, the results provide evidence that a low dosage implementation of the bilingual version of Story Champs is associated with improved narrative language skills in Spanish and English. However, more research is needed to examine the effects of Story Champs compared to business-as-usual and other narrative language intervention conditions. Future limitations and future directions will be discussed.

Victim or Perpetrator? Investigating Psychological Factors in Misinformation Sharing via Keystroke Dynamics

Isadora Oliveira Grasel

Faculty Mentor: Dr. Tempestt Neal (Bellini College of Artificial Intelligence, Cybersecurity and Computing)

In recent years, the internet, smartphones, and social media have revolutionized information access. These same tools have also accelerated the spread of misinformation, threatening public health, democratic processes, and public perception. However, keystroke dynamics, a behavioral biometric technique that analyzes individuals' typing patterns, has shown promise in detecting deception and identifying fake online profiles. As such, this study, conducted as a thesis project for the Judy Genshaft Honors College, aims to investigate whether keystroke dynamics can be used to potentially distinguish between intentional and unintentional misinformation sharing in online environments. Through a controlled typing experiment involving human participants, we will collect biometric data to be leveraged by machine learning algorithms to identify behavioral indicators such as hesitation, cognitive load, or impulsivity —factors that may correlate with user intent. To enhance accuracy, machine learning models will be trained on a user-specific basis, recognizing that individuals demonstrate unique "tells" in their typing behavior. By personalizing the detection models, we aim to increase the reliability and accuracy of the classification process. While we anticipate performance better than random baseline classification, our goal is to achieve approximately 75% accuracy in distinguishing between varying pairs of cognitive activities. These findings could inform the development of non-intrusive, privacy-conscious tools for proactive misinformation detection and contribute to broader discussions around ethical technology use, platform accountability, and the role of behavioral biometrics in digital spaces.

Maternal Risk-Management Elucidates the Evolution of Reproductive Adaptations in True Seals (Family: Phocidae) by Means of Natural Selection

Ivy Kachurick

Faculty Mentor: Dr. Deby Cassill (College of Arts and Sciences)

The maternal risk-management model is the study of how breeding females allocate resources between offspring size, offspring number, and offspring diversity to achieve reproductive success, i.e., replacement fitness. Maternal investments in offspring size, number, and diversity are shaped independently by diverse risk factors: the extent of gaps during seasonal resource cycles, rates of predation/parasites, and unpredictable catastrophes such as disease, floods, fire, or anoxic events. Here, in True Seals (Family: Phocidae), shows that maternal investments within and across species agree with the predictions of the maternal risk-management model. Within True Seals (Family: Phocidae)species, larger females invested in larger offspring, and that offspring size and offspring number per litter were independent maternal investment strategies. The risk of starvation favored investments in larger offspring. The risk of predation favored investments in larger litters. In conclusion, my study shows that True Seals (Family: Phocidae) are seasonal selected species. If empirical studies continue to confirm its predictions, maternal-risk management may yet emerge as a unifying model of diverse reproductive adaptations by means of natural selection.

Medicaid Expansion and Opioid Deaths: Evidence from Synthetic Indiana

Izabella Annunziata
Faculty Mentor: Dr. Luis Felipe Mantilla (College of Arts and Sciences)

This study investigates the relationship between Medicaid expansion and opioid-related mortality across U.S. states. Given the wide variation in opioid death rates—shaped by socioeconomic, demographic, and policy differences—the central hypothesis is that expanding Medicaid, by increasing access to healthcare and addiction treatment, reduces opioid-related deaths. A mixed-methods quantitative approach is employed, combining linear regression, time-series analysis, and synthetic control methods (SCM). Preliminary regression results indicate a complex relationship, with a positive correlation that may reflect delayed policy effects. SCM is used to simulate the impact of Medicaid expansion in Indiana by comparing real outcomes to a synthetic version constructed from states that did expand Medicaid. This method allows for a more rigorous causal assessment. Overall, the study aims to offer nuanced evidence on how access to public health insurance can mitigate opioid mortality, with implications for both health policy and addiction intervention strategies.

The Weaponization of Anti-Intellectualism in Society

Jacqueline Calhoun, August Cantor
Faculty Mentor: Dr. Peter Funke (College of Arts and Sciences)

Although it is a commonly held belief that those who do not acknowledge past mistakes are destined to repeat them, it doesn't prevent humanity from doing it nonetheless. At its core, anti-intellectualism can be defined as the extreme distrust of both logic and reason. Rather than viewing subjects through a critical lens and not allowing for one's own feelings to intervene, those who subscribe to anti-intellectualism often choose to reject information that doesn't coincide with their pre-existing ideology. We are of the belief that America itself may be teetering on this very concept as more and more citizens find themselves—even if unintentionally—subscribing to this method of thought as many choose to blindly follow leaders that may not have their best interests at heart. To further describe the significance of this shift and its potential ramifications on American society, it is worthwhile to look at what was once a prime example of a government that used anti-intellectualism as a means to retain power—Nazi Germany. The stage for this tumultuous period of German history was not set overnight, with its seeds having been planted far before the party was established. From extreme government censorship to the restructuring of educational systems, the calculated use of anti-intellectualism deprived German citizens of their autonomy and it can be argued that the same is beginning to happen in America. It is our hope that by analyzing these trends we can help rearm Americans with the knowledge to reflect upon history and break the habit.

Understanding Honors Students' Perspectives on ChatGPT in their Academic Activities

Jada Lessen
Faculty Mentor: Dr. Sanghoon Park (College of Education)

Universities around the world are increasingly aware of the use of generative AI chatbots towards academic coursework. Educator perspectives research has shown both disapproval and excitement surrounding the potential of chatbots like ChatGPT being utilized in higher level education, with a prevalent concern for academic integrity. This qualitative study aimed to explore university honors student perspectives to answer concerns in the literature and to gather insights on how ChatGPT can be useful in academics. After conducting literature review on student perspectives and ChatGPT, interviews were conducted with University of South Florida honors students regarding their ChatGPT use. An extended Technology Acceptance Model to include subjective norms guided the study and served as a foundation for the coding process, supplying the major and minor themes for an inductive template analysis. Participant responses revealed that honors students find ChatGPT useful for numerous academic activities, easy to use despite some prompting issues, and are more inclined to use ChatGPT than university resources. ChatGPT is commonly found useful within academics as a brainstorming tool, a search engine, and for evaluating projects based on rubrics. In both situations of professor support or professor disinclination, honors students are motivated to continue using ChatGPT towards academics. Despite ChatGPT utilization, professor relevancy to honors students prevails due to professors being perceived as masters of their field with real-world experience. Based on these findings, university policy that aims to integrate or allow the use of ChatGPT should revisit policy language to consider the elements of the Technology Acceptance Model.

Which Kit Yields a Higher Quantity and Quality of DNA from Anoa Saliva: Zymo Quick-DNA Microprep Kit or the Qiagen DNeasy® Blood & Tissue Kit?

Jada Poling
Faculty Mentor: Dr. Michelle Green (College of Arts and Sciences)

Lowland anoa, Bubalus depressicornis, are classified as endangered by the IUCN. Saliva is a material that can be collected non-invasively and yield DNA for genetic study. However, optimizing the use of saliva as a source of DNA requires optimization including determining the best DNA extraction method for in-situ species conservation research that will ultimately aid in managing genetic diversity within ex-situ populations in Indonesia. In this study, we compared the quantity and quality of DNA recovered from anoa saliva samples using two popular, and widely available commercial kits (Zymo Quick-DNA Microprep Kit and the Qiagen DNeasy® Blood & Tissue Kit). Saliva was collected from an adult lowland anoa at ZooTampa after it was observed licking a non-baited salt block. The salt block was swabbed and stored in DNA-RNA Shield buffer (Zymo). Three replicate DNA extractions were performed per kit. DNA quality and quantity of the isolated DNA was analyzed using visualization on an agarose gel and spectrophotometry. Determining which kit yields higher quality (A260/280 ratio) and quantity (DNA ng/µL) of DNA from noninvasive anoa saliva samples will support ongoing anoa in-situ and ex-situ conservation research methods in Indonesia by providing recommendations for noninvasive protocols that will provide valuable genetic data.

Phosphoregulation of GpsB in Staphylococcus aureus

Jason Carroll
Faculty Mentor: Dr. Prahathees Eswara (College of Arts and Sciences)

GpsB is a highly conserved, Firmicutes-specific cell wall synthesis protein. Our lab has demonstrated that GpsB plays an important role in the cell cycle of S. aureus, including directly regulating FtsZ polymerization and interacting with many divisome proteins. Yet, little is known regarding the regulatory mechanisms behind GpsB. Ser/Thr kinases are found to phosphorylate GpsB in a multitude of species, including S. aureus GpsB. Phosphoproteomic analysis identified 6 serine/threonine residues that are phosphorylated in S.aureus GpsB. In this study, using B. subtilis as a genetic tool, we can investigate the importance of GpsB phosphorylation. To investigate this, we generated phosphomimetic and phosphoablative mutants of GpsB by mutating several of the identified residues to glu or ala respectively. In previous studies, we demonstrated that overexpression of S. aureus GpsB is toxic to B. subtilis cells. We utilized this observation to probe the functionality of phosphomutants, and observed that phosphomimetic mutants, but not phosphoablative mutants, rendered GpsB non-toxic. This likely indicates that the phosphomimetic mutants render GpsB non-functional. This indicates GpsB is functional in an unphosphorylated state and ser/thr kinase mediated phosphorylation likely turns off the function of GpsB. To further examine this outcome, we generated individual point mutants of all 6 phosphoresidues to discern which site could be chiefly responsible for this phenotype, and therefore play a major role in GpsB regulation. Overall, we aim to uncover the significance of GpsB phosphorylation and illuminate its molecular role in cell cycle regulation in S. aureus and other organisms.

Gold Nanoparticle-Enhanced ECM Scaffolds for Promoting Cardiac Tissue Regeneration

Javier Todd, Matthew Lim, Keshav Anjan Konka, Anthony Lai, Sandhya Santhana, Sai Kaushik Upputuru
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Cardiovascular diseases, including myocardial infarctions, are among the leading causes of mortality around the world, posing significant challenges for healthcare systems. Emerging technologies such as gold nanoparticles (AuNPs), through interactions with extracellular matrix (ECM) scaffolds, hold promise for advancing cardiac tissue regeneration and repair. The purpose of this review is to systematically compile the data on the role of gold nanoparticles in enhancing cardiac tissue regeneration. Specifically focusing on their efficacy in improving vascularization, electrical conductivity, and cardiac tissue function within extracellular matrix scaffolds. This systematic review followed the PRISMA protocol, identifying 103 relevant articles from an initial pool of studies. AuNP-enhanced scaffolds, both ECM-based and synthetic have shown significant potential for cardiomyocyte proliferation through electrical conductivity, mechanical properties, and therapeutic efficacy. Through spectroscopy and microscopy imaging, notable reduced infarcted cardiac regions of tissue were observed in murine models. AuNP-collagen composites showed enhanced biodegradability, dense revascularization, and myocardial contractility. Functionalized AuNPs, like PEG-coated variants, improved cardiac targeting and retention. There are limited studies and data in clinical

studies, as the study focuses on understanding myocardial infarction in humans. Rat models also do not directly translate to human processes, so larger animal model studies are needed to mimic human anatomy and physiology. In conclusion, AuNPs show a promising potential in enhancing cardiac tissue regeneration by improving cardiomyocyte proliferation, vascularization, and improved conductivity of scaffolds. However, further clinical research in larger animal models is critical to understanding their applicability and translation into humans completely.

Exploring How Option Characteristics Influence Risk Taking in Monetary Lotteries

Jaylen Marrero, Weili Lu, Tatiana Vanegas
Faculty Mentor: Dr. Sandra Schneider-Wright (College of Arts and Sciences)

People often compare options to evaluate which alternative is most appealing. Because of this, we investigated differences in risk taking when the characteristics of the options change. Participants were randomly assigned into one of four conditions, and were asked to make choices among a series of two-option trials wherein one option was a two-outcome high-risk lottery (e.g., 50% chance to win $100 with 50% chance to lose $100). The other option was a lower-risk lottery (e.g., 50% chance to win $50 with 50% chance to lose $50) on half of the trials and a sure thing option (e.g., $0 for sure) on the other half. On each trial, participants indicated which option they preferred, and their score was how many high-risk options they chose out of ten option pairs in each condition. In the control conditions, wherein options were a mixture of gains and losses of equal expected value, we found that the high-risk option was not selected very often, especially when paired with a lower-risk option rather than a sure thing. When the high-risk option was higher in expected value than the alternative, it was popular, and when it was lower in expected value, it was rarely chosen. Shifting all of the values to make both options in a pair all gains or all losses only increased high-risk choices for loss pairs, and had no effect for gain pairs. This supports the idea that the option characteristics in choices influence how frequently high risks will be chosen.

Factors that Influence User Satisfaction and Long-term Effectiveness of Mental Health Apps

Jazlynn Hirschhorn
Faculty Mentor: Dr. Giti Javidi (Muma College of Business)

Mental health apps are becoming more popular, prompting important discussions about how effective they are and how satisfied users are compared to traditional in-person therapy. As these digital tools reach more people, it is essential to look at how they affect users' long-term mental health. This study will examine the factors that impact user satisfaction with these apps, such as ease of use, personalization, accessibility, and engagement features. To thoroughly investigate the comparative experiences of users with mental health apps versus in-person therapy, a comprehensive survey was conducted with 60 participants, carefully selected to represent a diverse range of demographics. By doing so, we can pave the way for future studies focused on refining and optimizing mental health care practices in an increasingly digital landscape, ultimately improving outcomes for those seeking support and treatment.

Designing Inclusive Museum Tours: Fostering Engagement, Focus, and Memory for Neurodiverse Children

Jazmeen De Gannes, Amanda Weakley, Samuel Kirschenmann, Whitney Louis
Faculty Mentor: Dr. Catherine Wilkins (Judy Genshaft Honors College)

Art in Mind is a specialized program at the James Museum in St. Petersburg, Florida that offers guided tours to individuals with memory loss conditions. In a similar manner to how the Art in Mind tours are specifically crafted to be beneficial to individuals suffering from memory loss, a new tour structure can be developed that is targeted toward neurodiverse students. By introducing them to habits that increase engagement and focus in the museum, children can later apply these skills in the classroom. Our goal is to create a museum environment that is welcoming, accommodating, and driven toward fostering long-term learning and comprehension skills.

Determining the Binding Affinity of The Crystal Structure of West Nile Virus Methyltransferase Through Computational Analysis and in-silico Molecular Docking

Jewelia Keller

Faculty Mentor: Dr. Leon Hardy (College of Arts and Sciences)

West Nile virus (WNV) is a neurotropic virus that may cause severe neurological deficits upon infection. The implication of neurological decline is a greater demand for the development of prophylactic healthcare, such as vaccination, through drug discovery using computational analysis. A specific protein-ligand system was obtained from the Protein Data Bank, (PDB ID: 2OY0), to determine the binding affinity of the protein-ligand system. This study aims to establish the binding affinity of the crystal structure of West Nile Virus methyltransferase, (PDB ID: 2OY0), and the binding affinity of the protein-ligand system to a panel of natural chemicals including, Olitigaltin, Curcumin, and Nintedanib. Molecular docking was performed individually on each natural chemical with the protein-ligand system. The average Gibbs free energy values were obtained for the original protein ligand system and for Olitigaltin, Curcumin and Nintedanib; the values were determined to be -20.36484 kcal/mol, -8.456436 kcal/mol ± 5 kcal/mol, -4.053328 kcal/mol ± 5 kcal/mol and -9.201844 kcal/mol ± 5 kcal/mol, respectively. Additionally, other natural chemicals will be considered based on their compliance with the Lipinski Rule. The binding affinities of the protein-ligand system to each natural chemical will provide results for potential pharmaceutical consideration and vaccine development.

Gracilimonas pinellae sp. nov., a Novel Species Isolated from the Gills of Lucinidae Bivalves in Boca Ciega Bay and Tampa Bay, Florida

Jewelia Keller

Faculty Mentor: Dr. Jean Lim (College of Marine Science)

A novel bacterium (ATCC TSD-459) was isolated from the gills of a Lucinidae bivalve species, Stewartia floridana, collected from a seagrass habitat at Boca Ciega Bay, St Petersburg, FL. Growth was observed on Difco™ Marine Agar 2216 at room temperature under dark conditions. The bacterium forms pink-colored, circular, and convex colonies and is short-rod-shaped, oxidase-positive, Gram-stain-negative, and endospore-stain-negative. Morphologically similar colonies were also isolated from the gills of 12 other S. floridana samples from Boca Ciega Bay, as well as one S. floridana and one Lucinisca nassula sample from the Terra Ceia Aquatic Preserve. 16S rRNA gene analysis revealed the bacterium to be the most closely related to Gracilimonas sediminicola strain CAU 1638 with ~99% sequence identity. Genome sequencing confirmed the bacterium to be a novel species sharing 86% average nucleotide identity (ANI) and 92% average amino acid identity (AAI) to G. sediminicola. The genome assembly of the bacterium comprises 21 contigs, with a total size of 3.3 Mb and G+C content of 44%. We propose the name Gracilimonas pinellae for this bacterial species and developed PCR primers specific to its 16S rRNA gene. Continued investigation into the physiology and prevalence of this species is crucial for understanding its ecological role in marine habitats.

Art Therapy as a Complementary Treatment for Cancer Patients

Jhanavi Sabharwal, Imane Erquizi, Joud Jamous, Mahek Mody

Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

In medicine, art therapy refers to a therapeutic practice that uses various forms of art, music and creativity, to help patients express themselves and help improve their overall well-being. This systematic literature review focuses on assessing the psychological and physiological benefits of art therapy as a complementary treatment for cancer patients. It focuses on exploring how art therapy can impact mental health and quality of life, while exploring the role of art therapy in integrative oncology. 61 Peer reviewed articles from the last 15-20 years on trusted websites like PubMed, CDC, NIH, ScienceDirect, etc. were primarily uploaded to Rayyan while focusing on populations of oncology patients across various age groups in the United States, balancing male-female population ratio. These articles were then screened, and 29 of them were selected for inclusion based on majority vote, focusing on predefined inclusion and exclusion criteria. Findings indicated that art therapy has helped reduce the symptoms of depression and anxiety while significantly improving sleep patterns and emotional resilience among cancer patients. By reviewing current research, this study shows how the use of art therapy in combination to other treatments can be the future of a holistic approach in oncology care. Art therapy can be the new definitive complementary treatment which will be scalable, accessible, and evidence-based for providing patient care in the realm of oncology.

Impact of Racial and Ethnic Discrimination on Quality of Care and Patient Outcomes

Jhanavi Sabharwal, Shania Brathwaite, Sole Brathwaite, Kiara Pena, Jada Bates, Rain Smith
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Racial and ethnic discrimination continues to be the basis for a negatively affecting the quality of healthcare being provided across the United States. This study takes a deeper dive into how discrimination based on race and ethnicity increases healthcare disparities while focusing on populations of African American, Hispanic and Asian Adults in the United States, who fall into the 20-45 years old age category. Rayyan software was used to conduct a systematic literature review, focused on understanding the consequences of biases and inequalities in the healthcare system. 84 peer-reviewed articles from 2018-2025 from websites like PubMed, CDC, NIH, ScienceDirect, etc. were primarily uploaded to Rayyan using the above inclusion criteria. 30 articles were finally chosen to be included in this study. Key issues examined in these articles were: the impacts of cultural variables on healthcare experience, patient-physician interactions, and impediments to care. Findings show that discrimination is a major cause of delayed or neglected care, lower patient satisfaction, and poorer medical outcomes. In clinical settings, women especially those of African American and Hispanic heritage reported a higher degree of inequality and lack of empathy. This perceived discrimination also led to reduced adherence to preventative healthcare measures and mental health problems such as insomnia. To combat such discrimination, there's a need to set up targeted interventions including teaching cultural sensitivity, enhancing fair access to care and advancing resources for addressing the language and cultural barriers that patients face. Reducing discrepancies & ensuring health equity for all communities requires addressing systemic disparities.

Behavioral Validation of Salicylate-Induced Hyperacusis in CBA/CaJ Mice Using an Active Avoidance Paradigm

JM Warith Rahman
Faculty Mentor: Dr. Joseph Walton (College of Behavioral and Community Sciences)

Hyperacusis, characterized by heightened sensitivity to everyday sounds, can significantly impair quality of life. Despite its clinical relevance, treatment options remain limited, emphasizing the need for effective assessment tools. Mouse models offer translational value due to similarities in auditory processing with humans. This study evaluated the active avoidance (AA) task as a behavioral measure of hyperacusis in CBA/CaJ mice. Using operant conditioning, mice learned to avoid a foot shock by moving compartments in response to an auditory cue. Sodium salicylate (SS), a known inducer of hyperacusis-like behavior, was hypothesized to enhance task performance. Mice that reached ≥75% accuracy across 32 frequencies (8–36 kHz) at 70 dB SPL during baseline were included. After SS injection, mice were tested at 50 and 70 dB SPL across three sessions. Following a washout, they were retested after saline injection. The acoustic startle reflex, the gold standard for hyperacusis assessment, was also measured for validation. Of 14 mice, 9 exhibited increased conditioned response rates and shortened escape latency post-SS. Response rates reached 95% (50 dB) and 96% (70 dB), with latencies of 2.14 and 2.00 seconds, compared to baseline values of 90% and 2.66 seconds, respectively. At 50 dB SPL, latency effects were most pronounced at mid-high frequencies (16-36 kHz), while at 70 dB SPL, effects were present across all frequencies. A strong negative correlation was found between response rate and latency. The AA task reliably detects hyperacusis-like symptoms in mice and may serve as a valuable tool for evaluating treatments targeting sound sensitivity disorders.

Barry Jenkins' Moonlight: Reimagining the Coming-Of-Age Genre in Film

Jonathan Davis
Faculty Mentor: Dr. Maria Cizmic (College of Arts and Sciences)

The coming-of-age genre in film was established during the 1950s, a postwar period defined by rebellious and confused teenagers. Within the film genre, the young protagonist experiences physical or emotional struggle throughout their expedition, resulting in organic identity discovery. One subdivision of the genre that emerged during the 1990s was black coming-of-age stories. However, it was not until Barry Jenkins' 2016 film Moonlight that the genre was completely reimagined in a new light. Jenkins' film does not follow the recurrent coming-of-age plotline that has been exemplified in previous films of the genre, which display youthful growth by the end. Instead, Jenkins illustrates the harsh realities of many young African Americans that grow up in impoverished environments with little guidance. The protagonist, Chiron, is unable to psychologically grow throughout the film due to the grim environment that he is forced to live in, along with the lack of parental figures in his life. These factors limit his own sexual expression and identity, resulting in a tragic lack of growth by the end of the film. I researched many scholarly writings that gave insight into Moonlight and other coming-of-age film's structures, as

well as exploring the background of Liberty City, Miami, the film's setting. Furthermore, I analyzed scenes in Moonlight that revealed Chiron's stunted psychological growth, differing from other narratives in the genre. This exploration is significant because Moonlight broke the traditional coming-of-age norms when it was released, allowing for more creative and transgressive ways to tell stories in the genre.

Exploring Sex Differences: A Cross-Sectional Analysis of Risk Factors and Substance Use Disorder in Sexually Abused Justice-Involved Adolescents

Jordan Barringer

Faculty Mentor: Dr. Micah Johnson (College of Behavioral and Community Sciences)

Substance use disorders (SUDs) remain a significant public health concern among at-risk populations such as sexually abused justice-involved adolescents (SA JIAs). The relationship between certain risk factors such as witnessing community violence and emotional dysregulation and SUDs is not well established in the SA JIA population. It is still unknown how these risk factors compound with one another concerning the risk for SUD. This study aims to determine the association between these risk factors and the development of SUDs among SA JIAs. It is hypothesized that female SA JIAs with the risk factors are more likely to experience SUDs compared to male SA JIAs. A multivariate logistic regression was employed to examine a sample of 9,953 SA JIAs obtained from the Florida Department of Juvenile Justice. The Positive Achievement Change Tool assessment collected information regarding demographics, risk factors, sexual abuse, and substance use. The results were then stratified, comparing male and female SA JIAs, to establish any differences among the groups. Female SA JIAs exhibited higher odd ratios for witnessing community violence (aOR = 2.08, $p < 0.001$) and emotional dysregulation (aOR = 1.86, $p < 0.001$) compared to male SA JIAs (aOR = 1.97, $p < 0.001$; aOR = 1.69, $p < 0.001$). The findings indicate a need for the implementation of trauma-informed SUD treatment programs for victims of sexual abuse, especially those involved in the justice system. These programs can reduce harmful coping mechanisms while fostering healthy behaviors. Consequently, reducing the risk of further victimization, and future recidivism.

Gaming Making a Difference

Jordan Pickrell

Faculty Mentor: Dr. Tammy Sommers (College of Education)

Many students struggle with low engagement during whole-group instruction, making it challenging to foster deep comprehension across subjects. This inquiry explores how incorporating gaming into instruction can enhance student engagement and build comprehension. Research indicates that gaming provides meaningful learning experiences by fostering problem-solving skills, collaboration, and motivation. By integrating gaming elements into the classroom, students can interact with content in a way that promotes critical thinking and deeper understanding. In addition to reviewing literature on the benefits of gaming in education, this research includes firsthand classroom implementation to examine its impact on student learning. Addressing the need for more engaging instructional strategies, my findings will aim to provide insight into how gaming can be effectively used to support comprehension and engagement, offering practical strategies for educators to enhance instruction.

Examining the Role of Annual Income and Race/Ethnicity on Mental Health Symptom Severity among Hematopoietic Stem Cell Transplant Caregivers

Jorge Romero Salgado

Faculty Mentor: Dr. Christine Vinci (Morsani College of Medicine)

Caregivers of cancer patients undergoing hematopoietic stem cell transplantation (HCT) often experience elevated psychological distress. Although previous literature indicates that lower socioeconomic status (SES) is often associated with increased mental health symptoms, the role of race/ethnicity in relation to psychological distress is unknown in this caregiving population. This project examines associations among annual income, race/ethnicity, and mental health symptoms to inform whether additional support may be warranted for certain subgroups of HCT caregivers. In the context of a larger study, caregivers completed a demographic questionnaire and several validated, self-report measures that assessed symptoms of anxiety, depression,

post-traumatic stress, perceived burden, and general distress. Race/ethnicity was dichotomized into white/non-Hispanic and non-white/Hispanic. Annual income was categorized, ranging from ≤$5,000 to $160,000+. Income distribution by race/ethnicity was analyzed, followed by comparisons of mental health severity by race/ethnicity (t-tests) and income (Spearman correlations). Among participants (N=264; 82.9% white/non-Hispanic; 52.5% income ≥ $80,000), 47% of white/non-Hispanics made ≥ $80,000 annually compared to only 6% of non-white/Hispanics. No significant differences in mental health symptom severity were found between racial/ethnic groups. However, a significant negative correlation was observed between depressive symptoms and income (r=-0.137, p=0.041), indicating more severe symptoms among lower-income caregivers. Although race/ethnicity was not significantly related to mental health symptoms examined, lower income was associated with greater depressive symptoms. Limitations include few caregivers from minoritized, lower-income backgrounds. Future research should use larger, more representative samples to replicate findings before determining whether certain subgroups would benefit from additional support.

Antimicrobial Activity of Marine Bacteria Isolated from Gulf Toadfish: Opsanus Beta

Jose Masso Maldonado, Pragati Adesh
Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

The continuous evolution of bacteria drives the ongoing search for new antibiotics to fight common human pathogens. To defend against ecological pressures, marine organisms are known to produce antimicrobial compounds which can target both human and fish pathogens. The objective of this project is to evaluate the antimicrobial effects of bacteria isolated from the epithelial mucus of Opsanus beta. Preliminary assays identified a bacterium as exhibiting significant antimicrobial activity against Mycobacterium smegmatis and Staphylococcus aureus, with moderate activity against Bacillus cereus and Escherichia coli. Bacterial growth media was subjected to liquid–liquid extraction, where antimicrobial activity was observed in the organic layer. The crude extract was further separated using High-Performance Liquid Chromatography (HPLC), and four of the 17 fractions demonstrated bioactivity. Once sufficient mass is collected for each of the four fractions, Nuclear Magnetic Resonance (NMR) spectroscopy will be conducted to determine the chemical structure of the active compound(s). Once compounds are identified they will be tested in vivo to assess their safety and potential for pharmaceutical applications against Mycobacterium, the causative agent of tuberculosis, and other common pathogens.

The Sunshine State: Sexual Behaviors, Attitudes, and Beliefs among Florida College Students

Joseph Marshall, Ananda Myers
Faculty Mentor: Dr. Tiffany Chenneville (College of Arts and Sciences)

The sociopolitical climate in the state of Florida increasingly reflects conservative views that affect many areas, including education. Florida Statue 1003.42 requires abstinence-only education in public K-12 schools despite research describing the potential benefits of comprehensive sex education and high rates of unintended pregnancies and sexually transmitted infections (STIs) among youth in Florida. Part of a larger project, this study examined current levels of sexual knowledge, attitudes, and behavior among 83 college students in southeastern Florida. Participants completed an anonymous online Qualtrics survey containing a demographic questionnaire, a sexuality education scale, the Sexually Transmitted Disease Knowledge Questionnaire, and adapted versions of the Assessment of Knowledge and Beliefs about HIV/AIDS and Sexual Risk Scales. We used descriptive statistics to analyze data. Findings will be discussed within the context of current educational policies, and future directions will be outlined.

Optimizing Parameters to Amplify Microsatellite Markers in DNA Derived from Lowland Anoa Saliva Samples

Josephine Combs
Faculty Mentor: Dr. Michelle Green (College of Arts and Sciences)

The Lowland Anoa (Bubulus depressicornis), an endemic species of dwarf water buffalo, is of great conservational concern. Because population numbers are rapidly declining, there is a risk of inbreeding and genetic bottleneck. Therefore, it is necessary to conduct genetic research. Given the low population numbers and their elusive behavior, non-invasive methods are preferred over traditional sampling methods. However, there are known challenges associated with non-invasive sampling when used in downstream analyses. The use of saliva-derived DNA for downstream sequencing and genotyping has

not been tested in the anoa. The goal of this study is to assess microsatellite DNA amplification using saliva-derived DNA. Saliva samples were obtained using non-invasive sampling techniques from anoas housed at ZooTampa. The saliva was collected from licked salt blocks and browsed feed. Previously published anoa primers were selected (TGLA226 and TGLA226) (Priyono et al., 2020). Determining whether saliva-derived DNA is of high enough quality and quantity to provide robust genetic results will contribute important guidance to the ongoing anoa conservation and population management strategies. By providing an alternative method to collect DNA, field conservationists will have additional options to collect genetic information about the remaining anoa population.

Comparison between AuNP and TiO2NP Nanocarriers for the Treatment of Chronic Obstructive Pulmonary Disease

Joy Yang

Faculty Mentor: Dr. Narasaiah Kolliputi (Morsani College of Medicine)

Chronic Obstructive Pulmonary Disease (COPD) is one of the most fatal diseases in the world, leading to lung tissue damage and persistent inflammation. Patients with COPD are typically treated with a bronchodilator and steroids to alleviate bronchoconstriction and inflammation; however, the steroids have limited effects. Inhaled nanomedicine utilizes small agents that facilitate pulmonary-targeted delivery, which improves the absorption and potency of the medication. Over a century ago, Paul Ehrlich proposed the 'magic bullet' theory—targeting diseases precisely while minimizing side effects. Recently, nanomedicine has emerged to support Ehrlich's theory by fostering nanoparticle drug delivery systems, such as gold (AuNPs) and titanium dioxide nanoparticles (TiO2NPs). Thus, this literature review aims to analyze and compare gold and titanium dioxide nanoparticles as carriers for COPD treatment for pulmonary and systemic applications. An analysis of over 60 PubMed research studies from the last twenty years compared the biodistribution, immunotoxicity, inflammation-causing abilities, and cellular interactions of AuNPs and TiO2NPs. The findings suggest that positively charged, small AuNPs are distributed and cleared quicker than other nanoparticles. However, smaller AuNPs can also cause toxic effects in the digestive and vascular systems. In contrast, TiO2NPs have been shown to cause strong pulmonary inflammation with immune cell accumulation, which occurs through repeated exposure and correlates with size and agglomeration. Ultimately, both AuNPs and TiO2NPs have benefits, but AuNPs demonstrate greater potential for safe and effective COPD treatment, promoting further clinical trials and research on their targeted drug deliveries.

The Impact of Genistein on PAI-1 Levels and Airway Inflammation in Asthma

Joy Yang

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Asthma is the fifth leading chronic disorder in the world, affecting hundreds of millions of people yearly. Asthma is a chronic inflammatory disease of the lung airways caused by airway narrowing and remodeling. Plasminogen Activator Inhibitor-1 (PAI-1) has been linked with increased risk of asthma. PAI-1's production is stimulated by immune cells through the Extracellular signal-Regulated Kinase (ERK) pathway. It inhibits the activity of plasminogen inhibitors, leading to buildup of the extracellular matrix (ECM). ECM buildup leads to airway narrowing, which causes difficulty breathing. Genistein, found in soy, is an isoflavone that has antioxidant and anti-inflammatory properties. This literature review investigated genistein's effects on PAI-1 levels through the ERK pathway, and airway inflammation in asthmatics. This review utilized literature deriving from several sources, such as PubMed, pertaining to genistein's impacts as an isoflavone, asthma's pathogenesis, and the role of PAI-1 to determine genistein's impact on asthma. Studies showed that for asthmatics with genotypes producing higher PAI-1 levels, inflammation and risk for asthma attack was increased. When genistein was introduced, it lowered PAI-1 levels by inhibiting the phosphorylation of the ERK pathway. Understanding genistein's effects on asthma is crucial to future clinical treatment, especially considering mutations and polymorphisms. Specific genotypes, such as the 4G4G polymorphism for the PAI-1 gene, may lead to increased risk for asthma due to higher predisposed PAI-1 levels. Genistein may be crucial in treating this specific genotype through oral supplementation and inhaled nanomedicine that could deliver genistein directly to airways.

STAT3: A Potential Therapeutic Target for Plaque Psoriasis

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Plaque psoriasis is a chronic skin condition that causes rapid cell growth, leading to the formation of thick scaly patches on the skin which affects millions of Americans. Many signaling pathways are implicated in the pathophysiology of the disease, including signal transducer and activator of transcription 3 (STAT3). Current literature implicates the involvement of STAT3 in mediating the proliferation of keratinocytes and various immunological pathways associated with psoriasis. The aim of this current literature review is to explore the relationship between STAT3 and plaque psoriasis and investigate STAT3's potential as a therapeutic target. A comprehensive review of 80 peer-reviewed articles was conducted, including studies that examined the role of STAT3 in psoriasis. Articles were then excluded on the basis of relevance to topics including "keratinocyte", "psoriasis", "STAT3", immune pathway", "cytokine", "interleukin (IL) - 6, 17, 22, 23, 37". Models and graphs were created with data from a multitude of recent studies. STAT3 inhibition may downregulate the inflammatory immune response implicated in plaque psoriasis, therefore slowing the progression of the illness. STAT3 influences various mechanisms that can contribute to the development of plaque psoriasis. This includes the promotion of keratinocyte proliferation, the heightened recruitment of T-helper cells, and the upregulation of inflammatory cytokines including IL6, IL17, IL22, IL23, IL37. Targeting STAT3 may offer a therapeutic advantage by interrupting the feedback loop between immune dysregulation and keratinocyte activation, thereby presenting an approach for psoriasis management.

Evaluating the Effect of Competition on Adult Physical Activity Using Heart Rate Monitoring

Julia De Paula Silva
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As of 2023 it has been reported that the United States is facing a physical inactivity crisis, with approximately 24.2% of adults meeting the recommended engagement levels of physical activity (PA). A lack of PA engagement is associated with an increased risk of obesity, type 2 diabetes, cardiovascular disease, and types of cancer (e.g., colon, breast). Therefore, the purpose of the proposed study is to develop a cost-effective behavioral intervention to promote PA among adults. This study will recruit dyads of existing friends between ages 18–65 who engage in low levels of PA (i.e., at least 45 min per week). First, an individualized heart rate assessment will be conducted to identify each participant's PA intensity zones. Next, an 8-to-10-week competition-based intervention with online public posting will be implemented between the existing adult peers to promote PA engagement. It is hypothesized that the competition-based intervention will result in an increase in PA engagement for all participants. The findings from this proposed study will contribute to the body of research related to the development and widespread implementation of cost-effective behavioral interventions aimed at promoting PA, thereby addressing the ongoing physical inactivity crisis. Importantly, such programs may reduce the incidence of chronic diseases influenced by sedentary lifestyles.

Saliva vs. Feces: Noninvasive DNA Quality and Quantity of the Endangered Lowland Anoa

Juliana Nascimento Dallalana e Aguiar
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When studying wildlife, invasive sampling methods, like specimen collection or biopsies, are usually preferred and more commonly used because they provide a larger amount of genetic material. However, these techniques can be harmful to the organism. Recent studies have analyzed how non-invasive sampling techniques can be used to collect genetic material without harming the animal. The Lowland anoa (Bubulus depressicornis) is a dwarf water buffalo species endemic to Indonesia. Their population numbers have been declining greatly, even though there are 14 designated wildlife protection areas in Indonesia for anoa populations (Wheeler et al., 2014). In hopes of enhancing protection of anoa species and preserving the quality of genetic material collected, this study compared the quantity and quality of fecal and saliva-derived DNA collected from anoas housed at ZooTampa. Both the saliva and fecal samples were collected using non-invasive sampling techniques. For saliva, the anoas licked salt-blocks and cutting boards, both baited and non-baited. The saliva was collected with swabs and stored in DNA/RNA shield buffer (Zymo). Fecal samples were collected using plastic spoons, noting time collected, environmental conditions and sample freshness. They were stored in containers of either dry desiccant or 100% ethanol. DNA was extracted using Zymo

Microprep kit. Comparisons of DNA quantity (DNA ng/µL) and quality (A260/280 ratio) were made between the DNA extracted from the saliva samples and the fecal samples. Determining which non-invasive material produces the highest quality and quantity of DNA will provide data for conservationists in Indonesia and provide the backbone for future studies.

GDNF-Based Neuroprotection in Parkinson's Disease: The Role of Advanced Nanotechnological Delivery Systems

Jumana Ahmed

Faculty Mentor: Emily Amick, Doctoral Candidate (College of Engineering)

Parkinson's disease is characterized by the progressive loss of dopaminergic neurons in the substantia nigra region of the brain, leading to debilitating motor symptoms such as tremors, rigidity, and difficulty of movement bradykinesia. Glial cell-derived neurotrophic factor (GDNF), a protein essential for neuronal survival, has shown promise in protecting and restoring these neurons in preclinical models, but clinical translation remains limited due to significant delivery challenges. Traditional methods, including intracerebral infusion and gene therapy, face barriers such as invasiveness, uneven distribution, and an inability to consistently cross the blood-brain barrier. This secondary research investigates nanotechnology's potential in addressing these delivery limitations. Engineered nanoparticles, including liposomes, carbon nanotubes, polymeric micelles, and mesoporous silica nanoparticles, offer novel solutions by enabling targeted, non-invasive delivery across biological barriers and sustained therapeutic release. These nanoparticles are designed to enhance bioavailability, ensure effective and targeted delivery to dopaminergic neurons across biological barriers, and reduce side effects resulting from traditional treatments. The findings emphasize how nanotechnology not only overcomes the shortcomings of traditional delivery systems, but also facilitates a shift from symptomatic relief to long-term regenerative and neuroprotective therapies. By integrating biological mechanisms with engineering innovation, these approaches pave the way for precise medical applications tailored to individual patient needs. Ultimately, this research contributes to the development of scalable, adaptable delivery systems that could transform Parkinson's disease treatment and inspire advances in therapies for other neurodegenerative conditions. Future work will focus on optimizing these nanocarriers for clinical translation, ensuring safety, reproducibility, and patient-specific adaptability.

Exploring the Role of HSV-1 in the Pathogenesis of Alzheimer's Disease

Kali Solages, Shruti Sreekanth, Aniuta Kremsaliuk

Faculty Mentor: Dr. Stuart Maudsley (H. Lee Moffitt Cancer and Research Institute)

Alzheimer's Disease (AD) is the most common neurodegenerative disorder, characterized by excessive amyloid beta(Aβ) plaque and tau protein tangles in the brain. While the exact cause of AD remains unclear, recent research implicates viral vectors, particularly Herpes Simplex Virus 1 (HSV-1), in its progression. This review investigates how HSV-1 infection can contribute to the development and transmission of AD through viral mechanisms, including pathological amyloid beta and tau protein deposition. A systematic review of 30 peer reviewed articles from the past 10 years was conducted, focusing on HSV-1's influence in AD, using databases such as PubMed and Google Scholar with keywords 'HSV-1,' 'AD,' 'amyloid beta,' and 'tau protein.' Findings indicate HSV-1 contributes to AD pathology, evidenced by HSV-1 DNA in AD patients' brain. A meta-analysis revealed HSV-1 infection is associated with an increased risk of AD, with a pooled odds ratio (OR) of 1.40. These observations suggest HSV-1 promotes Aβ and hyperphosphorylated tau protein accumulation via viral effects like neuroinflammation. This review supports the hypothesis that HSV-1 plays a significant role in AD development, offering new insights into disease progression. Targeting HSV-1 and its pathways may offer novel therapeutic strategies for preventing AD. Further research is needed to examine HSV-1's long-term effects on neurons and develop interventions that mitigate its impact on AD. Understanding the role of HSV-1 in transmitting AD could pave the way for future research investigating novel therapeutic and preventive strategies that target the viral interactions that lead to Alzheimer's pathology.

An Interactive Framework for Implementing Privacy-Preserving Federated Learning: Experiments on Large Language Models

Kasra Ahmadi
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Federated learning enhances privacy by keeping user data on local devices. However, emerging attacks have demonstrated that the updates shared by users during training can reveal significant information about their data. This has greatly thwart the adoption of FL methods for training robust AI models in sensitive applications. Differential Privacy is considered the gold standard for safeguarding user data. However, DP guarantees are highly conservative, providing worst-case privacy guarantees. This can result in overestimating privacy needs, which may compromise the model's accuracy. Additionally, interpretations of these privacy guarantees have proven to be challenging in different contexts. This is further exacerbated when other factors, such as the number of training iterations, data distribution, and specific application requirements, can add further complexity to this problem. In this work, we proposed a framework that integrates a human entity as a privacy practitioner to determine an optimal trade-off between the model's privacy and utility. Our framework is the first to address the variable memory requirement of existing DP methods in FL settings, where resource-limited devices can participate. To support such settings, we adopt a recent DP method with fixed memory usage to ensure scalable private FL. We evaluated our proposed framework by fine-tuning a BERT-based LLM model, leveraging the new accountant, and employing diverse data partitioning strategies to mimic real-world conditions. As a result, we achieved stable memory usage, with an average accuracy reduction of 1.33% for ϵ=10 and 1.9% for ϵ=6, when compared to the state-of-the-art DP accountant which does not support fixed memory usage.

The Changes in the Music Industry Caused by Digital Marketing

Katelyn Gingrey
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Social media and music streaming services are a couple of the most common digital marketing platforms used by musicians. The music industry is constantly changing, and it can sometimes be difficult for musicians to keep up with all the changing trends, while staying true to themselves. It can also prove to be challenging for musicians to grow their fanbase if they do not understand digital marketing concepts. To further look into how musicians can be successful in using digital marketing, I conducted a survey as well as a few interviews. The survey was on the consumer side and looked into how people interact with music (i.e. what streaming services they use, if they listen to playlists, where they find new music, etc.). The interview was geared towards musicians and looked into their relationship with social media and streaming services and how they use these tools to promote themselves. Looking into the future, digital marketing for musicians will continue to be a crucial aspect of their success, and it is essential for them to understand how to use social media and streaming services to their advantage.

Unveiling Gender Biases? An Exploration of Sexism and Gender-Based Cyber Violence

Katie N. Smith
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The rising prevalence of cybercrime and the growing demand for cybersecurity have heightened the need to understand those who engage in these attacks. To date, research on hackers has largely relied on open-source data and proxy samples, such as college students. This study examines a sample of 238 active hackers using an interdisciplinary approach to explore the complex interplay of sexism within the hacker community, uncovering the often-overlooked gender dynamics that shape this tech subculture. Additionally, we examine how incel membership relates to these beliefs and behaviors, providing insight into the broader ideological underpinnings of gender bias and discrimination in this space. Ultimately, this research advances our understanding of gender inequality in technology and the socio-cultural factors that sustain it.

A Thermal Insulation and UV-Resistance System Based on Aerogel for Settlements on the Moon and Mars

Kautilya Veer

Faculty Mentor: Dr. Krysta Banke (Judy Genshaft Honors College)

This paper presents a novel design for a habitable outpost on both the Moon and Mars that leverages the exceptional properties of aerogel - a material composed of 99% air, offering outstanding thermal insulation and UV protection. The outpost is engineered to withstand extreme temperature variations on Mars (-153°C to 20°C) and the Moon (-173°C to 127°C) using a single material. Protection against harmful UV rays is crucial for sustaining human life as prolonged exposure can lead to DNA damage and cancer. To safeguard the aerogel layer from meteoroids, Martian soil is utilized on Mars, and lunar soil on the Moon. The interior features a fiber composite layer, supported by a mechanical structure made from Martian concrete (ice, calcium oxide, and Martian aggregate) or lunar concrete (ice, calcium oxide, and lunar aggregate). The composite can be assembled on Earth with an inflatable system or sent to Mars in multiple missions for on-site assembly. Light transmission with radiation resistance is achieved using translucent silica aerogel filters for glass windows. The paper also includes heat transfer calculations between the internal and external environments of the habitat, as well as strength assessments of the habitat, taking into account the insulation and UV resistance provided by the protective soil layer. Keywords: Geant4, Thermal insulation, Radiation Protection, Moon/Mars settlement, Aerogel

Turning Points in Cybercrime: Understanding Hacker Desistance for Proactive Cybersecurity

Kaylee Eckelman

Faculty Mentors: Dr. C. Jordan Howell and Dr. Giti Javidi (College of Behavioral and Community Sciences and Muma College of Business)

Understanding the behaviors and motivations of cybercriminals is critical to developing effective cybersecurity strategies. While research on malicious hacking has expanded in recent years, systematic investigations using data directly obtained from active cybercriminals remain rare. This study addresses this gap by identifying key turning points that may lead hackers to disengage from illicit activities, offering valuable insights for cybersecurity professionals, policymakers, and researchers. To explore the relationship between potential turning points and desistance from hacking, we conducted the first-ever survey of verified, actively engaged malicious hackers. Each participant was authenticated through attribution records, ensuring that they had at least one documented attack linked to their moniker. Recruitment efforts included advertisements on the homepage of Zone-H, the world's largest hacking archive, resulting in 238 completed surveys. Our findings provide unprecedented insights into the factors influencing hackers' decisions to abandon cybercrime. We demonstrate how these turning points vary based on individual hacking motivations and integrate quantitative survey data with qualitative insights from interviews with a subset of respondents to offer a comprehensive perspective on disengagement from illicit cyber activities. By mapping potential pathways out of cybercrime, this study informs the design of more proactive cybersecurity interventions, enhances cyber threat intelligence efforts, and contributes to the development of policies that disrupt cybercriminal networks at their root.

The Perfect Storm: Climate Change, Insurance Instability, and Financial Stress in Florida

Kayleigh Baron

Faculty Mentor: Dr. Rebecca Johns (College of Arts and Sciences)

The Florida homeowner's insurance crisis, exacerbated by the growing threat of climate change, has placed a severe financial strain on residents, particularly seniors and middle-class families. This project investigates how climate change and escalating insurance rates are affecting Florida homeowners and evaluates the government's response, particularly in St. Petersburg. Using a mixed-methods approach, including surveys, interviews, and a review of scholarly literature and government documents, the study reveals overwhelming concern among homeowners about unsustainable insurance costs and inadequate policy responses. Survey data showed that 97% of respondents view insurance rates as unsustainable and are dissatisfied with governmental efforts. Interviews highlighted the burdens faced by seniors on fixed incomes and homeowners navigating abrupt policy cancellations and increasing premiums. Findings also revealed that while St. Petersburg is actively addressing climate resilience through flood management and conservation efforts, state-wide solutions to the insurance crisis remain lacking. This study underscores the need for more robust government intervention and further research into sustainable insurance reform amid Florida's escalating climate risks.

Analysis of Gene Products 26, 31, and 57 from Mycobacteriophage Kimona on Mycobacterium smegmatis Growth

Keelynn Barrier, Makenzie Davenport, Makenzie Estabrook
Faculty Mentor: Dr. Richard Pollenz (College of Arts and Sciences)

Phages are the most abundant organisms on Earth. They are important in health applications because phages can serve as antibiotics to antibiotic-resistant bacteria. The goal of this study is to analyze whether gene products from phage Kimona will exhibit cytotoxicity to Mycobacterium smegmatis. Kimona is a temperate A19 cluster phage, with a genome of 50,283 base pairs and 86 genes, of which 48 have a predicted function. Kimona genes 26, 31, and 57 were amplified by PCR and inserted into the inducible expression plasmid pExTra01 by isothermal assembly. The plasmids were then electroporated into M. smegmatis and evaluated in cytotoxicity assays. gp26 is a membrane protein with two transmembrane domains, predicted to be a holin involved in bacterial lysis. gp26 was partially cytotoxic and produced smaller colony size than control cells. gp31 is a membrane protein with four transmembrane domains. gp31 was not cytotoxic. gp57 is an endonuclease VII. gp57 was found to be highly cytotoxic, most likely due to the digestion of nucleic acids. Although the gene products studied in this project all had predicted functions, the majority of phage genes encode proteins that have unknown functions. Therefore, these studies are important because they contribute to understanding the roles of all phage proteins, especially those with unknown functions. This data will contribute to the overall understanding of phage biology and their interactions with bacterial hosts.

Evolutionary Conservation and the Role of FOXP2 in Human Speech and Language Development

Keira Ballard
Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

The study of genes offers a crucial understanding in the evolution of species and the many abilities an organism may have, including language. The FOXP2 gene encodes for the protein forkhead box P2, a transcription factor that is active in the development of speech and language during embryogenesis. Several single-nucleotide polymorphisms of this gene in humans have been linked to the speech and language disorder, childhood apraxia of speech, further supporting the gene's role in human speech and language. The FOXP2 gene is highly conserved across vertebrates, even in species with limited vocalizations. This is particularly true among humans, chimpanzees, and other great apes. In a pairwise amino acid alignment of the human FOXP2 amino acid sequence and the chimpanzee FOXP2 amino acid sequence, only two short sections are found to differ between the two. The change in these two sections is suggested to be a factor in the development of speech in humans. In addition, a global alignment of the FOXP2 gene in humans, chimpanzees, bonobos, gorillas, orangutans, and mice shows the conservation of the gene in humans, great apes, and mice, and the changes leading to the function of FOXP2 in humans. The evolutionary conservation in FOXP2 highlights its vital role in the language, speech, and vocalizations across vertebrate species, while offering insight into the development of speech and language in humans.

A Qualitative Evaluation of Transdisciplinary Co-responder Training

Kelsey Greenfield
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Persons with mental illness (PMI) are disproportionately represented in the criminal justice system. In response, law enforcement agencies have developed Police-Mental Health Collaboration strategies, such as Co-Responder Teams (CRT) model which pair law enforcement officers and behavioral health professionals. Despite over 30 years of research, there are still gaps in the implementation and research of co-responder teams; specifically, there is neither a uniform co-responder team model nor a standardized training procedure for this model. The overall purpose of this project is to better understand the training needs of these transdisciplinary co-responder teams. This exploratory project utilizes semi-structured interviews to evaluate CRT training procedures by examining team member perceptions of these trainings. Due to the population involved in the project, the development of community partner buy-in has been a vital process to ensure accurate findings. Identifying differences in team member perception of training procedures will be key to addressing gaps in training and any resulting misconstruction of team member roles and responsibilities. Moreover, this project will also endeavor to develop research methodologies that foster trust between the law enforcement community partners and evaluation teams. The overall expected outcome is that specific areas of growth will be identified for current CRT training procedures. This project will identify current training needs of transdisciplinary CRTs that can then lead to evidence-informed best practices.

Inflammatory Transcriptional Signature Can Discriminate De Novo and Secondary AML

Ken Phong Duy Dao

Faculty Mentor: Dr. Timothy Shaw (Morsani College of Medicine)

Myelodysplastic Syndrome MDS is a myeloid neoplasm and a precursor to Acute Myeloid Leukemia (AML). Previous studies have demonstrated that de novo and secondary AML could be determined without clinical history if the presence of 'secondary-like' mutations were identified. However, whether transcriptional changes can refine the discrimination of these entities is unknown. Here, we hypothesize that inflammation-driven MDS will be transcriptionally reprogrammed toward a pro-inflammatory myeloid lineage that will be imprinted in secondary AML transcriptomes. Thus, we performed a gene expression analysis of the MDS, secondary AML, and de novo AML samples in the BeatAML2 (N = 671) and GSE15061 (N = 366) datasets. From gene set enrichment analysis, MDS and AML patients with prior MDS (secondary AML) had a higher enrichment for the hallmark inflammation gene set p = 1.1e-04 and p = 8.4e-05, respectively. Several cytokine receptors were consistently enriched in MDS and secondary AML, including IL18RAP, IL18R1, IL1R1, IL2RB, and IL4R. Additionally, we found MDS and secondary AML to be strongly enriched for a monocyte expression signature and strongly correlated with inflammation (p = 6.1e-15). To determine the additive value of transcriptional signatures on genomic data in discriminating de novo and secondary AML, we trained an XGBoost machine learning model to predict secondary AML. Transcriptional signatures refined prediction in a joint genetic and expression model compared to singly genetic model, 0.8122 AUC ROC vs 0.7012 AUC ROC. Collectively, these data suggest that MDS-associated inflammatory and monocytic signatures are imprinted in secondary AML patients.

Does Explanatory Style Mediate the Relationship Between Spirituality and Happiness?

Khanh Nguyen

Faculty Mentor: Dr. Jay Michaels (College of Arts and Sciences)

Explanatory style (i.e. positive attributional style and negative attributional style), defined as the habitual ways individuals explain the causes of events, can significantly influence emotional well-being. This research aims to investigate the mediating role of explanatory style in the relationship between spirituality and happiness. We hypothesize that individuals who are more spiritual and who rely on a more positive attributional style will tend to be happier. A cross-sectional survey was conducted with a US national sample (N = 295, 77.6% women, 48.8% Christian). This possibility was tested using a mediation model with spirituality as the predictor, explanatory style as mediators, and happiness as the outcome. From the model, the variables had a significant overall effect on happiness (b = .053, p < .001, R-squared = .081). In addition, a positive attributional style significantly mediated the relationship between spirituality and happiness (b = .106, [.003, .022]). Negative attributional style had no mediating effect. Overall, results indicated that individuals who are more spiritual and with a more positive attributional style report higher levels of happiness. The findings suggest that fostering a positive attribute style may enhance the positive effects of spirituality on happiness.

Western Consumer Culture Meets Collectivist Values: How Youth in Botswana, Africa Mitigate the Influences of Modern Social Media on Youth Mental Health

Kima Sibayan

Faculty Mentor: Dr. Frank Biafora (College of Arts and Sciences)

While serving as the Social Science Student Liaison for an international study in Botswana, I noticed that most Batswana had Western social media and an interest in Western materialism. This poster presents preliminary findings from a follow-up sociological analysis in which we explored how youth in Botswana are managing role conflict between remaining within their indigenous culture while also balancing their identity within Western social media. We investigated the extent to which the mental health of youth in Botswana are being negatively impacted by consuming Western social media. We hypothesized that consistent exposure to Western social media would instigate negative mental health outcomes due to engaging with lifestyles that are not attainable. We employed a mixed methods ethnographic approach amongst our small, snowball sample of college educated youth in Botswana. The findings challenged our initial hypothesis. Youth in Botswana reported that social media provided valuable motivation in various areas of life, specifically pertaining to career, educational, and financial motivation. Participants also reported how reliance upon traditional values helped to mitigate some of the harmful effects of social media consumption. The findings also revealed the impacts of media imperialism on mental well-being, and how the implementation of

Southern African indigenous values, beliefs, and practices can serve as important protective factors. Lastly, further research should be conducted on how Western societies can adopt protective measures, similar to the ones the Batswana participants reported, to mitigate the growing mental health concerns among America's youth as a direct result of extensive social media use.

Character Strengths

Kimiya Vaezi
Faculty Mentor: Dr. Jenni Menon Mariano (College of Education)

There are considerable intervention studies inspired by Positive Psychology that are implemented among adolescents. Yet, fewer number of these interventions include the concept of character strengths. Having considered the importance and contribution of character strengths for the positive psychology field, including well-being, a mapping review is used to highlight a decade of intervention studies implemented on adolescents that encompassed character strengths fully or as a part of their content from 2014 to 2024. This review provides an overview of these studies, especially their context, design, results, participants, and intervention program.

The Impact of Ornithine Decarboxylase and Deoxyhypusine Synthase on Purine Metabolism in CD8+ T-cells

Krishna R Patel
Faculty Mentor: Dr. Aya Elmarsafawi (H. Lee Moffitt Cancer and Research Institute)

Ornithine decarboxylase (ODC) and deoxyhypusine synthase (DHPS) are critical enzymes involved in polyamine biosynthesis and hypusination, respectively, both of which influence T-cell development. This study examines how loss of ODC or DHPS affects purine metabolism by analyzing key genes involved in the purine biosynthetic pathway. Given the essential role of these pathways in RNA and DNA synthesis, disruptions could lead to significant cellular dysfunction. Quantitative reverse transcription polymerase chain reaction (qRT-PCR) was performed to assess the expression of key enzymes in the purine metabolism including, Gart, Atic, Pnp, Ada, Aprt, Prps1, Prps2, Adss, and Adsl, in Odc- or Dhps- deficient splenic mouse CD8+ T cells. Differential gene expression was evaluated and the subsequent effects on nucleotide synthesis will be assessed. Importantly, we found that genes of purine biosynthetic enzymes were reduced in Dhps-deficient CD8+ T cells. On the other hand, Odc-deficient CD8+ T cells exhibited higher levels of Prps1, Pnp, Aprt, Adsl, while levels of Atic and Ada were reduced, suggesting differential regulation of purine metabolism by ODC and DHPS. Additionally, gene expression of the transcription factors p53 and Nrf2 were analyzed to determine their regulatory influence on purine metabolic pathway. Our findings provide insight into the molecular mechanisms governing nucleotide metabolism in CD8+ T-cells and highlight potential regulatory networks influenced by ODC and DHPS.

Optimizing Neuro Check Frequency to Prevent Early Neurological Deterioration in Stroke Patients: A Systematic Review

Krutika Pedamkar, Jasmin Salcedo Lara, Raneem Yassin, Aishwarya Aggarwal
Faculty Mentor: Dr. Keith Dombrowski (Morsani College of Medicine)

Neuro checks are essential for detecting early neurological deterioration (END) in ischemic and hemorrhagic stroke patients, especially during the first 24 hours. While frequent assessments are critical in this early phase, research suggests that their effectiveness diminishes beyond this period. Current protocols have limitations, particularly in detecting gradual or subtle changes. The potential consequences of prolonged neuro checks, like sleep disruption or delirium, highlight the need for a balanced approach to monitoring in stroke care. This study examines the impact of neuro check frequency on the detection of evolving END in stroke patients. It also identifies optimal monitoring strategies for improving detection and patient outcomes. A comprehensive review of 32 peer-reviewed articles (2014-2024) from PubMed examined neuro check frequency in acute stroke patients, END detection, and clinical outcomes. Studies lacking patient monitoring data or insufficient sample sizes were excluded. Findings indicate that approximately 27% of stroke or neurologic disease patients experience END. Nearly half of these cases are detected through scheduled neuro checks. A high frequency of neuro checks (hourly) increases the likelihood of early detection; however, their effectiveness declines beyond the first 12–24 hours due to reduced detection rates of

new deterioration, as most critical neurological changes occur within the first day. Prolonged neuro checks, especially beyond 24 hours, are linked to a threefold increase in delirium risk due to sleep disruption. Adjusting or discontinuing checks after 12–24 hours can mitigate these risks, while alternative monitoring strategies can ensure early detection of neurological deterioration.

Computational Analysis of K-Ras Gene Expression in Dendritic Mouse Cells

K'yana Edwards
Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

The K-Ras oncogene is a driving force for cancer progression. Mapping its expression in dendritic cells (DCs) is one way we begin to understand its role in immune response evasion. This is critical for developing effective immunotherapies against Ras-driven cancers, such as pancreatic, colorectal, and lung cancers. The research project investigated if the murine dendritic cell line, DC2.4, expresses the K-Ras gene, potentially serving as a model for studying Ras-mediated immune evasion. Using established biotechnology approaches, K-Ras-specific primers (NCBI/Primer3) were designed, RNA was isolated, reverse transcription was performed (Maxima H Minus RT), and amplification was carried out via PCR and gel electrophoresis. The expression of the K-Ras gene was validated through Next-Generation Sequencing and BLAST alignment. The analysis confirmed strong K-Ras expression in the DC2.4 cells, with the sequence alignment showing high homology to reference sequences. These findings position DC2.4 as a relevant model for investigating how K-Ras influences dendritic cell function in tumor immunity. Future studies should explore how oncogenic K-Ras mutations in dendritic cells impact antigen presentation, which could reveal new immunotherapy targets for Ras-driven cancers. Keywords: K-Ras, dendritic cells, immune evasion, biotechnology

The Role of Imaginary Friends in Pediatric Cognitive Development

Laiba Majid, Oona Renkonen
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Imaginary friends are traditionally seen as a common form of pretend play in young children. Although this type of play involves abstract imagination, creativity, and role play, it is often dismissed as unimportant and trivial. However, emerging research demonstrates that this imaginative attribute in young children may play a positive role in their cognitive development. To investigate this phenomenon, this study examines two groups of children aged 3–8: one group with self-reported imaginary friends and one without. Both groups were shown a series of cartoons that they were instructed to memorize and recall later in as much detail as possible. Based on their responses and subsequent fMRI scans, their responses with respect to false belief and accuracy were recorded. The results indicated that children who had self-proclaimed imaginary friends showed no difference between perception of reality and imagination, indicating a precursor for theory of mind. Furthermore, children with imaginary friends showed heightened activity in the default mode network, a region of the brain responsible for social awareness and interpreting events. These outcomes suggest that children who engage in pretend play with imaginary friends may develop more advanced neural pathways related to social awareness, mental reasoning, and empathy. Further research may reveal whether these early cognitive differences have a lasting impact on development into adolescence.

Reducing ICU Mortality in Sepsis Patients

Lauren Bage, Niveditha Chandrakanth, Megha Kalia, Gabriella Romero-Leyva
Faculty Mentor: Dr. Keith Dombrowski (Morsani College of Medicine)

Sepsis is a life-threatening condition caused by an abnormal immune response, leading to excessive inflammation, multi-organ failure, and is the primary etiology of mortality in intensive care units. This review aims to interpret the effect of therapies and early detection on patient outcomes and sepsis-related mortality in the ICU. A systematic literature review was conducted using PubMed to analyze articles relevant to strategies for reducing ICU mortality published between 2023 and 2025. The review focused on 76 articles, with selected studies emphasizing vasopressor use reduction, prevention of bloodstream infections, and improvements in clinical protocols. Hypotension is a common adverse reaction to sepsis, it's treated by vasopressors which must be minimized to reduce blood flow constriction and dependency. HAT therapy–a combination of ascorbic acid, hydrocortisone, thiamine–and methylene blue are recognized for reducing vasopressor usage and stabilizing organ function by inhibiting nitric oxide pathways to allow

an increase in vascular tone. Protocols, such as the Princess Code, focus on rapid response with early recognition and intervention within one hour of diagnosis. Implementing a Comprehensive Unit-based Safety Program (CUSP) model has been associated with a 36% reduction in central line-associated bloodstream (CLABSI) rates and reduced ICU mortality. Findings from ICU mortality reviews demonstrate their critical role in improving patient outcomes through targeted interventions. Reducing vasopressor use, early detection of bloodstream infections, and improved infection protocols contribute to better hemodynamic stability, rapid diagnostics, and antimicrobial stewardship. Standardized ICU protocols are essential in reducing sepsis-related mortality, reinforcing the need for their widespread implementation.

Healthcare Systems Comparison of the United States and Germany

Lauren Dolan
Faculty Mentor: Dr. Peter Funke (College of Arts and Sciences)

The United States healthcare system spends about double the amount of other wealthy countries per capita, yet achieves the worst health outcomes overall according to OCED data. In comparison, Germany's healthcare system spends significantly less per capita but experiences better overall healthcare outcomes. In order to understand the health outcomes of each country, a comparison of the German and United States healthcare systems and the care both systems provide is crucial. This study was conducted by utilizing sources from PubMed, the USF Library Database, and Google Scholar using keywords such as "preventative care" and "healthcare system". The study focused on the preventative care measures of each country, as well as health delivery and access. The study found that the United States and German healthcare systems employ similar methods of healthcare delivery. This finding is important because the similarities in each system may pave the way for improvement in both systems.

Comparative Analysis of Nile Red and Beetroot Dye Staining for Microplastic Detection

Lauren Downey, Laini Potter
Faculty Mentor: Dr. William Ellis (College of Arts and Sciences)

In recent years, the topic of microplastics (MPs), or simply plastic particles <0.5mm, has gained increasing attention, mainly due to debate over the potential negative health effects associated with MP ingestion through seafood consumption. With over 3500 peer-reviewed publications about MPs in fish, a standardized methodology has not yet been established, raising concerns about inaccurate MP detection and difficulty in comparing results between studies. This is, in part, due to the high cost and large time requirements needed to perform MP analysis. The most frequently utilized methodology involves fluorescence staining dyes, such as Nile Red (NR), combined with visual counts of perceived MPs. This study aims to compare the staining efficacy of NR and beetroot dye on a variety of polymers, under different wavelengths, for the purpose of increased accuracy during low-cost MP detection. To assess staining efficacy, known polymers, such as polyethylene (PE), polypropylene (PP), polystyrene (PS), and nylon, were placed on filter papers and stained with a NR solution, a powdered beetroot solution, and a combination of both. Each sample was photographed pre- and post- filter staining under blue, red, green, and UV lights. Images were stitched together and analyzed with semi-automated macro scripts in ImageJ Fiji software. This study is expected to provide valuable insights into the strengths and limitations of each stain under various wavelengths that may contribute to developing guidelines for research protocols. Standardization of methodology in MP research will allow for more reliable trend analysis and facilitate comparability across studies.

Applying AI to Bioengineered Pharmaceuticals

Lauren Leatherman, Yara Saleh, Danton Nguyen, Valentina Canelo, Poojitha Swaminathan, Nadija Sulcaj
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

The integration of artificial intelligence (AI) into bioengineered pharmaceuticals is revolutionizing in both medicine and agriculture, marking progression in drug discovery, optimizing production, and enhancing bioproduction conditions. For this systematic review, we identified journal articles pertaining to the area of focus by using six databases; Science Direct, Springer, Wiley, Frontiers, PubMed, and MDPI. All journal articles were screened utilizing EndNote and Rayyan software. In the review of journal articles, a total of (n = 98) were narrowed down to (n = 14). Five articles were then finalized as suitable for use. Within these journal articles it was observed that AI-driven methodologies, specifically machine learning (ML) and deep learning (DL), have contributed to

optimizing multiple aspects of pharmaceutical bioengineering. ML based optimization of vector construction and codon adaptation has led to increased recombinant protein yields in host systems. DL models applied to protein folding and molecular docking analyses have significantly enhanced the precision of protein design and solubility predictions (Lecun et al., 2015). Thus, both ML and DL allow for bioengineered pharmaceuticals to be designed and produced in an expedited manner. In addition, AI integration into biopharmaceutical regulation has facilitated automated quality control, ensuring the safety and consistency of recombinant drug products. Even though AI has proved to have predictive accuracy comparable to or even surpassing that of human researchers, this technology lacks intuition; therefore, AI predictions must undergo human validation (Rehman et al., 2024). Future research should focus on refining AI algorithms, expanding training datasets, and improving predictive accuracy and bioproduction.

Restoration Techniques Throughout the Caribbean and Western Atlantic

Leah Hodges

Faculty Mentor: Dr. Pamela Hallock Muller (College of Marine Science)

A scientometric review is used to compile references from Web of Science to provide a coherent overview of restoration techniques used throughout the Caribbean and Western Atlantic from 1998 to the present, observing overlap between techniques and highlighting those with the greatest potential for reef replenishment. The success of each technique can be measured by the rate of coral survival, recruitment, coral coverage, habitat structure and complexity, and biomass of marine life, including fish and invertebrates, that inhabit a reef. This study explores the benefits of focusing on Acropora species, employing microfragmentation and nurseries, acclimating corals and modifying genomes to boost resilience, utilizing outplanting techniques, optimizing substrates and artificial reefs, enhancing larval recruitment, emphasizing the role of herbivory, improving management practices, and addressing the impacts of tourism and community engagement. The information from the techniques is compiled into a cohesive report that demonstrates the overlap between the categories and the ways in which they can be applied simultaneously for the most efficient and rewarding restoration outcomes. Additionally, sources are analyzed according to time, author, and location of publication to better visualize the major variables of the research publications in correlation to the differing techniques utilized.

Experimental and Bioinformatic Investigation of the Esterase and Head-to-Tail Adaptor in Phage Kimona

Lillian Mattley, Jenna Parker

Faculty Mentor: Dr. Richard Pollenz (College of Arts and Sciences)

Bacteriophages infect and replicate inside bacteria and are important in agricultural, environmental, and medical applications. Kimona is a cluster A19 phage that infects Mycobacterium smegmatis mc2. Kimona contains 87 genes, 48 of which have a predicted function. This study aims to analyze if the gene products from gene 58 (esterase) and gene 14 (head-to-tail adaptor) are cytotoxic or confer defense when expressed in M. smegmatis. Genes 14 and 58 were amplified using PCR, inserted into the pExTra plasmid using isothermal assembly, and transformed into M. smegmatis. Phenotypic assays were performed on single colonies to determine the cytotoxicity, and defense assays were performed to determine defense. gp58 encodes an esterase protein. The esterase catalyzes the hydrolysis of ester bonds and is predicted to have toxicity. When gp58 is expressed in M. smegmatis, it does not show toxicity or defense. gp58 may not be toxic due to the requirement of binding to other proteins or its stability. gp14 encodes a head-to-tail adaptor protein. This protein extends the portal channel. gp14 is not toxic and does not confer defense. gp14 may not have shown toxicity due to the effect being too mild to evaluate. In summary, the gene products in this study could not be identified as toxic due to the possibility of protein-protein interactions or stability. This data highlights the importance of further wet-lab research on the bacteriophage genome. We thank HHMI, the SEA GENES consortium, and the University of Pittsburgh for the support provided to this project.

Culturally Tailored mHealth Interventions for Hispanic Smokers: A Scoping Literature Review and Upcoming Study Protocol

Lillianna Cwynar

Faculty Mentor: Dr. Vani Simmons (H. Lee Moffitt Cancer and Research Institute)

In the past decade, culturally tailored interventions and mobile health (mHealth) technologies have emerged to address the challenges Hispanic/Latino smokers face in smoking cessation, including language barriers, limited access to resources, and provider advice. A scoping literature review was conducted on the effectiveness and acceptance of culturally tailored mHealth interventions for Hispanic/Latino smokers to identify recent advances and inform a protocol for creating a new Spanish smoking cessation app (described below). The literature review included papers on culturally tailored mHealth interventions for Hispanics/Latinos published from 2015-2025, which were found using keywords on PubMed such as "Hispanic/Latino smokers," "mHealth," "culturally tailored interventions," and "smoking cessation." Five relevant studies were identified and reviewed. Most studies reported improved abstinence rates and higher user satisfaction than non-tailored materials, with Spanish-language, family-oriented messaging and cultural values especially beneficial. Text messaging and smartphone apps had greater acceptance and engagement than printed booklets. Overall, culturally tailored mHealth interventions for Hispanic/Latino smokers can boost engagement and short-term quit rates. Key limitations included small sample sizes and limited long-term follow-up. An upcoming study to develop a new Spanish smoking cessation app will address these gaps by employing participant feedback and a three-arm randomized design with larger enrollment, extended follow-up, and direct comparisons of user engagement and quit outcomes across multiple culturally tailored interventions. Refining this app through user feedback and systematic comparison across other intervention materials will strengthen its effectiveness for smoking cessation and help reduce tobacco-related health disparities in this underserved population.

Atrial Septal Defect in the Florida Panther

Linda Lou Vesser

Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

Atrial septal defect (ASD) is a congenital heart disease characterized by the incomplete closing of the wall separating the right and left atrial chambers of the heart. The effects of ASD can range from benign to life-threatening. ASD, along with other morphological and functional abnormalities, has been used as a marker for inbreeding depression in the Florida panther population. Since the genetic restoration plan for the Florida panther was implemented in 1995, the frequency of ASD has declined. Understanding the molecular genetics of this pathogenic trait will aid in the continued assessment of the genetic health of the panther population. TBX20 is a gene that has been linked to ASD in humans. It is a member of a highly conserved group of transcription factors and one which plays a critical role in cardiac embryonic development. A known pathogenic mutation to TBX20 has been associated with ASD and is of the same morphology identified in the Florida panther. A global amino acid pairwise alignment between TBX20 in Homo sapiens and in Puma concolor reveals a 98% identity. As part of ongoing conservation efforts, TBX20 is a gene of interest to investigate further for its potential connection to the expression of ASD in the endangered Florida panther.

Empowering Young Writers Through Differentiation Strategies to Support Second-Grade ELLs in Writing Development

Lindsey Connolly

Faculty Mentor: Dr. Tammy Sommers (College of Education)

Supporting second-grade English Language Learners (ELLs) in developing their writing skills requires strategic differentiation to meet diverse linguistic and academic needs. My inquiry explores effective differentiation strategies that encourage young learners to overcome language barriers and build confidence in writing. Key approaches include scaffolding, such as sentence stems and word banks, to provide foundational support while encouraging creativity and self-expression. Personalized instruction, small group activities, and culturally responsive materials are highlighted as beneficial methods to engage learners and address differing proficiency levels. Additionally, integrating visual aids, collaborative writing tasks, and technology enhances accessibility and motivation. By fostering a supportive environment that respects individual differences and promotes growth, educators can help ELLs achieve meaningful progress in their writing abilities. This research highlights the importance of differentiated instruction in equipping young learners with the skills necessary for academic success and lifelong literacy.

Determining The Role of YTHDF1 in Regulating Neuroinflammation Induced by Lipopolysaccharide

Linh Nguyen

Faculty Mentor: Dr. Gopal Thinakaran (Morsani College of Medicine)

YTH N6-Methyladenosine (m6A) RNA Binding Protein 1 (YTHDF1) is a classical reader protein that binds to m6A-modified transcripts to regulate their translation. Emerging evidence implicates essential functions for YTHDF1 in gene expression relevant to AD pathophysiology and neuroinflammatory responses. Our goal is to explore YTHDF1's role in the context of neuroinflammation and gain molecular insights by employing knock out (KO) mouse and cell models. We hypothesize that YTHDF1 modulates lipopolysaccharide (LPS)-induced neuroinflammation both in vivo and in vitro. Control and Ythdf1-/- (YTHDF1 KO) mice were injected with LPS, then RNA was isolated after 1 day (acute) or 4 day (chronic LPS challenge) and quantified by RT-qPCR. We further explored the cellular mechanism in CRISPR-engineered YTHDF1 KO in the human microglial cell line by analyzing lipid droplet formation and myelin phagocytosis. These findings will expand our knowledge in the failure of immune resolution underlies chronic inflammation and subsequent neurodegeneration in AD.

Examining the Relationship Between Sexual Abuse and Sex Work Perceptions: A Research Protocol

Livia Hertel

Faculty Mentor: Dr. Tiffany Chenneville (College of Arts and Sciences)

Although sexual abuse is a key factor related to involvement in the commercial sex industry, the relationship between sexual abuse and involvement with sex work is less understood. Studying individuals in the commercial sex industry presents several challenges; however, perception research provides a means to explore how past experiences of sexual abuse influence people's judgments and attitudes toward sex work. Understanding the factors that may affect how society views sex work is essential, particularly among college student who are at high risk of involvement in the commercial sex industry. For this poster, we will present a research protocol for using existing survey data from over 600 college students to examine the relationship between college students' experiences of sexual abuse and their perceptions of sex work along two key dimensions: (1) view of sex work as a choice or a form of victimization; and (2) perception of sex work as normal or deviant. We will describe how findings can contribute to our understanding of the intersection of victimization and stigma, with implications for policy, support strategies, and the treatment of individuals involved in the sex work industry.

Germany and America: An Exploration of Work-Life Balance & Worker Satisfaction

Lizt Pena Castillo, Roselvis Martinez

Faculty Mentor: Dr. Peter Funke (College of Arts and Sciences)

According to the most recent Gross Domestic Product (GDP) index (2024), the United States and Germany are, respectively, the first and third wealthiest nations in the world. Although both countries enjoy a high level of development, the worker experience in each nation differs substantially. Germany continuously outranks the United States in worker satisfaction and work-life balance indexes and surveys. Several underlying factors are relevant to understanding why this discrepancy exists between the countries. Research into the two contrasting governmental approaches reveals that Germany has more robust worker protections that help ensure a healthier work-life balance. Meanwhile, the United States employs a more laissez-faire approach. From union membership to the size of the welfare state to worker benefits and the implementation of an experimental 4-work-day week, Germany presents an interesting comparison to the status quo of the U.S.'s work culture and practices. Questions arise when inquiring about the two respective systems: How are productivity and service affected in each approach? Does the number of hours worked affect life satisfaction? What do workers in each country value as a greater priority, and how does each approach affect quality of life markers? A thriving economy needs labor, but a happy nation needs healthy and content workers. The United States has historically implemented important safety protections, while Germany has prioritized a more holistic approach to worker well-being. Each nation's contemporary reality rests upon a series of policies that are not irreparable. As history shows, change and progress are the fruits of impassioned advocacy.

Actinium-225 Targeted Alpha-Particle Therapy Causes Cell-Cycle DNA Damage Checkpoint Arrest and Programmed Cell Death in MC1R Expressing Uveal Melanoma.

Loc Nguyen Nguyen

Faculty Mentor: Dr. Richard Pollenz (College of Arts and Sciences)

Uveal melanoma is an aggressive eye cancer. Targeted alpha-particle therapy (TAT) utilizing Actinium-225 (225Ac) presents a potential strategy for clinical treatment of metastatic uveal melanoma. Localized dose effects and significant local toxicity result from alpha-particle emissions due to the high linear energy transfer. This study investigates induction of the G2/M DNA damage checkpoint and different cell death mechanisms following treatment with Actinium-225. DNA-FACS was utilized to investigate DNA damage checkpoint arrest after irradiation. Apoptosis and necrosis-related cell death were assessed at 0-72h post-treatment by cleaved caspase 3 staining and propidium iodide uptake. Cell death-related protein expression data were generated via liquid chromatography coupled tandem Mass Spectrometry at 48h post-treatment. Data underwent Log2 transformation and normalization. DNA-FACS analysis revealed a 2.7-fold increase of cells in G2 phase compared to the control, showcasing G2/M DNA damage checkpoint. Propidium iodide uptake demonstrated necrotic-related cell death while apoptosis was not induced via cleaved-caspase 3. Proteomics data depicts 86 upregulated proteins among the 127 proteins involved in cell death mechanisms that were significantly changed at 48h post-treatment. Changes in expression were observed in proteins that are involved in six different cell death-related mechanisms, including senescence, ferroptosis, and pyroptosis. We identified significant increases in the expression of eight cell death-related immunogenic markers. Our study illustrates that TAT utilizing Actinium-225 induces DNA damage checkpoint arrest and potentially triggers different cell death mechanisms in uveal melanoma. These findings illuminate how uveal melanoma cells respond to α-particle emissions, contributing to future approaches for optimization of TAT treatment regimens.

Evaluating DNA Yield and Quality: Zymo vs. Qiagen

Luisa M Valor

Faculty Mentor: Dr. Michelle Green (College of Arts and Sciences)

When considering the conservation of endangered species, genetic analysis is fundamental to effective conservation strategies. Optimizing resource efficiency is therefore a fundamental concern. In the case of the lowland Anoa (Bubalus depressicornis), conservation efforts would benefit from non-invasive sampling methods given the natural history and behavior of the species. However, noninvasive sampling requires specific consideration of methods that provide robust DNA from sources like saliva. This study aims to evaluate and compare the efficiency of two different DNA isolation kits, the Zymo Mini kit and the Quiagen Blood and Tissue kit, to determine the optimal method for maximizing DNA yield and quality from anoa saliva samples. Given the challenges that non-invasive sampling presents, having the knowledge of the most effective kit is critical to achieving the best results in terms of information gained from each sample. We hypothesized that kit selection will have an impact on the quantity and quality of isolated DNA. To test this hypothesis, collected saliva samples from lowland anoas housed at ZooTampa and isolated DNA using two kits. We used a nanodrop to measure DNA quantity and quality. By evaluating and comparing these two kits, this research will provide practical knowledge into the most effective DNA extraction method for anoa conservation studies. This will directly improve the results of non-invasive sampling and strongly support the efforts to protect this endangered species.

Potential Causes for the Early Onset of Colorectal Cancer (EOCRC)

Lyndsey Hamsher, Irfan Mahadi Sharif, Manasa Jaishankar, Stuti Dibbur

Faculty Mentor: Dr. Stuart Maudsley (H. Lee Moffitt Cancer and Research Institute)

Colorectal cancer (CRC) arises in the digestive system, specifically the colon and rectum. Trends in CRC have become prevalent in individuals under the age of 50, this early form is referred to as Early-onset Colorectal cancer (EOCRC). As the third leading variant of cancer, associated risks include excessive exposure to antibiotics, drinking and smoking, western diets, and sedentary habits, which result in alterations to the gut microbiota; these alterations lead to inflammation and subsequent development of EOCRC. Genetic syndromes including Lynch syndrome, familial adenomatous polyposis (FAP), and MUTYH-associated polyposis (MAP), are also associated with increased EOCRC risk. These disorders are associated with genetic mutations that disrupt normal DNA repair, which significantly raises the risk for development of EOCRC. To reduce the healthcare impacts of EOCRC, early screening advocacy has

focused its efforts on providing individuals with genetic risk factors with easier accessibility for screening. For individuals diagnosed with EOCRC, traditional methods of surgery, chemotherapy, immunotherapy, and radiation are common; however, these conventional methods often have lasting side effects and do not prevent late-onset colorectal cancer (LOCRC). Targeted therapies have not evolved to identify and block cancer-promoting signaling systems for EOCRC. Regardless, technological developments have increased the future prospects of treatment for EOCRC; clinical trials building upon nanotechnology and advancements in DNA and RNA identification are instrumental in creating effective targeted therapies.

Examining the Association Between Interracial Relations and Political Affiliation

Madelyn Chandler, Nico Allen
Faculty Mentor: Dr. Byron Miller (College of Arts and Sciences)

Despite the tremendous influence politicians have over the lives of the growing number of people in interracial relationships, very little is known about the political beliefs of interracially partnered individuals. Using nationally representative data from the Add Health Study, we find that people in interracial relationships have more liberal political views than those in same-race relationships generally, and this is particularly true for Whites, Blacks, and those with a Black partner specifically. Among interracially partnered people, females and college educated persons report having more liberal views whereas the beliefs of Hispanics, those with Hispanic partners, married, and more religious persons are more conservative. We also find the political beliefs if interracially partnered people is significantly moderated by the individual's race and gender such that interracially partnered Blacks and females have more liberal views than Blacks and women in same-race partnerships, but the beliefs of interracially partnered Hispanics are more conservative. Additionally, the racial/ethnic differences in political beliefs are partly explained by religious beliefs. Overall, the findings of this study show a person's relationship type is an overlooked predictor of political beliefs and the growing prevalence of interracial romance may impact political representation and policies in the future so it is important to federally protect and respect interracial relationships.

Writing and Self-Belief: A Reciprocal Relationship

Madelyn Rickles
Faculty Mentor: Dr. Tammy Sommers (College of Education)

Writing is a fundamental skill in academic and personal development, yet students often experience a range of emotions toward the writing process. This study explores the reciprocal relationship between student confidence, writing ability, and emotional attitudes toward writing. Specifically, it examines how a student's confidence and proficiency in writing influence their feelings about the task and, conversely, how their emotions—whether positive or negative—affect their self-efficacy and skill development. By analyzing student perceptions, classroom experiences, and instructional strategies, this inquiry seeks to uncover patterns that either support or hinder student growth in writing. Student surveys and writing samples are being used to monitor and assess student progressions of skill and passion for this important subject. My findings will aim to inform educators on effective practices for fostering a more positive and productive writing experience, ultimately enhancing both student confidence and ability.

Cognitive Health Differences between Germany and the United States: An Exploration of the Effects of Western Work Culture

Madelyn Zera, Lindsey Smith
Faculty Mentor: Dr. Peter Funke (College of Arts and Sciences)

Sociocultural "norms" vary greatly by geography. The United States, for example, is often regarded as a nation with norms such as a fast-paced, continuous, without-end work culture. This stereotypical "norm" emphasizes work-life over breaks and work schedule moderation intended to prioritize mental health. Theoretically, psychological well-being and a healthy mental state are impacted greatly by these "norms." Conversely, many European countries, such as Germany, allot more time for life and activities outside of work. In pursuit of this life-work allotment, many businesses in Germany have switched to a four-day work week in hopes of encouraging positive cognitive health and well-being. This difference in work-life vs life-work norms results in

differing rates of work-related mental health outcomes. We considered factors such as self-reported mental illness, rates of suicide, and life satisfaction by reviewing literature, including self-reported surveys. This study aims to compare how different work cultures in Germany and the United States contribute to mental health among younger adults aged 18 to 35. Ultimately, we seek to answer the question: How do differences in work culture in the United States and Germany impact mental health? Are the differing norms between the two countries affected by workplace efficiency and length of the workweek, and do these factors also impact mental health? Are the standards for 'hard work" and productivity different in Germany and the United States, and does such a standard impact the overall work culture? Keywords: Cognitive Health, Germany, the United States, work-culture

How Phages are Engineered for Phage Therapy

Madhura Pandit, Kelie Shah, Sarah Robinson
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An increase in antibiotic resistance has led to treatment failures and renewed interest in phage therapy. Lytic phages target antibiotic-resistant bacteria show potential for effective therapy if aligned along clinical needs and regulations. However, uncertainties in immune response effects on efficacy and safety hinder regulatory approval. Many biologists are exploring alternative approaches. The compiled data indicates that there are gaps in the understanding of the relevancy of phage-immune interaction. Immunogenicity of phages itself does not seem to represent the relevant safety risk for its patients but lytic phages need to be used. Temperate phages may be able to infect relevant pathogenic bacteria, but need to be modified to decrease the negative drawbacks including small host range, reduction of bacteria resistance, and reducing the immunity to the phage. This research focuses on the mechanism of phage engineering for phage therapy. In general, the lysogenic genes are removed including the immunity repressor and integrase genes. In addition altered temperate phages are made lysine deficient which stops the release of endotoxins by gram-negative bacteria. For example, an engineered T7 phage was encoded with lactonase, which has improved on the conventional methods that are used to kill bacteria. Lytic phages are also used for therapeutic purposes as well because they will involve the replication of the phages in the phage-infected bacteria, which will disrupt the metabolism of the bacteria and kill the bacteria as well. Advancements in sequencing technology and synthetic biology can provide opportunities to modify and use temperate genes in the phages.

The Impact of Lifestyle Interventions on PCOS Symptom Management and Mitigating Risk Associated with Conventional Therapies

Madiha Reza, Angelina Touch, Tasbi Fatima, Lily Labinger, Alyssa Guertin, Ariana Reyes
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Polycystic Ovary Syndrome (PCOS) is a hormonal condition impacting 6-13% of reproductive-age women, with up to 70% of cases going undiagnosed due to lack of awareness and varied presentation. PCOS is characterized by insulin resistance, irregular menstrual cycles, metabolic dysfunction, chronic inflammation, and increased risk for type 2 diabetes and cardiovascular disease. Common therapeutics for PCOS include pharmacological interventions through oral contraceptives, metformin, and anti-androgens. These interventions may alleviate PCOS symptoms but are unlikely to address the root cause, which is currently unknown. This study highlights the potential benefits of different lifestyle interventions for PCOS, offering strategies to mitigate risk factors associated with current medications. A total of 305 peer-reviewed articles were extracted from Pubmed. Per PRISMA protocol, we reviewed the articles using the following keywords: PCOS, Diet, Hormone, and Insulin Resistance. 39 articles met the inclusion criteria. Dietary interventions through the DASH, Ketogenic, very low carbohydrate, high fiber, and low fat diets have been shown to help in the management of PCOS. Reducing the consumption of processed food lowers intake of processed sugars and fats, improving obesity risk and skin complications. Curcumin and probiotics have shown promise in improving insulin resistance in PCOS patients. Exercise interventions, especially aerobic interventions, show improvements in the ability to regulate the menstrual cycle, metabolism, and blood sugar levels. Sleep interventions were linked with better metabolic outcomes and improved oxidative stress levels. Overall, a personalized combination of lifestyle changes may reduce symptoms associated with PCOS and reduce risk factors related to traditional therapies.

Comparative Analysis of Vascular-Organs-on-Chip Technology to Standard Analysis of Vascular Conditions.

Malhar Paranjape, Ian Broadman, Claire Messerschmidt, Emaan Niaz, Jenna Chizmadia, Kristy Tran
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Organ-on-a-chip (OoC) technology has the potential to address the limitations of animal and 2D in-vitro modeling by creating a complex simulation of body system functions by growing cells in a dynamic fluid environment. Unlike standard 2D in-vitro modeling, OoC microfluidics simulate the biochemical environment using microchannels for precise fluid control within OoC devices, while also minimizing deformation of the vascular wall, and regulating fluid dynamics. The aim of this systematic review is to conduct a comparative analysis of Vascular Organs-on-a-Chip (VOoC) technology to the current standard treatments of heart conditions and diseases. Our methodology consists of a comprehensive literature review evaluating VOoC technology compared to standard methods based on efficacy, scalability, and potential for personalized treatments using electronic databases such as PubMed and ScienceDirect. VOoC technologies hold significant potential for advancing personalized medicine, drug discovery, and disease modeling. However, they encounter challenges like organ functionality replication, standardization, and scalability. Addressing ethical concerns requires collaboration among scientists and policymakers. Such partnerships are crucial for addressing issues related to materials, data management, and building public trust. In essence, OoC technology for the vascular system provides a highly specialized alternative to current standard treatments. With this technology, researchers can better simulate the intricacies of the vascular system and provide the opportunity to further study the cellular interactions within these systems.

Predicting 7-Day Mortality in Sepsis Patients: Enhancing Care Through Early Risk Assessment

Manvith Katkuri
Faculty Mentor: Dr. Ehsan Sheybani (Muma College of Business)

Sepsis is a critical and life-threatening condition that presents significant challenges to healthcare systems, contributing to high mortality rates and overwhelming hospital resources. This study focuses on optimizing healthcare delivery by developing a predictive model to classify whether a sepsis patient's hospital visit is likely to result in death or survival within the first 7 days, based on procedures performed, comorbidities, and demographic factors. Additionally, the study examines how sepsis outcomes vary across demographic groups such as age, hospital division, race, and gender. By leveraging these insights, hospitals can predict mortality risks more accurately, enabling proactive decision-making for transferring high-risk patients to better-equipped facilities and ensuring efficient resource allocation.

Maternal Risk-Management Elucidates the Evolution of Reproductive Adaptations in Panthera by Means of Natural Selection

Margaret Anderson
Faculty Mentor: Dr. Deby Cassill (College of Arts and Sciences)

The maternal risk-management model is the study of how breeding females allocate resources between offspring size, offspring number, and offspring diversity to achieve reproductive success, i.e., replacement fitness. Maternal investments in offspring size, number, and diversity are shaped independently by diverse risk factors: the extent of gaps during seasonal resource cycles, rates of predation/parasites, and unpredictable catastrophes such as disease, floods, fire, or anoxic events. Here, in Panthera, we show that maternal investments within and across species agree with the predictions of the maternal risk-management model. Within Panthera species, larger females invested in larger offspring and larger litters. We show that offspring size and offspring number per litter were independent maternal investment strategies. The risk of starvation favored investments in larger offspring. The risk of predation favored investments in larger litters. If empirical studies continue to confirm its predictions, maternal-risk management may yet emerge as a unifying model of diverse reproductive adaptations by means of natural selection.

Epilepsy and Botney

Mariama N Gullatte
Faculty Mentor: Dr. Anna Dixon (College of Arts and Sciences)

Epilepsy a disease with well over 50 million people affected has been around for over 5 thousand years and afflicts Tropical populations with higher frequency. Western medicine as we know it is a relatively infantile mode of treatment for humans as we have only recently with modern technology been able to explore the smallest compositions. Traditional shamans, medicine men and woman, as well as other forms of traditional medical practices have acknowledged and treated epilepsy for longer than western medicine has acknowledged its existence. There have been numerous plant species identified to treat both the symptoms associated with the disease as well as the environmental things that exacerbate the disease. In one country over 49 family's of plant species were identified alone with over 60 individuals identified for the range of treatments. Bacopa is one of the most agreed upon anticonvulsant plants used around the world by a verity of traditional medical practitioners.

Impact of Diet on the Development of Cardiovascular Disease

Mariana Silveira Vilani, Amrita Nayak, Sophia Santana, Angela Atta-Armah, Karolen Assad
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Cardiovascular disease (CVD) is the leading cause of death globally, accounting for over 20 million deaths yearly. CVD is an umbrella term for various heart conditions including heart failure, arrhythmias, stroke, and most notably coronary artery disease. Coronary artery disease (CAD) is the leading cause of death among CVD and occurs when the arteries supplying blood to the heart become narrowed or blocked due to plaque buildup. Some diets have been used to lower the occurrence of CVD, such as the mediterranean, DASH, vegetarian diet, and vegan diets. The Mediterranean emphasizes the use of fruits, vegetables, seafood, whole grains, and healthy fats, and the DASH diet prioritizes on lowering sodium and saturated fat intake. The vegetarian diet restricts meat-based product consumption while the vegan diet goes a step further to restrict all animal-based food products. Understanding the impact of dietary choices long-term and encouraging a heart healthy diet can help with lowering CVD death globally. A total number of 230 peer-reviewed articles were extracted from Pubmed. Per PRISMA protocol, we systematically reviewed articles using the following key words: CVD, CAD, Diet. Twenty one articles met inclusion criteria. Overconsumption of fats and sugars have shown to increase CVD events. Highly processed meat consumption was linked to greater CVD risk. Many diets incorporate increased consumption of fruits, vegetables, fiber, and healthy fats, leading to improved outcomes. Utilizing plant-based alternatives can improve outcomes by increasing vitamin and anti-inflammatory intake from diet.

The Cost of False Green: Linking Greenwashing to Turnover Intention in Hospitality Through Environmental Values

Marie Haidara
Faculty Mentor: Dr. Trishna Mistry (Muma College of Business)

Greenwashing, where organizations exaggerate or misrepresent their environmental efforts, has been widely studied for its effects on consumers, yet its impact on employees remains underexplored (Santos et al., 2025). This study investigates the impact of perceived greenwashing on turnover intention among employees in the hospitality industry, a sector that is increasingly reliant on sustainability branding yet prone to high employee turnover. Perceived greenwashing occurs when employees detect discrepancies between an organization's environmental claims and its actual practices (Xiang et al., 2024), potentially fostering perceptions of hypocrisy (Robertson et al., 2023). Such perceptions may disengage employees from pro-environmental behaviors, including employee green behavior, actions contributing to sustainability (Tao et al., 2024), and organizational citizenship behavior for the environment, which are discretionary efforts to enhance environmental performance (Li et al., 2022), ultimately increasing their desire to leave the organization (Srivastava et al., 2024). This research also examines the moderating role of environmental values (Li et al., 2022), suggesting that employees with stronger eco-conscious beliefs may feel more deceived by greenwashing, thereby amplifying their turnover intention. To test this model, an online questionnaire will be distributed to hotel employees across multiple hotel chains, with the data analyzed using partial least squares structural equation modeling (PLS-SEM). By focusing on the hospitality industry, this study fills a critical gap highlighted by Santos et al. (2025), shifting attention from

consumer reactions to internal organizational dynamics. The findings will offer practical implications for hospitality leaders, highlighting the importance of authentic sustainability practices in retaining talent and fostering employee engagement in environmental initiatives. This work highlights the broader consequences of greenwashing, linking ethical credibility.

Voice Past, Future Text: Exploring Student and Faculty Perspectives on Communication Media Choices and their Influence on Interpersonal and Academic Settings

Matthew Bernucca

Faculty Mentor: Dr. Manisha Joshi (College of Behavioral and Community Sciences)

Background: In two decades, a shift from voice-based to text-based communication has occurred, potentially reshaping social interactions and learning environments. As new birth cohorts grow distant from a voice-dominant past, understanding the implications of this transition is critical. Existing research, largely quantitative, suggests that individuals often underestimate how their chosen communication medium influences their sense of connection, instead prioritizing the avoidance of awkwardness over relational depth. Physiological evidence indicates text-based interactions may not elicit the same neurobiological responses linked to emotional bonding as voice. Prior studies focus on younger samples and lack a generational framework to compare cohort differences in navigating this shift. Methodology: In-depth interviews will be conducted with 20 undergraduate students (domestic and international) and 15 faculty members at a public university to explore perspectives on: (a) communication mediums they use and prefer (voice vs. text), (b) how these choices affect the quality of connections they make, (c) role of voice- and text-based communication in classroom learning, (d) how the use of voice and text-based mediums in the classroom may influence career, relationships, personal and professional goals, and (e) recommendations for optimizing the use of voice- and text-based mediums in academic and interpersonal contexts. Following the Institutional Review Board approval, participant recruitment will begin through on-campus flyers and digital outreach. Data will be analyzed using ATLAS.ti. Implications: Findings will reveal how communication media choices influence social and educational experiences, informing targeted interventions to enhance student well-being, strengthen interpersonal connections, and refine pedagogical strategies in an increasingly digital landscape.

Targeting Proton-Sensing Receptors in Cancer

Matthew Lim, Angela Nguyen, Ananya Ranganagoudar, Vishwa Murugappan

Faculty Mentor: Dr. Stuart Maudsley (H. Lee Moffitt Cancer and Research Institute)

Cancer is a known disease with many unknown causes but with further research a solution may arise in the near future. This poster highlights colorecta cancer, prostate cancer, and ovarian cancer while mentioning a few others proceeding to linking it to the specific type of GPCRs that can lead researchers into the right direction. Proton-sensing receptors (GPCRs) overall role is pH homeostasis, immune response, and acid-induced pain. Overall, GPCRs are involved in sensing extracellular acidic microenvironments and furthermore, transduced by these environments. They then will be activated intracellular signaling pathways, such as calcium signaling, to affect other cell functions. This study examined GPR4, GPR65, OGR1, three examples of GPCRs. GPR4 primarily couples with G13 Gs proteins to cAMP-dependent pathways, and is maximally activated at a pH of 6.8, playing significant roles in the progression of hepatocellular carcinomas and colorecta cancer through enhanced angiogenesis. ORG1 couples with Gq/11 and Gs proteins to influence PLC/calcium signaling pathways, releasing Ca2+ into the intracellular matrix. ORG1 senses a pH of 6-8 and is directly linked to metastasis of prostate cancer. GPR65 is a receptor that regulates immune responses in the body. It is very sensitive to pH as it is activated by acidic conditions. The optimal pH range for GPR65 is between 5.5 to 6.0, which is consistent with the acidic environment found in areas of inflammation and tumors. GPR65 can be expressed in many immune cells, and depending on its expression it can either activate or inhibit the progression of cancer. GPR65 is relevant to a plethora of cancers: breast, lung, ovarian, and pancreatic cancers, melanoma.

Chemical Fingerprints: Characterizing VOC Biomarkers Across Multiple Diseases

Meead Hadi, Behnam Zeinali Rizi
Faculty Mentors: Dr. Ehsan Sheybani and Dr. Giti Javidi (Muma College of Business)

In recent years, volatile organic compounds (VOCs) have emerged as promising biomarkers for diagnosing various diseases non-invasively through breath analysis. However, the specificity and reliability of VOC characteristics in accurately differentiating between diseases remain underexplored. This research systematically analyzes VOC profiles across multiple diseases, including head and neck cancer, lung cancer, colorectal cancer, diabetes, tuberculosis, COVID-19, and esophageal cancer. Utilizing advanced analytical tools such as electronic noses, gas chromatography-mass spectrometry (GC-MS), and ion mobility spectrometry, coupled with sophisticated machine learning algorithms, the study identifies distinctive VOC biomarkers for each disease. Preliminary findings indicate significant variation in VOC profiles between diseases, highlighting specific compounds such as acetone in diabetes and benzene derivatives in lung cancer. These results underscore the potential of VOC-based diagnostics to revolutionize early detection and screening methodologies. Further research is necessary to standardize these biomarkers and validate their clinical applicability across diverse populations.

Role of PCSK9 Inhibitors in Genetic Management of High Cholesterol

Megan Reddy, Ammar Anjum, Ian Sierra-Gonzalez, Pietra Andrade, Madison Knight, Ryan Chowdhury
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Hypercholesterolemia, specifically familial hypercholesterolemia, is a genetic condition that occurs due to mutations in Low Density Lipid-Receptor (LDL) genes, leading to high levels of LDL-C. High levels of LDL-C are associated with Atherosclerotic cardiovascular disease (ASCVD), coronary artery disease (CAD), and stroke. Annually, approximately 4.4 million deaths occur to cholesterol related diseases, emphasizing the need to develop therapies that manage high cholesterol. Proprotein convertase subtilisin/kexin type 9 (PCSK9) is protein that is vital to regulating LDL receptors and maintaining overall lipid homeostasis by binding to LDL receptors on the surface of hepatocytes. Increased PCSK9 activity has been shown to lead to higher LDL-C levels, which increases the risk of obtaining cholesterol related diseases. PCSK9 inhibitors prevent the binding of PCSK9 to LDL receptors, thus also preventing the clearance of LDL-C into the body. Patients with familial hypercholesterolemia often exhibit resistance to statins due to mutations affecting LDL receptor functionality. Monoclonal antibodies, RNA interference, and gene-editing techniques such as CRISPR-Cas9 can all be used to inhibit the PCSK9 gene. These therapies allow for the effective control of LDL-C, overcoming the limitations of traditional treatments, and improving overall health outcomes. This project will provide a comprehensive review of the evolving applications of PCSK9 inhibitors in genetic hypercholesterolemia management, emphasizing the need for further research to be conducted on this area.

Facilitating Blockchain Implementation in Supply Chains of Mined Materials: Addressing Diverse Barriers and Enabling Ethical Supply Chains

Meredith Jones
Faculty Mentor: Dr. Seckin Ozkul (Muma College of Business)

This paper investigated blockchain application in the cobalt mining supply chain, specifically in the Democratic Republic of the Congo (DRC), to understand its limited widespread adoption. Industry surveys and expert interviews revealed a significant correlation between company sustainability beliefs and successful blockchain implementation. Despite this, no dominant implementation barrier emerged, with concerns evenly distributed across technological, regulatory, security, and skill-related areas. These findings highlight the need for specialized blockchain firms to provide tailored support and address individual company challenges.

Low-intensity Summer Implementation of Story Champs-Bilingual Edition with Dual Language Learners

Mia Sinclair, Grace Cruzado, Vallerye Rivera Aldea

Faculty Mentor: Dr. Matthew Foster (College of Behavioral and Community Sciences)

This study examines the impact of a low-intensity implementation of Story Champs on narrative language development for first-grade Spanish-English-speaking dual-language learners (DLLs, n = 16). Participants attended a Title I school in rural Florida, and their teacher identified them as needing additional language support. Using a quasi-experimental, pre-post-test design, Story Champs was implemented for five weeks (20 minutes a week, totaling 100 minutes of supplemental intervention). Given that Narrative Language Measures (NLM) provide a valid and reliable way to assess young children's language skills and are useful for monitoring progress over time (Spencer et al., 2023), the NLM was selected as an appropriate tool to capture language development. Using SPSS, pretest, and posttest scores were moderately correlated ($r = .71$, $p < .001$), and a paired samples t-test provided preliminary evidence of the intervention's efficacy in improving narrative language scores, $t = 14.99$, $p = .02$, $d = .46$. Results of a repeated measures ANOVA indicated initial language scores (pretest) significantly predicted improvement over time, $F = 5.32$, $p = .03$, $\eta_p^2 = .24$; however, neither gender $F = 0.03$, $p = .88$, $\eta_p^2 = 0.01$) nor its interaction with pretest scores $F = 1.29$, $p = .27$, $\eta_p^2 = 0.07$) were significant predictors. These findings suggest that Story Champs may improve the narrative skills of DLLs regardless of students' pre-intervention scores and gender. Larger studies are needed, including a comparison group to better understand the effects of using Story Champs.

Technological Advancements and Wealth Generation: The Impact on Modern Financial Markets

Michael Hower

Faculty Mentor: Dr. Meng Wang (Muma College of Business)

Technological advancements have transformed our financial markets, reshaping wealth creation and distribution. Innovations such as algorithmic trading, blockchain, fintech, and artificial intelligence (AI) have increased efficiency and market access while also introducing new volatility risks, cybersecurity threats, and widening wealth disparities. While these technologies democratize investing, they disproportionately benefit institutional investors with access to advanced financial tools, leaving retail investors at a disadvantage. This thesis explores the dual impact of financial technology, highlighting both its opportunities and challenges. By analyzing market distribution data and key financial technologies, this study evaluates how market accessibility, regulatory frameworks, and cybersecurity concerns shape the evolving financial ecosystem. The findings of this study highlight the need for more balanced regulation and equitable financial inclusion to ensure that technological progress can be leveraged to create a more stable and accessible financial market for all investors. These insights provide a foundation for policymakers, financial institutions, and investors to foster an inclusive financial market that utilizes technology while mitigating its drawbacks.

Government Expenditure on Education and its Impact on Access to Higher Education in the U.S. and Germany

Miguel Barrero Garcia, Minh Anh Nguyen

Faculty Mentor: Dr. Peter Funke (College of Arts and Sciences)

On the surface level there seems to be a discrepancy between access to higher education in the U.S. and Germany, so we would like to explore its connection with government expenditure on education. How does government spending on education in Germany and the U.S. differ and how does it shape access to higher education? The research is being conducted by going over different studies on how each country's government treats education and spends on it. Research will also be done on access to higher education in both countries and what other factors, aside from government expenditure on education, could affect it. Are German teachers more encouraging of higher education? Is it the other way around? Why would that be the case? We hope to determine whether there is actually a direct connection between government spending on education and access to higher education in the U.S. and Germany. We also hope to find credible research that suggests our hypothesis is correct. If it is not correct, we will explain why exactly the two aren't connected when they seem to be. The research is significant because it can help governments determine which factors are affecting access to higher education in their respective countries and how they can navigate their similarities and differences to learn from each other. The research contributes to the discipline by exploring U.S.-Germany relations and the impact of the government on higher education and education as a whole.

From Resettlement to Employment: Bridging Barriers and Empowering Refugee Women Through Workforce Training in Tampa Bay

Mikayla William, Haley Mendillo, Brittany Gordon, Aileen Pinell

Faculty Mentor: Elizabeth Dunn, MPH, CPH (College of Public Health)

Approximately 12,425 refugees aged 18-60, resettled in Hillsborough County in fiscal year 2023, highlighting a need for targeted programs supporting refugees in building career skills and gaining confidence in navigating the job market. Refugee women face unique challenges as they integrate into the U.S. workforce, including communication barriers, limited work history, and adapting to workplace norms. A workforce readiness program tailored to refugee women in Tampa Bay provides essential career development tools, fostering economic independence and integration through culturally sensitive training methods. Over a two-day program, a structured curriculum was implemented to accommodate varying educational backgrounds and English proficiency levels. Participants engaged in discussions and trainings on U.S. workplace culture, employee rights, education pathways, role-playing conflict resolution, resume-building, and mock interviews to reinforce key concepts. Pre- and Post-tests were conducted with observational research using Social Cognitive Theory (SCT) constructs to conduct an impact evaluation using thematic analysis. Six women participated in the program, totaling 54.5 hours. The program directly impacted 21 family members. Participants were from three different countries, supported by 12 staff members who contributed a total of 326.5 hours. There was a 26% improvement in pre-and post-test scores. Thematic analysis highlighted recurring barriers, including economic, cultural, educational, and confidence-related challenges, and identified the strategies of community networks, expanding education, and empowerment. The program fosters leadership, community engagement, and economic resilience, helping refugee women successfully integrate into the U.S. workforce. Participants develop confidence, enhance advocacy skills, and improve job market proficiency, facilitating their integration into the Tampa Bay area.

How the Age of Black Defendants and Victims Affects Mock Jurors' Decisions: A Look Into the Methodology

Miriam Mami

Faculty Mentor: Dr. Christine Ruva (College of Arts and Sciences)

This study examines the impact of defendant age (25 vs. 72) and victim age (26 vs. 70) on juror decision-making, with a focus on Black male defendants and victims. Previous research has shown that extralegal factors, such as age, can bias juror verdicts, but findings remain mixed, particularly concerning older individuals. Participants were hypothesized to give more guilty verdicts when the defendant was young (25) versus older (72) as well as when the victim was young (26) versus older (70). Utilizing Prolific, a sample of juror-eligible community members participated in a two-phase experiment. In Phase 1, participants completed a pretest measuring their belief in a just world (BJW). Five days later, in Phase 2, participants read a transcript of a carjacking and murder case with a Black defendant and Black victim and rendered a verdict. Results indicated significant main effects of victim age were observed, but only when participants that thought the purpose of the study was about defendant or victim bias were removed. Contrary to hypothesis two, participants were less likely to convict when the victim was younger (41%), compared to older (53%). There was no main effect of defendant age on verdict. The hypotheses were not supported, although victim age significantly influenced verdicts when participants who suspected the study was about bias were removed. These findings show the role of extralegal factors in juror decision-making and provide insights into age bias in Black defendants and victims, addressing gaps in the literature that have predominantly focused on White defendants.

Bridging Care: Improving HPV Outcomes Through Dental and Gynecological Collaboration

Misha Raichura, Riya Patel

Faculty Mentor: Dr. Matthew Anderson (College of Medicine Obstetrics and Gynecology)

Human papillomavirus (HPV) is a prevalent infection linked to various cancers, including cervical and oropharyngeal cancers. Despite significant advancements in screening and prevention, gaps remain in early detection and patient education. Dental and gynecological providers each play critical roles in identifying HPV-related conditions, yet collaboration between these specialties is limited. This research explores the potential for interdisciplinary partnerships to improve HPV outcomes through earlier diagnosis and coordinated patient care. By integrating HPV screening awareness and patient education into both dental and gynecological practices, providers can leverage their unique roles to identify at-risk patients sooner. Dental professionals, who frequently examine the oral cavity, may detect early signs of HPV-related oropharyngeal abnormalities, while gynecologists are at the forefront of

cervical cancer screening. A collaborative approach could facilitate cross-referrals, enhance patient awareness, and ultimately lead to quicker diagnoses and better treatment outcomes. This study examines current barriers to collaboration, provider perspectives on interdisciplinary HPV screening, and potential strategies to implement coordinated care models. Methods include literature review, patient education assessments, and case studies of successful interdisciplinary interventions. Findings will inform recommendations for integrating HPV-related discussions into routine dental and gynecological visits, promoting a more holistic approach to patient care. By encouraging collaboration between these two fields, we hope to close critical gaps in HPV detection and improve long-term patient outcomes through earlier intervention and comprehensive care.

Treatment of Atrioventricular Nodal Reentrant Tachycardia: A Comparison of Radiofrequency and Cryo Ablation

Mitali Chaudhari, Logan Altvater, Vaniza Atiq
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Atrioventricular nodal reentrant tachycardia (AVNRT) is an abnormal arrhythmia and the most prevalent type of supraventricular tachycardia (SVT). Faulty signaling pathways in the AV node can form reentrant circuits, leading to rapid heart rates between 120-280 bpm. Common symptoms of patients with AVNRT include chest discomfort, dizziness, shortness of breath, and syncope. This type of tachycardia impacts nearly 100,000 new individuals of all ages each year within the United States. The most common treatment for AVNRT is an ablation, a procedure designed to disrupt the abnormal reentrant signals. Radiofrequency ablations (RFA) and cryoablations (CRA) are the most common ablation treatment for patients with AVNRT. RFA utilizes heat energy to burn the target issue, while CRA utilizes liquid nitrogen to freeze the target tissue. A total number of 336 peer-reviewed articles were extracted from PubMed with the goal of comparing RFA and CRA treatment in patients with AVNRT. Per PRISMA protocol, we reviewed articles using the following key words: AVNRT, Ablation, Cryoablation, Radiofrequency. 16 articles met the inclusion criteria. Recurrence rates for CRA were found to be higher in comparison to RFA. The number of patients undergoing CRA had a lower risk of developing permanent heart block. Pediatric patients undergoing CRA will likely have better outcomes compared to RF. Lower inflammation and pain scores were found for CRA in comparison to RF.

Analysis of Bacteriophage Alignments to Bacteria Genes Across the FR Cluster

Mohini Sharma, Medhana Kethamreddy, Ian Wells, Emily Benson
Faculty Mentor: Dr. Richard Pollenz (College of Arts and Sciences)

Bacteriophage genomes are heavily influenced by genes from their bacterial hosts through horizontal gene transfer. Within the FR cluster, phages Audell, TMaxx, and AnnabelLee, are novel because they have genes that align to mostly bacteria as opposed to the expected phage protein alignments in the protein-analyzing websites HHpred and NCBI BLAST. Our research investigates whether certain genes have bacterial or prophage origins. A prophage is a phage that is integrated into the host genome, which provides an evolutionary advantage to Audell and other FR cluster phages. The genes under analysis encode NrdH-like glutaredoxin, dihydrofolate reductase, ribonucleotide reductase, head-to-tail stopper, tail terminator protein, and thymidylate synthase. NrdH-like glutaredoxin is widely conserved among bacteria because it maintains redox homeostasis by reducing ribonucleotide reductase which is vital for synthesizing DNA under oxidative stress. Thymidylate synthase's role in DNA synthesis is catalyzing the conversion of deoxyuridine monophosphate to deoxythymidine monophosphate. Ribonucleotide reductase is an enzyme responsible for catalyzing the conversion of ribonucleotides to deoxyribonucleotides and is found to have prophage origins. The tail terminator protein and head-to-tail protein have both been found to have prophage origins. Dihydrofolate reductase is a catalytic enzyme responsible for the reduction of dihydrofolate to tetrahydrofolate, and it is an enzyme which maintains growth in bacteria. These findings show how certain genes can be misinterpreted to have bacterial origins instead of prophage, but both are essential to bolster phage defense systems. Further studying the FR cluster's genomic adaptations can inform the design of phage therapies to target antibiotic-resistant bacteria.

Missense Mutations of KRT25 Causing Hair-Related Conditions in Homo sapiens and Mus musculus

Monica Maxey
Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

KRT25, a gene in the type I keratin family is responsible for the formation of keratin intermediate filaments in the inner hair root sheath. A number of clinically significant variants of this gene have been identified. For example, certain missense variants of KRT25 can cause hair-related genetic conditions in multiple species. Mutation of this gene can cause hypotrichosis and/or autosomal recessive woolly hair syndrome characterized by sparse patches of fragile hair and hair texture that's non-uniform in structure. Genome Wide Association Studies (GWAS) have identified single nucleotide polymorphisms (SNPs) correlated with KRT25, specifically rs766783183 and rs879253749 which were found to be A>G and C>G variants, respectively. These variants located within an exon coding region causes amino acid changes leading to the specified mutations. When comparing the expression of this mutation in mice as it occurs in humans, similar conditions occur and result in fragile curled or wavy fur and whiskers known as a rex coat. Through further research, a deeper understanding of these missense variants and how they interact within the genome could aid in the detection and treatment of the disease in humans.

Real-Time Decisions, Real-Time Results: The Power of Point-of-Care Ultrasound (POCUS)

Muhamed Muntaser Jaber, Natalie Andrade Brin, Andrea Camila Marcano-Rodriguez, Grace Victoria Faberlle, Ryan Singh
Faculty Mentor: Dr. Donna Lee Ettel-Gambino (Judy Genshaft Honors College)

Point-of-care ultrasound (POCUS) serves as an invaluable tool in the assessment of anatomical variation, the guidance of invasive interventions and the diagnosis of critical conditions which may lead to changes in plan of care. Using POCUS, anesthesiologists may benefit from this fast diagnostic tool. This technology improves speed, success rate and gets patients to surgery faster. The purpose of this pilot program evaluation was to identify the anesthesiologist's system and processes for clinical decision-making during the perioperative phases of care. A MANOVA was conducted to identify differences across groups. The independent variable was the type of POCUS scan performed [GU, Cardio, Gastric, Pulmonary]. The dependent variables were the anesthesiologists' systems and processes for clinical decision-making: 1) Overall risk potential; 2) Aspiration potential; 3) Issues with cardiovascular hemodynamics; 4) Issues with volume status; and 5) Inotropic medication intervention. MANOVA findings identified statistically significant differences as evidenced by Wilks' Λ =0.33 (30, 27) F=1.99 ($p<0.0001$). After rejecting the null hypothesis, one-way ANOVA contrasts identified three statistically significant differences: 1) patients (95%) who were at some type of overall risk ($p<0.05$); 2) patients (36%) who were at risk for aspiration ($p<0.001$); and 3) patients (41%) who had issues with cardiovascular hemodynamics ($p<0.001$). POCUS is a proven imaging modality that is convenient, portable, and sensitive. It can identify various anatomical landmarks, conditions and pathologies, reduce reliance on CT scans, and maximize outcomes. Ultimately, POCUS scans have the potential to improve clinical outcomes, shorten hospital stays, and lower costs, benefiting both patients and healthcare teams.

Determining Spatial Cognition and Recognition of Neotropical Frogs Through Maze Navigation

Mya Mikaella Joya
Faculty Mentor: Dr. Yusan Yang (College of Arts and Sciences)

Poison dart frog species vary in parental care from uniparental (paternal or maternal) to biparental. Ranitomeya imitator is a species of dart frog exhibiting biparental care in the form of egg guarding (male), tadpole transport (male), and trophic-egg feeding (female) as well as social and genetic monogamy. Upon tadpole transport and deposition in breeding pools, males call to their pair-bonded female to lead her to the tadpoles for feeding. Given these sex-specific behaviors, there may be differences reflected in contexts such as spatial cognition. Here, we hypothesize that sexually mature males have greater spatial cognition due to tadpole transportation displayed during parental care whereas females may require less spatial cognition. We explore the cognitive abilities of R. imitator using a complex maze to test the predictions that (i) later life stages will express greater cognitive ability than those of earlier stages, and (ii) male spatial cognition will be greater than that of females. Future research will aim to investigate cognitive ability in closely related species with uniparental care for differences in spatial cognition dependent on parental care method.

Premature Aging Biomarkers in Schizophrenia: A Correlative Relationship

Nadia Rohani, Rania Jamal

Faculty Mentor: Dr. Stuart Maudsley (H. Lee Moffitt Cancer and Research Institute)

Premature aging processes, characterized by biomarkers such as telomere attrition, oxidative stress, and inflammatory responses, have been increasingly recognized in individuals with schizophrenia. Previous studies suggest a possible link between these aging biomarkers and the progression of schizophrenia, yet the precise nature of this relationship remains unclear. This review aims to synthesize recent findings on aging biomarkers in schizophrenia to establish a stronger correlation between premature aging biology and schizophrenia progression, and identify potential areas for therapeutic intervention. A systematic review was conducted, analyzing 30 articles published within the past 10 years from databases including PubMed and ScienceDirect. Keywords used in the search included "schizophrenia," "premature aging," "telomere length," and "oxidative stress." The review found that individuals with schizophrenia exhibit significantly shorter telomere lengths compared to control groups, indicating accelerated cellular aging. Elevated levels of oxidative stress markers and systemic inflammation were also consistently observed among patients with schizophrenia. These biomarkers were associated with increased cognitive decline and functional impairments, suggesting a link between premature aging processes and disease severity. These findings underscore a potential mechanistic link between premature aging biology and schizophrenia progression. However, a gap remains in understanding the precise role these biomarkers play in disease development, highlighting the need for longitudinal studies. Addressing this association could inform the development of therapeutic strategies targeting aging biomarkers, potentially slowing cognitive decline and improving patient outcomes.

Parafoveal Vision and the Frontal Positivity in Sentence Reading

Nadija Sulcaj

Faculty Mentor: Dr. Elizabeth Schotter (College of Arts and Sciences)

While reading, people receive information from both the word that they fixate on (foveal input) and upcoming words just outside the fixation point (parafoveal input). However, it has long been debated how deeply readers can process words using parafoveal input alone – can they fully process the words' meanings? Research measuring event-related brain potentials (ERPs) finds that that cognitive processes related to detecting expectation violations (i.e., the N400; a negativity at 300-500 ms after encountering an unexpected word), occur in response to both foveal and parafoveal input. In contrast, cognitive processes specific to encountering semantic anomalies (i.e., the LPC; a posterior positivity at 600-900 ms after encountering a word that makes no sense), do not occur in response to parafoveal input but rather only when the word is fixated on foveally. This ERP study aims to determine whether other post-N400 components (i.e., the FP; a frontal positivity at 600-900 ms after encountering an expectancy violation that does make sense, and the FN: a frontal negativity at the same time frame from having a facilitation met) is sensitive to the quality of visual input, like the LPC, or occurs more ubiquitously like the N400. These findings will reveal whether parafoveal vision is sufficient to process a word's meaning or only to determine whether a word was unexpected, and therefore will further constrain theories of language processing and reading.

Machine Learning Insights into Multilingual Children's English Reading Achievement: Evaluating the Predictive Power of Kindergarten Factors on Predicting Elementary English Reading Achievement

Nam Nguyen

Faculty Mentor: Dr. Ye Shen (College of Education)

Existing machine learning research that examines factors influencing student's academic achievement largely focuses on monolingual rather than multilingual students. To address this gap, we employ machine learning to analyze the Early Childhood Longitudinal Study, Kindergarten Class of 2010-11 (ECLS-K:2011) data of 3,542 nationally representative multilingual children from 970 U.S. schools, who were followed from kindergarten (Fall 2010) to 5th grade (Spring 2016). Our study models and compares the predictive power of six key factors in kindergarten (early reading ability, cognitive and language skills, socio-emotional skills, child characteristics, home literacy environment, and school/classroom characteristics) on English reading achievement across primary years. Using Random Forest and Elastic Net, we will predict English reading achievement from 1st to 5th grade based on the kindergarten predictors and analyze how the predictors' importance evolves over time. Preliminary results indicate strong correlations within cognitive and language skills but weak correlations across other predictor factors. We are currently running machine learning analyses to answer our research questions. We

hypothesize that initial English reading achievement will be the strongest predictor but diminishes over time, with other factors such as cognitive and language skills taking dominance in later elementary school. The findings of this study will suggest the significance of each key factor in multilingual children's long-term English reading achievement across primary years.

Study of Mangroves on Coastal Hydrodynamics and Flood Regulation

Naomi Burton, Maryam Latif, Minjay Heo, Grace Angeli, Gabriella Davis, Eli Lopez-Miralles
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

The research team conducted a systematic review of mangroves and coastal hydrodynamics. The team aimed to understand to what extent mangroves prevent the effects of flooding in coastal areas. The literature review was conducted using three search engines: Google Scholar, Science Direct, and Scopus. In total, there were 2449 articles uploaded into Rayyan, a literature organization software. After duplicates were deleted, 2381 articles were screened based on title relevancy. Then, 311 articles were screened using their abstract to determine inclusivity. Lastly, the final 37 articles were read for relevancy. Reasons for exclusion include topics on, but are not limited by soil, coastal reefs, plastic pollution, machine learning, and pharmaceuticals. The remaining 35 were used to derive the team's conclusion that mangroves have a major positive effect on coastal protection due to their root structure, forest density, and sediment properties. Mangroves were also suggested to be a cheaper method to prevent coastal erosion by the articles. Due to these conclusions, the team suggests that further research should be conducted on the impact of different heights and sizes of mangroves on wave reduction, and the impact of storm speed/size on the efficacy of mangrove coastal protection. The team calls for this because further research can close the gaps caused by the study's limitations. This study is limited by the broadness of the topic due to the amount of literature in open-access journals, the timeframe of the included research studies, and potential technological advancement compared to the original articles.

Point of Care Ultrasound (POCUS): The Curriculum Conundrum Facing Anesthesiologists

Natalie Andrade Brin, Andrea Camila Marcano-Rodriguez, Muhamed Jaber, Grace Victoria Faberlle, Ryan Singh
Faculty Mentor: Dr. Donna Lee Ettel-Gambino (Judy Genshaft Honors College)

Point-of-care ultrasound (POCUS) has become prevalent across many medical specialties, with one such specialty being anesthesia. The lack of a national standard for competence makes training difficult, as clinical proficiency has not yet been defined. This technology increases success rate and gets patients to surgery faster. The purpose of this study was to identify anesthesiologists' systems and processes for utilizing POCUS in clinical decision-making for patients during the perioperative period and also to examine POCUS curriculum opportunities for anesthesiologists. A Multivariate Analysis of Variance (MANOVA) was conducted to identify differences across groups. The independent variable was the type of POCUS examination performed. The dependent variables included the patient's: 1) Perioperative status; 2) Review of History and clinical question posed; 3) Level of the Scanner; 4) POCUS answered the clinical question and 5) Plan of care was changed. MANOVA findings (Wilks' Λ) identified a statistically significant interaction between POCUS scan type and the anesthesiologist's clinical decision-making ($p<0.0001$). The following three criteria were statistically significant:1) patients (64%) were examined with POCUS preoperatively ($p<0.05$); 2) the anesthesiologist (62%) reviewed the patient's history and formed the clinical question ($p<0.05$); and 3) patients' (36%) plan of care was changed ($p<0.0001$). This study highlights POCUS's role in anesthesia decision-making, from patient evaluation to care modifications. Expanding POCUS expertise through standardized guidelines and competency assessments will assist clinicians in enhancing perioperative care. By facilitating early interventions, accelerating surgical readiness, and reducing reliance on costly diagnostic tests, POCUS contributes to improved patient outcomes and more efficient

Overturning Roe vs. Wade: Realities, Reactions, and Repercussions Among High Performing College Students

Natalie Rae Mirabal, Courtney Lynn Bauer, Nikolas George Roberts, Elliot Armando Santaella-Aguilar, Grace Victoria Faberlle, Ryan Singh

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The United States (US) Supreme Court decision regarding Roe vs. Wade (1973) provided federal protection for termination of pregnancy (TOP). This symbolizes reproductive freedom under the Fourteenth Amendment and reshaped Americans' social, cultural, and economic landscape. Limited studies have explored the role of this event on college students' perspectives on TOP. This study examines how academic level shapes perceptions and opinions of TOP among high performing college students. A MANOVA was conducted to identify differences across groups. The independent variable was the student's academic level. The dependent variables were the students' agreement with the following survey statements: 1) the US Supreme Court decision removing federal protection for TOP; 2) self-identified as pro-choice; 3) agreed they knew someone who traveled out of state for a TOP; and 4) agreed with federal law superseding state law. There were statistically significant findings as evidenced by Wilk's Λ (12, 324) = 0.82 ($p < 0.02$). One-way ANOVA contrasts identified two statistically significant criteria: 1) students (10.1%) agreed with the 2023 Supreme Court decision to overturn Roe vs. Wade and return it to the states ($p < 0.05$); and 2) students (86%) self-identified as pro-choice ($p < 0.05$). Recent political landscapes have amplified opinions surrounding TOP among high performing college students. The aftermath of the reversal has impacted access to TOP affecting student communities, young individuals, and those with minimal economic resources. Learning about these differences among college students post Roe vs. Wade is critical to navigate conversations regarding TOP.

The Hidden Cost of Cheap Labor: Poor Working Conditions, Late Diagnoses, and Health Inequalities

Nathan Mundukottackal, Nikhil Chainani

Faculty Mentor: Dr. Holly Donahue Singh (Judy Genshaft Honors College)

Social and economic factors have a strong influence on the health and overall care that people in South Asian countries receive. This project will focus on the poor working conditions and discrimination faced in the garment and fast fashion industry, and it will explore how such conditions foster an environment that can cause diseases such as cancer. This project will also focus how poor working conditions, such as exposure to hazardous chemicals and lack of healthcare access, contribute to the late diagnoses of diseases like cancer, highlighting the need for improved screening rates and early treatment. Big corporations try to keep costs down by not following proper regulations and violating them to turn over huge profits. This causes the laborers to be underpaid, work long hours, and be exposed to hazardous materials. This prevents them from being able to take care of themselves and eventually, they start to develop numerous health problems such as cancer. South Asia's poor healthcare infrastructure system prevents the lower and middle class from receiving the care and treatment that they need, and this causes later detection rates for diseases such as cancer and it becomes too late to treat the disease. This project will then analyze labor policies, health data, and cultural norms to highlight the need to improve screening rates, reforms in labor laws, and awareness of these issues to enhance the well-being and health of workers in the garment industry and other fields of labor.

Does childhood exposure to helminth parasites negatively correlate with inflammatory bowel disease (IBD)?

Neha Bhusarapu

Faculty Mentor: Dr. Marc Lajeunesse (College of Arts and Sciences)

The Hygiene Hypothesis predicts that early parasite exposure can lead to positive resistance against atopic disorders like inflammatory bowel disease (IBD). Here, we report a preliminary systematic review of everything published on the potential link between childhood exposure to helminth intestinal parasites (e.g., nematodes) and the development of IBD later in life. The approach to this topic is to execute a concrete analysis and conclusion about the evidence regarding the correlation via determined keywords – Inflammatory Bowel Disease (IBD), Inflammatory Bowel Syndrome (IBS), Hygiene Hypothesis, Helminths, Nematodes. We aim to map the evidence base of this potential link, appraise published reports, and provide a comprehensive overview of completed work to date. So far, the preliminary search of related peer-reviewed journal articles has identified around 20 published reports using sources from PubMed, Web of Science, Google Scholar, etc. Our next aim is to complete a systematic review, statistical meta-analysis, and numerical

evaluation of the existing literature, providing information to assess the consistency of reported correlations and rank what methodological approaches should become practices for linking IBD to the hygiene hypothesis. These findings can be referenced on a larger, global-community scale for living and medical applications.

The Promise of Crystal Tunability of Microwave-Assisted Synthesis of Metal Halide Semiconductors

Nicholas Giunto
Faculty Mentor: Dr. Ioannis Spanopoulos (College of Arts and Sciences)

In recent years, research has placed metal halide semiconductors (MHS) at the forefront due to their versatile uses in clean energy, photodynamic therapy, and quantum information. This demands effective synthetic methods and tunability of their crystal structures. Where novel synthetic techniques like precipitation, antisolvent, and bomb reactions give way to products with high yields, they lack in crystal tunability. This narrative no longer holds true with microwave-assisted reactions, which rely on microwave heating techniques. Microwave-assisted synthesis uses heat, pressure, and microwave irradiation to directly target and influence the rate and conditions of a chemical reaction. These tunable conditions, coupled with solvent choice, reaction time, and number of cycles, allows us to control the results of MHS synthesis reactions. With controlled results, the size, shape, and phase of MHS can be tuned for specific applications - providing a new way of how materials chemistry is conducted.

Where Do We Go When We Die?

Nico Burnett
Faculty Mentor: Dr. Lindy Davidson (Judy Genshaft Honors College)

Many Americans wonder what they will face once they die but fail to consider what might happen to the physical body they leave behind. This study examines the case of Victor Carl Honey, whose body was sent to the University of North Texas Health Science Center for medical research after he died in Dallas, TX in 2022. Without his family's knowledge of Honey's death and without his prior consent, his body was marked as unclaimed and transferred to a research facility at the university. County and university officials argue they were acting in good faith to save taxpayers Honey's burial costs while helping advance medical research; however, questions remain regarding the diligence of county officials in their efforts to contact family members. Honey's family, after discovering what happened, claim these actions inflicted distress on them and silenced a patient's voice. This case highlights the importance of respecting a patient's autonomy in both life and death, the responsibility of government and researchers to communicate well, and the value of planning for one's end of life.

The Economics and Politics of Education: A Comparative Analysis of How Education Leads to Long-Term Economic Growth and Political Participation

Nicole Ramos Lobato
Faculty Mentor: Dr. Luis Felipe Mantilla (College of Arts and Sciences)

Education is widely recognized as a key factor in a country's development. However, the specific mechanisms through which this institution generates such developments remain underexplored. This research aims to establish that countries that emphasize the value of education—not only by allocating funds but also by prioritizing the importance of knowledge and its construction—achieve better long-term economic growth and political participation. By expanding the array of choices available, education enlarges freedom, empowering individuals to pursue happiness and meaningfully contribute to economic and political progress in their countries. This study will use data from the Barro-Lee dataset, Our World in Data, and IMF specifically on OECD countries. Education will be measured by average years of schooling in the 1980s, while economic growth will be assessed through the compound annual growth rate from 2000 to 2024. Political participation trends will be analyzed through changes in the political participation index from 2006 to 2024. Additionally, a qualitative analysis will explore how placing inherent value on education influences long-term development. Using South Korea as a case study, it will highlight how the country's strong educational ethics, combined with government investments, not only underpinned the Korean miracle but also impacted

long-term economic growth and political participation. Conducting this study is crucially important as it will show the causal relationship between education and its economic and political benefits. Ultimately, this will increase awareness of the importance for governments and societies to recognize education's inherent value as a foundation for national development–fostering long-term growth and broader political participation.

SLC6A4 and Mental Health: How Small Genetic Changes Can Have Big Consequences

Nilmarie Soto Salinas

Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

The SLC6A4 gene encodes the serotonin transporter, a protein that regulates serotonin reuptake. Genetic variants are strongly linked to psychiatric conditions like depression and anxiety. The 5-HTTLPR polymorphism leads to the loss of 14 amino acids in the extracellular loop near the transmembrane region. This region stabilizes the transporter in the membrane and aids serotonin binding. The amino acid loss may reduce membrane stability, weaken ligand binding, and impair serotonin regulation. Individuals with the short allele may face heightened emotional reactivity and greater vulnerability to stress-related disorders. Understanding these molecular differences is crucial for developing targeted therapies and improving treatment outcomes for psychiatric conditions.

Enhancing Patient Safety through Improved Imaging Contrast-related Adverse Event Documentation

Niveditha Chandrakanth

Faculty Mentor: Dr. Christina Eldredge (College of Arts and Sciences)

Gaps exist in documentation of contrast-related adverse events (AEs). This study aims to use case reports to create a comprehensive list of symptoms/signs categorized by physiologic system from the Common Terminology Criteria for Adverse Events (CTCAE) guide to design a patient reporting tool. Nervous system AEs were the most prevalent, however, not listed on the American College of Radiology reaction card. This study emphasizes the need for expansion of the ACR reaction card for cancer patients.

Targeting Mitochondrial Dysfunction in Pulmonary Hypertension and Fibrosis

Niveditha Chandrakanth

Faculty Mentor: Dr. Narasaiah Kolliputi (Morsani College of Medicine)

Mitochondria, the powerhouse of the cell, play a pivotal role in regulating inflammatory responses and balancing macrophage polarization. Mitochondria are crucial for lung health by generating ATP through oxidative phosphorylation, supporting endothelial cell function, fibroblast/myofibroblast regulation, and metabolic homeostasis. Mitochondrial impairment contributes to diseases like idiopathic pulmonary fibrosis and pulmonary arterial hypertension (PAH). This review maps pathophysiology to understand how mitochondrial dysfunction promotes pulmonary hypertension and fibrosis. A systematic review using the keywords "mitochondrial dysfunction," "pulmonary hypertension," and "pulmonary fibrosis," resulted in 70 peer-reviewed in-vivo, in-vitro and clinical study articles from PubMed. Shifting toward Warburg metabolism, with a 3- to 5-fold increase in glycolysis and reduced oxidative phosphorylation, leads to excessive vascular cell growth and chronic inflammation in PAH. Increased senescence, contributing twofold increase in cellular aging markers and a decline in ATP production, leads to impaired tissue repair, intensified inflammation, and disease progression. Ferroptosis, caused by up to a 50% reduction in glutathione and increased oxidative stress, damages lung cells and worsens fibrosis. Mitochondrial dysfunction in alveolar cells disrupts energy metabolism, triggering inflammation and cellular stress, leading to tissue scarring. This review demonstrates how senescence, alveolar cell death, and ferroptosis in mitochondrial dysfunction correlate with hypertension and fibrosis. The findings align with existing research, indicating that cellular aging and tissue damage accelerate mitochondrial stress. The link between ferroptosis and alveolar cell death suggests that targeting mitochondrial pathways and functioning may mitigate damage. Future studies should focus on therapeutic interventions that regulate mitochondrial function relating to ferroptosis and senescence.

The Gut-Lung Axis in Pulmonary Diseases: Microbiome-Mediated Immune Responses

Niveditha Chandrakanth

Faculty Mentor: Dr. Narasaiah Kolliputi (Morsani College of Medicine)

The gut-lung axis influences regulatory T-cell and mucosal activity, systemic inflammation, and disease outcomes, which affect pulmonary illnesses such as asthma, COPD, and COVID-19. A homeostatic host maintains microbial stability and respiratory protection, while dysbiosis in the gut-lung axis upsets immunological homeostasis. Thus, gut microbiota imbalance is the primary cause of respiratory problems which proves that microbiota-targeted therapy can improve lung health. This study explores the relationship between the gut-lung axis and pulmonary diseases, focusing on how dysbiosis in the gut and lungs can lead to inflammation, weakened immunity, and increased pro-inflammatory cytokine production. A systematic review from PubMed was conducted yielding 69 articles from the past decade using the keywords "gut-lung axis," "pulmonary diseases," and "microbiome immune interactions," which evaluate the established relationship and microbiome-based therapies as potential treatments. Gut dysbiosis of the microbiome is associated with increased lung severity, as COPD patients have 30-50% less microbial diversity than normal controls and COVID-19 patients are three times more likely to get secondary pneumonia due to a 40-50% reduction in bacteria such as Bifidobacterium and Lactobacillus. Microbiome-guided therapy, probiotics, prebiotics, and synbiotics, have been found to improve lung function, restore microbial balance, and reduce inflammation by 20-40%. Probiotics have lowered asthma symptoms by 30% and flare-ups of COPD by 25%. This study highlights the gut-lung axis's role in pulmonary disease, linking dysbiosis to inflammation, weakened immunity, and poor respiratory outcomes in COVID-19, asthma, and COPD. Future research should explore individualized microbiome interventions through clinical trials to assess their long-term effects.

Treatment Efficacy of Receptor-Targeted Therapy in Migraines

Niveditha Chandrakanth, Javier Todd

Faculty Mentor: Dr. Libin Ye (College of Arts and Sciences)

G-protein-coupled receptors (GPCRs) are crucial in drug development due to their participation in various disease pathways. The calcitonin gene-related peptide (CGRP) contributes to migraine pathophysiology through cerebral vasodilation and nociceptor activation. Emerging therapies targeting CGRP and serotonin (5-HT) receptors show promise in mitigating migraines, but their long-term efficacy requires further research. This literature review explores the role of CGRP and other receptors, including 5-HT, in migraine regulation, with a focus on their mechanisms and potential therapeutic applications. A systematic review of 42 peer-reviewed articles published within the past ten years was conducted, focusing on migraine pathophysiology and receptor-targeted treatments. Relevant studies were sourced from multiple databases, including PubMed, Google Scholar, and ScienceDirect, using keywords like "CGRP," "5-HT receptors," "migraine therapy," and "GPCRs." The analysis confirmed elevation of CGRP correlates with migraine manifestation. Clinical trials of CGRP antagonists like erenumab, fremanezumab, and rimegepant showed reduced pain severity for acute and chronic migraine prevention up to 50%. Activation of serotonin receptors, particularly 5-HT-1B, lowered CGRP release within the trigeminal vasculature of the meningeal spaces. Targeting these pathways, with CGRP antagonists and serotonin receptor modulators, presents a promising therapeutic approach. Results were consistent with the initial hypothesis of inhibiting the release of CGRP through antagonist medication treatment. Similar receptor-targeted therapies are effective clinically in psychiatric regulation and mood disorders which may be indicative of CGRP therapy's efficacy. Future studies should focus on large-scale clinical trials and explore potential side effects to fully establish the clinical utility of GPCR-targeted treatments for migraines.

Phage Therapy: The New "Antibiotic"; A Case Review of Two Multidrug Resistant Infections

Niveditha Chandrakanth, Sasha Hoang, Kayce R. Boucher, Kim Bao Nguyen, Tri Duc Luong

Faculty Mentor: Dr. Richard Pollenz (College of Arts and Sciences)

Bacteriophage (phage) therapy employs bacteriophages to lyse specific bacteria. With the increase in drug-resistant bacterial infections, phage therapy is an adjuvant treatment option in solving antibiotic resistant infections whilst developing new drugs. Staphylococcus aureus (MRSA) and Klebsiella pneumoniae are two persistent multidrug-resistant organisms. Phage therapy will be evaluated in tandem with antibiotic treatment to treat drug-resistant bacterial infections. In this study, two case reports utilizing phage therapy are reviewed. The first study discusses a 61-year-old woman with a history of chronic rhinosinusitis (CRS) caused by MRSA since 2004, treated with surgeries and extensive antibiotics. The patient received an intranasal bacteriophage therapy targeting the MRSA. Initial treatment with phage SeMN68phi1 was administered for 10 weeks then modified with intranasal infusion

and in the right ear canal with phage SaWIQ0456AØ1. The phage treatment resulted in negative cultures, no signs of relapse to CRS, and normal mucosa presentation. In the second case, a 70-year-old male presents with Klebsiella pneumoniae infection within their prosthetic shoulder which was initially treated with IV ertapenem. Patient was infected intra-articularly (IA) through a Hickman catheter with simultaneous administration of phages KP1 and KP2. Post-IA, IV therapy was conducted. Patient observed no joint infections, adequate range of motion, and no recurrence. An arthrocentesis at six months detected infection, but the patient remained asymptomatic. These case reports highlight phage therapy in managing drug-resistant bacterial infections. More research is needed to optimize phage selection, delivery, and dosage. Future studies should focus on clinical trials to standardize protocols and broaden applicability.

Airbus's Formation and Impact in US Markets and the American Response

Noah Burkley, Aidan Carroll

Faculty Mentor: Dr. Peter Funke (College of Arts and Sciences)

The research that will be presented at the USF Undergraduate Research Conference will cover both the formation of Airbus and Airbus's current position in the modern duopoly of commercial aircraft. The goal of this display will display Germany's past and present influence in the commercial aviation sector. The first of two sections of research will cover the creation of Airbus. This engrossing sector will discuss the collaboration from various aerospace companies from France, England, West Germany, and Spain to break into the American aviation market, the most profitable market globally. This sector will also discuss Airbus's earliest aircraft, namely the A300 and A320 families, and the commercial reception associated with each respectively. Meanwhile, the research will recover the reactions of the Boeing group to Airbus's entrance into the US market.
The second section will discuss the modern duopoly of Airbus and Boeing (focusing heavily on the US Market) and the successes and shortcomings of both manufacturers respectively in the development and implementation of their modern lineup of commercial aircraft. This section hopes to address the challenges both have faced in the acquisition of regional jet programs from smaller aerospace companies. In the case of Airbus, this refers to the integration of Bombardier's C-Series lineup. This is paralleled by Boeing's attempts to acquire Embraer's E2 lineup. The principal objective of this research is to illuminate the fascinating history and modern turmoil of the commercial aviation industry while simultaneously demonstrating the European influence in the current American aviation market.

Genomic Analysis of a FOXP3 Variant Associated with SLE and MS

Noelle Kakascik

Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

FOXP3 is a gene symbol which stands for Forkhead box protein 3. This is a gene that is crucial for immune regulation, notably for the effectiveness of regulatory T cells. Deficits in regulatory T cell activity have been linked to multiple autoimmune disorders, such as lupus (Otherwise known as SLE), and Multiple Sclerosis (Known as MS). Research on the genetic components of these illnesses is crucial, as not much is known about the pathogenesis or cause of them. Upon genomic computational analysis, a variant, rs3761547, was found, which indicated an association with SLE. Using tools such as Fabian Variant and the UCSC genome viewer, this variant also affects the expression of notable other transcription factors, such as HIRIP3, which is a gene involved in histone metabolism. This could lead to a greater understanding of the pathogenesis of SLE, and MS, especially if this variant indicates a change in the core abilities for the cells to induce epigenetic changes, as histone metabolism is associated with cells abilities to access the genome for transcription.

The Role of Real-Time Feedback in Enhancing Patient Satisfaction, Efficiency, and Safety Across Various Healthcare Settings

Noor Yassin

Faculty Mentor: Dr. Keith Dombrowski (Morsani College of Medicine)

"Real-time feedback" (RTF) refers to an immediate assessment of an individual's performance to enable prompt adjustments. In healthcare, RTF improves patient experience and care quality through surveys, digital platforms, and in-person reporting. RTF with rapid data relay enhances patient satisfaction by improving provider communication, responsiveness, and care coordination. However, its effectiveness varies across healthcare settings, with implementation difficult in the fast-paced emergency department compared to primary clinics. This study examines how RTF impacts patient satisfaction, efficiency, and safety outcomes, aiming to enhance patient-centered care and institutional adoption despite technological barriers. A literature review of 80 peer-reviewed articles from the last ten years was conducted using "real-time feedback" and "patient experience" as key terms in PubMed, yielding 40 relevant articles for analysis. The findings suggest that RTF is effective at improving patient experiences through strong physician-patient communication, leading to higher patient satisfaction. Additionally, real-time monitoring devices, such as watches, provide staff with data to improve treatment plans, while simulation training and surveys improve students' ability to practice empathy and efficiency, reducing patient anxiety and examination times. However, the inconvenience of patients reporting feedback and technical difficulties hinders broad-scope adoption. This study demonstrates the growing usage of RTF in medical settings and its potential in fostering a patient-centered environment. Although RTF's benefits are evident, further research is needed to enhance digital infrastructure and facilitate staff engagement. By overcoming these challenges and evaluating RTF's effectiveness in different healthcare settings, RTF can be fully integrated into clinical practice, maximizing its impact on patient care.

Let Them Eat Wheat: An Isotopic Analysis of Medieval Transylvanian Diet

Nora Wolfgang

Faculty Mentor: Dr. Jonathan Bethard (College of Arts and Sciences)

Exploring a past population's diet provides anthropologists and historians with key insights into medieval lifestyles, social structures, and food access. This study examines the diets of medieval Szekler individuals from the Patakfalva-Papdomb cemetery in Transylvania, Romania, using stable carbon, nitrogen, and oxygen isotope analysis. Bone samples from twelve adults were analyzed using isotope ratio mass spectrometry of collagen and bioapatite to determine primary food sources. Results suggest a diet dominated by C3 plants like wheat and barley, rather than C4 crops such as maize or millet. Nitrogen isotope levels varied, with one individual (G10-72) displaying notably high values, possibly linked to higher social status and greater consumption of animal protein. As a biological female buried among nobility, G10-72 raises questions about the role of women in medieval Szekler society and whether noblewomen had dietary privileges similar to their male counterparts. This pattern suggests dietary differences based on social hierarchy, reinforcing historical records of nobility having greater access to meat and other protein-rich foods. These findings contribute to a broader understanding of how medieval communities sustained themselves and how food availability reflected social divisions. Further research comparing isotope data across different medieval cemeteries could offer a more comprehensive picture of regional dietary trends and gendered access to resources.

"Restoring the Eyesore": Bayboro Harbor's History and the Case for Restoration

Oliver Laczko

Faculty Mentor: Dr. James Ivey (College of Arts and Sciences)

Since its salt marsh bayous and expansive mudflats were first dredged in the early 1900's, Bayboro Harbor has served as a multi-faceted waterfront for industrial, governmental, and commercial endeavors located just south of downtown St. Petersburg, Florida. This historical landmark serves as an example of the rapid development that St. Petersburg underwent over the last century and presents a unique opportunity for education and restoration. Utilizing newspaper articles from The St. Petersburg Times and the Evening Independent, historical photographs, archived documents, and research publications focused on the health of Bayboro and the greater Tampa Bay region – the principal investigator seeks to develop a comprehensive restoration plan of Bayboro Harbor's estuary – incorporating the social and environmental history of the region to justify such an initiative. The findings of this investigation ultimately concluded that Bayboro Harbor presently suffers from chronic pollution sourcing from multiple facets of nutrient, industrial, and commercial

outflow due to nearby industry and rapid environmental degradation. An opportunity to mend the diverse coastal ecology that once populated this region is still possible. The findings of this thesis compiles literature, history, and ecological knowledge about Bayboro Harbor, and presents design concepts for what a restoration plan would look like for the entire Bayboro watershed.

Evaluation of Diverse Gene Products from Phage Kimona on the Growth of M. smegmatis

Olivia Payne, Loc Nguyen
Faculty Mentor: Dr. Richard Pollenz (College of Arts and Sciences)

Bacteriophages are viruses that infect and reproduce within bacteria and may be used in combatting antibiotic-resistant bacteria. Bacteriophages encode diverse gene products that allow phages to infect and kill their hosts. Kimona is an A19-cluster phage infecting Mycobacterium smegmatis, with 87 encoded proteins and a genome GC content of 64.4%. This study evaluated four gene products from Kimona to determine if they were cytotoxic to M. smeg or conferred immunity to phage infection. The genes 11, 27, 53, and 77 were amplified by polymerase chain reaction and ligated into the inducible expression plasmid using Gibson Assembly. The plasmid construct with the Kimona gene was electroporated into M. smeg and single colonies were evaluated for cytotoxicity and defense in the presence and absence of the inducer. gp27 is a putative single transmembrane protein predicted to be involved in bacterial lysis and the release of peptidoglycan-degrading enzymes. gp27 has no cytotoxic effect when induced in comparison to the control. gp11 is the scaffolding protein assisting the formation of phage capsid and exhibits no toxicity. gp53 has no known function (NKF) and exhibits minimal toxicity with reduced colony size compared to the uninduced control. gp77 is an NKF and presents as non-toxic. None of these proteins confer defense mechanisms against superinfection of A-cluster bacteriophages Kimona, Acme, or D29. Due to the small percentage of phage proteins with determined function, studies like this can contribute to the overall understanding of bacteriophage gene function and their influence on bacterial physiology.

The Impact of Rising Interest Rates on Credit Offered by Commercial Banks and Utilized by Commercial Real Estate Developers in The United States of America

Owen Leckie
Faculty Mentor: Dr. Yuting DiGiovanni (Muma College of Business)

Commercial real estate development involves the usage of credit from commercial banks to sustain development projects. Both industries are experiencing challenges in the wake of high interest rates. Interest rates have caused commercial banks to tighten their credit policies and limit investments into industries such as commercial real estate. High interest rates have also caused real estate developers to experience difficulties obtaining commercial credit from banks. Thus, leading to an economic slowdown in commercial real estate development. Both industries have been negatively impacted by the recent interest rate hikes the economy has experienced. As a result, there are a multitude of financial factors that the commercial real estate market has and currently is experiencing. These factors are evaluated and expanded upon in this paper in order to understand the relationship between commercial banks, real estate developers and the Federal Reserve's monetary policy decisions.

How The US's Latin American 30 Years of Peace, Ceased Through The Overt Occupation of the Dominican Republic

Parker English
Faculty Mentor: Dr. Arturo Jimenez-Bacardi (College of Arts and Sciences)

Throughout the Cold War, Latin American democracies were replaced by authoritarian military dictatorships, with most regimes being US allies. Several of these regimes change operations were done with US covert assistance. An outlier was from the Civil War (1965) of the Dominican Republic as the US used overt military action to establish a friendly government. One of the questions that emerges is, why did the U.S. choose overt use of military force against the Dominican Republic when using covert action in the rest of Latin America? This paper will be using documents from the State Department Foreign relations of the US and Presidential recordings from the Lyndon Johnson administration, this paper will explain US fears, interests, and goals in the lead up

to the U.S. invasion of the Dominican Republic. During this war the US had a direct military occupation and aided the federalist factions in the Dominican Republic as it perceived them as more pro-Western. A main aim that this paper will highlight is the US desire for the restoration of law and order through the aid of the federalist in the Dominican Republic, with the need for the Dominican Republic's favorability to the US. In highlighting the need for stability in the Dominican Republic, the US was able to get support from other members of the Organization of American States which provided legal cover for an overt military occupation and reduced the need for the use of covert action to achieve its aims and objectives.

Pathogenic Missense Mutation in the MC4R Gene Identified Using the UCSC Genome Browser

Paul Lennon

Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

The MC4R gene encodes the melanocortin 4 receptor, a G-protein-coupled receptor crucial for regulating energy homeostasis, appetite control, and body weight. Pathogenic missense mutations in MC4R have been implicated in monogenic obesity, disrupting receptor function and impairing satiety signaling. This study utilized the UCSC Genome Browser to investigate a specific pathogenic missense variant located at on Chromosome 18. This variant involves a single nucleotide change that affects a highly conserved amino acid residue, resulting in a damaging effect on protein function. The MC4R gene exhibits its highest median expression in the hypothalamus underscoring its critical role in central energy regulation. Structural modeling suggests that this mutation disrupts ligand binding and intracellular signaling, contributing to obesity-related phenotypes. These findings highlight the necessity of functional studies to further validate the pathogenic effects of this MC4R variant and explore its implications for targeted obesity therapies.

Reproductive Strategies and Survival Dynamics of African Elephants (Loxodonta Africana): Maternal Investment, Birth Weight, and Human Threats

Paul Lennon

Faculty Mentor: Dr. Deby Cassill (College of Arts and Sciences)

African Elephants (Loxodonta africana) reproduce in diverse environments across Africa. Elephants have a long gestation period of about 22 months, the longest of any land animal. Female elephants give birth to a single calf every 4 to 5 years. A single calf weighs around 220 pounds at birth and requires significant maternal care for several years, with extended nursing periods. The survival rate of calves is highly influenced by maternal care and the presence of other herd members. Researchers have analyzed/plotted the relationship between calf birth weight and calf survival rate, and birth intervals with maternal investment to determine the reproductive strategy used by African elephants to meet their replacement fitness. The findings suggest that while resource availability, such as water and food, can influence calf survival in harsh conditions, predation remains a relatively minor threat to the calves due to the protective nature of the herd. Human-related threats, such as poaching, pose a far greater risk to the overall population's survival.

Duty or Diligence?: Latin American Migrants and Provisioning Across A Transnational Context

Peter Kyriacou

Faculty Mentor: Dr. Kevin Yelvington (College of Arts and Sciences)

Economic anthropology can speak to us about the migration experience. Latin America and the Caribbean are the origin of a near majority of immigrants arriving in the United States. As well as social, environmental, and humanitarian reasons, many migrants have economic motives for relocation. Forming transnational bonds, migrants maintain connections to their home communities while forming new ones in their destinations. Through these ties, remittances are sent to their relatives and social networks back home. Remittances to Latin America vary by country. With this assumption, it would be natural to assume that remittances are sent in a uniform fashion to different home countries. However, there are differences in the amount remittances received by Latin American nations. It has been found that countries with lower social safety nets receive a higher volume of remittances, regardless of migration numbers. This paper explores the role that social obligation plays in sending remittances. It examines the responsibilities migrants take on as providers for their home communities, and the factors that bind them to participating in this network. The paper provides a discussion of the relevant social science literature, economic statistics, and ethnography in illustrating these points.

But Daddy, I Love Tin: How Bolivia Managed Soft-Balancing With The United States in the 1950s

Peyton McManus
Faculty Mentor: Dr. Arturo Jimenez-Bacardi (College of Arts and Sciences)

How does a relatively weak state maintain a semblance of political independence in the face of intervention by a great power–a regional hegemon–like the United States? This is precisely the question that faced Bolivia throughout the 1950s as the United States attempted to intervene in the economic reforms that the Bolivian government was trying to enacted. Building on Friedman and Long's (2015) concept of soft-balancing, this paper will illustrate how a relatively weak state like Bolivia can successfully push back against the desires of a much more powerful state. Soft-balancing is defined as the non-military, persuasive tools used by a state to counteract the actions of a greater power, and includes everything from economic actions, contracts of neutrality, and the wielding of international law and institutions to shame a great power into restraint (Friedman & Long 2015). Bolivia's successful revolution of 1952, the fires of which were stoked by the United States' economic intervention, set in motion a series of land reforms, expropriation and changes to mining laws, and higher taxes which directly affected U.S. companies. Even though the revolution itself was anything but soft, the Bolivian government managed to maintain positive relations with the United States–so positive, in fact, that the United States even ultimately supported Bolivia's land reforms–something that in any other state, would have been deemed a communist threat. Using archival research from U.S. state department files, this presentation will highlight the different tools that Bolivia employed to allay concerns and tame U.S. actions.

Unveiling Suicide Risk in Bipolar Disorder Communities: Static Graph Analysis and Comparative Modeling on Reddit Networks

Phong Tran
Faculty Mentor: Dr. Seungbae Kim (College of Engineering)

Suicide risk detection in online mental health communities poses significant challenges, particularly within bipolar disorder support groups where user interactions are diverse and complex. This study presents a foundational investigation using graph neural networks (GNNs) to model Reddit-based communities through both homogeneous and heterogeneous static graphs. In our homogeneous graph, where all users and interactions are treated uniformly, we extract key centrality measures—degree, closeness, betweenness, and eigenvector—to identify influential users and understand the network structure. To capture the richer semantics of the heterogeneous graph, we derive meta-path-based centrality measures that leverage predefined meta-paths to uncover deeper relational patterns among different types of nodes and edges. Additionally, PageRank is computed for both graph types to assess node importance across the networks. We generate node embeddings by combining structural features from the graph with textual representations extracted using Sentence-BERT to evaluate baseline GNN architectures for downstream node classification. Our findings reveal distinct structural signals in each graph type and offer insights into risk-related patterns within the community. This work establishes a basis for future extensions incorporating temporal and dynamic graph modeling and emphasizes responsible AI practices, including user privacy and ethical data usage, throughout the research process.

An Analysis of Culture, Identity, and Beauty in Media

Pooja Magesh
Faculty Mentor: Dr. Cayla Lanier (Judy Genshaft Honors College)

This media analysis explores the themes of culture, identity, and beauty in the movie Real Women Have Curves. The movie explores Latinx culture, identity, and values from the perspective of an immigrant household in America. This analysis explores the tensions shown between family hierarchies as well as Ana challenging her mother's beauty & body standards. This study was conducted by researching the key moments of dialogue, music, scenery, and scenes to broaden the understanding of key themes within the movie, such as identity, culture, and body positivity. One of the film's main themes was the negative environment Ana had to face and how she dealt with it throughout the film. The film also highlights the differences between immigrant parents and their kids. Through this analysis, these findings emphasize the importance of standing your ground and uplifting yourself to be better.

Shape-Shifting and Molecular Chaperoning: Unraveling ARHGEF7 and TIAM1 in Cancer Metastasis with AlphaFold 3

Poojitha Swaminathan, Kieran Ball, Ana Beatriz Melgar, Khary Walker
Faculty Mentor: Dr. Inna Smalley (H. Lee Moffitt Cancer and Research Institute)

The identification of ARHGEF7 and TIAM1 has deepened our understanding of cancer metastasis, highlighting their roles in driving aggressive tumor behavior. These genes contribute to leptomeningeal colonization, bone infiltration, and systemic migration, facilitating transitions into invasive phenotypes capable of crossing the blood-brain barrier. This study explores the protein structures of ARHGEF7 and TIAM1 through AlphaFold3, offering insights into their domain architectures, folding patterns, and conformational dynamics that drive metastatic progression. As key regulators of cytoskeletal remodeling, cell polarity, and adhesion, these proteins enable cancer cells to detach, invade, and establish secondary colonies in distant organs. Beyond structural modeling, emerging research suggests that artificial chaperones and chaperone-based vaccines could modulate protein folding kinetics and stability, potentially disrupting metastasis-promoting pathways. Leveraging AlphaFold 3's predictive capabilities in conjunction with these approaches may provide a deeper understanding of how ARHGEF7 and TIAM1 mediate cellular transitions—particularly epithelial-mesenchymal transition (EMT) and mesenchymal-like adaptations that enhance invasiveness. By integrating computational protein modeling with novel strategies in protein folding regulation, this review examines potential avenues for advancing cancer research and identifying therapeutic interventions to impede metastatic dissemination.

Integration of AI in Anesthesiology and Its Ethical Implications

Praise Ofakunrin, Mahek Mody, Natalia Poland, Azlin Edwards, Aishwarya Aggarwal
Faculty Mentor: Dr. Hector Gomez (Morsani College of Medicine)

Artificial Intelligence (AI) is increasingly prevalent in anesthesiology due to its advancements in quality and safety. Systems like anesthesia information management systems (AIMS) assist with patient care, automated recordkeeping, and drug calculations. This review explores the challenges and impact of AI in anesthesia by examining how it can be ethically and effectively integrated to enhance clinical decision-making while addressing concerns about bias, data privacy, and security. A comprehensive review was conducted, screening 96 peer-reviewed articles from PubMed using terms 'artificial intelligence', 'anesthesia', and 'ethics'. Exclusions were made for studies focusing on AI in other medical specialties, clinical trials, and animal studies. 33 articles were selected and analyzed based on their focus on AI's clinical accuracy, ethics, and effectiveness in anesthesiology. Research indicates that AI in anesthesia improves clinical decision-making, outcome prediction, and data analysis. Deep neural networks achieve a 92.9% accuracy in anesthesia depth assessment and 97% accuracy in anatomical landmark identification. AI-guided ultrasound imaging analysis enhances peripheral nerve detection and block precision, supporting risk stratification and perioperative monitoring. Anesthesiology is continually being improved by AI, a useful tool for patient safety and monitoring, operating room management, and procedural efficiency. However, ethical challenges related to data privacy, potential bias, and accountability must be addressed. To ensure AI systems are rigorously tested and continuously monitored across different stages, a total product framework can be implemented to mitigate ethical concerns. Establishing clear ethical guidelines and fostering collaboration among researchers, clinicians, and policymakers is key to responsible AI integration.

Paving the Way for Cancer Detection: A Sensor-Based E-Nose Approach in Clinical Research

Premal Doshi
Faculty Mentor: Dr. Ehsan Sheybani (Muma College of Business)

This study presents an innovative sensor-based approach for early disease detection, with future applications in cancer diagnostics. Utilizing an electronic nose (e-nose) system, our method offers a low-cost, accurate, and rapid solution that could enhance early diagnosis in clinical settings. The e-nose's speed and precision suggest promising integration into future cancer diagnostics, potentially improving patient outcomes and reducing healthcare costs. We employ machine learning models for classification and estimation tasks, crucial for various industries requiring reliable methodologies. Our approach leverages the logistic regression algorithm, utilizing sensor data for enhanced classification and estimation accuracy. To address data imbalance and improve model generalization, we applied the Synthetic Minority Over-sampling Technique (SMOTE). A rigorous feature selection process resulted in a model, achieving close to 85% accuracy. Our study explores optimized sensor combinations, maintaining high accuracy while reducing the number

of sensors, thus enhancing cost efficiency. Focusing to do for colorectal cancer detection with AI/ML methods and sensor data, we collaborated with a Swedish research team, successfully applying our techniques to ovarian cancer detection. Our ongoing efforts aim to refine AI/ML capabilities to not only detect cancer but also determine its stage, offering potential breakthroughs in early diagnosis and treatment planning. Overall, this research highlights the power of advanced machine learning in classification and estimation, demonstrating its real-world impact.

Personality and Behavioral Syndromes in Ranitomeya Imitator

Quarohn Holliday
Faculty Mentor: Dr. Yusan Yang (College of Arts and Sciences)

Research on animal personality has increased in recent years, but additional data in species with vastly diverse ecology and evolutionary patterns is still needed. Here, we investigated personality traits (activity, boldness and exploratory behaviors) in a Neotropical poison frog (Ranitomeya imitator). We tested i) whether individuals exhibit consistent behaviors across repeated assays, and ii) whether there are correlations among the personality axes. For everyone, we conducted five sequential trials in a custom-made maze with four arms, with a familiar shelter at one of the arms as a reward. After 5 minutes of acclimation at the end of another arm, frogs were given up to 30 minutes to solve maze. We measured latency to move, area explored, and total distance traveled when solving the maze. Results support both repeatability of personality and behavioral syndromes in R. imitator, and lay groundwork for further research on cognitive and behavioral variability in dendrobatid species. We plan to further test whether boldness, activity, or exploratory tendencies correlate with the frog's spatial cognitive ability in solving the maze.

Tucker Carlson's Fall from Grace: A Crisis Management Case Study

Quyen Tran
Faculty Mentor: Dr. Mildred Perreault (College of Arts and Sciences)

This paper examines the post-crisis reputation management strategies following Tucker Carlson's abrupt departure from Fox News employed by both Fox News and Carlson. Despite Carlson's status as a popular cable news host, neither party provided a clear reason for his departure, fueling widespread speculation. Two primary factors are explored: the Dominion Voting Systems lawsuit, which cost the Fox News corporation $787 million, and sexual allegations charged against Carlson. Drawing from crisis communication theories—including the apologia theory, excellence theory, and image restoration theory—this Case Study recommends that both Fox News and Carlson could have benefited from a more strategic and transparent response to control the narrative and protect their reputations. The findings demonstrate the importance of prompt and clear communication in crisis management to control narratives, minimize negative public opinion and protect reputations of all parties involved.

How Does Winning a Super Bowl Championship Significantly Increase the Value of an NFL Team, as Measured by Franchise Growth Over the Following Year?

Rachel Robidoux
Faculty Mentor: Dr. Russell Clayton (Muma College of Business)

This research study will uncover the relationship between National Football League Super Bowl Championships and the change in value of the franchise in the following year. The research will be analyzing fan engagement benchmarks and dollar value of teams by tonnage and in proportion in the following year, using these as benchmarks for the valuation. A key highlight that this research has led me to conclude is that monetary valuation can be proven to be directly affected by a team winning a Super Bowl Championship in the year following the win. On the other hand, audience size, audience valuation, and fan engagement metrics cannot be proven to be directly affected in the following year but can be seen to be affected in the year that the team won the Super Bowl. Using this study is of importance to team owners, sports marketers, and stakeholders who are looking to grow the financial well-being and fan engagement metrics of their franchises through on-field performance success. It relates the sport on the field to what goes on behind the scenes in the business office.

Wetlands, Biochemistry, and the Brain: Harnessing Nature's Power to Mitigate VOCs and Enhance Brain Health

Raehanna Brown
Faculty Mentor: Dr. Andrea Vianello (Judy Genshaft Honors College)

Volatile Organic Compounds (VOCs) have been increasingly linked to neurological, cardiopulmonary, and immune diseases, particularly in urban areas where exposure to industrial VOCs is prevalent. These compounds can permeate cell membranes, leading to changes in the Central Nervous System. Despite a 5% reduction in VOC emissions in the United States over the past 15 years, the complex physiological effects of VOCs remain elusive due to the volatile atmospheric mixtures they form. Unlike industrial areas, wetlands produce biogenic VOCs, which are naturally attenuated through biochemical processes within the wetland ecosystem. This study reviews relevant literature to explore the feasibility of using replicated wetlands and their ecological components to absorb man-made VOCs, while simultaneously introducing health benefits to urban areas in the United States. By discussing eco-friendly methods for air pollutant removal, this research aims to deepen understanding of the neurotoxic potential of VOCs and encourage the development of communal habitats for waste management and air purification.

Assessing Socioeconomic Coastal Vulnerability to Meteotsunamis in Lake Michigan

Ramya Subramanian
Faculty Mentor: Paul Parris, Doctoral Student (College of Arts and Sciences)

Meteotsunamis, or meteorological tsunamis, are a growing hazard in the United States with notable historical cases affecting the U.S. Great Lakes, and East and Gulf Coasts. Due to the unique atmospheric conditions that can rapidly generate meteotsunamis, understanding the vulnerability of urban areas near this lake is critical for disaster preparedness and risk mitigation. The central research question guiding this analysis is which coastal communities along Lake Michigan are at the highest risk from meteotsunamis based on shoreline elevation and bathymetric data. Within these high-risk areas, this study will investigate the socioeconomic factors such as median income that could impact the risk level and disaster preparedness of these coastal communities after the 2018 Lake Michigan meteotsunami incident. The findings of this study suggest that low-elevation coastal areas, particularly in high-density, low-income urban regions, are at the highest risk from meteotsunamis. These findings emphasize the need for targeted interventions to improve coastal resilience in these zones. This study addresses these gaps by analyzing the relationship between lakebed topography, coastal elevation, and economic resilience in Michigan's urban coastal communities. Ultimately, this study will contribute to a better understanding of meteotsunami hazards in Lake Michigan and inform policymakers, emergency managers, and local governments on strategies to reduce future risks.

Genetic Factors Controlling Pathologies Across the ALS-FTD Spectrum of Disorders

Ramzia Sorathia, Roy Chen, Cheyenne Martinez
Faculty Mentor: Dr. Stuart Maudsley (H. Lee Moffitt Cancer and Research Institute)

Neurological conditions severely harm patients' abilities to move and think. Amyotrophic Lateral Sclerosis (ALS) and Frontotemporal Dementia (FTD) are two debilitating neurodegenerative disorders that share significant etiological similarities. ALS primarily affects the spinal cord's motor neurons, while FTD damages the frontal and temporal lobes. While the two neurological conditions were initially diagnosed separately, contemporary studies discovered a disease continuum between ALS and FTD: the ALS-FTD continuum. This systematic review re-examined the ALS-FTD continuum's genetic factors, especially potential factors for genetic anticipation. A search was performed on PubMed and EMBASE using "amyotrophic lateral sclerosis," "frontotemporal dementia," "genetic anticipation," and their medical subject headings (MeSH). After yielding 48 results, this review included 26 English, peer-reviewed original articles published between 2014 and 2024; it excluded review articles and studies that focus on other conditions. This study identified C9orf72's GGGGCC expansion in its introns as the most frequent genetic cause of ALS and FTD. Despite its elusive effects, this mutation was found to downregulate C9orf72's expression and alter the immune response, leading to lymphadenopathy and splenomegaly. Moreover, C9orf72 mutation has mixed results for inducing genetic anticipation. The risks of carrying C9orf72 are affected by single nucleotide polymorphisms. Namely, rs139185008 increased the risks of frontotemporal lobar degeneration by 4.38 times and the risks of carrying C9orf72 by nearly 40 times. Overall, C9orf72 holds significant promise for research into its potential role in genetic anticipation. Other genetic factors of the ALS-FTD continuum, including TDP-43, TBK-1, and OPTN, also deserve further investigation.

Maternal Risk-Management Elucidates the Evolution of Reproductive Adaptations in Oncorhynchus Mykiss by Means of Natural Selection

Razputin Hinebaugh
Faculty Mentor: Dr. Deby Cassill (College of Arts and Sciences)

The maternal risk-management model is the study of how breeding females allocate resources between offspring size, offspring number, and offspring diversity to achieve reproductive success, i.e., replacement fitness. Maternal investments in offspring size, number, and diversity are shaped independently by diverse risk factors: the extent of gaps during seasonal resource cycles, rates of predation/parasites, and unpredictable catastrophes such as disease, floods, fire, or anoxic events. Here, in Oncorhynchus mykiss, we show that maternal investments within and across species agree with the predictions of the maternal risk-management model. Within Oncorhynchus mykiss, larger females invested in larger offspring and larger clutches. We show that offspring size and offspring number per clutch were independent investment strategies. The risk of starvation favored maternal investments in larger offspring. The risk of death by predation favored investments in larger clutches. The risk of death by hypoxia favored investments in multiple broods per lifetime. In conclusion, our study showed that Oncorhynchus mykiss are predation selected species. If empirical studies continue to confirm its predictions, maternal-risk management may yet emerge as a unifying model of natural selection.

The Six Triple Eight: The Women Who Delivered in WWII

Rea Grezda
Faculty Mentor: Dr. Cayla Lanier (Judy Genshaft Honors College)

In The Six Triple Eight, the film highlights the pivotal role of the 6888th Battalion during WWII, focusing on the challenges faced by African American women who were tasked with clearing a massive mail backlog. This portrayal challenges traditional media representations of women in combat, showing them as strong, capable leaders in a male-dominated military environment. By emphasizing Pvt. Cora Lee's determination and Lieutenant Colonel Charity Adams' leadership, the film disrupts stereotypes of women as passive or incapable in war, reinforcing their essential role in supporting the war effort. This representation not only confronts societal views on gender and power dynamics but also showcases how media plays a crucial role in reshaping historical memory, ensuring that these women's contributions are finally recognized and remembered as an integral part of the WWII legacy.

Alatato's Novel Immunity Cassette

Rebecca Aguilera, Angela Chen, Adrianna Chacko
Faculty Mentor: Dr. Richard Pollenz (College of Arts and Sciences)

Bacteriophages are viruses that infect bacteria and can be used against antibiotic resistant infections. Temperate phages have four key genes that make up its immunity cassette: tyrosine integrase, cro, excise, and immunity repressor. The purpose of this project is to investigate the presence of these four genes using Phamerator, NCBI Blast, PhagesDB, HHpred, and HTH Finder. Alatato was annotated to have tyrosine integrase at gene 29 with hits to tyrosine recombinase in HHpred and integrase domains. This aligns to gene 35 from Shoya and gene 28 from Sarge, reference genes from the same cluster FB. Alatato also has an excise at gene 35 that aligns to gene 41 from Shoya and 35 from Sarge. Gene 35 was annotated as an excise due to hitting fully to several exisonases hits in HHpred and finding the tyrosine integrase which is needed to call excise. The immunity repressor and cro could not be identified based on HHpred analysis because the Alatato gene products from genes 31-34 were very small (<80 amino acids) and missing the required CI-like dimerization domain. However, these genes all encode proteins that have putative helix-turn-helix (HTH) domains suggesting that they can possibly bind to DNA and regulate lytic or lysogenic genes. This finding is novel and will require wet-lab work to determine how these HTH proteins function and if they serve as the immunity repressor and cro for phage Alatato. Overall, this research shows that there is diversity in the immunity cassette of phages that infect Arthrobacter bacteria.

Implications of Ozempic: A Semaglutide with Peptide (GLP)-1 Receptor Agonists Misused for Cosmetic Weight Loss

Renee Reardon

Faculty Mentor: Dr. Amy Bohan (College of Arts and Sciences)

Ozempic, classified as a GLP-1 receptor agonist, is a semaglutide primarily prescribed for managing type 2 diabetes. It operates by mimicking the hormone glucagon-like peptide-1 (GLP-1), thereby prompting insulin secretion and reducing glucagon levels. Administered via weekly injections, it aids in regulating blood sugar levels by enhancing insulin production from the pancreas. Originally designed to assist diabetics in controlling their blood sugar, it was later discovered to be effective in promoting weight loss as well (National Library of Medicine, n.d.). However, individuals using Ozempic for weight loss may face elevated risks of experiencing gastrointestinal issues. This conclusion stems from comprehensive research analyzing insurance claims spanning from 2006 to 2020, involving over 5,000 patients across the United States. The findings highlighted a range of health complications, including biliary disease, gastroparesis, pancreatitis, and bowel obstructions among those using Ozempic for weight loss. Notably, collected data has revealed a significant demand for Ozempic for weight loss, with 22% of Americans seeking prescriptions from their physicians and 15% having personally used it for weight management (Arillotta et al., n.d.). Additionally, 47% of respondents reported knowing someone who had used Ozempic for similar purposes. These statistics underscore the imperative for healthcare providers to educate patients regarding appropriate medication use and associated risks. Moreover, the study underscores the necessity for further research initiatives and public awareness campaigns to address the hazards associated with the misuse of pharmaceuticals for off-label purposes for cosmetic usage (Chiappini et al., 2023).

Using Optomotor Response to Characterize Visual Acuity in Ranitomeya Poison Frog Tadpoles

Rey Danger Cohen

Faculty Mentor: Dr. Yusan Yang (College of Arts and Sciences)

The animal kingdom displays high variability of visual acuity based on factors such as eye size and pupil shape. While numerous anurans have well-developed vision due to a complex retina, the sheer volume of species with vastly different physiology and ecology leaves many unstudied. Here, we use an optomotor apparatus with alternating black and white stripes to determine the acuity limits of visual capabilities in Ranitomeya species by triggering their innate reflexes to track the moving stripes. We characterized the range of visual acuity that elicits a strong positive response in early-stage tadpoles (Gosner stages 26-39; pre-forelimb development) by varying the stripe width of an optomotor drum. By developing and troubleshooting the methodology, we not only provide new data on visual acuity of Ranitomeya tadpoles, but also a means for further experiments to test factors such as changes in visual acuity through development, visual acuity variation among species, and even color sensitivity.

Prevalence of Anxiety Disorders in Rural VS Urban Populations of India

Rhea Joshi, Priya Desai

Faculty Mentor: Dr. Holly Donahue Singh (Judy Genshaft Honors College)

There are many social, cultural, and environmental factors that can impact the prevalence of anxiety disorders within the Indian population. We looked at how rural and urban populations differed in areas such as anxiety disorder prevalence, treatment, and help-seeking practices for mental health. This research draws on research related to gender, available mental health services, stigma surrounding anxiety, and factors distinguishing rural and urban areas. We provide an insightful overview of how social and cultural determinants in these differing populations can create heightened levels of anxiety and propose potential mechanisms for bridging the gap between urban and rural populations in the area of mental health.

Future Critical Habitat for the Roseate Spoonbill in Florida: A Probabilistic Habitat Suitability Model Based on County Population Growth and Existing Spoonbill Sightings

Ria Reynolds

Faculty Mentor: Dr. Barnali Dixon (College of Arts and Sciences)

Historically, studies surrounding future conservation practices for the roseate spoonbill (Platalea ajaja) have been scarce, instead focusing on ecosystem/community based spatial analyses. The roseate spoonbill has long acted as both a flagship species for conservation and ecotourism and an indicator species of wetland health. However, the lack of focus on this species in research only aids in the disjointed classification of their vulnerability levels – the IUCN Red List labeling them as a species of least concern while the Gulf Coast Vulnerability Assessment describes them as highly vulnerable with the lowest capacity to adapt. An individualized assessment of the roseate spoonbill seems necessary to clarify the species' vulnerability. This study therefore attempts to answer two questions: how high is the affinity of the roseate spoonbill to their mangrove habitats, and which areas of Florida should be the focus of future conservation efforts for this species? These questions were answered through the use of GIS. Roseate spoonbill sightings from 2013 to 2023 were intersected to the major wetland types (estuarine, lacustrine, palustrine, riverine, and marine), making sure to highlight the presence of these birds within both mangrove and salt marsh habitats. This information was cross-referenced over Florida counties with the highest percentage of population growth from 1990 to 2020, these counties being grouped into three categories (low, medium, and high). Research revealed that, overall, palustrine wetlands continue to have the highest habitat affinity for roseate spoonbills, but specific counties have unique variables that may require other wetland types to be prioritized.

Modified Graham Patch Repair of Small Bowel Anastomotic Leak

Rishabh Thakkar

Faculty Mentor: Dr. Ashley Alden (Morsani College of Medicine)

Graham patch repair is a surgical technique used for perforation closure, most commonly with foregut peptic ulcers. This technique involves the perforation being covered with a patch made with a piece of omentum (abdominal fatty tissue). The patch is held in place with sutures drawn through the perforation and tied around the omental patch. This technique has been successful as natural tissue and blood supply of the omentum tightly close the perforation. The modified Graham patch repair involves two sets of sutures, one to close the perforation and another securing the omental patch around the perforated area. We present the case of a 79-year-old female who had history of an emergent treatment of an iatrogenic perforation during an endoscopic polypectomy with a right hemicolectomy. Over a two-year period, she had several abdominal complications leading to many resections and an ileostomy. Our institution performed an ileostomy reversal using the single incision laparoscopic (SILS) technique. Ileostomy reversal led to an anastomotic leak. With the re-operative field involving dense fibrosis and adhesions, mobilization of the anastomosis was not deemed safe. She underwent repair of her ileocolic anastomotic defect with diverting loop ileostomy using a SILS modified Graham patch technique. Five months later, with no radiographic evidence of anastomotic leak, successful loop ileostomy reversal was performed. The modified Graham patch repair is not commonly performed in the distal midgut or re-operative field. We encourage further investigation of midgut anastomotic complication management using modified Graham patch repair given unsafe conditions for re-anastomosis.

The Association Between Infant Age and Size and the Availability of Remnant Blood Samples

Rishitha Chiguru, Janaki Menon

Faculty Mentor: Dr. Thao Ho (Morsani College of Medicine)

Background: Blood loss from phlebotomy can lead to an increased risk for iatrogenic anemia in preterm infants. Routine blood tests are needed to monitor the clinical status, including nutrition and physiologic functions, of preterm newborns. Some of these blood samples have leftover blood volume or remnant specimens after the ordered tests were completed. Our study aimed to identify the age and lab groups where the blood loss from phlebotomy can be minimized. Methods: A total of 794 blood specimen orders were analyzed from 32 preterm infants to test the association of gestational age and current weight on the availability of remnant blood samples. Lab orders to determine the availability of remnant samples and the types of tests, chemistries, hematology, biomarkers, or others, were recorded. Results: We found that 62.3% of ordered labs had remnant samples, with most of these samples being from chemistry (23.7%) and hematology (17%) blood tests. Data also showed a significant association between the availability of remnant samples and

infants with higher gestational age and weight. The presence of remnant samples showed a mean gestational age of 35.0 +/- 6.0 weeks and a mean weight of 2199 +/- 1208 grams, while the absence of remnant samples showed a mean gestational age of 31.9 +/- 4.8 weeks and mean weight of 1616 +/- 899 grams. Conclusions: Our findings suggest that a lower volume of blood specimens can be drawn from preterm infants of >35 weeks and >2000 grams to reduce the risk of iatrogenic anemia.

Assessing the Effectiveness and Implementation of Artificial Intelligence in Detecting and Preventing International Financial Crimes: A Case Study of the United Kingdom

Robert Dalton
Faculty Mentor: Dr. Jung Chul Park (Muma College of Business)

Financial crime has been an issue that has plagued the world for as long as the concept of trade has existed. With the rise of the digital age and globalization, financial crime has continuously and significantly evolved, with increasingly complex and intricate methods of financial crime and fraud being committed each year. Government organizations and financial institutions are having to constantly overcome new barriers and challenges to monitor financial crimes due to their evolving nature. Artificial intelligence, a new technology that is being constantly researched and explored, has the potential to innovate current and new technologies within the financial intelligence sphere, such as regulatory technology (RegTech), and suspicious activity reports (SARs), to help detect and prevent financial crime as criminals seek to innovate on the technology themselves. This study will assess the implementation and effectiveness of artificial intelligence in fighting and detecting financial crime within the United Kingdom, specifically analyzing the regulatory landscape, current practices, and the effectiveness of these practices while also providing future recommendations.

Advancing Automated Code Vulnerability Detection: A Federated Learning and Graph-Based Perspective

Ronia Arabian
Faculty Mentor: Dr. Giti Javidi (Muma College of Business)

Modern software systems face increasing threats from security vulnerabilities, making automated vulnerability detection a critical area of research. Code vulnerabilities—such as memory leaks, buffer overflows—are often buried within millions of lines of source code and traditionally require expert manual analysis. Vulnerability detection methods vary in how they process and learn from source code, with prominent approaches including deep learning (DL), graph neural networks (GNNs), and large language models (LLMs). DL-based methods treat code as sequences of tokens and leverage models like CNNs and RNNs to identify syntactic patterns, while GNN-based approaches—such as Devign—analyze structural code representations like ASTs, CFGs, and CPGs to capture execution dependencies and semantic relationships. In contrast, LLM-based methods such as CodeBERT and MIVDL incorporate code tokens, comments, and graph features to build contextual understanding, offering strong performance on semantic analysis. Federated Learning (FL) enables collaborative model training across distributed data sources without sharing raw code, making it a promising solution for privacy-preserving vulnerability detection. Because of the limitation for dataset in detection vulnerability, FL allows clients to keep datasets secure while contributing to a global model through local updates. A diverse selection of vulnerability datasets can support this, including Devign, Big-Vul, and DiverseVul. In this study, Joern is considered as a tool for parsing source code into CPGs, enabling structured analysis. A literature review of FL-based and graph-based methods is conducted to compare their models and results. Several gaps are identified for future consideration, including multi-granular detection, interprocedural learning, and cross-language analysis.

A Theoretical Approach to Post Hurricane Disasters: Service, Reciprocity, and Meaning in the Florida Peninsula

Rosemary Rios, Victoria Vo, Sarah McKnight Welzbacher
Faculty Mentor: Dr. Heather O'Leary (College of Arts and Sciences)

The hurricane season between June and November presents a significant environmental challenge for the peninsula of Florida. With the very real threat of each season being worse than the last, Floridians are on high alert now more than ever. However, a hurricane's impact extends far beyond that of just natural forces; it deeply influences the cultural, social, and economic dynamics of the area. Through academic sources and personal lived experiences,

various anthropological theories have been found at the root of these impacts. Sociological thought, neo materialism, and globalization were theories utilized to provide valuable insights into comprehending the complex ways these disasters affect society and shape responses at different scales. The research suggests the impacts of hurricanes on Florida is far more complex than previously thought. This proves just how important it is to look beyond the surface level and dig a little deeper.

Stem Cells-Based Spinal Treatment For Spinal Cord Injury

Roy Chen, Fahed Hamad, Vaishnavi Kota, Amanda Villasmil
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Spinal cord injuries disrupt the human body's sensorimotor functions. However, with studies on regenerative medicine, stem cell treatments have been implemented in the central nervous system (CNS) to restore functions after spinal cord injuries (SCI). This systematic review aimed to assess the effectiveness of different stem cell therapies against SCI. By using "spinal cord injuries," "stem cell research," and their Medical Subject Headings as its search terms, this review yielded 370 results from PubMed. Using Rayyan, this review included ten English, original, peer-reviewed studies between 2014 and 2024, while it excluded review articles or studies that do not focus on human adult stem cells and SCI. Through immunosuppressive drugs, phase I/II clinical trials confirmed stem cell therapy's safety. From there, stem cell therapy's effectiveness was assessed using the American Spinal Injury Association's Impairment Scale (AIS). Many types of stem cells showed promising results: adipose-derived stem cells grown alongside endothelial cells significantly enhanced neural growth with capillary recruitment. Additionally, nearly half of the patients receiving autologous bone marrow mesenchymal stem cells (MSC) had improved ASI grading, sensorimotor functions, and bladder usage. Nevertheless, some stem cells yielded conflicting results. Although CNS stem cells in the thoracic spinal cord improved senses, they did not affect the lower extremities' motor scores. Similarly, umbilical cord MSC significantly improved sensorimotor functions, but another study found the lower extremities' improved strength to be insignificant. Although stem cell therapy showed promising results for resolving SCI, more research is needed to improve stem cell therapy's effectiveness.

Media Analysis of "Under the Same Moon"

Ruby Suarez
Faculty Mentor: Dr. Cayla Lanier (Judy Genshaft Honors College)

This media analysis will identify and interpret the cultural and social themes in the 2008 movie, "Under the Same Moon," by Patricia Riggen. Through analyzing and providing context for the cultural and social components in this movie, this analysis shows how this movie provides insight in the cultural experience of Mexican immigrants in the United States.

Climate Change-Induced Shifts in Vector-Borne Disease Patterns: Impacts on Human Health and Adaptive Public Health Strategies

Ryan Chang, Leila Sujanani, Ariba Chaudhry, Shakiela Boothe Rodney, Zara Khan, Jenna Thimesch
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Climate change factors such as increased temperature, increased rainfall, and humidity have appeared to exponentially impact the transmission of various vector-borne diseases, including malaria, dengue fever, Zika virus, lyme disease, and more. This systematic review aims to further evaluate the correlation between climate change factors and vector-borne diseases. Once the relationship was determined, the impact of vector-borne diseases on human health and the possible solutions to mitigate the effects was assessed. Peer-reviewed articles published between 2018 and 2024 were systematically analyzed, focusing on the relationship between climate change and vector-borne diseases. Comprehensive searches were conducted across databases, including NCBI and PubMed, using the keywords "climate change," "vector-borne diseases," and "vector distribution". The main findings of the research show significant climate-driven shifts in vector-borne disease similarities across multiple regions. Higher altitudes and latitudes were reached by malaria and dengue transmission, and a 1 Celsius degree of temperature increase was related with increases of 39% for malaria in the East African highlands and 14%

for dengue in Southeast Asia. The northward extent of spread of Lyme disease in Europe was up to 80 km over a decade, and tick activity increased by 20% during milder winters. The findings confirm that climate change is a significant driving factor in the increased spread of vector-borne diseases. This research thus highlights the urgent need for addressing climate change to protect public health from the sharp increase in vector-borne diseases and emphasizes the importance of integrating climate data to anticipate future disease outbreaks and inform interventions.

GPCR-Mediated Mechanisms in Obesity: The Role of Ghrelin and GLP-1 Receptors

Ryan Singh, Tuana Cenberoglu, Jonathan Budlong, Jaclyn Alejandro
Faculty Mentor: Dr. Libin Ye (College of Arts and Sciences)

G protein-coupled receptors (GPCRs) regulate metabolism and transmit appetite cues throughout the brain and digestive system. Binding to GPCRs, ghrelin, and GLP-1 are ligands that influence hunger, energy balance, and insulin secretion. Understanding the relationship between GPCRs and ligands such as ghrelin and GLP-1 offers critical insights into treating metabolic disorders such as obesity, a growing issue in America. Our methodology involved a literature review using USF, NIH, and JSTOR databases. Search terms like "GPCR obesity," "GLP-1 obesity," and related keywords identified articles from 2000 onward, yielding 59 studies on GLP-1 and ghrelin in obesity. GLP-1 receptor agonists (GLP-1RAs), initially developed for type 2 diabetes, have shown effectiveness in treating obesity by reducing blood glucose levels, appetite, and hunger while delaying gastric emptying and enhancing satiety. Studies on semaglutide, liraglutide, and retatrutide demonstrated their efficacy in promoting weight loss when combined with diet and exercise, highlighting their potential as pharmacologic treatments for obesity. However, side effects such as gastrointestinal discomfort and limitations of mostly animal studies underscore the need for further research to enhance safety and reliability. This study highlights the pivotal role of GPCRs in managing obesity and diabetes by regulating energy balance and metabolism. Advances in GLP-1-based therapies and GPCR-targeting drugs offer transformative potential for personalized treatments, emphasizing the importance of continued research into these mechanisms.

The Role of Citizenship in the Poor Living Conditions of the Chinese Xinjiang Uyghur Muslims

Rysun Chu
Faculty Mentor: Dr. John Perry (College of Arts and Sciences)

The Xinjiang Uyghur Muslims are a persecuted ethnic minority of the People's Republic of China (PRC) that have reached new heights of international attention with the recent discovery of their internment in concentration camps. But beyond these more recent tragedies, the Uyghurs have suffered a long history of oppression under the Chinese Communist Party (CCP), a steep escalation of early ethnic tensions between the majority Han Chinese and Uyghurs. This growing cultural divide occurred concurrently with post-revolution China's new status of nation state and subsequent undefined notion of citizenship—an unofficial system that pitted party comrades against state enemies. Therefore, I will argue that the birth of the PRC nation state and its history of unofficial citizenship catalyzed an existing cultural divide between the Hans and Uyghurs, leading to the Xinjiang Uyghurs' poor living conditions. This is especially highlighted by the Uyghurs' stunted social integration, extreme healthcare statistical disparity showcasing their lack of governmental support, and decreased economic opportunity compared to the overall Chinese populace, with the common denominator of being a product of prolonged cultural divide fueled by a marginalizing citizenship model. This study was conducted through extensive review of both primary and secondary sources, with an emphasis on acquiring key statistics such as healthcare data, interviews and details on Chinese government policies all reflecting the Uyghurs' poor living conditions. These conclusions are significant due to their illustration of the dangers resulting from neglecting disadvantaged populations, showcasing a slippery slope of inequality to tragedy that is echoed across the globe.

Provider Engagement in ICU Quality and Process Improvement

Sailaasya Pinnamaneni, Nour Shokr, Sama Shokr, Carole Wadie, Niveditha Chandrakanth
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Effective provider engagement in the Intensive Care Unit (ICU) is critical for optimizing patient outcomes and ensuring high-quality care delivery. This study examines the relationship between provider engagement and ICU process improvements. Family/patient-centered care, interprofessional collaboration, and

education/training are key factors to enhance engagement, fostering a more efficient care environment. A systematic literature review was conducted using PubMed, incorporating quantitative and qualitative data to understand provider engagement and processes in the ICU. Of the 77 articles screened, 24 met the criteria. Shared decision-making between the provider and the patient/family led to a 29% reduction in adverse events and a significant increase in patient satisfaction from 71.8 to 93.3. Participation in rounds potentially enhances outcomes in the ICU. Collaborative practice has improved patient outcomes, leading to a 43% reduction in ICU mortality and a decrease in ICU length of stay from 8.3 to 3.6 days. An essential element was the continuous education and training of the providers; in particular, case-based learning and on-the-job training were the most impactful in modifying established processes. These aspects improve ICU processes by reducing complications, such as a 69% decrease in CLABSI rates in one year, through a holistic approach to care. This review provides a structured approach to how high-quality care in the ICU can be enhanced and further assessed through interviews and surveys with healthcare professionals, patient families, and ICU patients. Future studies should integrate longitudinal data alongside critical provider feedback to enhance ICU care.

Even the Caged Bird Sings: Afghan Women and the Fight to Flourish Under Modern-Day Taliban Rule

Samantha Whiskeyman

Faculty Mentor: Dr. Raheleh Dayerizadeh (USF World)

Resistance to violence can take many forms. Art has been used as a means of resistance for hundreds of years, even through to the modern age. The work of an artist will often reach farther into the world than the artist themselves can physically. Afghanistan today, ranked as one of the least free countries in the world due to the authoritarian rule of the Taliban, is rife with heightened levels of gender-based violence against women. This paper examines how many Afghan women use art as a means of resistance against the Taliban's mandates. Poetry, paintings, photography, and music all hold examples of Afghan women reclaiming their voices through art. Afghan women expats such as Roya Sadat, Rada Akbar, and Aryana Sayeed use their art as a way to speak for those who cannot speak for themselves. Although the situation seems hopeless, as the Western feminist world seemingly turns a blind eye to the violence in Afghanistan, one can see a grassroots movement towards liberation within the artwork of these women.

Comparing Coral Reef Structural Complexity in Protected and Unprotected Regions of the Eastern Caribbean Using Photogrammetry.

Sandra Little

Faculty Mentor: Dr. John Parkinson (College of Arts and Sciences)

Calcareous coral skeletons create the structural complexity of coral reefs. This three-dimensional complexity creates habitat for reef organisms, dissipates destructive wave force energy to surrounding coasts, and dictates ecosystem functionality. Structural complexity can be quantified through measurements of reef rugosity, (vertical deviation in surface height compared to the flat planar surface of the reef area). Traditionally, rugosity was measured using a chain and tape method, but this approach is limited to a singular linear line along a reef and therefore fails to provide a comprehensive metric of physical complexity. Photogrammetry (the use of photographs to survey and measure distances between objects) is emerging as a new tool in coral reef monitoring. Combining photogrammetry, orthographic mapping, and digital elevation models, comprehensive reef rugosity can be measured with great accuracy and efficiency. To test this approach, photogrammetry surveys were performed at multiple reef sites at Union Island of the Grenadines and the Tobago Cays, including sites within and without marine protected areas. Maps and models were constructed for twelve permanent plots and analyzed in Agisoft Metashape and TagLab to estimate surface complexity. Protected sites featured greater rugosity than unprotected sites with values of 2.53 and 2.44 respectively. However, average live coral coverage was low (5.98%), and there was no clear relationship between reef rugosity and coral coverage, indicating other factors such as dead colonies may have greater influence on rugosity differences among sites. Based on this preliminary work, photogrammetry appears to be a promising technique for efficient coral reef monitoring efforts.

Examining the Influence of Hearing Aid Intervention on Physical Activity and Function: A Mixed-Methods Approach

Sarah Bochat

Faculty Mentor: Dr. Michelle Arnold (College of Behavioral and Community Sciences)

Objectives. Determine the benefits of a best-practice hearing intervention on quantitatively-measured and qualitatively-perceived activities and physical abilities. Design. This is an embedded mixed-methods study involving 17 new hearing aid users aged 55 to 75 years. Quantitative outcomes were assessed at baseline and 6-months post intervention. Questionnaires: 1) Baecke Habitual Physical Activity questionnaire, 2) The Hearing Handicap Inventory-Screening Version, 3) PROMIS Mobility V2.0, 4) RAND 36-Item Short-Form Health Survey. Performance-based measures: 1) Expanded Short Physical Performance Questionnaire, 2) Modified Four-Square Step Test. The qualitative strand consisted of in-depth, semi-structured interviews conducted at 4-months post intervention using the WHO International Classification of Functioning, Disability and Health framework. Qualitative content analysis was performed to identify categories capturing participants' perceived changes with intervention. Fisher's Exact 2x2 tests were used to test the association between assigned qualitative categories and quantitative results expressed as a dichotomized residualized change score. Results. Four hierarchical and mutually exclusive qualitative content categories were inductively derived: 1) Hearing-Related Improvement, 2) Positive Psychosocial Change, 3) Positive Social Activity Change, and 4) Positive Physical Activity and Health Change. For statistical analysis, categories were expressed as group 1 (category 1 & 2 combined) and group 2 (category 3 & 4 combined). Compared to group 1, group 2 demonstrated visually poorer performance at baseline and greater raw change on most quantitative measures. However, the association between group and change scores was not statistically significant ($p>0.05$). Conclusions. A best-practice intervention supports improvement in hearing, psychosocial wellness, social and physical activity, and physical health.

A Functional Analysis of Shell Tools from the Safety Island Period (900 – 1700 CE) at the Weeden Island Site, Pinellas, County Florida

Sarah McKnight Welzbacher

Faculty Mentor: Dr. John Arthur (College of Arts and Sciences)

The Weeden Island archaeological site (8PI1) in St. Petersburg, Florida, is characterized by a diverse artifact assemblage, including pottery sherds, both shell and stone tools, and shell beads. This research addresses specifically the shell tools recovered from a living floor, that radiocarbon dates to 900 CE and was occupied by the Safety Harbor culture. Unfortunately, little is known about how the Safety Harbor inhabitants used their shell tools. This research analyzes the wear patterns from the shell tool assemblage uncovered from the living floor to determine the function of this unique ancient technology. The research findings suggest that some shell tools could have had multiple functions. The results also suggest that the shell tools were reused to extend their use-life. This shell tool functional analysis provides critical data for possibly determining how the associated shell beads from the living floor were manufactured.

The Sami People, Culture, and Legacy: The Archaeological Record in the Sápmi Region of Fennoscandia

Sarah McKnight Welzbacher

Faculty Mentor: Dr. Kathryn Weedman Arthur (College of Arts and Sciences)

Comprising Finland, Norway, Sweden, and parts of Russia, the Fennoscandia region has been home to the indigenous Sami people and their ancestors for around 10,000 years. This research investigates the archaeological record of the Sampi region in Fennoscandia, focusing on the indigenous people, their cultural development, and their enduring legacy. It examines the dynamic between indigenous traditions and external influences, such as that of historical colonialism, into shaping the present-day Sami culture. Through archaeological case studies and Sami oral traditions, this research contributes to a deeper understanding of the Sami people's historical presence and their ongoing significance in the Sápmi region. This project aims to emphasize the importance of responsible stewardship and the need to include Sami voices in the interpretation of their history. Recognizing the Sápmi region as a living cultural landscape, it is imperative that future research prioritizes ethical considerations and engages with Sami communities to ensure that archaeological investigations are conducted in a manner that honors their traditions and ancestral connections to the land. Aiming to minimize disturbance and maximize the preservation of cultural heritage.

The Utilization of Museum-Based Art and Music Therapy for the Well-Being of Dementia Patients and their Caregivers

Sarah Percy, Carolyn Mazur, Rebecca Buete, John Adams
Faculty Mentor: Dr. Catherine Wilkins (Judy Genshaft Honors College)

The aim of this research was to facilitate a space where simplistic music and movement can benefit emotional regulation, present theoretical improvement in memory, and develop connections to art in a museum setting. A comprehensive literature review informed the development of a music-centered activity for the Art in Mind program that allowed for patients to individually engage with live music alongside artworks in a museum setting, as well as in homes and patient care facilities. Overwhelmingly, research showed that music has a positive effect on mood, behavior, and engagement with others for patients and healthy individuals exposed to music. Through the use of selected hand-held instruments, participants were led through a tour of the James Museum, where they observed various artworks and made connections to the instruments and the music they made with them. Participants were instructed to play their instrument, observe its characteristics, and think about how they could connect their instrument to the art they were appreciating. After the tour, participants' survey results showed an increase in mood and sociability through their responses. Accordingly, docent observations of the participants in the music-based section of the tour showed a great deal of enjoyment, and helped some participants make connections to past experiences. Overall, the inclusion of a music section within the program was beneficial for the participants' mood and willingness to communicate, but more intensive research must be done to show any definitive benefits from a neurocognitive standpoint.

Targeting the PI3K/AKT/mTOR Signaling Pathway in Non-Small Cell Lung Cancer

Savannah Cullen Woods, Nadia Rohani, Noor Yassin, Lily Moore, Carol Agaiby, Zaid Ballich
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Non-small cell lung cancer (NSCLC) is the leading cause of cancer related deaths and is characterized by its appearance on the lining of the epithelial cells of the lungs. Previous studies suggest interventions to the P13K/Akt/mTOR pathway can lead to apoptosis and autophagy of NSCLC cells but the response to these inhibitors are varied due to the large presence of cell line mutations. The PI3K/Akt/mTOR pathway is an intracellular signaling pathway that regulates cell growth, survival, proliferation and is often dysregulated in cancer. This review aims to synthesize the current treatment options offered by PI3K/Akt/mTOR inhibitors and their efficacy, establishing a greater correlation between the pathway's inhibition and treatment outcomes. With the knowledge collected, the aim is to identify safe areas for regulatory intervention. A systematic review analyzing 21 articles published within the past 10 years from scientific databases, including PubMed and ScienceDirect, were collected based upon key words including "PI3K/Akt/mTOR," "NSCLC," and "inhibitors." The review established that the combined use of inhibitors had a greater efficacy on cell death and autophagy. The inhibitors cedrol, cardamonin, and ailanthone were found to be the most effective at promoting apoptotic cell death, while the inhibitors ailanthone and cisplatin were found to be most effective at combined treatment in relation to apoptotic cell death. The findings illustrated that combined P13K/Akt/mTOR inhibitors enhance apoptosis and autophagy in NSCLC cells, supporting the pathway's role in cancer progression. Addressing the relationship between combined inhibition therapy and mutation variability can improve treatment outcomes for NSCLC patients.

Understanding the Coping Mechanisms Used by Older Formerly Incarcerated Persons During Reentry

Sayla Victores
Faculty Mentor: Dr. Jessica Grosholz (College of Behavioral and Community Sciences)

The current study investigated the coping mechanisms employed by older formerly incarcerated individuals during reentry. While there is research on the reentry experiences of older formerly incarcerated individuals, less is known about how they cope with the strains of reentry. As such, this study fills this gap in the literature by exploring both adaptive and maladaptive coping mechanisms employed by this population during reentry. Using in-depth interviews with 20 older, formerly incarcerated individuals, I found that older formerly incarcerated persons experienced challenges related to securing stable housing, finding employment and economic security, community supervision, stigma and judgment, and overall reintegration. To cope with these challenges, the data revealed that older formerly incarcerated individuals turned to both positive coping mechanisms (e.g., social support, employment, religion, etc.) and negative coping mechanisms (e.g., avoidance and withdrawal). The results of the current study have the potential to guide policy makers,

corrections leaders, and communities to invest in activities that promote positive coping mechanisms, ensuring that older incarcerated individuals maintain connections with family and friends. Furthermore, the results of this study can guide correctional leaders to ensure that older incarcerated persons know about the programs that are available to them while they are still incarcerated and post-release to aid in their reentry experience.

Down the Witches Road: The Feminine Culture and Identity found in 'Agatha All Along'

Scarlett-Rose A Austin
Faculty Mentor: Dr. Cayla Lanier (Judy Genshaft Honors College)

The following project will focus on both the perceived and personal feminine identity, as well and the cultural impacts on characters found in the Disney+ Series 'Agatha All Along', and how they connect to real life sociological theory.

Alternative Delivery Systems in Gene Therapy for Parkinson's Disease

Sebastian Rakowski, Mahek Khiantani, Ameera Jamil, Jnya Harry, Aaryan Issam Wali, Talia Koussayer
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Parkinson's Disease (PD) is a progressive neurodegenerative disorder characterized by the depletion of dopaminergic (DA) neurons in the substantia nigra (SN), leading to cognitive, motor, and nonmotor symptoms. Gene therapy has emerged as a promising treatment by enhancing dopamine production, but challenges remain, particularly regarding immune responses to viral vectors. This study examines the effectiveness and limitations of gene therapy strategies for PD, focusing on direct infusion of growth factor proteins and the use of lentiviral and adeno-associated virus (AAV) vectors. A review of 50 peer-reviewed studies from 1993 to 2024, sourced from Google Scholar and the USF Library, analyzed approaches such as AAV and lentiviral delivery, glial cell line-derived neurotrophic factor (GDNF) administration, dopamine level modulation, and inflammation control, often tested in mammalian models. Findings indicate that lentiviral and AAV vectors enhance dopaminergic function and therapeutic protein expression in the striatum but face challenges related to limited distribution and immune responses. Direct infusion of growth factor proteins shows potential in increasing neurotrophic factor expression but presents difficulties in precise brain delivery. While gene therapy offers promise in alleviating PD symptoms, immune responses to AAV vectors, limited agent distribution, and safety concerns related to brain accessibility and delivery precision must be addressed. Future research should focus on optimizing vector dispersion, minimizing immune reactions, and improving targeted delivery methods to enhance the efficacy and safety of gene therapy for PD.

Broccoli and Obesity: a Comprehensive Overview on the Usage of Bitter-Tasting Compounds in Brassica Plants to Stimulate GLP-1 Production

Selah Thompson
Faculty Mentor: Dr. Anna Dixon (College of Arts and Sciences)

In the past few decades, obesity has become an increasingly prevalent problem across the world. In 2022, the World Health Organization (WHO) reported that 1 in 8 people globally are living with obesity. As the "Obesity Epidemic" has begun to find mainstream presence, so have potential solutions for reversing detrimental effects. GLP-1 agonists, also known as Glucagon-Like Peptide 1 agonists have become a more common product used to help adults with obesity and weight loss. Medications such as Ozempic, Wegovy, and Trulicity all use GLP-1 agonists to assist in managing blood sugar levels, controlling hunger, and triggering the release of insulin. A large problem with GLP-1 medications is the cost. Doses of GLP-1 agonists can cost upwards of 1,000 dollars for just a one-month supply. However, a possible solution may lie in plants of the Brassica genus. Brassica plants such as broccoli, cabbages, mustard, and cauliflower contain compounds known as isothiocyanates that have a notoriously bitter taste. Because of how Bitter Taste Receptors (T2Rs) in the body interact with endocrine responses, it stands to reason that the bitter compounds found within Brassica plants could possibly be used to induce GLP-1 secretion in manners like current GLP-1 medications. This comprehensive overview will discuss the properties of Brassica plants and isothiocyanates in relation to GLP-1 secretion while also exploring possible solutions in creating a derived product that could act as a low-cost option in fighting the obesity epidemic.

Beyond Probiotics: Exploring Heyndrickxia coagulans for Antimicrobial Potential

Serena Lozandi

Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

As antibiotic resistance continues to rise, the importance of researching alternative antimicrobial agents is crucial. Heyndrickxia coagulans (formerly Bacillus coagulans) is a spore-forming, lactic acid-producing bacterium with potential antimicrobial properties. Due to its ability to produce resilient spores, it can withstand adverse conditions. Previous research has studied the effects of Heyndrickxia coagulans in managing irritable bowel syndrome symptoms, and its ability to inhibit pathogenic bacteria such as Salmonella Typhimurium. Additionally, different strains are found to have different effects in enhancing immune responses. This study examines its ability to inhibit the growth of pathogenic bacteria. Through a series of modified Kirby-Bauer assays, Heyndrickxia coagulans was found to show semi zones of inhibition against E. coli. While results indicate weak antimicrobial activity, these findings suggest that H. coagulans may play a role in microbial interactions or require specific conditions to enhance its efficacy. Further research into its metabolite production and environmental parameters may provide insights into its potential as a supplementary antimicrobial agent. Understanding these mechanisms could contribute to the development of alternative strategies in addressing antibiotic resistance.

Notable Barriers to Study Abroad Program Participation in Undergraduate Studies: Through case studies at the University of South Florida's Honors College Programs

Serena Lozandi

Faculty Mentor: Dr. Benjamin Young (Judy Genshaft Honors College)

Despite the increasing emphasis on global engagement in higher education, many undergraduate students face significant barriers to participating in study abroad programs. This study explores the primary obstacles preventing students from engaging in study abroad programs, using the University of South Florida's Honors College Programs as different case studies. Through qualitative data collection via a comprehensive survey, key barriers such as financial constraints, lack of awareness and support through the application process were identified. The research highlights disparities in access based on socioeconomic background and academic discipline, underscoring the need for targeted institutional support. Findings suggest that universities can enhance participation by increasing transparency in financial costs and financial aid opportunities, providing efficient communications across all study abroad program departments pre and post travel, and fostering early awareness initiatives. This study contributes to a broader conversation on improving equitable access to global learning experiences in undergraduate education.

Economic Impact of Nicotine Addiction: A Multi-stakeholder Cost Analysis

Shikha Patel

Faculty Mentor: Dr. Ganesh Halade (Morsani College of Medicine)

Extensive research has examined the health consequences of nicotine addiction, but economic analyses incorporating multiple stakeholder perspectives remain scarce. This study quantifies the annual financial burden of nicotine addiction across users, employers, and insurers. A systematic analysis was conducted on direct and indirect costs, utilizing data from the Centres for Disease Control and Prevention (CDC), Bureau of Labor Statistics, and insurance industry reports (2022-2024). The financial impact was assessed for each stakeholder, including consumption expenses, productivity losses, healthcare utilization, and insurance claims. The estimated annual economic burden of nicotine addiction was ₹1,773.4 billion in India, while in the U.S., costs reached $28,428 per smoker (2024 USD). Employers bore the highest financial burden, averaging $2,083 per smoking employee due to productivity losses (₹1,16,160) and additional break time ($3,796). Individual users incurred $5.86 billion in direct costs, while insurers faced $45.40 per smoking member annually. Healthcare-related expenses accounted for 41% of total costs. Success rates of cessation methods varied. Pharmacological interventions showed effectiveness at 12 months: Varenicline (21-24%), Bupropion (15-20%), and Nicotine Replacement Therapy (NRT) (17-25%). Behavioral approaches, such as Cognitive Behavioral Therapy (CBT) and talk therapy, demonstrated success rates of 7-16% and 40-80%, respectively. The Qtox cessation program, integrating pharmacological, psychological, and nutraceutical support, showed high efficacy, with 65 out of 99 patients achieving 100% success after 90 days. Nicotine addiction imposes a significant economic burden, with employers experiencing the greatest financial strain. Workplace cessation programs offer a strong return on investment by improving productivity, reducing insurance costs, and enhancing well-being.

Exploring Marine Microbial Products: Targeting Medical Bacteria in Little Bayou Bay

Shivam Patel

Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

This study focuses on the identification and curation of microbial natural products, with a specific interest in their potential to target medical-related bacteria. The environment of the Little Bayou Bay was sandy with dirt near alley water that goes out to the Little Bayou Bay. The depth of sample was collected can have different pH level, and bacteria that live in the area. Understanding these reasons why microbial natural target medical-related bacteria can open numerous treatment options. The goal of the research lab is to isolate a bacterium from a sample from Little Bayou Bay. During the lab conduct multiple experiment that include high-density bacterial plating, compare isolation to killer cells, Kirby-Baur test, and multiple test that help determine if the bacteria is positive or negative. Following the Kirby-Bauer test, the bacterial isolates BAOB-4 and BAOB-5 demonstrated promising antimicrobial activity against Staphylococcus aureus. Through 16S rRNA sequencing, these isolates were identified as belonging to the genus and species [Bacillus and Bacillus stratosphericus]. The identification of BAOB-4 was unsuccessful because of an error that occurred during the 16S PCR sequencing process. The sample will be resent for identification. The study establishes a foundation for further exploration into marine natural products and their application in hoping it could be use in helping target cancer cells in the future.

Exploring Learnability in Memory-Augmented Recurrent Neural Networks: Precision, Stability, and Empirical Insights

Shrabon Kumar Das

Faculty Mentor: Dr. Ankur Mali (Bellini College of Artificial Intelligence, Cybersecurity and Computing)

This study investigates the learnability of memory-less and memory-augmented Recurrent Neural Networks (RNNs) with deterministic and non-deterministic stacks, which are theoretically equivalent to Pushdown Automata in terms of expressivity. However, empirical evaluations reveal that these models often fail to generalize on longer sequences, particularly when learning context-sensitive languages, suggesting they rely on precision rather than mastering symbolic grammar rules. Our experiments examined fully trained models and models with various frozen components: the controller, the memory, and only the classification layer. While all models showed similar performance on training validation, the model with frozen memory achieved state-of-the-art performance on the Penn Treebank (PTB) dataset, reducing the best overall test perplexity from 123.5 to 120.5—a gain of approximately 1.73%. When tested on context-sensitive languages, models with frozen memory consistently outperformed others on small to medium test sets. Notably, well-trained models experienced up to a 60% performance drop on longer sequences, whereas models with frozen memory retained close to 90% of their initial performance. Theoretically, we explain that freezing the memory component enhances stability by anchoring the model's capacity to manage temporal dependencies without constantly adjusting memory states. This approach allows the model to focus on refining other components, leading to more robust convergence to optimal solutions. These findings highlight the importance of designing stable memory architectures and underscore the need to evaluate models on longer sequences to truly understand their learnability behavior and limitations.

Systematic Review – Comparative Analysis of Opioid v. Non-Opioid Pain Management Strategies

Skye Hughes, Sebastian Mendez, Constanza Bravo Rodriguez

Faculty Mentor: Dr. Arun Kalava (Morsani College of Medicine)

Opioid analgesics (OA) are frequently prescribed for managing chronic non-cancer pain (CNCP) and post-surgical pain, but their widespread use has led to a global crisis of opioid dependence and misuse. Non-opioid analgesics (NOA) are emerging as alternatives, though they are often perceived as less effective. This review aims to evaluate the effectiveness of OA and NOA in managing pain, assessing outcomes such as pain intensity, adverse events (AE), addiction rates (AR), and quality of life (QoL). A systematic review of English-language literature from the past 10 years was conducted using databases including Google Scholar, PubMed, JAMA, and USF Libraries. Studies eligible for inclusion were randomized clinical trials (RCTs), cohort studies, or observational studies that used a standardized pain scale and reported at least one primary outcome (pain intensity or AE) or secondary outcomes (AR or QoL). The Cochrane Risk of Bias 2.0 tool was used for study quality evaluation. Of 101 studies screened, 10 met the criteria. The results consistently

demonstrated that NOA were at least comparable to OA in managing pain intensity, with advantages in improving short-term QoL and reducing AE. NOA interventions also showed a lower risk of addiction. This review suggests NOA as a viable first-line treatment for chronic pain, but further research is necessary to assess long-term outcomes and their efficacy across different types of surgical pain.

Identifying Genetic Links Between ADHD and Associated Physical Ailments

Skylar Nedd

Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

Neurodevelopmental disorders affect the nervous system during development, leading to impaired cognitive ability, motor control, and behavioral issues. Common disorders in this group include autism, ADHD, dyslexia, and Tourette's syndrome. Attention deficit hyperactivity disorder (ADHD) is primarily characterized by behavioral and cognitive symptoms, but less is known about the physical ailments that may correlate with it. We aimed to identify potential links between ADHD and physical ailments within the genome. To refine and narrow our search, we utilized genomic databases and analytical tools provided by UCSC Genome Browser, ECR Browser, Expasy, and NCBI. The Synaptotagmin 1 (SYT1) gene, which codes for structural components of neurotransmitter vesicles, has been implicated in ADHD. Gene expression analyses show that, although SYT1 is predominantly expressed in the developing and mature central nervous system, it is also highly expressed in the adrenal gland, liver, intestine, heart, and kidneys during early development. These organs, where SYT1 is expressed during fetal development, have an increased risk of disease in individuals with ADHD. Further research into the genetic causes and physical manifestations of ADHD is essential for developing a deeper understanding of the disorder's broader impact on health. Preemptive screenings for other diseases could become an important component of future ADHD diagnoses, potentially improving early intervention and treatment outcomes.

Optimization and Amplification Success of Nuclear and Mitochondrial DNA Isolated from Fecal and Saliva Samples of Lowland Anoas

Skylar Nedd, Nick Delluci

Faculty Mentor: Dr. Michelle Green (College of Arts and Sciences)

Invasive sampling techniques, i.e. blood extractions, are traditionally used to collect genomic data from wild species. These techniques are both hard to implement on more elusive species and they place stress on the animals they are performed on. Noninvasive collection methods avoid these issues by collecting DNA from traces of the organism instead of the organism itself. Animal conservation efforts may aim to use noninvasive DNA because of this benefit. One challenge when using noninvasive DNA is environmental degradation that renders the DNA unusable. However, it is now widely accepted that noninvasive samples can be just as reliable as traditional samples. In this study, we aimed to retrieve viable genetic samples from two noninvasive sources, fecal samples and saliva. Samples were collected from Lowland anoas (Bubalus depressicornis) housed at ZooTampa. Lowland anoas are found in Indonesia and are listed as endangered. We compared the amplification success of nuclear and mitochondrial DNA across fecal samples and saliva samples. The results of the study provide practical guidance to anoa conservation efforts in Indonesia. Conservation efforts in the future may use the study to determine the best noninvasive source of DNA for genetic management.

Student Well-Being and Reading Achievement: A Profile-Based Analysis of U.S. Students

Sofia Cobo Navas

Faculty Mentor: Dr. Ye Shen (College of Education)

Student well-being is a critical factor influencing educational outcomes. Previous studies have highlighted the importance of school belonging, academic self-concept, and bullying in shaping students' well-being and academic achievement. However, little is known about how variations in well-being indicators predict students' academic success. Using a nationally representative sample of 4th graders from the PIRLS 2021 dataset, this study investigates (1) whether different student profiles exist based on well-being indicators and (2) how the profile membership predicted students' reading achievement. Latent Profile Analysis identified three distinct groups based on four well-being indicators: sense of school belonging, bullying experiences, feelings of tiredness or

hunger, and absenteeism. Profile 1, with high absenteeism, tiredness, hunger, and bullying, and the lowest school belonging, showed the poorest reading performance. Profile 2, with moderate well-being and school belonging, lower absenteeism, and reduced bullying, performed better than Profile 1 but less well than Profile 3. Profile 3, with the highest well-being, strongest school belonging, and least bullying, achieved the best reading outcomes. These results suggest a clear link between a positive school environment and improved academic performance. The findings emphasize the need for schools to reduce bullying, foster inclusivity, and address students' basic needs, such as hunger and tiredness. By improving student well-being, educators and policymakers can enhance academic outcomes. Our future research will build on these results by comparing patterns across different countries to identify effective, globally relevant practices.

German Culture & Identity through a Cinematic Lens

Sofia Dolmanet, Essimo Mokube
Faculty Mentor: Dr. Peter Funke (College of Arts and Sciences)

Cultural differences present themselves in a myriad of ways. Differences in identity, values, and social norms can be observed through forms of media: such as literature, music, or film (Bonfadelli 4-5). This study aims to investigate the cultural values and identity of Germans through an analysis of recent award-winning films. Identities are fluid and subject to change, perhaps few cultures are more familiar with this concept than German culture. Though Germany existed long before (Fulbrook 27), the 1900s marked rapid identity shifts in Germans and even a seeming loss of identity in some (Feldman 251-254). These tumultuous years presented many challenges for Germany, WWI, WWII, the Cold War, as well as economic and political turmoil. This unstable environment served as a hospitable climate for social unrest. Since the German identity has undergone historically rapid development, it makes Germany an interesting country to study via film, a rapidly responsive industry. Films are useful for gauging public opinion, values, and public perception of current events (Lu 70), for these reasons, cinema analysis was chosen as a method of qualitative research. Using the analysis of recent German films and documented cultural trends in Germany, inferences about modern-day German values, social norms, and identity will be suggested.

STAT5A-Mediated Regulation of BRCA1: Implications for Cancer Risk and Women's Health

Sofia Orozco Lizana
Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

BRCA1 is a gene that plays a crucial role in repairing damaged DNA and protecting cells from becoming cancerous by preventing uncontrolled growth. A mutation in this gene is associated with an increased risk of cancer, particularly breast and ovarian cancer. BRCA1 is a tumor suppressor gene located on chromosome 17. Evolutionary conserved regions (ECRs) within the BRCA1 gene were identified to better understand the factors which regulate its transcription. Notably, the transcription factor STAT5A was found to have two predicted binding sites within an intronic ECR. This suggests that STAT5A may influence the expression of BRCA1, potentially regulating its transcription either by promoting or inhibiting it. As such, STAT5A could play a role in the development of breast and ovarian cancer. Given the significant impact of cancer as a leading cause of death, this protein holds considerable importance in both medical research and women's health.

Targeting STAT3: An Approach to Reducing Neuroinflammation in Autism Spectrum Disorder

Sofia Profeta, Jillian Tulchinsky, Adelaide Lasater
Faculty Mentor: Dr. Hector Gomez (Morsani College of Medicine)

Autistic Spectrum Disorder (ASD) is a neurodevelopmental disorder that involves chronic neuroinflammation of the brain and is characterized by difficulties in learning, behavior and social interactions. Signal transducer and activator of transcription 3 (STAT3), a transcription factor involved in Th17 cell differentiation and activated by cytokines such as IL (interleukin)-6 and IL-17, plays a key role in regulating neuroinflammation, a hallmark of ASD. The aim of this literature review is to explore the role of STAT3 activation and its potential contribution to neuroinflammation in ASD. A systemic analysis of 42 peer-reviewed articles containing the keywords "STAT3" and "Autism" was analyzed from the PubMed database, with articles screened for relevance to topic. Current literature consistently demonstrates that STAT3 activation is influenced by factors, including elevated levels of pro-inflammatory cytokine,

exposure to environmental stressors and maternal immune activation (MIA). Studies indicate that MIA elevates IL-6 levels, which subsequently activates the STAT3 pathway, promoting neuroinflammation in newborns later diagnosed with ASD. Moreover, experimental models reveal that inhibition of STAT3 signalling reduces pro-inflammatory cytokine production, highlighting its therapeutic potential. These findings suggest that STAT3 plays a pivotal role in mediating neuroinflammation associated with ASD. Further research should focus on establishing a direct causal link between STAT3 activation and the development of ASD, as this could open avenues for targeted therapeutic strategies aimed at mitigating neuroinflammation and improving clinical outcomes for individuals with ASD.

Rumination, Decision-Making, and Depression among Young Adults: A Directed Network Analysis

Sofia Reyes Ochoa, Madeline Hanks

Faculty Mentor: Dr. Max Owens (College of Arts and Sciences)

Depression manifests through a complex spectrum of symptoms across cognitive, emotional, and physical domains, resulting in a diverse array of symptom combinations. Prior investigations have overlooked the integration of cognitive symptoms within this network of varied depression symptoms despite evidence of their significant contribution to depressive states. We seek to examine the underlying network structure of the domains of rumination, co-rumination, depression, and decision-making style. Previous findings indicated that brooding had the highest cumulative strength in positive correlations and the highest expected influence, along with depression [1.53, 1.23]. By contrast, rational decision making had an expected influence of -1.00, making it highly influential in deactivating the network. Brooding and avoidant decision-making had the highest betweenness scores [8, 6], making them common bridge nodes between other nodes and depression. With this, a directed network analysis was conducted to confirm directed pathways within the networks of rumination, depression, and decision-making. Using an expanded sample size and our previous model, we ran the data through R Studio to develop the directed network. This will reveal a new dimension of how the nodes interact with each other to feed a certain thought pattern through possible causation. For example, we hypothesize that the directed network will show that brooding and depression have the highest out-degree value, confirming their strong influence in activating the behavioral patterns represented by the nodes in the network. Rational decision-making might have the lowest in-degree value due to its influence in deactivating the network.

Two Paths, One Goal: Exploring the Intersection of Ayurveda and Biomedicine in India

Solomon Van Horn, William Farrell

Faculty Mentor: Dr. Holly Donahue Singh (Judy Genshaft Honors College)

In healthcare, western medicine is seen as the first choice and the most effective form of treatment overall. The allopathic care system is the central ethos utilized in Western medicine because of its evidence-based therapies. However, in many South Asian countries, the Ayurvedic system of care is the preferred first line of defense when health issues arise. The principles employed in Ayurvedic medicine focus on healing using natural remedies centered around preserving the balance between the body, mind, and spirit. Although it is widely used, Ayurvedic practices often fall short compared to modern Western medicine. Because of this, many South Asian countries have begun integrating modern Western biomedical technology into their care practices to increase efficacy. In this literature review, the question of “How is the type of main medicinal treatment determined when presented with a medical dilemma?” will attempt to be answered. This research aims to differentiate the ethical principles of each care form and determine how treatment plans are assembled. Will treatment include only Ayurvedic or Western practices? Or both? Where is the line drawn between the two, and how is an effective treatment plan formed?

How does early diagnosis of Pulmonary Renal Syndrome (PRS) influence the effectiveness of targeted therapies and impact patient prognosis?

Sophia Martinez
Faculty Mentor: Dr. Narasaiah Kolliputi (Morsani College of Medicine)

Pulmonary Renal Syndrome (PRS) is a severe disease that affects the lungs and kidneys simultaneously, often linked to ANCA and anti-GBM antibodies, which serve as key markers of PRS. The disease progresses rapidly, leading to irreversible organ damage if not promptly treated. While previous research explored the effects of targeted treatment and therapies, there is limited information on how early diagnosis can influence treatment efficacy and long-term patient outcomes. This study explores how early diagnosis influences PRS treatment and prognosis, assessing targeted therapies in improving patient outcomes and disease progression. A comprehensive literature review of 60 articles, narrowed to 30 based on relevancy to the research objectives, was conducted using case studies, systematic reviews, and clinical trials from PubMed of the last 10 years. Early diagnosis of PRS, particularly within the first two weeks of symptom onset, significantly improves patient outcomes. In cases of PRS without plasma exchange (PE) treatment, mortality rates exceeded 90% within six months. However, timely treatment reduces mortality to below 25%. Double-positive patients (ANCA and anti-GBM) demonstrated increased one-year survival rates (50% to 80%) and a 30-40% higher chance of remission. Furthermore, early-diagnosed patients had a 40-50% reduced need for long-term dialysis compared to those diagnosed later. These results highlight the critical role of early recognition in mitigating disease progression and enhancing patient outcomes. Future research should focus on long-term effects and the development of standardized diagnostic protocols guidelines to optimize patient care. Establishing uniform guidelines for early diagnosis may improve patient prognosis significantly.

The Role of Nutrition and Diet in Modulating Pediatric Inflammatory Bowel Disease (IBD) in Later Life Stages

Sophia Martinez, Katherine Kieu, Adeline Davis, Brandon Lopez, Karissa Trannguyen, Pranav Tammineedi
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Inflammatory bowel disease (IBD) refers to a chronic inflammatory condition of the gastrointestinal tract linked to gut dysbiosis—an imbalance in microbiota composition. There are two main types: Ulcerative colitis (UC) and Crohn's disease (CD), each affecting the colon and the gastrointestinal tract respectively. Current studies indicate a lack of consistent nutritional treatment arising from the complexity of IBD's pathology, and push for preventative treatment. IBD often begins in childhood with symptoms worsening in adulthood. Thus, this study analyzes current trends in preventing pediatric IBD through diet/nutrition. Keywords such as "gut microbiome" and "IBD" were used to analyze 270 publications, from which 50 articles were selected. Our review highlights the significant role of gut microbiota-derived butyrate, a short-chain fatty acid (SCFA) produced through fiber fermentation, in regulating gut mucus barrier repair and reducing inflammation in IBD, including UC and CD. A strong correlation exists between pediatric IBD and the Western diet—characterized by high fat, refined sugars, and especially low fiber—which is associated with gut dysbiosis, exacerbating symptoms and increasing long-term health risks. IBD is also heavily associated with conditions such as bone-density loss and obesity, which are mitigated by high-fiber diets. Following such diets strengthens gut barrier integrity, emphasizing prevention as a key strategy in managing IBD. While dietary interventions are most effective when supplemented with other treatment, long-term effects stress the need for early holistic prevention. The importance of sustained, fiber-rich dietary patterns remains an undermined approach in improving overall health outcomes in children with IBD.

The Role of Oxidative Stress (OS) and Mitochondrial Dysfunction (MD) as Therapeutic Targets in Chronic Obstructive Pulmonary Disease (COPD)

Sophia Martinez, Pallavi Karnam, Aashritha Cherukuru, Nidhi Kulkarni
Faculty Mentor: Dr. Narasaiah Kolliputi (Morsani College of Medicine)

Chronic Obstructive Pulmonary Disease (COPD) is a respiratory condition that significantly impacts smooth and skeletal muscle. While previous studies explore oxidative stress (OS) and mitochondrial dysfunction (MD) in cellular damage, their role in muscle deterioration is unclear. This literature review examines the roles of OS and MD in the inflammatory cycle and their impact on smooth and skeletal muscle decline in COPD, while exploring trends as therapeutic targets. A comprehensive PUBMED analysis of 60 papers used key terms "oxidative stress/mitochondrial dysfunction" and "COPD" to examine the relationships between OS and MD in pulmonary conditions and their correlation with muscle deterioration. These were then narrowed

down to 30 articles based on our research objectives. Findings indicate no definitive causative factors for COPD, but highlight a correlation between dietary and antioxidant treatments, and the inflammatory cycle. Vitamin D deficiency is linked to increased OS and MD, impairing muscle function, while supplementation protects mitochondrial function. Moreover, lower antioxidant levels, such as peptide GHK, lead to muscle loss and inflammation. Mitophagy involves removing damaged mitochondria and is a process impaired in patients with COPD, leading to an accumulation of ROS, such as in exercise. While elevated ROS during exercise may worsen atrophy in COPD patients, moderate exercise can enhance muscle function, suggesting potential benefits. Therapeutic strategies such as moderate exercise, vitamin D supplements, and antioxidants may mitigate muscle loss and inflammation by improving mitochondrial function and increasing oxidative capacity. Further research should explore specific immune pathways to refine therapeutic measures.

CIA Covert Operations in Cold War Italy

Sophia McGregor
Faculty Mentor: Dr. Arturo Jimenez-Bacardi (College of Arts and Sciences)

Why would the United States meddle in the elections of an ally? In the late 1940s and early 1950s, the Central Intelligence Agency (CIA) did just that: it engaged in a political action program that funneled millions of dollars to the Italian Christian Democratic Party and to combat perceived communist influence in Italy. This presentation is based on 300 recently declassified documents from the U.S. governments covert action review body, the Psychological Strategy Board (PSB). The workings of the PSB have been greatly understudies and documents from the Harry S. Truman Library along with the CIA Freedom of Information Act webpage help fill some of those gaps. By analyzing declassified CIA documents and emphasizing PSB meeting minutes, this research seeks to further understand how the United States uses clandestine tactics on its allies. By interfering with elections, diffusing propaganda, and diverting funds, the PSB attempted to adjust the Italian political climate, aiming to cement Italy within the U.S.-led Western alliance system.

Breaking Barriers: Addressing the Vulnerabilities of Hispanic Immigrant Youth to Sex Trafficking in the United States

Sophia Robinson
Faculty Mentor: Tami Shadduck, MPH (College of Public Health)

In my presentation, I will highlight the cultural and linguistic barriers that prevent Hispanic youth from accessing comprehensive sex education, leading to higher rates of teen pregnancy and STDs, with a primary focus on how this acts as a primary contributor to the emergence of young Hispanic immigrants who are seeking work in the U.S. becoming more vulnerable to sex trafficking. Many young migrants arrive in search of work or to escape violence, yet they are vulnerable to exploitation due to a lack of legal protections, linguistic hurdles, and economic instability. My research will examine the specific challenges faced by Female Hispanic immigrant adolescents, emphasizing how structural injustices and the stigma associated with reporting abuse make them invisible in criminal anti-trafficking initiatives. Further, I will examine the cultural taboos that accompany sexual health discussions, which further isolate victims and deter those from getting care. By putting young women under the weight of honor and shame, traditional gender norms tend to silence their voices and make them more vulnerable to exploitation. My research will bring this issue to light and promote the creation of culturally aware, bilingual materials and focused community engagement initiatives to empower youth.

A Bioinformatic Analysis of the Lysis Cassette in Phage Audell

Sophia Singh, Olivia Godfrey, Erin Stanford, Josh Smith, Marco Barillas
Faculty Mentor: Dr. Richard Pollenz (College of Arts and Sciences)

Bacteriophages are organisms that kill specific bacterial hosts by injecting their dsDNA into the bacteria, replicating themselves, and then lysing the host. To lyse the bacteria, the phage must penetrate its inner membrane, peptidoglycan layer and mycolic acids. There is minimal research on the biological mechanisms phages utilize against gram-positive bacteria, so the purpose of this research is to evaluate phage Audell's ability to infect the gram-positive

Arthrobacter globiformis B-2979, identify and characterize its genes and protein products, and acquire data on its lysis pathway. This analysis utilizes the following bioinformatic programs: DNA Master, PhagesDB, NCBI BLAST, HHpred, DeepTMHMM, Topcons, and Phamerator. The lysis cassette genomic region is identified by Gene 24 which hits to N-acetylmuramoyl-L-alanine amidase AmiD in HHpred, therefore encoding the endolysin necessary for digestion of the peptidoglycan layer. In canonical lysis cassettes, the endolysin is followed by genes encoding one or more transmembrane (TMD) proteins that are inserted into the host membrane to destroy the Proton Motive Force (PMF) and trigger the lysis event. Gene 25 encodes a membrane protein with 2 TMD and 69 amino acids (aa) akin to class II holin proteins. Unexpectedly, 26 does not encode a TMD protein despite the precedent set by other phage lysis cassettes. However, the gene upstream of the endolysin (23) contains the expected 1 TMD, suggesting involvement in the lysis pathway. Overall, the unique data from Audell's lysis cassette analysis contributes insight into the diversity of lysis pathways for gram-positive bacteria exhibited by Arthobacter phages.

Endothelial Cells Adhere Through Multiple Integrins to the Kidney-Enriched Extracellular Matrix Protein, Nephronectin

Sophie Khullar

Faculty Mentor: Dr. George Davis (Morsani College of Medicine)

Nephronectin is a kidney extracellular matrix protein, and when this protein is genetically deleted in either humans or mice, bilateral renal agenesis occurs. A key receptor for nephronectin is the integrin, α8β1, which is typically expressed by epithelial cells and by various mesenchymal cell types, but not endothelial cells (ECs). Within the kidney glomerulus, epithelial cells and ECs are closely associated with an intervening basement membrane matrix containing nephronectin. Here, we sought to determine if ECs can interact with nephronectin, since they do not express α8β1. We demonstrate that ECs strongly adhere and spread on nephronectin substrates, a response that depends on the divalent cations, Mg^{2+} and Ca^{2+}; a characteristic of integrin-dependent adhesion. Nephronectin contains an Arg-Gly-Asp (RGD) sequence which is necessary, but not sufficient, for α8β1-dependent adhesion. We attempted to inhibit EC adhesion to nephronectin using a cyclic-RGD peptide, and a β1 integrin subunit blocking antibody individually and in combination. The cyclic RGD peptide did not block adhesion, but did interfere with EC spreading on nephronectin, while the β1 integrin blocking antibody failed to block EC adhesion and had minimal effects on EC spreading. However, when the cyclic RGD peptide was combined with the β1 integrin antibody, complete blockade of EC adhesion to nephronectin occurred. We conclude that despite a lack of EC α8β1 expression, ECs utilize two or more distinct integrins in combination to adhere and spread on nephronectin. We speculate that EC-nephronectin interactions play an important role in kidney development and glomerular function.

DRD4: The Dopamine Receptor

Stephanie Mujica

Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

The gene of interest being analyzed is DRD4 which is a dopamine receptor gene associated with psychiatric disorders including schizophrenia, ADHD, autonomic nervous system disorder, and bipolar personality disorder. These disorders impact an individual's ability to attain a traditional education, job, or even carry out a healthy lifestyle. People with this expressed disorder often make decisions impulsively without consideration of consequences. DRD4 is found on chromosome 11. DRD4 is most expressed in the pituitary gland followed by the cerebellum. Clinical variations of this gene assist in diagnosing areas of concern. The allele associated with diseases has a null mutation on the first exon of the DRD4 gene that results in a nonfunctional protein. The frequency of deletion is found in about 2% of the population. A good ortholog which could be used to study is the mouse due to DNA similarity with humans and prior work conducted on the species for reference, more specifically within the pituitary gland. Studies associated with DRD4 can help advance understanding and treatment of the listed psychiatric diseases. A greater understanding of these conditions often associated with a negative stigma can help change the way society approaches education, criminal justice, and medicine (for cases requiring medical treatment).

Expression of NCOA3 Missense Mutations in Homo Sapiens and Danio rerio

Stephanie Ramos

Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

NCOA3, found in humans, is the nuclear receptor coactivator 3 located on chromosome 20. This nuclear receptor has been linked to antiestrogen therapy resistance, tamoxifen resistance, and is found overexpressed in 60% of human breast tumors. In humans, the NCOA3 gene has been known to cause mutations that led to breast cancer, while in other species, Danio rerio, the observed variant causes bilateral sensorineural hearing impairment. In analyzing the gene, Genome Wide Association Studies (GWAS) was used to determine the single nucleotide polymorphisms (SNPs) and their correlated clinical variants. It was found that nucleotide 1758 with a G>C variant and 2880 with a A>G variant are the mutations found to be associated with breast cancer amongst different human populations. Within the D. rerio species the SNP rs142951578 is responsible for the developmental hearing impairment of the fish. Although differentiation in presentation of the mutation is based on the species, understanding of the possible mutations can assist in further development of cancer treatment drugs and overcoming drug resistance.

Cardiopulmonary Interactions in Heart Failure and Chronic Lung Disease

Stuti Dibbur

Faculty Mentor: Dr. Narasaiah Kolliputi (Morsani College of Medicine)

Globally, cardiovascular diseases, which are directly related to cardiopulmonary interactions, affect over half a billion people and cause 20.5 million deaths in 2021. Cardiopulmonary interactions refer to the complex interactions between the heart and lungs, particularly in diseases where dysfunction in one organ significantly impacts the other. This research aims to discover treatments and prevention methods for Cardiopulmonary Interactions in Heart Failure and Chronic Lung Disease. The aim is to help find early detections of these diseases and educate the public on how to prevent these diseases. A systematic review analyzed 22 peer-reviewed studies out of 45 from 2010 to 2025, examining conditions like heart failure and chronic obstructive pulmonary disease (COPD) based on relevance, methodological rigor, and recency. The data found in the study shows that Positive Pressure Ventilation devices like the CPAP (Continuous Positive Airway Pressure), can help and treat different diseases in the cardiopulmonary system. From the review it was found that regular exercise can significantly reduce the risk of heart failure and improve outcomes for individuals with the condition, with some research indicating a 20-25% reduction in major cardiac mortality. This study captures how the cardiovascular system works with the pulmonary system in treatments and prevention of diseases like COPD and heart failure, such as CPAP and Positive Pressure Ventilation Systems. Educating the public on how to prevent and treat COPD and Heart failure from cardiopulmonary interactions is extremely important considering over half a billion people are affected by diseases relating to cardiopulmonary interactions.

Stem Cell and Regenerative Therapies for Primary Ciliary Dyskinesia: Restoring Ciliary Function with iPSC-Derived Airway Cells

Stuti Dibbur

Faculty Mentor: Dr. Narasaiah Kolliputi (Morsani College of Medicine)

Primary Ciliary Dyskinesia (PCD) is a genetic disorder that impairs ciliary function, leading to respiratory and fertility issues. While genetic mutations and stem cell-derived airway cells have been explored, effective regenerative therapies are still lacking. This study examines the potential of iPSCs in restoring ciliary function and advancing PCD treatments. Furthermore, it aims to evaluate the effectiveness of iPSC-derived airway cells in replicating functional cilia for potential regenerative therapies in PCD. Additionally, it seeks to identify genetic targets that may enhance treatment strategies. This study reviews existing literature to examine the role of stem cell-derived airway cells on restoring ciliary function in patients with PCD. Research from PubMed and Google Scholar was analyzed to conduct our literature review. Keywords such as “primary ciliary dyskinesia”, “stem cell”, and “regenerative therapy” utilizing Boolean operators. iPSCs derived from PCD patient cells were differentiated into airway epithelial cells. Functional assays revealed ciliary defects, such as reduced beat frequency and impaired mucociliary clearance. Gene-editing strategies partially restored ciliary function, and genetic profiling identified targets for potential therapies. This study highlights the potential of iPSC-derived airway cells in restoring ciliary function and advancing regenerative

therapies for PCD. The findings support prior research on stem cell applications in respiratory diseases, validating iPSCs as a therapeutic option. Harnessing iPSC-derived airway cells marks significant progress in regenerative treatments for Primary Ciliary Dyskinesia. However, further research is needed to enhance ciliary function, address genetic diversity, and refine differentiation techniques for clinical use.

GJB2 Mutations: Prevalence, Severity, and Advancements in Treatment for Genetic Hearing Loss

Stuti Dibbur, Fatima Emran, Kirstenn Claire Calaguas, Alexis Milano, Anas Kartoumah, Ahmar Farrukh, Muhammad Hassam Amir
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

The GJB2 gene plays a crucial role in hearing by producing connexin 26, a protein essential for maintaining chemical balance in the inner ear. Mutations in this gene can disrupt these processes, leading to hearing loss, often as autosomal recessive nonsyndromic hearing loss (ARNSHL), which is inherited from both parents and not linked to other conditions. Several mutations in this gene can cause hearing loss; some are more prevalent in specific ethnic groups. For example, c.35delG is common in Europe and the Middle East, while c.235delC is prevalent in Asia and the Middle East. The severity of hearing loss caused by GJB2 mutations ranges from mild to profound. Homozygous mutations (from both parents) often result in more severe impairments than heterozygous mutations (from one parent). Truncating mutations, which prevent functional protein production, often cause more severe impairments than non-truncating mutations, which may lead to milder or progressive hearing loss. Data was extracted from PubMed, Google Scholar, USF Library, and JSTOR. Some GJB2 mutations can also cause syndromic hearing loss, involving other conditions like skin disorders. Screening for GJB2 mutations provides a cost-effective method for early diagnosis, especially in newborns. Advanced genetic testing techniques like next-generation sequencing (NGS) and Sanger sequencing help identify common and rare mutations. Treatments like cochlear implants have successfully improved hearing and speech development in affected individuals. Gene therapy, including CRISPR technology, shows promise for treating and preventing GJB2-related hearing loss. Expanding access to genetic testing and advanced treatments can improve outcomes for high-risk populations.

AI in Hospitality and Tourism Industry

Sumeyra Buran Utku
Faculty Mentors: Dr. Cihan Cobanoglu and Dr. Faizan Ali (Muma College of Business)

This presentation examines the role and impact of AI technologies in the Hospitality and Tourism Industry. This research synthesizes existing technologies and studies, identifying kep applications, benefits, challenges, and future directions for AI in this sector. The findings suggest efficiency, and innovation in the hospitality industry. However, challenges related to implementation, ethics, and workplace adaptation remain.

Has the FTC Delivered on Its Mission? Analyzing Consumer Protection Through Regulation

Sumon Estifanos
Faculty Mentor: Dr. Vikas Soni (Muma College of Business)

The Federal Trade Commission (FTC) plays a critical role in safeguarding consumers and promoting fair competition within the U.S. economy. As markets evolve rapidly with technological advancements and corporate consolidation, questions arise about the effectiveness of the FTC's regulatory actions, particularly in balancing consumer protection with economic growth. This study critically examines whether the FTC has fulfilled its mission to protect consumers and promote competition, focusing on its approaches to non-compete agreements and merger enforcement. To assess the FTC's effectiveness, this research utilizes a mixed-methods approach, combining quantitative data analysis from economic reports and case studies with qualitative insights from expert interviews and consumer feedback. Key metrics include changes in labor mobility, consumer choice, and market concentration following FTC interventions. Preliminary findings reveal mixed perceptions of the FTC's impact. While stricter regulations on non-compete agreements are seen as beneficial for labor mobility, concerns remain about reduced incentives for workforce training. Additionally, merger enforcement policies face criticism for inadequately addressing the growing power of large tech corporations. Especially with the changing political climate, the contrast between former FTC Chair Lina Khan's regulatory approach and that of previous and current FTC Chairs highlights a drastic shift in the agency's stance. These findings suggest

that while the FTC's efforts to regulate non-compete agreements and mergers are promising, challenges remain in balancing consumer protection with innovation. Future research should explore the long-term implications of these policies on competition and investigate how growing public awareness of regulatory actions could influence consumer confidence and market behavior.

Quantifying the Effects of Marine Protection on Herbivorous Fish Abundance and Benthic Coral/Macroalgal Cover in the Eastern Caribbean

Sydney Tritschler
Faculty Mentor: Dr. John Parkinson (College of Arts and Sciences)

Coral reef ecosystems are shaped by the interactions between fish populations and benthic communities. Herbivorous fish help maintain coral dominance by grazing macroalgae that compete with corals for space and resources. Marine protected areas (MPAs) aim to increase fish abundances by limiting fishing pressure, but their effectiveness in promoting reef resilience can vary across different regions. This study investigates differences in fish abundance between the Tobago Cays Marine Park (TCMP) and unprotected reefs off Union Island in the Eastern Caribbean to understand how these differences influence benthic composition. Belt transect surveys and benthic photo quadrats were conducted over three years (2022-2024) following Global Coral Reef Monitoring Network protocols, with benthic macroalgal cover quantified using CPCe software. Protected reefs within the TCMP supported higher abundances of herbivorous fish than unprotected reefs outside the park, indicating increased grazing pressure. This likely led to the observed reduction of macroalgal cover in TCMP, which may facilitate coral recruitment. Meanwhile, unprotected sites closer to the shore of Union Island exhibited greater macroalgal cover and less herbivorous fish abundance. Understanding the influence of MPAs on reef dynamics is important for fine tuning conservation strategies, predicting long-term ecological shifts, and informing future management decisions for coral reef ecosystems.

History of Politicide: Las Madres de Plaza de Mayo, Las Abuelas de Plaza de Mayo, and the U.S. Non-Intervention in Argentina's Human Rights Crisis

Tabina (Sasha) Hossain
Faculty Mentor: Dr. Arturo Jimenez-Bacardi (College of Arts and Sciences)

The United States had recognized the political instability occurring in Argentina after the election and exile of Juan Peron, yet their focus lies in the suppression of communist influence in Argentina as a human rights crisis rages. The United States' response to Argentina's "Dirty War" (1976-1983) began after Juan Perón's exile when his wife Isabel assumed power and the Peronist Party was reestablished. The Argentine Anticommunist Alliance (Triple A) targeted left-wing activists, leading to the junta's 1976 coup. Under leaders like Jorge Videla, the junta's repression resulted in 30,000 forced disappearances and deaths. The Abuelas de Plaza de Mayo organization was formed to locate disappeared children. While the U.S. under Henry Kissinger did not directly intervene, its anti-communist priorities and rhetoric egged on by Kissinger, encouraged the regime's actions and the military junta's "politicidal" campaign. This archival research study analyzes U.S. policy during the Cold War and the global response to the human rights crisis in Argentina.

Uncovering Antimicrobial Potential in Coastal Sand Bacteria: A Microbiological Investigation

Taegan Guerra
Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

Coastal environments may harbor unique bacteria with antimicrobial potential. This study investigated bacterial isolates from sand collected Longboat Key, Florida. Two distinct bacterial colonies, Turt A and Turt B, were isolated using high-density plating techniques and subsequently tested for antimicrobial activity through a modified Kirby-Bauer disk diffusion assay. Turt A demonstrated significant inhibitory activity against Bacillus cereus, and Staphylococcus aureus, suggesting antimicrobial potential. Growth on selective and differential media indicated that Turt A likely represents a Gram-negative, halotolerant organism. In contrast, Turt B exhibited limited antimicrobial activity; however, its consistent growth patterns and genetic identity point to other notable biological traits. Selective and differential media results indicated that Turt B is likely a Gram-positive organism with emerging halotolerance. Molecular

identification via 16S rRNA sequencing and BLAST analysis revealed Turt A to be closely related to Alcaligenes ammonioxydans (99% identity), and Turt B to Bacillus subtilis (99% identity). These results suggest that turtle-associated bacterial isolates, particularly from Turt A, may possess promising antimicrobial properties and warrant further biochemical investigation for potential therapeutic applications.

Evaluating Vocal Biomarkers for Detecting Mental Health Distress in Veterans: A Focus on Predictive Accuracy and Clinical Application

Tanishqa Parulekar, Ayush Kalia, Garrielle Bones, Hanna Lindemann, Cassandra Montjoy, Kenny Weng
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Veteran populations face disproportionately high rates of suicide, making the early detection of mental health distress a critical concern. Vocal biomarkers—acoustic and linguistic features of speech—are emerging as non-invasive tools for detecting distress, offering significant advantages over traditional screening methods, which can often be inaccessible or ineffective for vulnerable populations. This project evaluates the predictive accuracy and clinical applicability of vocal biomarkers in detecting mental health distress among Veterans. A systematic review of databases such as PubMed, ScienceDirect, and JMIR identified studies examining the effectiveness of vocal biomarkers for detecting distress. Data extraction and analysis focused on evaluating predictive models, highlighting their strengths and limitations, and assessing their potential for broader clinical application. Findings suggest that vocal biomarkers demonstrate high predictive accuracy in identifying distress markers associated with conditions such as depression, PTSD, and suicidal ideation. Preliminary models also show promise in distinguishing between healthy and at-risk individuals, offering scalable and objective tools for mental health evaluation. However, limitations such as small sample sizes, lack of standardization, and generalizability challenges restrict their broader application. Future work should prioritize refining algorithms, expanding sample populations, and conducting longitudinal studies to enhance reliability and ensure clinical validity. By addressing these gaps, vocal biomarkers could become an essential tool for evaluating mental health distress in underserved populations, providing accessible and effective solutions tailored to Veterans' unique needs.

Replication Fork Remodeling Curtails DNA Synthesis during Excessive Origin Firing

Thanh Le
Faculty Mentor: Dr. Huzefa Dungrawala (College of Arts and Sciences)

DNA replication is a faithful and accurate process during S-phase in each cell division. Errors in replication can potentially lead to cancer, highlighting the purpose of studying mechanisms of DNA replication. There are many challenges that cause DNA damage, making replication fork regulation essential to protect genome integrity. When cell misregulate during replication, it can result in re-replication, which replication origins are re-licensed and fired again. This leads to stress induced DNA breaks, activating cell cycle checkpoints and apoptosis, which cancer cells try to evade, making it a potential chemotherapy target. While re-replication is a source of genomic instability, re-replication regulatory pathways remain unclear, driving the aim to explore the mechanism of how cell respond to re-replication. Re-replication can be triggered by MLN4924 (pevonedistat), a drug that inhibits the neddylation activity of Cullin4A-RING E3 ubiquitin ligase (CRL4). One of the CRL4 targets is the replication licensing factor CDT1 for proteolytic degradation, in which the inhibition of CRL4 by MLN4924 leads to CDT1 accumulation. This promotes re-licensing and over-replication. We find that exposure of MLN4924 slows replication forks and induces replicative stress, which can lead to fork stalling and reversal. In normal cells, this reversal is mediated by fork translocases such as SMARCAL1, ZRANB3, and HLTF. However, in the MLN4924 treatment, HLTF shows its independency for fork reversal. This suggests unknown dynamics by which CDT1 alters replication dynamics. Our future work aims to explore the mechanism of how accumulation of CDT1 affects DNA replication and the regulatory involved in fork reversal.

Resilience in the Himalayas: Nepal's Response to Climate and Public Health Challenges

Tiana Shamis

Faculty Mentor: Dr. Holly Donahue Singh (Judy Genshaft Honors College)

Nepal faces environmental and public health challenges, which have been exacerbated by climate change due to its location in the Himalayan region and dependence on natural resources, despite contributing minimally to global emissions. This research examines environmental conservation, health risks, and governmental and community-based climate adaptation strategies. Nepal's successful forest regeneration program has reversed deforestation, improved biodiversity, reduced landslides, and increased carbon sequestration. However, climate change has intensified extreme weather events, worsening monsoons and increasing displacement of vulnerable communities. Rising temperatures have led to vector-borne diseases, particularly dengue, which is now affecting high-altitude regions that were once considered safe. The healthcare system faces shortages in resources. However, NGO-led disease monitoring programs, awareness campaigns, and education initiatives have helped mitigate these effects. Traditional medicine in hospitals and amongst community homes has also been incorporated into the healthcare response. Extreme weather events such as monsoons and landslides have displaced vulnerable communities and damaged infrastructure. In response, the government has implemented infrastructure projects, disaster preparedness programs, and water management strategies. Meanwhile, community-driven initiatives focus on early warning systems and sustainable agricultural practices. Education has also proved to be an essential resource in addressing climate change. Organizations such as Canopy Nepal bring climate change awareness into school curricula, educating younger generations about climate change and ways to address it. This study highlights the need for integrated environmental and health policies. Addressing these issues requires collaboration between local communities, policymakers, and global organizations to ensure resilience for Nepal's vulnerable populations.

Development of Sulfonyl-γ-AApeptide PROTACs for β-catenin Degradation and Inhibition of Wnt Signaling in Colorectal Cancer

Ting Chao

Faculty Mentor: Dr. Jianfeng Cai (College of Arts and Sciences)

Colorectal cancer (CRC) is the third most commonly diagnosed malignancy worldwide, yet remains a significant therapeutic challenge due to the molecular heterogeneity of tumor cells1. The oncogene BCL9 serves as a critical transcriptional co-activator of Wnt/β-catenin pathway, playing a pivotal role in cancer stem cell propagation, angiogenesis, epithelial-mesenchymal transition, chemoresistance, and metastasis2. Therefore, targeting β-catenin/BCL9 interaction represents a promising antitumor strategy. In this study, we developed a novel α-helical mimetic, Sulfonyl-γ-AApeptide, as an alternative to canonical peptide-based inhibitors of the Wnt/β-catenin signaling pathway. Individual sulfonyl-γ-AApeptides building blocks are developed via a 5-step general synthetic route. Using rink amide resin, the peptide sequence is synthesized by solid phase peptide synthesis through cycles of deprotection and coupling reactions. Preliminary findings demonstrate that our linear Sulfonyl-γ-AApeptide helical mimetics structurally and functionally replicate the BCL9 helix. These peptides exhibit superior binding affinity to β-catenin, demonstrated by a lower dissociation constant (Kd) compared to conventional peptides. Functional assays, including half-maximal inhibitory concentration (IC50) and co-immunoprecipitation, confirm their ability to effectively disrupt the β-catenin/BCL9 interaction at low concentrations. Additionally, enzymatic stability studies highlight the remarkable stability of these peptides, further enhancing their therapeutic potential. To this end, we then synthesized a series of PROTAC peptides by coupling our Sulfonyl-γ-AApeptide helical mimics with E3 ligase ligands via PEG azide linkers. It is hypothesized that these molecules have the potential to facilitate β-catenin degradation and suppress Wnt signaling, underscoring peptide PROTACs as a promising anticancer therapeutic approach.

Enhancing Cloud Security Assessment Frameworks for the Generative AI Era

Tra Le

Faculty Mentor: Dr. Giti Javidi (Muma College of Business)

Cloud computing plays a critical role in modern information systems, but ensuring security in AI-driven cloud environments remains a challenge. Traditional security frameworks, such as the Consensus Assessments Initiative Questionnaire (CAIQ) and the Secure Software Development Framework (SSDF), lack comprehensive AI-specific security measures. This study aims to identify gaps in these frameworks and enhance cloud security assessments to address

AI-driven software development risks. Using an Action Design Research (ADR) approach, we refine CAIQ by integrating SSDF principles and AI-specific security considerations. We conducted a comparative analysis of CAIQ, SSDF, and AI-focused SSDF guidelines, developed an enhanced CAIQ framework, and evaluated its applicability by analyzing cybersecurity disclosures from 50 cloud vendors' 10-K filings using a Large Language Model (GPT-4o). Findings indicate that while traditional security practices — such as secure design reviews and third-party component validation are widely adopted, AI-specific security concerns, including adversarial testing, AI governance, and AI incident response, are inconsistently addressed. Our study highlights critical security gaps in cloud assessments related to AI-driven software development. By integrating AI-specific security considerations into CAIQ, we propose a more comprehensive framework that strengthens cloud security compliance. This enhanced approach helps cloud providers, policymakers, and regulators ensure more robust security in AI-powered cloud environments.

Advancing Sepsis Diagnosis: The Role of miRNAs, Presepsin, and qSOFA as Novel Biomarkers and Screening Tools

Tracy Truong, Trisha Pitchala, Serena Bhaskar, Danton Nguyen, Riya Pandey, Dima Ali
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Sepsis is a life-threatening condition with an acute onset and high mortality rates, necessitating reliable early detection tools. Current biomarkers for sepsis diagnosis have limitations in accuracy and reliability, highlighting the need for novel biomarkers and screening tools. This systematic review evaluates the diagnostic potential of microRNAs (miRNAs), presepsin, and the Quick Sequential Organ Failure Assessment (qSOFA) score. A systematic search was conducted using the PRISMA methodology across PubMed, Scopus, and ScienceDirect, identifying 222 peer-reviewed articles. After applying inclusion and exclusion criteria, 21 studies were selected for in-depth analysis. Findings indicate that while qSOFA provides rapid bedside assessment, its low sensitivity limits its utility for early detection despite high specificity. miRNAs, particularly miRNA-125a (elevated) and miRNA-21 (reduced) in sepsis patients, demonstrated high specificity with moderate sensitivity, suggesting strong prognostic value. Presepsin showed comparable, but faster, diagnostic accuracy to current biomarkers with high sensitivity and specificity due to its rapid kinetic response to infection. Overall, miRNAs and qSOFA provide high specificity for accurate diagnosis, while presepsin's rapid response enhances early detection. However, challenges remain, including the standardization and cost of miRNA and presepsin assays and qSOFA's limited sensitivity, necessitating complementary biomarkers. Integrating these biomarkers could enhance sepsis detection and improve patient outcomes, but further research is needed for clinical implementation.

Evaluation of Cytotoxicity of Six Gene Products from Cluster A19 Bacteriophage Kimona on the Growth of Mycobacterium smegmatis

Trang Thien Ma, Kathleen Huyen Dao, Emaan Niaz
Faculty Mentor: Dr. Richard Pollenz (College of Arts and Sciences)

Bacteriophages are viruses that infect and lyse bacterial cells, playing a crucial role in microbial ecology and genetic exchange. The goal of this study is to determine if gene products from 6 Kimona genes confer cytotoxicity to Mycobacterium smegmatis. Kimona is a temperate bacteriophage comprising of 88 genes with a genome length of 50,283bp and a GC content of 64.4%. Genes 2, 32, 34, 35, 54 and 69 were amplified by PCR and ligated into pExTra01 plasmid by Isothermal Assembly. The plasmid was then electroporated into M. smeg and single colonies were evaluated for cytotoxicity. gp2 encodes a terminase small subunit. This protein is essential for phage DNA packaging during viral assembly and does not confer cytotoxicity. gp32 encodes an excise protein. This protein is involved in the site-specific recombination process that facilitates prophage excision from the bacterial genome and does not confer cytotoxicity. gp34, gp35, gp54, and gp69 all have unknown function (NKF) and are different sizes. Preliminary results suggest that gp35 and gp54 confer cytotoxicity to Mycobacterium smegmatis, but further studies are needed to confirm their specific mechanisms. In conclusion, investigating how these phage proteins impact bacterial host cells could provide valuable insights into bacteriophage biology and potential therapeutic applications, particularly in combating the rising threat of antibiotic-resistant bacteria.

Implementing Interactive Strategies for Enhancing Reading Skills in Third Graders

Trinity Broderick

Faculty Mentor: Dr. Tammy Sommers (College of Education)

This study explores how interactive activities can help third grade students improve their reading skills, including fluency, comprehension, and phonics. The problem being addressed is the challenge of engaging students at different reading levels and effectively supporting their growth. The goal is to boost fluency, comprehension, and phonics skills by using reading manipulatives and lessons tailored to each student's level. This work is significant because it can help young learners, especially those struggling with traditional methods, develop stronger reading abilities. The approach involves using tools like letter tiles, sentence strips, and individualized lessons to meet each student's needs, creating a more engaging and effective learning experience. My findings aim to inform educators about the impact of interactive, individualized instruction in enhancing reading development and offer practical strategies for fostering reading skills in diverse classrooms.

Insights on AApeptides as they relate to Inhibiting the p300 CH1 domain

Tyler Lambert

Faculty Mentor: Dr. Jianfeng Cai (College of Arts and Sciences)

The HIF-1 pathway helps sustain cancerous tumors by preventing tumor cells from becoming necrotic. The histone acetyltransferase p300 protein is a vital coactivator used in the HIF-1 (hypoxia inducible factor) pathway by binding to subunit HIF-1a. Within our lab we aim to use novel AApeptides as a means of competitively inhibiting the p300 coactivator from binding to the HIF-1a subunit. In order to do this we are specifically studying the protein protein interactions of the CH1 (cysteine/histidine rich-1) domain of the p300 protein as it binds to the C-terminal transactivation domain of the HIF-1a subunit. The p300 CH1 domain is purified through detergent-solubilization followed by incubation with Ni-NTA resin. The supernatant is then purified via IMAC purification using Ni-NTA resin and an imidazole wash. Reverse IMAC is thereafter used to remove the His tag from p300 CH1 domain. The concentrated protein is then analyzed in SDS PAGE. In the future we hope to find AApeptides that can competitively inhibit the p300 proteins with a strong binding affinity. With promising results, this line of research is a testament for the myriad of practical applications that can come from AApeptides and peptidomimetics in general. On top of this, this line of research could also provide a new method to fight cancer.

Tritan Color Blindness: Missense Mutation of the Blue Cone Opsin

Vi Gallagher

Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

The OPN1SW gene codes for the short wave-sensitive protein that allows us to visualize colors on the short-wavelength spectrum, mainly shades of blue. Mutations on the OPN1SW gene typically result in Tritan color blindness; however, the specific types of mutations and results from those mutations to cause this color blindness are not well known. A collection of resources was used to identify common pathogenic mutation sites, what amino acids were substituted, and the possible ways that these changes in amino acids affect the protein and gene function. A single nucleotide substitution of guanine to adenine causes a missense mutation in which a serine is coded for in place of a proline. This substitution can disrupt the transport and folding of the protein to cause a complete loss of the short-wavelength cones in the retina. Color vision is a sense that becomes overlooked when that is all one has ever known, further research into how mutations such as these can affect opsin proteins will give us a better knowledge of what the structure of these mutated proteins looks like and even how tritanopia can be acquired through age.

How Does the Musical In the Heights Portray the Concept of Being a Dreamer as Integral to Latino identity?

Victoria S. Santaella Aguilar
Faculty Mentor: Dr. Cayla Lanier (Judy Genshaft Honors College)

I will be conducting a media analysis of the film In the Heights, exploring the Latino identity of being a dreamer. Through a narrative analysis and mise-en-scène, I will examine the film's portrayal of the Latino Community, focusing on character development and cultural symbols.

BRCA1 and BRCA2 Gene Mutations and their role in Breast and Ovarian Cancer

Willeiky Otanez Disla, Nora Eid, Mandy Jiang, Sailaasya Pinnamaneni, Aishwarya Aggarwal, Anjali Mukkamalla, Muhammad Hassam Amir
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BReast CAncer gene (BRCA), specifically, BRCA1 and BRCA2, are critical tumor suppressor genes involved in DNA repair, transcription, and cell cycle regulation. Their normal function helps control cell growth and prevent uncontrolled cell division. However, some mutations in these genes significantly impair the capability to repair DNA damage, leading to genomic instability and substantially increasing the risk of developing breast and ovarian cancers. This review aims to evaluate the relationship between BRCA1 and BRCA2 mutations and breast and ovarian cancer incidence. A systematic literature review was conducted using PubMed, focusing on studies published from 2014 to 2024. The analysis highlighted the correlation between BRCA mutations and hereditary breast and ovarian cancers, emphasizing their implications for screening and management. There is a strong association between BRCA1 and BRCA2 mutations and breast and ovarian cancers. BRCA1 carriers tend to develop high-penetrance breast cancer at a younger age, while BRCA2 carriers show a heightened risk of ovarian cancer. Specific mutations, particularly those in BRCA1 (exon 24) and BRCA2 (exons 11 and 27) play a crucial role in DNA repair mechanisms, significantly heightening cancer risk. Notably, BRCA1 mutations align with high-grade serous ovarian carcinoma and triple-negative breast cancer, whereas BRCA2 mutations are more commonly linked to hormone receptor-positive cancers. The presence of BRCA1 and BRCA2 mutations dramatically increases the risk of breast and ovarian cancers. This underscores the need for early detection, risk assessment, and the development of targeted therapies, such as PARP inhibitors, while emphasizing further research into tailored screening and treatment strategies.

Examining the Influence of Religious Beliefs on Termination of Pregnancy (TOP)

Windee Yzhelle Gareza, Sameera Beharry, Sydney Johnson, Grace Victoria Faberlle, Ryan Singh
Faculty Mentor: Dr. Donna Lee Ettel-Gambino (Judy Genshaft Honors College)

The Supreme Court (2022) reversed the landmark decision of Roe vs Wade which eliminated the assurance on women's essential rights. As a result, patients and providers face challenges of navigating a complex network of ambiguous and conflicting laws. Evidence showed differences among religious denominations with respect to TOP. The purpose of this study was to examine whether the student's religious affiliation influenced their views regarding TOP. A MANOVA was conducted to identify differences across groups. The independent variable was the students' religious affiliation. The dependent variables were the students' agreement with the following survey statements: 1) identifying as pro-choice; 2) voted for pro-choice politicians; 3) government policy shapes TOP laws; 4) comfortable discussing TOP with others who self-identified as being pro-life; 5) discuss with family first; 6) discuss with a physician first; 7) discuss with a religious leader first; 8) discuss with my significant other first; and 9) research the Internet first. There were statistically significant findings as evidenced by Wilk's Λ (56, 630) = 0.54, $p<0.05$. One-way ANOVA contrasts identified two statistically significant criteria: 1) students (46%) who voted for pro-choice politicians ($p<0.05$); and 2) students (88%) who reported being comfortable discussing TOP with others who self-identified as being pro-life ($p<0.005$). These data emphasize the need for a nuanced and individualized approach to patient care, considering the influence of religious beliefs. Physicians need to recognize the diversity of opinions and ensure respectful and sensitive discussion with patients as they navigate the evolving legal landscape with empathy and cultural competence.

Bioinformatic and Phenotypic Analysis of Mycobacteriophage Lysis Proteins

Wynter Dean
Faculty Mentor: Dr. Richard Pollenz (College of Arts and Sciences)

Bacteriophages (phages) are viruses that infect bacteria. Phages produce endolysins and membrane proteins used to lyse their hosts and release progeny. Endolysins degrade the cell wall, and the membrane proteins destabilize the proton motive force and facilitate endolysin release. This study aims to analyze the lysis proteins of three phages infecting Mycobacterium smegmatis (Mycobacteriophages), NormanBulbieJr (NBJ), D29, and Girr, as well as proteins from lysis escape mutants of these phages. These proteins were bioinformatically analyzed using SOSUI, DeepTMHMM, TOPCONS, CoCoPRED, Waggawagga, JPred4, NCBI BLAST, HHpred, SignalP 6.0, and AlphaFold3. The protein sequences were acquired from PhagesDB. Their corresponding genes were cloned into the inducible expression plasmid pExTra-01 using isothermal assembly. The plasmids were then transformed into M. smegmatis via electroporation. The transformed cells were used in cytotoxicity assays to determine if the proteins kill M. smegmatis when expressed. NBJ and Girr share a similar set of lysis proteins encoded in a single operon including lysin A, lysin B, a membrane protein with two transmembrane (TM) domains, and a membrane protein with one TM domain. D29 differs in the topology of its TM proteins and that the gene encoding its two TM protein is located downstream of its other lysis proteins. Girr and NBJ's one TM proteins appear highly toxic, while D29's has no cytotoxicity. None of the two TM proteins show toxicity. In conclusion, mycobacteriophages show a variety of lysis gene organizations, protein interactions, and protein topologies. Understanding these proteins and how they interact may inspire new antibiotics.

The Effects of Microplastic Phytotoxicity on Seagrasses and Duckweeds

Wynter R. Dean, Coen E. E. McGarrah, Brenna Strehle, Aurora Gomez Garcia, Huong Ha Lan Do
Faculty Mentor: Dr. Olukemi Akintewe (College of Engineering)

Microplastics are plastic particles ranging from one nanometer to five millimeters and are comprised of various chemical compounds. These particles are thought to have wide health and environmental impacts, including restricted growth and photosynthesis of aquatic plants such as duckweeds and seagrasses. These plants are essential for maintaining marine ecosystems, improving water quality, and protecting the coast. This review compiles current knowledge on the abundance and biological effects of microplastic interactions with aquatic plants, using duckweed and seagrass as model organisms. In initial searches for relevant literature, approximately 2,000 articles were selected for review based on their titles and uploaded to EndNote, where duplicate articles were eliminated. The selected articles were then transferred to Rayyan for full review of the papers' contents, with 39 papers included in the final review. The precise mechanism of microplastic phytotoxicity on seagrasses and duckweeds has yet to be thoroughly investigated, though general effects have been observed. Studies on existing populations are limited. Plant growth impairment appears to vary depending on microplastic type. Two common effects are impairment of seagrass blade or duckweed root growth, and cytoskeletal defects. Small particles could be absorbed directly into plant tissues and coat their exteriors. Additionally, stress from microplastics can interact with other aquatic plant contaminants. Impacts on primary consumers have been noted in both species contaminated with microplastics. From these findings it is clear that microplastics have a negative effect on aquatic plants, though more research is needed to determine the extent of their impact.

Computational Modeling of Colonial-Era Trade Policies and Their Impact on Bengal

Yamin Arafat Islam
Faculty Mentor: Dr. Holly Donahue Singh (Judy Genshaft Honors College)

The economic decline of Bengal under British colonial rule led to devastating consequences, including the Great Bengal Famine of 1943 and the collapse of its thriving textile industry. This study investigates the long-term impact of colonial economic policies on food availability and industry decline through computational modeling. Prior research has extensively documented British economic exploitation, yet existing studies often rely on qualitative historical analysis rather than quantitative simulations. To address this gap, we apply algorithmic analysis to simulate the effects of different policy regimes—Pre-Colonial Bengal (no restrictions), British Colonial Rule (high taxation, forced exports), and War-Time Policies (severe resource extractions). Using simulated data, we compare food availability and industry strength over time to assess the extent of economic deterioration under each policy. The results reveal that colonial policies significantly reduced food per capita and led to a rapid decline in local industries due to forced trade imbalances and taxation. In contrast, simulations of pre-colonial conditions suggest economic stability and growth. Our findings challenge traditional narratives that attribute Bengal's economic

struggles solely to internal inefficiencies, highlighting instead the systematic extraction of resources by colonial rule. By integrating historical research with computational analysis, this study provides a novel approach to understanding the long-term economic effects of colonialism, offering valuable insights into how historical policies continue to shape economic disparities in Bangladesh today.

The Impact of Culture on Preferences, Attitudes, and Acceptability of Alternative PrEP Modalities: A Mixed-Methods Study Among Sexual Minority Men

Yolanda Rotzinger Ballesteros

Faculty Mentor: Dr. Ji-Young Lee (College of Behavioral and Community Sciences)

HIV prevention remains a critical public health priority, with PrEP serving as an effective tool in reducing transmission risk. However, disparities in uptake persist, particularly among Sexual Minority Men and LGBT persons of color. Cultural identity, structural barriers, and stigma limit the adoption of alternative PrEP modalities, such as long-acting injectables and on-demand PrEP. This study employs an intersectionality framework and a mixed-methods design to examine how culture shapes PrEP preferences, attitudes, and acceptability. Quantitative surveys assess psychosocial and behavioral factors, while qualitative semi-structured interviews explore cultural influences on PrEP decision-making. Quota-based respondent-driven sampling guarantees the representation of Black, Latinx, and Asian communities. Preliminary findings suggest that the intersection of sexuality and cultural expectations shaped participant discussions of PrEP and HIV prevention across various social contexts. Structural barriers, including cost, stigma, lack of familiarity with alternative PrEP options, and concerns about side effects, were commonly reported barriers. Conversely, healthcare providers and community-led initiatives facilitated engagement. Community support varied, with some participants reporting affirming networks while others experienced isolation or discrimination. Religion, moral beliefs, and geographic location also affected identity expression, with urban participants experiencing greater openness than those in rural settings. This study informs culturally tailored public health interventions by expanding PrEP education and guiding policy reforms to improve equitable access. By addressing systemic barriers and cultural factors, it advances efforts to reduce health disparities and strengthen HIV prevention for underserved communities. Future research should assess the long-term impact of culturally responsive PrEP initiatives on uptake, adherence, and health outcomes.

Human Cerebral Organoid as a Model for Toxoplasma gondii Infection

Zaid Hassan

Faculty Mentor: Dr. Kami Kim (Morsani College of Medicine)

Toxoplasma gondii is a parasitic infection with a global seroprevalence of about 30%. T. gondii infection is often asymptomatic in healthy individuals, particularly during the latent stage when bradyzoite cysts can form in the brain and muscles. However, chronic infection is linked to neurodegenerative and neuropsychiatric disorders, especially in immunocompromised people, where bradyzoites can revert to tachyzoites, causing complications. Cerebral organoids are self-organizing 3D cell culture models derived from human induced pluripotent stem cells (iPSCs) that exhibit characteristics resembling the human brain. Our goal is to investigate T. gondii infections within cerebral organoids. Mature human cerebral organoids were infected with the T. gondii Type I/III EGS reporter strain expressing SAG1-mCherry (tachyzoite) and LDH2-sfGFP (bradyzoite). Tachyzoite proliferation and bradyzoite transformation in the cerebral organoids were observed through live fluorescence microscopy. When GFP-expressing bradyzoites were detected at 17-days post-infection, both infected and uninfected cerebral organoids were fixed and cryosectioned for immunofluorescence analysis (IFA). To further characterize the interaction between T. gondii and cerebral organoids, IFA was conducted using a panel of cell-specific and parasite-specific antibodies. Anti-SRY-like HMG-Box (SOX2) and anti-tubulin βIII were used to identify neuron markers, anti-Glial fibrillary acidic protein (GFAP) to detect microfilament elements within astrocytes, and anti-paired box gene 6 (PAX6) to mark radial glial cell transcription factors. The Y321 antibody was used to confirm the presence of T. gondii across all infection stages. Ongoing analyses aim to identify additional cell types and evaluate the cellular composition of cerebral organoids to establish a more comprehensive understanding of host-pathogen Interactions.

Exploring a TERT Gene SNP Variant Resulting in a Phenotype with Pulmonary Fibrosis

Zala Wager

Faculty Mentor: Dr. Michael Shamblott (College of Arts and Sciences)

The telomerase reverse transcriptase (TERT) gene is highly conserved amongst all vertebrates and codes for the catalytic portion of the protein telomerase which is responsible for maintaining the telomeres of chromosomes. Telomeres, once they become degraded to a certain length, cause a cell to enter cell senescence. At this point in a cell's lifecycle replication becomes very limited and may even completely stop. This acts as a check to stop the replication of older cells with potential DNA damage and mutations. Telomerase is typically expressed in non-neoplastic cells or cells that must divide often such as stem cells. A number of clinical variants and associated SNP's (single nucleotide polymorphisms) were related to phenotypes that displayed many bone, skin, epithelial cell, and stem cell related diseases. A pathogenic SNP variant of TERT (rs121918663) which is correlated with a high risk of pulmonary fibrosis was selected and aligned with a typical TERT gene in humans. The SNP location was identified as being in an exon that results in a missense in the protein sequence. This likely lessens the overall function of the protein, resulting in a poorly functioning telomerase. Acknowledging and discovering the pathogenic variants of TERT is very important for understanding genetic diseases. Further research into SNP's may allow potential cures or gene therapies to be discovered and help those suffering from diseases caused by mutations in DNA.

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