

UNDERGRADUATE RESEARCH & SCHOLARSHIP SYMPOSIUM



Hybrid Event

In-Person: Wednesday, April 17, 2024: 8:00 am to 4:30 pm
Featuring Posters & Podium Presentations

Online: Monday, April 15 – Friday, April 19
Virtual Posters & Videos via [Symposium](#) by Forager One

Sponsored by Office of
Research & Innovation

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ACKNOWLEDGEMENTS

The organizers would like to **thank** all of the
faculty mentors

for their service and support of our
undergraduate scholars.

Thank You!

We would like to thank the following organizations and individuals for their generous time and support of this event:

- ❖ Center for African Studies
- ❖ Center for the Catholic Faith & Culture
- ❖ Center for Community-Engaged Teaching & Research
- ❖ Center for Excellence in Diversity & Student Inclusion
- ❖ Center for Global Health Ethics
- ❖ Center for Migration, Displacement & Community Studies
- ❖ Center for Teaching Excellence
- ❖ Center for Women's & Gender Studies
- ❖ Chief Diversity Officer
- ❖ Department of Biomedical Engineering
- ❖ Department of Counselor Education
- ❖ Department of History
- ❖ Department of Peace, Justice, and Conflict Resolution
- ❖ Department of Physician Assistant Studies
- ❖ Gumberg Library
- ❖ Honors College
- ❖ Institute for Ethics & Integrity in Journalism
- ❖ Mary Pappert School of Music
- ❖ McNulty College and Graduate School of Liberal Arts
- ❖ School of Education
- ❖ School of Nursing
- ❖ School of Pharmacy
- ❖ School of Science and Engineering
- ❖ Office of Disability Services
- ❖ Office of the Provost
- ❖ Office of Research & Innovation
- ❖ Palumbo-Donahue School of Business
- ❖ Rangos School of Health Sciences
- ❖ University Sustainability Committee

SCHEDULE

Monday, April 15	
All Day	Welcome - Symposium Site Launch! Browse through posters and accompanying videos all week long! Comment and ask questions.
Tuesday, April 16	
All Day	Virtual Symposium Browse through posters and accompanying videos all week long! Comment and ask questions.
Wednesday, April 17	
8:00 am to 4:30 pm	URSS In-Person Event – Location: Charles Dougherty Ballroom, Power Center Poster Session and Oral Podium Presentations Stop by to view posters in-person and ask students questions about their work! *Detailed schedule on the next page*
Thursday, April 18	
All Day	Virtual Symposium Browse through posters and accompanying videos all week long! Comment and ask questions
Friday, April 19	
All Day	Virtual Symposium Browse through posters and accompanying videos all week long! Comment and ask questions

SCHEDULE FOR IN-PERSON EVENT

Wednesday, April 17, 2024 | Power Center @ Duquesne University

8:00 a.m. – 8:45 a.m.	Registration and Breakfast Continental Breakfast provided for participants. Morning Poster Session: Poster set up.
8:45 a.m. – 9:00 a.m.	Welcoming Remarks: Provost David Dausey
9:00 a.m. - 10:00 a.m.	ORAL PRESENTATION SESSION 1 Students participating in the poster sessions should attend the formal presentations.
10:00 a.m. - 12:00 p.m.	MORNING POSTER SESSION Guests are invited to walk around, peruse student projects, and engage with students.
12:00 p.m. - 12:30 p.m.	LUNCH BREAK/POSTER SESSION CHANGE Boxed lunches provided for participants. Afternoon Poster Session: Poster set up.
12:30 p.m. - 1:30 p.m.	ORAL PRESENTATION SESSION 2 Students participating in the poster sessions should attend the formal presentations.
1:30 p.m. - 3:30 p.m.	AFTERNOON POSTER SESSION Guests are invited to walk around, peruse student projects, and engage with students.
3:30 p.m. - 4:30 p.m.	ORAL PRESENTATION SESSION 3 Students participating in the poster sessions should attend the formal presentations.
ALL AWARD WINNERS WILL BE ANNOUNCED THE WEEK FOLLOWING THE EVENT VIA EMAIL & ON OUR WEBSITE!	

Oral Presentations – Detailed Schedule

SESSION 1

Charles Dougherty Ballroom A

Moderator: Samiya Henry

9:00 am – 9:15 am	<p>Jacob Mazurkiewicz Data Science School of Science and Engineering Junior Faculty Advisor/s: Lauren Sugden, Ph.D.; David Kahler, Ph.D. Abstract: 53 (Morning Session) <i>Harnessing Neural Network Classification to Identify Illicit South African Sand Mines</i></p>
9:15 am – 9:30 am	<p>Kyle Schulze Pharmacy School of Pharmacy Senior Faculty Advisor/s: Paula Witt-Enderby, Ph.D. Abstract: 39 (Afternoon Session) <i>Assessing the role of endogenous melatonin in a transgenic mice model and exogenous melatonin with osteogenic loading in an osteopenic population to understand its role in musculoskeletal disorders</i></p>
9:30 am – 9:45 am	<p>Emma Buttino Occupational Therapy Rangos School of Health Sciences Senior Isabella Bien Occupational Therapy Rangos School of Health Sciences Senior Faculty Advisor/s: Elena Donoso Brown, Ph.D., OTR/L; Kasey Stepansky, CScD., OTR/L., C/NDT., CBIS Abstract: 10 (Morning Session) <i>Understanding Caregiver Experiences with Implementation of Home Practice Programs for Caregivers of Patients with Acquired Brain Injury</i></p>
9:45 am to 10:00 am	<p>Olivia Greene Supply Chain Management, Information Systems & Technology A.J. Palumbo School of Business Administration Senior Ben Sadler Computer Science McNulty College and Graduate School of Liberal Arts Junior Sarah Martin Supply Chain Management A.J. Palumbo School of Business Administration Junior Faculty Advisor/s: Mike Sherwin, Ph.D. Abstract: 44 (Morning Session) <i>UNDERSTANDING THE KEY FACTORS ASSOCIATED WITH OBSOLESCENCE RISK IN CRITICAL SUPPLY CHAINS</i></p>

Oral Presentations – Detailed Schedule

SESSION 2

Charles Dougherty Ballroom A

Moderator: Hayley Willis

12:30 pm – 12:45 pm	<p>Gram Hepner Biomedical Engineering School of Science and Engineering Senior</p> <p>Norah Delaney Biomedical Engineering School of Science and Engineering Freshman</p> <p>Heran Pradhan Biomedical Engineering Science and Engineering Junior Faculty Advisor/s: Melikhan Tanyeri, Ph.D. Abstract: 23 (Afternoon Session) <i>Engineering a Novel Bioreactor for Mechanobiological Studies in Congenital Heart Disease</i></p>
12:45 pm – 1:00 pm	<p>Laiba Mirza Public Health Rangos School of Health Sciences Junior Faculty Advisor/s: Faina Linkov, Ph.D.; Diane C. McClune RN, BSN, MBA Abstract: 20 (Morning Session) <i>Parental Leave Policies Influenced by Companies in the US: Battling Inequities and Realizing Transformational Health Outcomes data (BIRTH & MIHE)</i></p>
1:00 pm – 1:15 pm	<p>Fatima Zahra Demlak Communication Studies, Political Science McAnulty College and Graduate School of Liberal Arts Senior</p> <p>Maria Ortiz Jaunarena Psychology McAnulty College and Graduate School of Liberal Arts Senior Faculty Advisor/s: Aleina Smith, Ph.D. Abstract: 73 (Morning Session) <i>Pedagogy to Practice: Addressing the Differential Needs of At-Risk Gen-Z Students in Secondary and Post-Secondary Education</i></p>
1:15 pm to 1:30 pm	<p>Olivia Bigler Music Therapy Mary Pappert School of Music Junior Faculty Advisor/s: Nicole Vilchner, Ph.D. Abstract: 57 (Afternoon Session) <i>Taylor Swift's Folklore as an Epidemiological Study of Socio-Cultural Responses to Pandemic</i></p>

Oral Presentations – Detailed Schedule

SESSION 3

Charles Dougherty Ballroom A

Moderator: Laiba Mirza

3:30 pm – 3:45 pm	<p>Isabelle Ebenhoch Nursing School of Nursing Senior</p> <p>Grace Yeretian Nursing School of Nursing Senior</p> <p>Sofia Rush Nursing School of Nursing Senior Faculty Advisor/s: Jessica Devido, Ph.D., APRN, CPNP Abstract: 42 (Afternoon Session) <i>Black Doulas Perspectives of and Experience with the Edinburgh Postpartum Depression Scale</i></p>
3:45 pm – 4:00 pm	<p>Juan Corujo History, Classical Civilization McAnulty College and Graduate School of Liberal Arts Senior Faculty Advisor/s: Sarah Miller, Ph.D.; Jing Li, Ph.D. Abstract: 56 (Afternoon Session) <i>Examining Trading Networks Between Imperial Rome and Imperial Han China during the 1st and 2nd Centuries AD</i></p>
4:00 pm – 4:15 pm	<p>Abigail Noll Forensic Science and Law School of Science and Engineering Senior Faculty Advisor/s: Stephanie Wetzel, Ph.D. Abstract: 50 (Morning Session) <i>Identification and Quantification of Illicit Drugs in Blood Using Stir Bar Sorptive Extraction and LC-QQQ-MS</i></p>
4:15 pm to 4:30 pm	<p>Philip Stark Biomedical Engineering School of Science and Engineering Junior</p> <p>Thomas Teehan Biomedical Engineering School of Science and Engineering Junior Faculty Advisor/s: Bin Yang, Ph.D. Abstract: 73 (Afternoon Session) <i>Mechanically Pressurized Tunable Lens</i></p>

AWARDS

Biomedical Engineering

Duquesne Award for Excellence in Biomedical Engineering

Center for the Catholic Faith and Culture

Common Good Research Award

The Center will recognize and reward research from any discipline that aligns with Duquesne's Catholic, Spiritan mission, particularly our commitments to:

- the dignity and equality of all persons
- working with vulnerable populations for systemic change
- preserving justice, peace, and integrity of creation

Center for Community-Engaged Teaching and Research

CETR Award for Undergraduate Research

The Center for Excellence in Diversity and Student Inclusion

Undergraduate Research Award

The aim of this award is to recognize and celebrate research that contributes to creating, and maintaining an inclusive campus community here at Duquesne University.

Center for Migration, Displacement and Community Studies

Outstanding Research Award

This award aims to support original research related to migration, displacement, and community through original research. Eligible projects focus on creating awareness about these issues in our communities from any disciplinary perspective.

Judges will assess the following elements of the research: 1) Connection to themes of migration, displacement, and community studies; 2) Scholarly merit including: originality of research and contribution to the field; clear articulation of the research question, existing literature, methods, and contributions to the field.

Center for Teaching Excellence

Award for Undergraduate Research

Eligible projects focus on the study of human learning in any of its many contexts, including but not limited to K-12 education, college, community, and clinical settings. Projects will explore topics such as how and where learning happens or what empowers or hinders people in their learning.

Center for Global Health Ethics

Award for Undergraduate Research in Ethics

This award aims to promote the interest of students for issues in healthcare ethics within contemporary society and culture. It also intends to encourage undergraduate research in the

area of healthcare ethics. The HCE prize is for the presentation that best highlights ethical issues in healthcare and ethical dimensions of developments in science and technology for human health and wellbeing.

Center for Women's and Gender Studies

Award for Undergraduate Research

Chief Diversity Officer/ Palumbo- Donahue School of Business

DEI Award for Undergraduate Research

Honorable Mention

The awards recognize excellence in research addressing issues or questions relating to diversity, equity and inclusion (DEI).

Criteria: Judges will assess the following elements of research: 1) Connection to themes of diversity, equity and inclusion and 2) Clear articulation of the research question, existing literature, methods, and contributions to the field.

Counselor Education Program

2 Awards for Undergraduate Research

Department of Physician Assistant Studies

Award for initiative and potential for future research as a physician assistant

Grefenstette Center for Ethics in Science, Technology, and Law

Top Undergraduate Research Project

Honorable Mention

The Grefenstette Center for Ethics in Science, Technology, and Law will present its inaugural award to the top undergraduate research symposium projects that tackle current issues in technological ethics, including but not limited to issues of AI, automation, policy, health care, labor, extremism, social media, and bias. The winning entries will not only analyze an ethical issue in modern technology but create avenues for discourse while offering possible solutions in a rigorously researched and presented project.

Gumberg Library

Gumberg Library Award for Undergraduate Research

Honorable Mention

The Gumberg Library Award judges posters based on their intellectual merits and demonstration that the research presented meets the standard of its field.

Honors College

Outstanding Poster and Outstanding Video

Symposia posters are at their best when they optimally combine intellectual sophistication with legibility to the non-specialist. Therefore, criteria for this award include: scholarly rigor; visual appeal; organization; professional polish.

Institute for Ethics and Integrity in Journalism

Top Undergraduate Research Paper

The DU Institute for Ethics and Integrity in Journalism will be presenting its inaugural award to the top undergraduate research symposium paper that tackles a current issue in local or national journalism ethics. The winning entry will not only identify and elaborate on an ethical issue in journalism today but also create an avenue for discourse about journalism ethics and offer possible solutions.

Mary Pappert School of Music

Mary Pappert School of Music Undergraduate Award

The Mary Pappert School of Music Undergraduate Award is open to all music students who participate in the URSS.

McAnulty College and Graduate School of Liberal Arts

Outstanding Research Merit

The McAnulty College and Graduate School of Liberal Arts Outstanding Merit Award is open to undergraduate participants in the liberal arts. A committee of Liberal Arts faculty and administrators will evaluate the posters' intellectual merits and demonstration that the research presented meets the standard of its field.

Office of the Provost

Provost Award for Outstanding Research

Office of Research and Innovation Award for Outstanding Research

Provost Award for Best Presentation

This award serves to recognize outstanding scholarship within the university across all of the fields of study. The awards will be given to a student demonstrating exceptional scholarship through either poster or oral presentation.

Peace Justice and Conflict Resolution

The Peace, Justice and Conflict Resolution (PJCR) Minor Program Award

The Peace, Justice and Conflict Resolution (PJCR) Minor Program offers an undergraduate research/scholarship award for research related to peace or conflict studies. The reward hopes to stimulate undergraduate awareness of factors for a sustainable social and political stability, the obstacles to peace, and the building blocks of a just global society.

Rangos School of Health Sciences

Rangos School of Health Sciences Award for Undergraduate Research: 2 awards

Students of the Health Sciences who are participating in the URSS will be eligible for these awards.

School of Nursing

School of Nursing Undergraduate Research Award

The School of Nursing Undergraduate Award is available to students participating in the URSS whose research is applicable to the nursing field.

School of Pharmacy

Award for Undergraduate Research

The School of Pharmacy Award for Undergraduate Research serves to recognize projects in the field of pharmacy which demonstrate a high level of scholarly merit.

School of Science and Engineering

2 for Excellence in Research in the Basic Sciences

4 Honorable Mentions

Students participating in the Undergraduate Research & Scholarship Symposium whose project fall within the realm of the basic sciences will be considered for this award.

University Sustainability Committee

2 Awards for Excellence in Sustainability & the Environment

ABSTRACTS

Note: The number in front of each title corresponds with the physical place the student's poster will be located at the in-person event on April 17.

*Indicates live in-person oral presentation on April 17. See above for detailed schedule of oral presentations.

All posters/presentations also available throughout the week of April 15 on our [Symposium site](#).

MORNING POSTERS

1: Air-jetting based bioprinting of alginate droplets for human stem cell encapsulation toward biomanufacturing of pancreatic islet organoids

Elyse Barnes | Biomedical Engineering, Mathematics | School of Science and Engineering | Senior Faculty Advisor/s: Bin Yang, Ph.D.; Kimberly Williams, Ph.D.

ABSTRACT:

The transplantation of biomanufactured pancreatic islet organoids has shown promising results towards finding a treatment for Type-1 diabetes. However, the process of generating consistent and robust derivations of mature organoids from human pluripotent stem cells (hPSCs) is challenging. Activation of cellular mechano-transduction pathways has been proposed to overcome this challenge. We developed a custom air-jetting based droplet generation system capable of generating highly controllable blank alginate droplets at high speed. The system works by separating the extruded alginate into droplets through a constant airflow surrounding the needle.

The objective of this study was to adopt this droplet generation system to encapsulate hPSCs into alginate droplets. We conducted comprehensive studies to optimize the printing parameters including airflow rate and crosslinking medium. We tested bioink formulation with different alginate concentrations and cell densities. Our study showed that a higher airflow rate generated smaller alginate droplets and that crosslinking with a higher CaCl₂ concentration produces more spherical droplets. Increasing the alginate concentration improved the integrity of the droplets. Increasing the cell density seemed to negatively impact cell bead sphericity. Through optimization, we have developed a robust cell encapsulation protocol that allowed us to reliably generate cell-laden and monodisperse droplets in the size range of 300-500µm. The droplets can be generated at a rate of approximately 50 droplets per second, which translates to 27,000 droplets in 10 minutes. The cell-laden droplets will be incorporated into the existing research towards the large-scale biomanufacturing of organoids.

2: Discovering the Effect of Red Blood Cell Lysis Buffer on Gram-Positive and Gram-Negative Bacteria

Kyla Covato | Biomedical Engineering, Applied Mathematics | School of Science and Engineering | Junior Faculty Advisor/s: John Viator, Ph.D.

ABSTRACT:

Red Blood Cell (RBC) Lysis Buffer consists of a concentrated amount of ammonium chloride and is used to lyse red blood cells when introduced into a whole blood sample. During this project, the primary objective was to test if RBC Lysis Buffer had a detrimental effect on the growth and survival of both

gram-positive and gram-negative bacteria. Two cultures of K3255, a strain of gram-positive bacteria called *Staphylococcus aureus*, were cultured, centrifuged, and diluted - one in PBS and the other in RBC Lysis Buffer. Each dilution series was plated and incubated for twenty-four hours. The same procedure was repeated for PA01, a strain of gram-negative bacteria called *Pseudomonas aeruginosa*. The results were obtained from observing the number of colony forming units (CFUs) on each bacterial plate. MATLAB was used to analyze if the difference in the number of CFUs was statistically significant. This was done using a hypothesis test that compared the mean, standard deviation, and p-value for each set of plates. It was found that RBC Lysis Buffer had no effect on the growth and survival of the gram-positive bacteria K3255; however, there was a significant effect on the gram-negative bacteria PA01. Future research includes lysing whole blood samples infused with bacteria and analyzing this sample using a photoacoustic flow cytometry system. Ensuring that the desired analyte is not lysed along with the red blood cells is essential to this research.

3: Simultaneous multi-particle trapping using serially coupled stagnation flows

Katherine Flannery | Biomedical Engineering | School of Science and Engineering | Senior
Raegan Gouker | Biomedical Engineering | School of Science and Engineering | Senior
Faculty Advisor/s: Melikhan Tanyeri, Ph.D.

ABSTRACT:

Recent advancements in science and engineering enable trapping and manipulating colloidal particles and macromolecules in aqueous mediums using a flow-based confinement approach. This study demonstrates the feasibility of trapping and manipulating multiple particles through coupled planar extensional flows. By employing Brownian dynamics simulations and a proportional feedback control algorithm in MATLAB, we illustrate how three or four micro/nanoscale particles can be simultaneously confined and manipulated at the stagnation points of interconnected planar extensional flows. These stagnation points arise at a four-way microfluidic junction, where particles are passively confined along stable inlet channels and actively confined through a feedback mechanism along unstable outlet channels. We investigated the impact of particle size on particle displacement at each trap site. Specifically, we explored two cases: i) varying the particle size at all junctions simultaneously between 10-10,000nm, ii) varying the particle size at only one junction between 10-10,000nm while maintaining a fixed particle size of 100nm within other junctions. Our findings reveal the influence of changing particle sizes on displacement in neighboring junctions, categorizing trapping sites as "upstream" and "downstream". Notably, the highest displacement occurs along stable inlet channels in Junction 3, positioned between two upstream junctions. These results significantly contribute to understanding colloidal particle behavior under combined advection, Brownian motion, and active flow control. Overall, this method demonstrates the versatility of flow-based confinement and enhances our comprehension of feedback-controlled particle manipulation.

4: Bioprinting Alginate Droplets Through Electro spraying Techniques

Jackson Lee | Biomedical Engineering | School of Science and Engineering | Senior
Brendan Livelsberger | Biomedical Engineering | School of Science and Engineering | Junior
Faculty Advisor/s: Kimberly Williams, Ph.D.; Bin Yang, Ph.D.

ABSTRACT:

Electro spraying is a technique used in biomedical engineering to alter the surface characteristics of materials such as the coating of biological implants or to encapsulate materials or cells for drug delivery or tissue engineering applications. Micro or nano-sized droplets of a polymeric material can be produced by ejecting solution through a needle into a high-voltage field where it breaks into droplets that can be

collected on the grounding surface. The voltage, polymer concentration, needle size, and distance between needle and collector are key parameters that can impact the electrospray process. Voltage differences in the 5-30 kV range have been used previously with a variety of natural and synthetic polymers with/without cells. Alginate is a polymer that crosslinks in the presence of calcium ions providing a convenient form for cell investigations.

We are interested in establishing a robust method for alginate bead manufacturing via an electro-spraying process. To investigate feasibility, we have assembled a system composed of a syringe pump with a needle adaptor, a high voltage generator and an adjustable height zone between the needle and the grounding surface. Previous studies have used a stirring bath to collect and crosslink alginate microbeads but we are collecting in small well plates to eliminate stirring and transfer. Studies focused on size, structure, and spread of the microdroplets using a constant alginate concentration but varying the voltage, distance, and needle will be presented. Ultimately, we hope to develop a robust process for the manufacturing of small cell-enclosed beads for individualized cell studies.

5: Fluid-Structure Coupled Biotransport Processes in Biphasic Vocal Fold

Isabella McCollum | Biomedical Engineering, Applied Mathematics | School of Science and Engineering | Senior

Faculty Advisor/s: Rana Zakerzadeh, Ph.D.

ABSTRACT:

Fluid-structure interactions (FSI) between the glottal airflow and the poroelastic tissue of the vocal folds (VFs) causes the VFs to vibrate, resulting in voice production. Computational modeling of this FSI provides a prediction of VF dynamics and glottal flow which can lead to an improved understanding of these interactions. Furthermore, biological transport processes within the VF tissue play a crucial role in disease initiation. Previous experimental observations report contradictory relationships regarding the effects of phonation conditions on the interstitial flow within the tissue and the associated oxygen partial pressure. Particularly, it has been hypothesized that physiological conditions may influence VF oxygenation, which corresponds with dysfunctions such as hypoxia and localized lesions. The goal of this study is to develop a multiphysics computational framework that investigates the association of interstitial flow with oxygen transport within the VF. This coupled methodology combines an FSI model with a mass transport model to quantify key features that contribute to oxygen transport in the VFs. By considering a poroelastic model for the tissue, both the liquid dynamics within the VF and its contribution to convective oxygen flow can be studied. A transient airflow was simulated and physiological parameters such as oxygen reaction rate, lung pressure, and tissue permeability were varied. Biomechanical simulations of transient glottal aerodynamics, VF tissue dynamics, interstitial fluid dynamics, and oxygen flow were performed. Results of the interstitial velocity streamlines and oxygen concentration contours highlight the association of poroelasticity with oxygen flow within the permeable VF structure.

6: C-Recovery: A Mother's Hug

Anelise McGee | Biomedical Engineering, Nursing | School of Science and Engineering | Senior

Kayla Kraeuter | Biomedical Engineering | School of Science and Engineering | Senior

Gram Hepner | Biomedical Engineering | School of Science and Engineering | Senior

Isabella McCollum | Biomedical Engineering | School of Science and Engineering | Senior

Jackson Lee | Biomedical Engineering | School of Science and Engineering | Senior

Faculty Advisor/s: Leda Kloudas, Ph.D.

ABSTRACT:

C-section delivery is the second most common surgery, comprising 30% of all births in the U.S.; however, support for the mother once she returns home is often an afterthought. The everyday acts of a mother, including sneezing, coughing, or lifting her baby, can cause pressure and strain on her incision; this can result in pain, discomfort, wound dehiscence, or other complications, leading to setbacks in the mother's recovery. Thus, we are spearheading the development of a new medical device, C-Recovery: A Mother's Hug. Our novel abdominal binder for post C-section women aims to enhance the movement and stability of new mothers in their recovery following a C-section. Our binder works to enhance the recovery process by focusing on optimizing the elements of compression, conformability, and comfort for new mothers. Our wearable device utilizes a detachable pump to provide customizable compression and constant splinting to the incision that can be adjusted according to the mother's stage of recovery. The wearable binder covers the entire abdominal region, extending down around the hips to provide extra support for lower abdominal skin. Our novel abdominal binder will aim to promote mobility, and, subsequently, decrease the risk of complications like clotting and wound dehiscence for post C-section women.

7: Evaluation of Flow Behavior in a Microfluidic Slide using Computational Fluid Dynamics

Manoela Rocha Neves | Biomedical Engineering | School of Science and Engineering | Senior

Faculty Advisor/s: Rana Zakerzadeh, Ph.D.; Wilson Meng, Ph.D.

ABSTRACT:

This study focuses on the development and validation of a framework to leverage computational fluid dynamics (CFD) into an in vitro platform. This simulation methodology approach allows for a systematic investigation of perfusion flowrate in a microfluidic device. Previous literature shows that using CFD in microfluidic cell culture system studies is key, as fluid flow processes have direct implications on cellular response.

A mathematical model of the scaffold of a microfluidic cell culture slide (ibidi GmbH, Germany) is developed to determine the fluid perfusion and resulting shear stresses within its boundaries. A parabolic velocity profile equation is applied for laminar flow within the channel. The ANSYS CFX Workbench software is used to carry out numerical simulations that determine the fluid forces and flow mechanics produced within the slide's channel. Fluid is perfused at a defined rate as experimentally derived properties for the culture media and computer simulations are performed to obtain physiologically relevant values for pressure and shear stress as well as the extent to which filtration velocity is affected in the scaffold.

Moreover, the sensitivity of the model predictions to physical parameters such as perfusion flow rate is explored. Whilst CFD model predictions are performed, biofluid mechanic parameters are simultaneously calculated, and laboratory experimental data is collected from cell culture experiments,

so the results are validated. These findings will help researchers optimize the perfusion operating conditions to manage cell proliferation when mechanically simulating cells via flow perfusion.

8: Mathematical Modeling of VEGF Binding

Billy Sanchez | Biomedical Engineering | School of Science and Engineering | Junior

Faculty Advisor/s: Kimberly Williams, Ph.D.

ABSTRACT:

Angiogenesis, the growth of new blood vessels, is needed for cancer progression after tumors grow beyond a few millimeters in size. Several factors mediate this process, and the release and binding of vascular endothelial growth factor (VEGF) to its transmembrane signaling receptor is known to be a critical mechanism. Bevacizumab, an anti-VEGF antibody known as Avastin, was designed to bind VEGF and prevent it from initiating the angiogenic process. There has been some clinical success with this treatment, but it has not been universal. We postulated that the acidic environment characteristic of tumors might have an impact on the success of this antibody strategy and that stabilizing the interaction between VEGF and Avastin at low pH would be a valuable way to facilitate removal of the growth factor from the local environment.

Experimental cell studies from the Nugent Laboratory (JBC (2019) 294:17603) have shown pH-dependent changes in the binding of VEGF with Avastin, VEGF receptors, Heparin, and Fibronectin - an important ECM component. Based on this data, we have used ordinary differential equation well-mixed compartment computational modeling in MATLAB to investigate how changes in the kinetic binding parameters and interactions can be used to control the localization of VEGF. In this presentation, we show how specific changes impact VEGF binding in agreement with the data, suggest schemes for better sequestration of this angiogenic factor, and share how modeling can be used to solidify and explain experimental measurements and observations.

9: The Intersection of Brain Injury Perceptions in Pediatric Patients with a Concussion

Alexis Dzadovsky | Biology | School of Science and Engineering | Senior

Caitlin Mackey | Biology | School of Science and Engineering | Sophomore

Faculty Advisor/s: Erica Beidler, Ph.D., LAT, ATC

ABSTRACT:

Background: An individual's perceptions of an injury and illness are multi-faceted. These different facets do not occur individually and are likely interrelated. Gaining an appreciation for the interconnectedness of these beliefs and addressing them is foundation to providing person-centered care. This may be especially important when managing invisible pathologies, such as brain injury.

Purpose: To characterize the intersection of different brain injury perception constructs in pediatric patients (11-18 years old) following concussion.

Methods: Responses to a 10-minute cross-sectional survey were captured at a concussion clinic from 56 pediatric patients. Participants completed the Brain Injury Perceptions (BIP) questionnaire that included 38 items which composite into seven summed outcome scores [i.e., timeline acute/chronic (6 items), timeline cyclical (4 items), consequences (6 items), personal control (6 items), treatment control (5 items), injury coherence (5 items), emotional representations (6 items)]. We constructed a dendrogram tree diagram to visualize item clustering to describe the interrelated nature of BIP constructs.

Results: Visual analyses indicated that the following items from the following constructs were most closely related: emotional representations and consequences, treatment control and personal control, timeline acute/chronic and timeline cyclical. The remaining injury coherence items clustered together, were distinctly separate from the other item constructs, and appeared centralized between amongst the other construct clusters.

Conclusion: This study provides insight into what injury perceptions may occur concurrently following concussion. Healthcare providers can use these findings to enhance their post-concussion assessment and management approaches.

***10: Understanding Caregiver Experiences with Implementation of Home Practice Programs for Caregivers of Patients with Acquired Brain Injury.**

Emma Buttino | Occupational Therapy | Rangos School of Health Sciences | Senior

Isabella Bien | Occupational Therapy | Rangos School of Health Sciences | Senior

Faculty Advisor/s: Elena Donoso Brown, Ph.D., OTR/L; Kasey Stepansky, CScD., OTR/L., C/NDT., CBIS

ABSTRACT:

Home exercise programs (HEPs) are often designed for individuals with an acquired brain injury (ABI) upon discharge from inpatient rehabilitation to support continued improvement in functional outcomes. Caregiver involvement has been reported to be a critical factor in promoting success for HEP adherence. The purpose of this qualitative study was to explore the experience of caregivers in the training and implementation of home programs. To participate in this study, individuals had to be 18-85 years old, a caregiver for an individual who had a recently acquired brain injury and speak English as their primary language. Individuals with neurogenic conditions (i.e., dementia) were excluded from the study. Data was gathered through the completion of two one-on-one nested phone interviews. The first interview was completed near discharge from the rehabilitation hospital and the second was approximately two to three months after the first interview. Eight participants were included in the study and seven out of eight completed both interviews. Interviews were transcribed and de-identified then entered in MAXQDA software for coding. A consensual content analysis process with triangulation by analysts was used to code the interviews. The preliminary analysis indicates that caregivers find value in HEPs, but also report limitations and the need for additional support. The reported involvement of caregivers in HEPs varied and may be influenced by caregivers' prior healthcare experience and availability. From these findings, rehabilitation therapists will learn more about elements to consider when training caregivers to support HEP implementation.

11: Emotional Brain Injury Perceptions and Concussion Assessment Outcomes in Pediatric Patients

Allison Gass | Health Sciences | Rangos School of Health Sciences | Sophomore

Cameron Crivelli | Finance | A.J. Palumbo School of Business Administration | Sophomore

Faculty Advisor/s: Erica Beidler, Ph.D., LAT, ATC

ABSTRACT:

Background: It is unclear how an individual's thoughts, feelings, and perceptions influence post-concussion assessment outcomes.

Purpose: To investigate if emotional brain injury perceptions are related to Concussion Clinical Profiles Screening tool (CP-Screen) concussion assessment outcomes in pediatric patients (11-18 years old).

Methods: This cross-sectional survey study included 56 pediatric patients who were evaluated and treated for an acquired brain injury at one concussion clinic. Participants completed a 10-minute paper and pencil survey at the end of their appointment. The 38-item Brain Injury Perception (BIP) questionnaire was used to capture emotional injury perceptions. There were six individual BIP items for this construct that used a five-point Likert scale (1-strong disagree to 5-strongly agree) to assess perceptions of being sad, upset, mad, worried, anxious, and afraid regarding their current injury. A sum emotional perception composite score (max 30) was our primary independent variable. The five clinical profiles raw scores [i.e., anxiety/mood (max 15), cognitive/fatigue (max 9), migraine (max 15), ocular (max 15), vestibular (max 15)], two modifier raw scores [i.e., sleep (max 12), neck (max 6)], and total raw score (max 87) from the 29-item CP-Screen were the dependent variables.

Proposed Statistical Approach: We will assess the relationship between the emotional BIP composite score and the CP-Screen assessment outcomes using a series of simple, univariable linear regression models that will inform a final multifactorial linear regression model.

Potential Implications: The results of our study will provide foundational evidence regarding the important role that emotional injury perceptions.

12: Perspectives on Inclusion: Near-Peer Mentoring Relationships between College Students with and without Intellectual and Developmental Disabilities (IDD)

Anna Stonesifer | Occupational Therapy | Rangos School of Health Sciences | Senior
Samantha Smith | Occupational Therapy | Rangos School of Health Sciences | Senior
Faculty Advisor/s: Meghan G. Blaskowitz, DrPH, MOTR/L, Alia Pustorino-Clevenger, Ed.D.

ABSTRACT:

The Higher Education Opportunity Act has allowed students with IDD greater access to inclusive post-secondary education (IPSE) programs across the country (Grigal et al., 2021). Within IPSE programs, near-peer mentors support students in a variety of ways, such as with employment opportunities, socially, and academically (Carter et al., 2018). There is minimal research highlighting the impact of peer-mentor relationships on students with IDD. This study explores peer mentor perspectives relating to their relationships, roles, and personal growth through involvement in IPSE programs.

A 19-item Peer Mentor survey was administered to peer mentors at Duquesne University in the academic years 2022-2023 and 2023-2024. This proposal provides a cross-sectional analysis of two cohorts at Duquesne University. Both thematic analyses of open-ended questions and descriptive data were collected to understand perspectives of peer-mentor relationships on campus.

Twenty peer mentors completed the survey. The most common majors elicited were occupational therapy (35%), speech-language pathology (25%), and psychology (12%). Mentors expressed deeper advocacy efforts (25%) and commitment to inclusion (20%) within the survey. They also described lasting friendships they created (50%), and the reward of assisting mentees in achieving their goals (40%). One challenge across mentors was the balance between providing support and allowing independence (20%).

This study highlights the importance of the relationships formed between peers in IPSE programs. These findings reflect positive outcomes for clinical application and increased advocacy and commitment to inclusion, all of which are aspects that can be carried over into the occupational therapy profession as a whole.

13: A Qualitative Study of the Experiences of Parents Navigating the Educational System

Johnna Estep | Occupational Therapy | Rangos School of Health Sciences | Senior

Faculty Advisor/s: Jeryl Benson, EdD, OTR/L, FAOTA

ABSTRACT:

Under the Individuals with Disabilities Act, as children reach the age of 3, they are transitioned from Early Intervention (EI) to school-based services which requires parents to navigate new territory, the development and implementation of the transition plan. The transition plan is utilized to support families and their children during this process. Although the transition plan is meant to assist families in undergoing a smooth transition, some dissatisfaction within this process is evident. Parents, as key stakeholders, report various areas of dissatisfaction. An overall lack of parent education regarding the school system and options for their children can impact the parent's perceptions and feelings throughout the transitional process and can hinder the success of the child within their new education setting. Parents report frustration with the disconnect from one school to the next in recognizing the needs of the students and leading to increased parental stress. Understanding the lived experience of the parents is paramount to understanding how the process can be changed to better serve all parties. This study uses a phenomenological qualitative approach to gather data with semi-structured interviews in order to explore parents' perceptions and experiences navigating this transition in services. The goal is to identify what actions are needed so parents can successfully navigate the system with satisfaction. The outcomes from this study will provide service providers with a better understanding of what supports need to be implemented and what changes need to be made in order to best aid parents throughout the process.

14: Exploring Rehabilitation Therapists' Knowledge and Perspectives on the Use of Artificial Intelligence and Machine Learning for Persons Post-stroke

Hannah Clark | Health Sciences | Rangos School of Health Sciences | Senior

Faculty Advisor/s: Elena Donoso Brown, Ph.D., OTR/L

ABSTRACT:

The use of artificial intelligence (AI) and machine learning (ML) in post-stroke environments such as implementing the use of robotics, gaming systems, self-monitoring apps, or other sensor-based devices is currently low. However, due to the rapid expansion of technology within the medical field, it is important to look at the current growth of AI/ML trends and how they can currently assist, what is needed to assist therapists when using these devices, and what barriers could arise when using AI/ML within a rehabilitation field. The purpose of this research project is to gain clinician's views and ideas on AI/ML in post-stroke assessment and intervention. The study is ongoing and uses mixed methods designs with surveys and focus groups. Participants in the study must complete a survey before and after a one-time virtual session. To be included in this study, clinicians had to have practiced in the last year or be currently practicing as an occupational or physical therapist practitioner in United States (US) or Asia who speak English. They also need to have had a caseload with persons post-stroke making up at least 30%. Currently, there have been six focus groups completed with a total of 28 clinicians. Preliminary analysis of the surveys indicates that clinicians are aware of technology that uses AI/ML but use in practice for persons post-stroke is infrequent. Most participants reported that the webinar increased their knowledge of AI/ML.

15: Impact of a diabetic retinal exam screening program on quality measure gaps at a family medicine practice: An interprofessional initiative

Michael Hair | Pharmaceutical Sciences | School of Pharmacy | Senior
Alexandra Tardugno | Pharmacy | School of Pharmacy | 6th year
Alyssa Greenaway | Pharmacy | School of Pharmacy | 6th year
Faculty Advisor/s: Autumn Stewart-Lynch, Pharm.D., BCACP, BC-ADM

ABSTRACT:

Background: Patients with diabetes are at risk for retinopathy, which is a leading cause of blindness in the United States. The American Diabetes Association (ADA) recommends that patients receive an annual diabetic retinal exam (DRE) to prevent vision loss. This annual exam is also a quality measure that is assessed by insurance companies when determining reimbursement rates for healthcare facilities. There are several barriers to annual DRE screenings including cost and lack of access to healthcare.

Objective: The purpose of this study is to describe the impact of a DRE screening program at a family medicine center (FMC) on the number of quality measure gaps resolved.

Methods: This descriptive study was conducted at a FMC in a rural area with a medically underserved population. A regional Medicaid plan provided a list of patients with a quality measure gap for an annual DRE and loaned a RetinaVue 700 Imager to take retinal photos. After screening eligible patients via phone, retinal exams were administered by student pharmacists and medical assistants to consenting patients over the course of nine days. Images were then sent to an ophthalmologist to be interpreted.

Results: A total of 61 patients were included in the analysis. This program closed quality measure gaps for 11 (18.0%) patients who were able to receive an in-office eye exam.

Conclusions: This pilot project shows that offering in-office diabetic retinal exams may be an effective strategy to close quality measure gaps and provide access to screening among a medically underserved population.

16: Attitudes, beliefs, knowledge, and practices for over-the-counter syringe sales in community pharmacies: A systematic review

Katelyn Owens | Pharmaceutical Sciences | School of Pharmacy | Senior
Faculty Advisor/s: Jordan Covvey, Pharm.D., Ph.D., BCPS

ABSTRACT:

Background: Community pharmacies are an important resource for people who inject drugs to purchase over-the-counter syringes. Access to sterile injection equipment can reduce the transmission of blood-borne illnesses. However, pharmacists and their staff ultimately use discretion over sales.

Objective: To identify staff attitudes, beliefs, knowledge, and practices in the sale of OTC syringes in community pharmacies.

Methods: PubMed, Embase, and Scopus were systematically searched from inception to September 2022. The review included peer-reviewed empirical studies regarding OTC syringe sales among community pharmacy staff. We screened records and extracted data using a predefined data extraction form. Findings were narratively synthesized, and critical appraisal was conducted using the Mixed Methods Appraisal Tool.

Results: 1895 potentially relevant articles were identified, and 35 were included. All studies included pharmacists, with 19.4% also including technicians, 5.6% including interns, and 11.1% including other staff. Studies found relatively high support among respondents for harm reduction-related services within community pharmacies, but less common reports of staff engaging in said services themselves. When studies investigated the perceived positive or negative impacts of OTC syringe sales, prevention of blood-borne illness was widely understood as a benefit, while improper syringe disposal and safety of the pharmacy and its staff were commonly reported as concerns. Stigmatizing attitudes/beliefs toward PWID were prevalent across studies.

Conclusion: Community pharmacy staff report knowledge regarding the benefits of OTC syringes, but personal attitudes/beliefs heavily influence decisions to engage in sales.

17: Presentation, Treatment, and Clinical Outcomes of Patients with Lyme Carditis: A Descriptive Study

Chloe Potosnak | Pharmaceutical Sciences | School of Pharmacy | Senior

Hanna Gosliak | Pharmaceutical Sciences | School of Pharmacy | Senior

Rayn Oswald | Pharmaceutical Sciences | School of Pharmacy | Senior

Camren Horton | Pharmaceutical Sciences | School of Pharmacy | Senior

Faculty Advisor/s: Courtney Montepara, Pharm.D.; Anthony Guarascio, Pharm.D.

ABSTRACT:

Lyme disease is a tick-borne infection prevalent in the northeastern United States. Carditis is a rare manifestation of early disseminated Lyme disease, commonly presenting as atrioventricular (AV) nodal conduction abnormalities. Current guidelines recommend initial treatment of Lyme carditis with intravenous ceftriaxone followed by oral antibiotics like doxycycline. This recommendation is derived from low-quality evidence, and large, well-designed studies comparing treatment and clinical outcomes are lacking. An IRB-approved, retrospective descriptive study was conducted to further describe Lyme carditis treatment regimens and associated outcomes for 78 patients within an endemic region. Electronic health records were utilized to collect past medical history, history of present illness, laboratory data, serology testing, cardiac testing/imaging, and treatment. Outcomes of interest included antibiotic regimens and duration of therapy, cardiovascular manifestations, length of stay, need for ICU admission, 30-day readmission, and 30- and 90-day mortality. The most common cardiovascular manifestation was AV block, experienced by 65 patients. Sixty-five patients received ceftriaxone in the hospital/ED for 3.7 ($\hat{A}\pm 2.3$) days; 8 received ceftriaxone for 3.8 ($\hat{A}\pm 2.8$) days prior to transition to inpatient oral doxycycline. Fifty-three patients received oral doxycycline following discharge for 18.7 ($\hat{A}\pm 7.8$) days, while 25 received outpatient ceftriaxone for 19 ($\hat{A}\pm 6.5$) days. This study represents one of the largest studies to-date evaluating treatment and clinical outcomes of Lyme carditis. It offers additional support that ceftriaxone and oral antibiotics, such as doxycycline, are appropriate first-line therapies for Lyme carditis.

18: A Pharmacist's Impact on Diabetes Quality Measures in a Primary Care Setting

Vivian Di | Pharmacy Foundations | School of Pharmacy | Senior

Faculty Advisor/s: Autumn Stewart-Lynch, PharmD, BCACP, BC-ADM

ABSTRACT:

Pharmacists play a critical role in optimizing treatment regimens and decreasing suboptimal medication prescribing for patients with diabetes mellitus (DM). They avoid or minimize gaps in care to promote

treatment consistent with the evidence-based guidelines reflected in the National Committee for Quality Assurance's HEDIS Measures for Comprehensive Diabetes Control. The primary objective of this study is to describe the impact of an ambulatory care pharmacist embedded within a family medicine residency clinic on DM quality measures in a medically underserved population. This retrospective, cohort study reviewed the charts of adult patients seen at least once for a DM management encounter by a clinical pharmacist between Jan 2021 and Dec 2022. Demographic and clinical data related to DM outcomes and quality measures were gathered and analyzed using descriptive and inferential statistics. A paired t-test was used to compare the change in A1c from baseline (first clinic visit during study time frame) to most recent data available. The number of patients with an A1c <8% or >9%, a blood pressure (BP) <140/90, a urine microalbumin/creatinine, a diabetic eye exam, or a statin on record were also compared between baseline and follow-up. Study findings support a positive impact of a clinical pharmacist on quality measures related to DM management, with several measures exceeding the national averages for a Medicaid population. The improved control observed has the potential for reduced DM complications and prolongation of life. Future research is planned to compare these findings with those of patients in the practice not seen by a clinical pharmacist.

19: The use of buprenorphine to-go packs in the emergency department

Amanda Kearns | Pharmacy Foundations | School of Pharmacy | Senior

Abigail Robb | Pharmacy | School of Pharmacy | Senior

Benjamin Johnson | Pharmacy | School of Pharmacy | Senior

Heather Metro | Pharmacy | School of Pharmacy | 2024

Faculty Advisor/s: David Zimmerman, PharmD, BCCCP, BCEMP, FASHP; Branden Nemecek, PharmD, BCPS

ABSTRACT:

Introduction: Buprenorphine is an effective treatment for opioid use disorder (OUD). Patients in the emergency department (ED) can be initiated/continued on buprenorphine as a bridge to follow-up and given a “to-go” pack.

Research Question: What is the buprenorphine prescription fill rate and return to ED rate for patients 30 days post-discharge after receiving a buprenorphine to-go pack?

Study Design: Retrospective descriptive study (June 2022 to May 2023).

Methods: Adult patients discharged with a buprenorphine to-go pack from an ED within a health system were included. Excluded patients included those admitted, transferred, incarcerated, or died in the ED. Data was extracted from the hospital electronic medical record. The primary outcomes assessed within 30 days of ED discharge were: (1) return to a health system ED, and (2) fill history of buprenorphine in the state prescription drug monitoring program database. Data was analyzed using descriptive statistics in Microsoft Excel.

Results: A total of 124 patients received buprenorphine to-go packs. The sample was primarily male (63.7%), white (71.8%), on Medicaid (63.7%), and a mean age of 40.9 years. A total of 43 patients (34.7%) were initiated on buprenorphine for the first time, while the others previously received buprenorphine. Of patients with data available at 30 days, 63.3% filled buprenorphine prescriptions and 32.8% returned to an ED within the health system.

Conclusion: The implementation of a system-wide buprenorphine to-go supply at ED discharge is a feasible option to provide continuity of care to patients with OUD.

***20: Parental Leave Policies Influenced by Companies in the US: Battling Inequities and Realizing Transformational Health Outcomes data (BIRTH & MIHE)**

Laiba Mirza | Public Health | Rangos School of Health Sciences | Junior
Faculty Advisor/s: Faina Linkov, Ph.D.; Diane C. McClune RN, BSN, MBA

ABSTRACT:

Introduction: In the 21st century workplace dynamics dramatically changed, with both mothers and fathers needing parental leave. However, there is no guaranteed policy in the US workforce system regarding the availability or the amount of leave a parent should have.

Methods: Through PBGH and Healthy Start, 25 employers covering approximately 200,000 lives were surveyed regarding their policies related to health insurance coverage, maternal/ paternal leaves, and benefits for non-traditional parents. Descriptive statistics were used to analyze the data.

Results: Out of the companies surveyed, 28% did not offer maternity leave, 36% did not offer paternity leave, and 22% did not provide leave for adoptive parents. The companies that provided disability/ parental leave offered as few as 2-3 paid weeks off. Over the next two years, 76% of companies reported no intention of adjusting their leave policies.

Discussion: Becoming new parents is a transformational life event, which employers should consider in improving their employee retention and support of employees' health and well-being. While the FMLA has provided a basis for maternity leave with up to 12 weeks of unpaid leave and FEPLA further assured 12 paid weeks of leave with job security, policy changes are necessary to prevent challenges for low-income families and to provide opportunities for parents to emotionally connect with the child. Ensuring that employees have sufficient time to spend with their new children is essential regardless of whether the birth is traditional or nontraditional. Providing much-needed bonding experiences can positively influence the child's health, development, and well-being.

21: Building Together: Collaborative Community Planning and Assessment

Olivia Pezich | Public Health | Rangos School of Health Sciences | Senior
Faculty Advisor/s: Urmi Ashar, MD, MBA

ABSTRACT:

Objectives: Duquesne University Center for Community Engaged Teaching and Research (CETR) and Jasmine Nyree Campus are partnering to complete a Partners of Campus Community Engagement (PCCE) grant to build Jasmine Nyree's capacity to deepen community engagement in Sheraden, a neighborhood in the City of Pittsburgh.

Priority Population Served: The study primarily targets the community of Sheraden, a Pittsburgh neighborhood that often experiences a lack of opportunities and barriers to optimal health outcomes.
Methods: The grant will utilize an action-oriented approach to community engagement that will focus on the concerns of the Sheraden community, building a coalition of community organizations, and practical solutions for meeting residents' needs.

(Expected) Results: The project focuses on the Partners for Campus Community Engagement (PCCE) grant writing process with, the help of a collaborating organization. I will be conducting meetings and windshield surveys to develop this process. If the grant is accepted it is anticipated that the intervention will significantly improve participants' quality of life in the Sheraden, PA area.

Conclusions: The PCCE grant will create a coalition between Sheraden organizations & Center for Community Engaged Teaching and Research at Duquesne University hoping to provide strong support for the Sheraden community.

Public Health Implications: "Teaches the skill of grant writing which will be utilized in my public health career.

22: From Solitude to Serenity: Treating Loneliness with Mindful Meditation

Tamara Sioui | Public Health | Rangos School of Health Sciences | Senior

Faculty Advisor/s: Matthew Kostek, Ph.D.

ABSTRACT:

According to the Surgeon General, loneliness is an epidemic and a public health crisis affecting individuals and society. Loneliness can impact anyone, especially with the growth of technology. Mortality increases 60% in people who lack social connection. Yet, for loneliness, actual social connection may not be as important as perceived social connection. Thus, it seems to be just as much a psychological as a physical disturbance. Because loneliness has only recently gained significant public attention, there are not many treatments. Currently, most interventions are therapy or group-based so that those struggling with loneliness can be more socially involved. However, mindfulness meditation (MM) is a solution that has recently gained attention. MM is likely to be an effective treatment because it is a psychological intervention that directly addresses a person's perception. Mindfulness meditation is also easily personalized allowing the participant to address their own views of loneliness. Because MM has minimal costs and many positive side effects it is likely to help long-term. MM is likely to affect the patient's perception of loneliness thereby directly affecting the underlying psychology. It is likely to allow the patient to become more at peace with more alone time. To learn more about this public health issue, our project consisted of a systematic literature review to examine loneliness and treatments that may help, with MM as a potential treatment. Our presentation illustrates the effect MM is likely to have on loneliness and the importance of studying treatments for loneliness as a newer public health crisis.

23: Healthcare Disparities in HIV/AIDS: A Comparative Analysis between Rural and Urban Communities in the United States

Hayley Jenkins | Biology | Rangos School of Health Sciences | Senior

Faculty Advisor/s: Gerald Boodoo, Ph.D.

ABSTRACT:

Human Immunodeficiency Virus (HIV) is a viral infection transmitted through bodily fluids that results in destruction of the immune system, leading to Acquired Immunodeficiency syndrome (AIDs). The HIV/AIDs epidemic has killed and infected nearly 1 billion people globally. The staggering rates of infection and mortality over the last 40 years have been the driving force behind efforts to prevent and treat HIV infection. In the US, healthcare availability and quality varies between racial, ethnic, and geographical communities. Disparities in access and the standard of healthcare provided extend into the treatment and prevention of HIV/AIDs. This review aims to characterize and quantify the differences in

prevention, infection, and treatment of HIV/AIDs between rural and urban US communities. Prevention is the first, and arguably most important, step to reduce HIV/AIDs infection. Improving awareness and education contributes to the prevention of infection and reduction in mortality rates. In addition to an analysis of prevention tactics, measuring and comparing infection rates will provide context to the success of prevention strategies. Finally, understanding treatment success and failure rates will provide insight into the healthcare disparity between urban and rural populations. Each of these aspects will be discussed in light of improvements to HIV/AIDs prevention and treatment initiatives in the United States.

24: Measuring Attitudes about Artificial Intelligence Uses in Education

Isabella Donato | Psychology, Strategic Public Relations and Advertising | McAnulty College and Graduate School of Liberal Arts | Sophomore

Hannah Gorman | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior
Faculty Advisor/s: Alexander Kranjec, Ph.D.

ABSTRACT:

ChatGPT, a newly launched artificial intelligence platform that generates human-like text and answers based on the input it receives is becoming more popular in a variety of fields. While there are many helpful uses for ChatGPT, opinions differ with respect to using the platform for educational purposes. Educational domains are particularly fraught in this regard because ChatGPT has the potential to be used for cheating, presumably by students. However, the ways that professors might "cheat" by using ChatGPT to make some daily tasks easier is not well understood. To explore how students and professors might differ in their opinions about ChatGPT, we created a 23-question survey for students and professors to rank the acceptability of its use for educational purposes. Participants were asked to rank each statement for its acceptability on a 4-point Likert scale. We predicted that professors would be more accepting than students of using Chat GPT for teaching uses. Indeed, we found that professors were more accepting of using Chat GPT for teaching and educational purposes as compared to students. Our findings suggest that as artificial intelligence platforms become more popular and powerful, students are likely to have increasingly negative attitudes about professors using AI in classrooms for teaching purposes.

25: Building a Model of a House Dysmorphia

Jacob Schaner | Psychology | McAnulty College and Graduate School of Liberal Arts | Junior

Mia Capretta | Liberal Arts | McAnulty College and Graduate School of Liberal Arts | Senior

Faculty Advisor/s: Alexander Kranjec, Ph.D.

ABSTRACT:

Distorted perception is a symptom of psychiatric disorders such as Body Dysmorphia(BDD) and Obsessive-Compulsive Disorder (OCD). Individuals with BDD perceive defects and flaws in their appearance that are exaggerated or not observable, and individuals with OCD see similar distortions in the world around them. The research and understanding of these disorders have increased in recent years, but there is little data regarding whether or not distorted perception is relevant in an individual's interpretation of their home and intimate environment. To determine whether or not distorted perception is relevant in these specific areas, we modified question models from both BDD and OCD surveys to establish diagnostic criteria for the possibility of what we're calling "House Dysmorphia." Such interpretations can be clustered more closely with distorted perceptions present in BDD, or the more generalized stress related to untidy environments present in OCD. We predict they will be more clustered with BDD, as these perceptions could be seen as relating more to the self than the literal

environment. The findings of this study can be used to better understand BDD and OCD distortions in general, and how they relate to the ways people interact with their environment.

26: Juror Sentencing Decisions in a Criminal Court Case

Maya Baker | Psychology | McAnulty College and Graduate School of Liberal Arts | Junior
Zachary Seddon | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior
Faculty Advisor/s: Alexander Kranjec, Ph.D.

ABSTRACT:

This study investigates the influence of defendant gender on juror sentencing decisions in a sexual assault case involving repeated statutory assault of a minor by a 44-year-old defendant. Participants (N = 145) randomly received case versions featuring either a male or female defendant and were asked to determine a prison sentence ranging from 64 years to life without parole. Drawing on previous research concerning gender biases in sentencing decisions, we hypothesized that gender would impact the severity of sentences: female defendants would receive comparatively more lenient sentences, while male defendants would face harsher ones, with female participants more likely to give harsher punishments. The findings reveal compelling patterns in juror decision-making. As predicted, male defendants received longer sentences. However, while numeric trends showed that male and female participants tended to be more severe when sentencing a defendant of their own gender, the main effect of juror gender was not significant. These results underscore the nuanced role of defendant gender in shaping juror sentencing decisions, shedding light on the interplay between gender dynamics and judicial outcomes in sexual assault cases.

27: Exploring Cancer Patients' Experiences in Treatment

Nicholas Tarabokia | Psychology | McAnulty College and Graduate School of Liberal Arts | Junior
Faculty Advisor/s: Alexander Kranjec, Ph.D.

ABSTRACT:

Cancer patients chemotherapy treatment negatively affects their basic cognitive functions. Effects differ depending on individual levels of treatment and specific cancer diagnoses. Despite this well known issue amongst cancer patients, there are no formal studies to evaluate these issues. To address this gap, the current survey asks of number of participants (ranging in age, diagnosis, and type of cancer, a number of questions concerning: physical symptoms experienced from radiation or chemotherapy, how effective certain treatments were physical and mental health, levels of difficulties with multitasking, interactions in social settings, and mental delays or challenges. Results suggested that people who experienced different treatments experienced a number of task specific difficulties. 70% of the participants stated they had trouble concentrating on daily tasks, 57% had trouble multitasking, 63% experienced high levels of mental fogginess, and 63% suffered from short term memory loss. Only 69% of participants received chemotherapy, leaving 31% receiving another form of treatment. These results show how the different kinds of cancer and the level of treatment make an impact with the cognitive functions of most patients. Along with cancer treatment, there should be more studies that take a more expansive view of the cancer patients overall physical well-being.

28: Navigating Comprehensive-Contemporary-Clinical Education: Student's Self-Efficacy

Jaimee Conmy | Speech Language Pathology | Rangos School of Health Sciences | Senior
Faculty Advisor/s: Heather Rusiewicz, Ph.D., CCC-SLP; Brooke Baumann, M.S., CCC-SLP

ABSTRACT:

The purpose of this study was to explore student perceptions of self-efficacy related to clinical education experiences as professional phase (i.e., graduate) students in speech-language pathology (SLP) program to inform more effective and comprehensive contemporary, clinical education (CCCE) experiences (i.e., face-to-face clinical interactions, telepractice, computerized and other simulated experiences, standardized patients). In recent years, CCCE emerged as a growing and evolving model of education and clinical experiences to meet the demands of preparing an increased number of SLP students.

This investigation sought to answer the following research questions: "What was the relative contribution of the components of clinical education on students' current confidence in clinical performance?" and "What components of clinical education influenced students' self-efficacy in the American Speech-Language-Hearing Association (ASHA) Big 9 standards?"

A mixed quantitative survey and phenomenological approach were used with qualitative data from 43 Duquesne University students in the professional phase of the speech-language pathology program. Results from the study inform an understanding of the emerging facets of teaching and learning practices in the CCCE model for SLP students in the ever-changing landscape of educational requirements and best practices in SLP.

29: Student Withdrew

30: Investigating Self-Efficacy and Reported Experiences of Simulations as a Mode of Clinical Education in a Graduate Speech-Language Pathology Program

Caitlin Whiteford | Health Sciences | Rangos School of Health Sciences | Senior
Faculty Advisor/s: Panayiota Senekkis-Florent, Ph.D., CCC-SLP, BCS-S

ABSTRACT:

Simulation has been integral to clinical education and practice for decades in medical school and nursing programs, however, it is only in the past 10 years that the American Speech-Language-Hearing Association (ASHA) approved that 20% of the total required hours of clinical contact time, could be achieved via simulated experiences. Simulated experiences provide both didactic and collaborative instruction by clinical and academic instructors. Types of simulation include, though not limited to, the use of high and low fidelity mannequins; partial task simulators; interactive technology; and engaging with "standardized patients" whereby volunteers play the role of the patient, for assessment and/or treatment protocols. SLP graduate programs have, of late, begun to work collaboratively with existing university simulation labs to provide SLP students with realistic interactions as an integral part of the clinical education requirement. Though there are a growing number of SLP programs that are employing these simulated experiences as part of the clinical education, there is a paucity of research examining teaching and learning via simulated experiences, and particularly the use of low and high-fidelity mannequins. The purpose of this mixed methods investigation is to examine the perceptions, experiences, and self-efficacy, related to clinical education via simulated experiences of recent alumni (i.e., over the last 5 years), of an SLP program, with an eye to guiding and enriching future clinical learning experiences.

31: Environmental Justice: Helping Disadvantaged Communities Transition From Non-Renewables to Clean Energy (Comparative Analysis)

Kyra Miklos | Political Science | McAnulty College and Graduate School of Liberal Arts | Freshman
Faculty Advisor/s: Michael Jarrett, MPP

ABSTRACT:

There is an urgent need in the United States to address environmental justice concerns within historically disadvantaged communities. The topic for this research pertains to the intersection of environmental policy, social equity, and clean energy transitions and seeks to answer the following questions: how can switching to clean energy address environmental injustices experienced by disadvantaged communities and how can governments help struggling citizens? Previous research highlighted the disproportionate burden of pollution and climate change impacts on marginalized communities. Unfortunately, there remains gaps in policies tailored to address the specific needs of these communities. I seek to fill these gaps by exploring policy alternatives that governments could implement and ultimately recommend the best options. My primary goal is to propose a policy framework that empowers disadvantaged communities to transition to clean energy sources, thereby mitigating environmental injustices. By employing a multi-attribute analysis and drawing on existing policy initiatives, I present a comprehensive strategy for addressing the complex challenges associated with equitable climate change mitigation. My key findings demonstrate the effectiveness of state-specific transitions, where governments implement clean energy solutions for struggling communities. By providing more targeted funding, resources, and accountability measures, these policies have the potential to significantly improve resident well-being, reduce pollution, and enhance environmental sustainability. This research holds potential to inform policymakers, advocacy groups, and community stakeholders about effective strategies for advancing environmental justice.

32: Mass Burials in Jewish Cemeteries: Examples from the Holocaust

Joseph Reeder | Environmental Science | School of Science and Engineering | Sophomore
Faculty Advisor/s: Philip Reeder, Ph.D.

ABSTRACT:

The Old Jewish and Livas Cemeteries in Latvia and the Āliakalnis Jewish Cemetery in Kaunas, Lithuania, all possess a shared history as burial grounds used for centuries by local Jewish communities. During World War II, the Nazis and their local collaborators potentially used these cemeteries for the mass burial of Jews murdered as part of the Holocaust. The main objective of this research was to use technology, archival data, and Holocaust survivor testimony to determine if mass graves and other features related to the Holocaust are present in these cemeteries. Specific technologies used included ground-penetrating radar (GPR), electrical resistivity tomography (ERT), and a hand-held LIDAR (Light Detection and Ranging) system called SLAM (Simultaneous Localization and Mapping). ERT and GPR analysis determined three separate trench anomalies in the Old Jewish Cemetery in Riga, Latvia. SLAM analysis did not indicate any micro-topographic features correlated with these anomalies. Anomalies in Āliakalnis Cemetery support historical accounts of mass burials at this location. ERT and GPR analysis indicated an anomaly in the western part of the cemetery, and additional ERT analysis indicates other potential mass graves are present. Preliminary Livas Cemetery investigations also show an apparent GPR anomaly. The ERT and GPR data, correlated with archival data and Holocaust survivor testimony, points towards the possibility that mass graves may exist at all three sites. Future research includes expanding search areas, additional archival and testimony studies, and incorporating other geophysical techniques.

33: Exploring The Legal Aspects of Climate Change and Artificial Intelligence: A View from the American Society of International Law (ASIL) Conference

Kendall Nigh | Political Science, International Relations | McAnulty College and Graduate School of Liberal Arts | Junior

Gabrielle Jenkins | Political Science | McAnulty College and Graduate School of Liberal Arts | Senior
Faculty Advisor/s: Sara Grove, J.D., Ph.D.

ABSTRACT:

The American Society of International Law (ASIL) conference brings together international law experts from across the globe to examine arising issues within the field. Topics covered at the conference include the implications of climate change and states' responses and the concerns raised by the increasing presence of artificial intelligence in global affairs. We plan to attend the ASIL annual meeting in Washington, D.C. from April 3-6 to network with legal experts and evaluate the current issues affecting laws surrounding climate change and artificial intelligence. This research project assesses the ASIL presentations on these two emerging topics and expands our awareness of the legal challenges in these areas. Kendall Nigh will focus her research on climate change, while Gabrielle Jenkins will examine issues related to artificial intelligence.

34: A Neorealist Perspective on Contemporary US Policy Towards Venezuela

Gabe Sanders | International Relations, International Security Studies | McAnulty College and Graduate School of Liberal Arts | Senior

Faculty Advisor/s: Mark Haas, Ph.D.

ABSTRACT:

This research examines United States-Venezuela relations since 1999, specifically the policies of the US towards Venezuela and how the US should proceed. This will be done by using the neorealist theory of international relations to analyze: how sanctions levied on Venezuela have been ineffective in changing Venezuelan foreign policy and, how US sanctions have contributed to causing a humanitarian crisis in Venezuela; how the humanitarian crisis has negatively impacted the US; how the US policy should be changed to diminish tensions. The options for the US are to use military force to compel Venezuela to change its foreign and domestic policy or to reassure Venezuela by offering a resumed diplomatic mission and lesser sanctions in exchange for policy changes. Considering that previous sanctions have been ineffective; the US should offer reassurance through reopening the embassy and reducing sanctions on Venezuela in exchange for policy changes while being prepared to militarily compel a policy change in Venezuela. While it is unclear what the US will do it is clear that something must be done as the current Venezuelan policy is becoming increasingly aggressive and opposed to the US.

35: Electronic Waste: An Analysis of the Newest Environmental Epidemic and Its Impacts

Dominic Failor | International Relations, International Security Studies | McAnulty College and Graduate School of Liberal Arts | Sophomore

Faculty Advisor/s: Dina Huehn, Ph.D.

ABSTRACT:

Previous research indicates that electronic waste impacts everyone, yet as this project will demonstrate, underdeveloped countries are impacted disproportionately. In addition, research points to these underdeveloped countries being immensely impacted through this waste by, having adverse effects on the land, air, and the sea. Considering the complex understandings on not only a global level but also a societal level as to how electronic waste is growing, we can better understand its impacts, current

production rate, and how to combat it. Some common questions to what extent does the impacts of electronic waste harm the environment? How do we do something about it? The goals of my research are to bring to light these issues and give more environmentally friendly alternatives for recycling electronics. Through examining this, we are better able to combat electronic waste, giving a modernized and fresh look into the literature as well as case studies. Understanding how the presence of electronic waste impacts the environment on three prongs: land, air, and sea, we see how there is a need for change. Through the analysis of UN conventions""analyzing how Intergovernmental Organizations can hold others accountable""as well as understanding why we see such an uptick, through acknowledging the main two contributors, we can see that we are a source of the problem and must make strides to combat this globally critical issue.

36: Socialism with Confucian Characteristics: Traditions and Political Legitimacy in China Today

Deagan Moore | History, Education | McAnulty College and Graduate School of Liberal Arts | Sophomore

Faculty Advisor/s: Jing Li, Ph.D.

ABSTRACT:

Political Legitimacy takes many forms during the tenure of the Chinese Communist Party (CCP). In recent times, Confucianism and traditional Chinese values have emerged as key elements in the legitimization of the Chinese government, and they will likely remain a critical factor in the coming decades. Since the CCP broke away from the hardline Marxist policies of the Mao Era in the late 1970s, it has been reliant on the country's economic performance to legitimize party rule. Now, however, China's economy is already showing signs of slowing down, and the workforce is expected to shrink. President Xi Jinping looks to Confucius as a potential remedy for legitimacy, drawing from traditions that had been utilized in imperial China. Xi is fleshing out the definition of "Socialism with Chinese Characteristics" that was popularized by Deng Xiaoping. The new definition includes the perspective that socialism is of Chinese origin because of China's historical practices such as the distribution of land and benevolent rulers governing in favor of the largely agrarian proletarian class. The party is promoting the study of China's past and urging academia to explore the ideas of traditional China, and this has led to voluminous writings on the subject. While President Xi's reliance on Confucianism and traditional Chinese values is not unheard of in the history of the CCP, the extent and intensity of his efforts are unprecedented.

37: Humanitarian Aid and Conflict: Lessons from the Syrian Civil War

Alex Hajkowski | International Relations, International Security Studies | McAnulty College and Graduate School of Liberal Arts | Junior

Faculty Advisor/s: Dina Huehn, Ph.D.

ABSTRACT:

Since the 1990s, there has been an increasing amount of humanitarian aid sent to areas experiencing conflict. While the basic assumption maintains that aid has positive effects, the last ten years have seen a greater focus on the negative impact of aid as the war in Afghanistan and other insurgent and guerilla conflicts have started to be analyzed. From a review of past literature, two antithetical positions arise: aid worsens conflict, and aid improves conflict. Rather than arguing whether aid ameliorates conflict or worsens it, this research studies how actors attempt to control aid, and the effects of this control on the conflict. This research seeks to answer this question, first, by reviewing literature on humanitarian aid's effect on conflict, then, by presenting a case study on the Syrian Civil War, specifically examining how aid was controlled and used by the Syrian government. My findings reveal how humanitarian agencies sacrificed impartiality in aid deliverance, and the subsequent effects this had on the conflict.

38: Analyzing Constitutional Dynamics: Is SCOTUS more powerful than the Chief Executive?

Katelyn Waranavage | Political Science, International Relations | McAnulty College and Graduate School of Liberal Arts | Junior

Faculty Advisor/s: Kristen Coopie, Ph.D.

ABSTRACT:

The Framers believed that without wielding the "sword of community" like the chief executive or "commanding the purse" like Congress, the judiciary was to be the weakest and least threatening of the three branches. However, the decision in *Marbury v. Madison* (1803) quickly and effectively changed the trajectory of the Supreme Court's power. In this landmark decision, the principle of judicial review was established, providing the Court with the authority to pass judgment on the constitutionality of the actions of other branches. The power of judicial review has greatly influenced Supreme Court proceedings, ultimately allowing the Court to establish the rules the chief executive must adhere to. This research evaluates the balance of power between the branches by analyzing significant Supreme Court cases in which the Court rules on the constitutionality of the presidents' executive actions. *McCulloch v. Maryland* (1819), *Myers v. United States* (1926), *Youngstown Steel and Tube v. Sawyer* (1952), and *United States v. Nixon* (1974) are a few of the cases referred to in this research to demonstrate the Supreme Court's ability to check the power of the president's executive actions. All these cases establish that, despite the system of checks and balances outlined in the Constitution, the Court has more power over the president than the president has over the Court.

39: The President as Commander in Chief

Kaitlin Novak | Economics | A.J. Palumbo School of Business Administration | Senior

Faculty Advisor/s: Kristen Coopie, Ph.D.

ABSTRACT:

Article 2 Section 2 of the United States Constitution states that, "The President shall be Commander in Chief of the Army and Navy of the United States, and of the Militia of the several States, when called into the actual Service of the United States". However, war powers are split between the legislative and executive branches as Congress has the power to declare war. The extent of the President's independent authority over the military has been debated for as long as our country has existed. The Commander in Chief Clause is notoriously brief, leaving a large window for interpretation of that power. My research suggests that the framers intended for Congress and The President to have a working relationship, with their delegated roles complementing one another. Congress's war powers are listed in Article 1 section 8, while The Commander in Chief Clause is left pointedly vague. After examining a variety of sources such as The Articles of Confederation, and The Federalist papers it can be determined that the President's power was intended to be relatively limited to command and direction of the armed forces. Throughout history various presidents have taken advantage of the vagueness present in the Commander in Chief Clause, expanding the President's role during war time. Supreme Court cases and legislation such as the War Powers Resolution of 1973 altered the definition of Commander in Chief in a modern context.

40: The Cold War over Taiwan: America's Unsustainable Policy Toward the Taiwan Question

James Harbert | History | McAnulty College and Graduate School of Liberal Arts | Junior
Faculty Advisor/s: Jing Li, Ph.D.

ABSTRACT:

Over the past seven decades, the small island of Taiwan has been at the center of complex Sino-American relations. Stemming from Chiang Kai-Shek's retreat following the Chinese Civil War, Taiwan, known as the Republic of China (ROC), has remained separate from Communist control, drawing the interest of both the People's Republic of China (PRC) and the United States. This paper delves into the historical backdrop of the Taiwan Strait, analyzing pivotal moments like the First and Second Taiwan Strait Crises, where the United States demonstrated a cautious yet strategic approach, balancing support for Taiwan while avoiding direct confrontation with the People's Republic of China. The policy of strategic ambiguity employed by the U.S. aimed to deter Chinese aggression without explicitly committing to Taiwan's defense. However, with China's rising military power and assertiveness under President Xi Jinping, the efficacy of this policy is increasingly questioned. Furthermore, shifts in Taiwan's political landscape, from advocating a "two Chinas" policy to "one China and Taiwan" complicate the situation. As tensions escalate and the status quo becomes untenable, this paper discusses the prospects of a new equilibrium, exploring the possibilities ranging from peaceful negotiations to potential military conflicts and the implications for regional stability.

41: The Power of Rhetorical Strategy in Creating Successful Environmental Change

Madison Wisen | English, Political Science | McAnulty College and Graduate School of Liberal Arts | Senior

Faculty Advisor/s: Sarah Wright, Ph.D.

ABSTRACT:

Rachel Carson's novel, *Silent Spring*, was a hopeful catapult towards a possible revolutionary movement of restricting and decreasing the use of certain pesticides that are harming the Earth's environment and its inhabitants. It did ignite some action against the harms of pesticides in the 20th century, but another problem that has recently increased in prevalence throughout the 21st century is climate change. My research seeks to answer whether Rachel Carson's ethical rhetoric or businesses' logistical rhetoric created more positive environmental change, and I do so by using both comparative and rhetorical analysis. Previous research has suggested that Carson's lack of scientific consensus led to less effective change in the environment, but what I found is that her decision to use moral rhetoric made environmental change more successful. My findings further reveal that her rhetorical appeal to human morality was more efficient than 21st century businesses' environmental policies because of businesses' motivation for more money. This research is significant because it bolsters the need for serious environmental change, while highlighting what rhetoric can create that change most effectively. More importantly it strengthens individuals' consciousness to deceptions in businesses' environmental policies, creating more awareness in how consumer products are actually harming the environment. Future research might look at what other environmentalist writers, besides Carson, have created successful environmental change. Other author's writings could then be compared to Carson's piece and

businesses' environmental policies to see if their rhetoric follows Carson's trend of creating more effective change than businesses' do.

42: Corrupt Corporate Climate: A Literary Analysis of Noor's Perspective on Corporate and Governmental Role in Climate Change

Aaron Duke | Pharmacy Foundations | School of Pharmacy | Sophomore

Faculty Advisor/s: Erin Speese, Ph.D.

ABSTRACT:

Climate change's effects on the lives of people worldwide have become increasingly concerning as natural disasters become more frequent. Many authors take to the pen to bring light to the dire issue of climate change. Despite these efforts, the ever-present climate crisis is pushed behind the scenes in the current world and corporate capitalism/economic growth takes precedence. With a futuristic Nigeria, Nnedi Okorafor's *Noor* highlights the ever-pressing issue of exploitation of the environment and impoverished countries through the actions carried out by the novel's mega-corporation, Ultimate Corp. Today, the actions of major corporations have posed a threat not only to the countries that are being exploited but also to the global climate. In the novel, *Noor*, the powerful windmills that are owned by Ultimate Corp, are representative of how, even in a futuristic setting, major corporations exhibit disregard for the environment. With the role of the government in *Noor*, Okorafor comments on governmental disregard for climate issues through the lack of effective legislation which continues to leave the issue to the public. Okorafor's work emphasizes the importance of corporate responsibility and governmental regulation in the ability to shift the tides against ongoing malpractice that is exacerbating the climate crisis.

***43: UNDERSTANDING THE KEY FACTORS ASSOCIATED WITH OBSOLESCENCE RISK IN CRITICAL SUPPLY CHAINS**

Olivia Greene | Supply Chain Management, Information Systems & Technology | A.J. Palumbo School of Business Administration | Senior

Ben Sadler | Computer Science | McNulty College and Graduate School of Liberal Arts | Junior

Sarah Martin | Supply Chain Management | A.J. Palumbo School of Business Administration | Junior

Faculty Advisor/s: Mike Sherwin, Ph.D.

ABSTRACT:

All supply chains are impacted by diminishing manufacturing sources and material shortages(DMSMS). However, critical supply chains are uniquely susceptible to DMSMS risks. In particular, the obsolescence of products and suppliers poses a substantial risk to the continuity of supply. In addition to ordinary risks that affect the longevity of a company, irregular procurement cycles, qualification barriers, and strict requirements pose additional risks in the supply chain network of manufacturers. This research focused on gaining valuable information for strategic and tactical decision-making by identifying key factors that assure continuity of supply. As such, we pose and test hypotheses pertaining to key variables that may affect the continuity of supply within critical supply chains and present results with the purpose of improving decision-making.

44: DNA Mixture Analysis of Co-mingled, Burnt Remains (CBR)

Sydney Bivens | Biochemistry | School of Science and Engineering | Senior

Faculty Advisor/s: Lyndsie Ferrara, Ph.D.

ABSTRACT:

Mass disasters leave devastation and heartache in their wake, and leave countless people affected. The identification of victims is an arduous task as most nuclear DNA is degraded, leaving mitochondrial DNA which is not specific to the individual. The purpose of this study was to determine if identifiable genetic profiles could be obtained from nuclear DNA from remains that had been mixed together in a burn simulation. Teeth were collected deceased individuals who donated their teeth. One tooth was utilized to gather a reference profile of the individual while the other teeth were mixed in groups of two by a third party to be burned in a kiln at 250°C. The mixtures were extracted, and the profiles were analyzed using the probabilistic genotyping software TrueAllele™ by Cybergene. It is hypothesized that the profiles from co-mingled and burnt samples will exhibit degradation and mixture complexity. To aid in deconvolution, a mixture analysis software will be used to separate the individual profiles from the mixture then compared back to the reference profiles. The ability to extract nuclear DNA from remains that have been compromised and mixed will provide more opportunities for individuals to be identified from mass disaster sites, leading to closure for persons affected by tragedy.

45: The Persistence of Human eDNA in Air

Kayla Houghton | Forensic Science and Law | School of Science and Engineering | Senior
Faculty Advisor/s: Lyndsie Ferrara, Ph.D.; Pamela Marshall, Ph.D.

ABSTRACT:

Environmental DNA, eDNA, is genetic material that organisms shed into their surrounding environment. eDNA deposited in soil and water has been analyzed to track locations and travel patterns of animals and determine the presence of species in an environment. The purpose of this study is to determine how effective air filtration is in obtaining eDNA from human remains stored in contained spaces over time. Tissue samples were placed in an airtight box and removed after an hour. The air from the box was then filtered and any genetic material was captured on filter paper. The genetic material was then quantified, extracted via Qiagen, amplified, and sequenced. The DNA profiles collected were compared to reference profiles developed from the tissue samples. The ability to generate a genetic profile from air would allow forensic scientists to gain another tool to obtain evidence in cases in which no trace was seemingly left behind.

46: Virtual Reality as a Format of Crime Scene Documentation

Jocelyn Rodriguez | Forensic Science and Law | School of Science and Engineering | Senior
Faculty Advisor/s: Pamela Marshall, Ph.D.; Lyndsie Ferrara, Ph.D.

ABSTRACT:

Virtual Reality (VR) technology has been a source of entertainment for many, with educational institutions and companies implementing VR as an educational supplement and tool in the training of future forensic scientists, law enforcement officers, medical professionals, and other fields. The natural progression would be to bring the benefits that other fields have seen with VR to a real-life scenario. Current literature shows a mock jury being placed in a virtual recreation of a crime scene and shows promise with the retention of details from the crime scene. However, placing a jury in VR and allowing them to walk around is not feasible in most courtrooms and can be very expensive and time-consuming. Instead of a virtual recreation of the crime scene, as used by previous studies, a 3D scan can be taken at the scene, creating a digital 3D model using the information gathered from them. While there is plenty of research involving 3D models and 3D scanners, VR does not have the same privilege and is relatively uncharted territory in the eyes of the law. To examine this possibility, the normal workflow of documenting a crime scene will be modified to include the use of FARO® 3D Scanners. The scans will

be processed into a 3D model and VR environment to determine the viability of this updated procedure, which could allow new ways to examine a crime scene. A future experiment will use these scans and models to examine VR's use in the courtroom.

47: An Analysis of Human DNA Recovery from Plants Grown in Blood Infused Soil

Rebecca Sines | Biochemistry | School of Science and Engineering | Senior

Faculty Advisor/s: Pamela Marshall, Ph.D.; Lyndsie Ferrara, Ph.D.

ABSTRACT:

Previous studies have shown that the decomposition of a human body in a shallow grave has caused differences in the carbon footprint for the plants above the burial site. The purpose of this study was to determine whether human DNA can be extracted and quantified from a plant grown in blood infused soil. Prior research indicates that human DNA can be extracted from soil, but there are microbial activities in the soil that causes DNA degradation. This project focuses on DNA extraction from plants to determine if recovery is possible with less degradation. In this experiment, lima beans were planted individually into soil that is mixed with either 100 uL or 1000 uL of blood. Additional lima beans were planted in clean soil as control samples. After growing for a month, the physical appearance of the plants was recorded. At that time leaf samples were collected from the experimental and control plants. The leaves were crushed with the Mini Leaf Crusher™ onto DNA sample cards prior to DNA extraction and quantitation. It is hypothesized that DNA can be recovered from plants that grew in the blood-soil mixture. The findings can be applied to cases where no physical human remains exist in an effort to identify victims.

48: Examining Solutions for the Sexual Assault Kit Backlog

Gabrielle Gibbons | Forensic Science and Law | School of Science and Engineering | Senior

Faculty Advisor/s: Lyndsie Ferrara Ph.D., Pamela Marshall Ph.D.

ABSTRACT:

The Sexual Assault Kit Backlog is the mass accumulation of untested Sexual Assault Kits (SAKs) that were not turned over for DNA testing across America. Over the past couple of decades there have been considerable efforts from laboratories, nonprofits, and legislators to diminish the SAK backlog. Through researching a series of techniques used by these institutions across varying levels of laboratories and government, this examination seeks to determine which techniques have been most successful at reducing the backlog. While these techniques have been examined individually throughout the movement there has never been an amalgamation of all the methods to determine if there is an overall best practice over the varying levels of jurisdiction.

49: Examining the Presence of Foreign DNA on Neck Swabs

Alexa Gonzalez Morales | Forensic Science and Law, Biochemistry | School of Science and Engineering | Senior

Faculty Advisor/s: Lyndsie Ferrara, Ph.D.; L. Kathleen Sekula, Ph.D., PMHCNS-BC, FAAFS, FAAN

ABSTRACT:

Strangulation is the compressing of blood vessels and/or air passages through external pressure on the neck. Growing research and anecdotal information suggests the increase of strangulation in sexual assault cases. In suspected strangulation cases, it may be possible to retrieve touch DNA from a

survivor's neck and detect the DNA profile of the perpetrator. This study looks to determine the presence of foreign DNA on a subject's neck after exposure to everyday activities. The goal is to determine if there is a buildup of foreign DNA on our necks even without direct contact. Reference and neck swabs were obtained from numerous volunteers across three separate visits to a DNA lab. DNA from the swabs was extracted, quantified, amplified, and genotyped. It was then visualized using OSIRIS. Volunteers also filled out a questionnaire related to their daily life and activities they had performed in the 24 hours prior to the collection of the swabs. Reference profiles were compared to the DNA profiles obtained from the neck swabs to identify the presence of foreign DNA. Preliminary results show that DNA is present in very low quantities in the neck area. Genotyped DNA samples show single source, two-person, and three-person profiles. This research will impact the forensic science community by determining the validity of neck swabs as forensic evidence. It is important to know what could be present on a victim's neck before testing for touch DNA and how daily activities could impact the presence of DNA.

***50: Identification and Quantification of Illicit Drugs in Blood Using Stir Bar Sorptive Extraction and LC-QQQ-MS**

Abigail Noll | Forensic Science and Law | School of Science and Engineering | Senior
Faculty Advisor/s: Stephanie Wetzel, Ph.D.

ABSTRACT:

The evolving drug epidemic has not only increased the risk of injury and death in people struggling with addiction but has also strongly affected the surrounding communities. The danger proposed by illicit drug use has led to further research into more sensitive substance detection and identification techniques for biological samples. Stir bar sorptive extraction (SBSE) is used in environmental and pharmaceutical chemistry to detect and quantify organic pollutants in water reserves and dietary supplements. This extraction method utilizes a polymer-coated magnetic stir bar to absorb analytes of interest that can later be desorbed based on temperature or solvent change for separation. SBSE has been shown to have higher analyte recoveries with less solvent use as compared to the more common solid phase and liquid-liquid extraction methods. Very little research has been done using this method with biological samples such as blood, let alone in a forensic toxicology setting. In this study, polydimethylsiloxane-coated magnetic stir bars were used to extract analytes correlating to a fifteen-drug panel from blood samples. Each blood sample was spiked with a known analyte concentration. The drug panel included illicit substances such as fentanyl and heroin and medical prescriptions like oxycodone and methadone. LC-QQQ-MS with a biphenyl column was used for separation and quantification of these analytes. There have been promising results that the addition of salts has aided the extraction process by making the PDMS more favorable for the drug analytes. Victims and their grieving families would receive justice and closure by furthering research in drug extraction techniques.

51: Quantitative Determination of Heroin and Fentanyl in Dried Blood Spots on Various Surfaces

Rachel Westley | Forensic Science and Law, Biochemistry | School of Science and Engineering | Senior
Faculty Advisor/s: Stephanie Wetzel, Ph.D.

ABSTRACT:

Heroin and fentanyl have been rigorously tested in various biological samples, the foremost being blood, due to their prominence in illegal use and activities. The use of dried blood spot (DBS) testing, which originally was used for infant medical screening, has recently entered toxicological analysis to detect drugs of abuse. A stabilizing effect on some drugs resulted when using DBS, thus increasing the accuracy of testing. However, this was limited because DBS testing only uses DBS cards or filter paper. Whether

or not the use of bloodstains on surfaces other than DBS applications can be used for toxicological analysis has not been explored, and the stabilizing effect has not been confirmed in bloodstains outside of DBS applications. This study aimed to determine whether fentanyl and heroin could be detected from bloodstains on common household surfaces such as wood flooring, tile, and carpeting. A stability test was also performed for each surface to discover if there is a stabilizing effect on certain drugs similar to what has been observed using DBS. Analysis of bloodstains was completed using μ -SPE and LC-QQQ-MS. The application of dried bloodstains for use in toxicology could open possibilities of using crime scene bloodstains to determine whether a perpetrator was under the influence of drugs during the crime.

52: Thinking Small: The Revolutionizing Potential of Nanotechnology in National Security

Julia Filipkowski | Forensic Science and Law | School of Science and Engineering | Junior

Faculty Advisor/s: Matthew Regentin, MSFS

ABSTRACT:

This poster examines the potential that nanotechnology has to transform the field of chemical detection, with a specific focus on explosives. It examines the evolution of detection methods from those that were utilized before the implementation of nanotechnology to current, nano-based methods. In the examination of current methods, the potential for future innovations is highlighted. In addition to examining the potential benefits of nanotechnology, this poster outlines the most pressing setbacks that are faced in the advancement of this type of technology (including the need for standardization, infrastructure development, and stable funding). These setbacks were determined based on a series of interviews conducted with experts and professionals in the field of explosives detections, nanotechnology, and/or national security. In addition to the previously mentioned setbacks, the interviews demonstrated a collective opinion of nanotechnology: being that it does have the potential to be largely beneficial. Overall, this poster concludes that, in order for nanotechnological methods to reach their full potential, there needs to be a specialized lab focused on nano-materials research, collaboration across academia and industry, and increased awareness of nanotechnology's significance.

53: UX Design: Website Navigation Placement on Mobile Devices

Tessa Markham | Digital Media Arts | McNulty College and Graduate School of Liberal Arts | Junior

Faculty Advisor/s: William Gibbs, Ph.D.

ABSTRACT:

This project focuses on user experience (UX) design. Website interfaces optimized for mobile devices hide navigation, and make it accessible by a menu "hamburger" icon placed at the top of the screen. Mobile devices are often used when people are walking and holding objects, and the location of navigation and whether users are holding the mobile device with one or two hands impacts how easily and efficiently user interactions occur. This research aimed to determine whether users preferred top or bottom navigation placement and how navigation placement impacted how quickly and easily users navigate the website interface. Users were approached and asked to perform an A/B usability test on two different navigation systems (Top and Bottom). Their thoughts about ease of use and how quickly they could accomplish tasks with each navigation system were recorded. Afterwards, users completed a System Usability Scale (SUS) survey to evaluate their perceptions of each navigation system. The A/B usability test and SUS scores provided insights into how users preferred to navigate and their familiarity with navigation configurations. Users preferred the bottom navigation and found the top navigation difficult to reach, especially when using one hand. SUS scores for bottom navigation were higher compared to top navigation.

54: AI: Artificial Ignorance in Facial Biometrics

Samiya Henry | Physics | School of Science and Engineering | Junior

Faculty Advisor/s: John Slattery, Ph.D.

ABSTRACT:

Artificial Intelligence (AI) has become one of the most evolved forms of technology across the globe over the past few years, and the efforts these systems and their developers are making may lead to AI being implied into many different aspects of day-to-day life. However, as AI becomes more universal, the biases within these systems and their data sets place AI into an ethical spotlight, especially within the biometrical field of facial recognition. Facial pattern recognition seems to be on the frontlines of this AI bias and ethics battle. With this threat in mind, one must ask: where does the bias come from and what does it look like?

***55: Harnessing Neural Network Classification to Identify Illicit South African Sand Mines**

Jacob Mazurkiewicz | Data Science | School of Science and Engineering | Junior

Faculty Advisor/s: Lauren Sugden, Ph.D.; David Kahler, Ph.D.

ABSTRACT:

Illicit sand miners in South Africa currently exploit riverbank sand deposits to gain financial advantages, bypassing environmental regulations. Their disregard for these guidelines leads to severe environmental damage, devastating local ecosystems. To detect these illegal operations, we develop and deploy a specialized convolutional neural network, built with TensorFlow Keras API. As a first step, we collect Landsat or Sentinel imagery of riverbanks, the areas most frequently violated by illegal sand mines. We extract images that contain rivers as outlined by geographical data from the Department of Water and Sanitation in South Africa via the Google Earth Engine API. We then preprocess these images by selecting the correct infrared bands, filtering the cloud cover to acquire high-quality images, and choosing the optimal pixel resolution for analysis. Once processed, the dataset feeds into our neural network to train a model capable of identifying the unique features of these illegal mines. The model uses a combination of convolutional, pooling, and feedforward network layers to detect the unique characteristics of the mines, such as color variations and structural anomalies. After model training, we will regularly feed new Landsat imagery into the deep-learning network. In doing so, the model can identify potential newly established illegal mines and pinpoint their coordinates. With the rapid increase in the number of illicit mines, the ability to detect potential anomalies using this sophisticated deep-learning network is an effective tool for timely intervention and preservation of the ecosystems.

56: Exploring Medical Physics

Rachael Hall | Physics | School of Science and Engineering | Senior

Faculty Advisor/s: Fatiha Benmokhtar, Ph.D.

ABSTRACT:

The field of physics offers a large variety of opportunities for career options. One opportunity that is provided is medical physics, which is the application of physics in medicine. In correlation between the understanding of particle physics, nuclear physics, and general topics, physics in medicine has been developing at a rapid rate with research being done in local hospitals to national laboratories. At Thomas Jefferson National Accelerator Facility, in the Radiation Detector and Imaging Group, there is a device being developed for proton Computed Tomography (pCT) that utilizes a Time Projection Chamber (TPC) for proton energy measurement. Most prevalent CT machines used in proton treatment planning

use photons which leads to uncertainties in treatment planning due to differences in the interactions. These can be reduced by using the proton for imaging. Focus has been placed on the analysis of cosmic ray data for characterizing the electrical and electron transport properties of the TPC, with first tests being performed on the Tagged Deep Inelastic Scattering (TDIS) TPC prototype. The drift velocity of electrons liberated by ionization of the gas by cosmic rays will be determined and the uniformity evaluated. This will allow the reconstruction of ionization points in 3-D space defining cosmic ray muon trajectories.

57: Exploring the Structure of the Proton

Emma Landefeld | Physics | School of Science and Engineering | Sophomore

Miranda Chitwood | Physics and Mathematics | School of Science and Engineering | Sophomore

Nathan Carpenter | Physics | Science and Engineering | Freshman

Faculty Advisor/s: Fatiha Benmokhtar, Ph.D.

ABSTRACT:

Protons are made from constituents, called quarks and gluons. The goal of this project is to study the dynamics inside the proton and the formation of particle jets from electron scattering experiments. Our group took the lead in the analysis of Semi-Inclusive Deep-Inelastic Scattering (SIDIS) of electrons off a liquid Hydrogen target in Hall B at the Thomas Jefferson National Accelerator Facility (Jlab). In this talk we will present our work on the Physics and kinematic variables of the ep to epX that will help us understand the origins of the particle jets.

58: Combinatorial Analysis of Tiling Strategies for 2xn Boards

Anna Mitchell | Mathematics, Education | McAnulty College and Graduate School of Liberal Arts | Senior

Faculty Advisor/s: Robert Muth, Ph.D.

ABSTRACT:

We explore a number of combinatorial tiling problems, counting the number of ways there are to cover the $2 \times n$ chessboard with 1×1 dominoes, 1×2 dominoes, and L-trominoes. We prove recursion relations and determine generating functions. We establish these results through a number of translations of the problem into different settings, following the work of Butler, Ekstrand and Osborne. Initially, we convert the tiling problems to a path-counting problem, identifying and enumerating all the possible paths that the tiles can form on the chessboard. Using the information gained from path counting, we translate these counts into a linear algebra framework. That work leads to calculating minimal polynomials, generating functions and identifying recursions. Building upon the established methods for 2-dimensional chessboards, we discuss methods for extending this analysis to tiling patterns on cylindrical boards and Möbius strips. While applying similar methods, adjustments will be made to accommodate the unique characteristics of these geometric surfaces, particularly in terms of path counting.

59: Search for pollution sources in binary tree prossets

Valerie McMullen | Speech-Language Pathology, Mathematics | Rangos School of Health Sciences | Junior

Faculty Advisor/s: Robert Muth, Ph.D.

ABSTRACT:

We study a search problem motivated by testing for the pollution source in a river system. For a binary tree poset of rank n with a hidden “pollution source”, we investigate optimal search strategies for identifying the pollution source, given only a small number of testing devices which are destroyed upon encountering pollution. We present an optimal solution for the case of one testing device, and near-optimal strategies for the cases of two and three testing devices. Building on the pattern within the formulas derived for one, two, and three testing devices implies that similar formulas could be developed for situations with larger numbers of testing devices; further research is required. This problem is a generalization of the well-known 'marble drop problem in computer science and algorithm design.

60: Crosslinking-Mass Spectrometric Studies of the Serotonin Transporter in the Inward and Outward Facing States

Ashley Berdel | Biochemistry | School of Science and Engineering | Senior
Faculty Advisor/s: Michael Cascio, Ph.D.

ABSTRACT:

Regulation of serotonin levels is essential in treating diseases such as depression and anxiety. These levels are regulated by re-uptake by presynaptic neurons via their serotonin transporters (SERT). We propose to examine the inward- and outward-facing states of SERT (w/ or w/o bound ibogaine) using cross-linking mass spectrometry (CX-MS). Rat SERT containing a single reactive cysteine at position 310 was overexpressed in insect cells, purified, and reconstituted into vesicles. CX studies were conducted using MTS-diazirine in the presence of ibogaine, and sites of crosslinking were identified by MS. These studies identify distance constraints in full-length SERT and could lead the development of more selective therapeutics that are more effective with less side effects than current selective serotonin reuptake inhibitors.

61: Near-Infrared (NIR) Application of Reduced Main Group Elements in Azadipyromethene Chelates

Alayna Funke | Chemistry | School of Science and Engineering | Sophomore
Faculty Advisor/s: Paul Lummis, Ph.D.; Thomas Montgomery, Ph.D.

ABSTRACT:

As the medical field continues to progress, doctors are looking for more efficient ways to care for and diagnose patients. One of the best methods used to accomplish this is medical imaging, this technique gives medical professionals the ability to quickly visualize abnormalities in the body without using other invasive procedures. Real-time fluorescence imaging is an approach to medical diagnostics that utilizes an optical contrast material that can highlight internal anatomical features such as vasculature and organs. These contrast materials need to be moderately inexpensive, harmless to living tissue, and have emission and absorption wavelengths in the near-infrared range. These NIR wavelengths are capable of being absorbed into the body without causing extensive damage to surrounding organs and anatomy, and benefit from a higher penetration depth relative to higher energy photons. In previous studies, we have assessed the behavior of a series of Azadipyromethene (aza-DIPY) chelates of group 13 elements, specifically to investigate the effects of ligand substitution on the photophysical properties of the resultant compounds. In this investigation, a novel Aza-DIPY core is synthesized and chelated to various group 13 elements with the intention of probing the effect of oxidation state on these properties.

62: Uncovering the diet of Wood Thrush and Veery in ecological forestry gaps using DNA metabarcoding

Ava Bailey | Biology | School of Science and Engineering | Junior
Faculty Advisor/s: Brady Porter, Ph.D.

ABSTRACT:

Ecological forestry gaps (EFGs) are areas where unfavorable trees have been removed to create diversified forest structure of early successional plant growth within mature forests. Wood Thrush (*Hylocichla mustelina*) and Veery (*Catharus fuscescens*), Neotropical migratory thrushes which have experienced population declines over the last 50 years, utilize EFGs after fledging and before migration in the Floraroz Forest in northwestern Pennsylvania. This project aims to determine the arthropods and plants in the diets of these two species during this critical period. High-calorie fruits and seeds made available by the early successional plants in EFGs are needed to prepare for the physical demands of fall migration and are therefore of particular importance to identify. Fecal samples were obtained during bird banding in 2022 and 2023 and used as a source of dietary DNA for metabarcoding analyses using arthropod primers targeting a region of cytochrome c oxidase I (COI) mitochondrial gene and a unique combination of plant primers targeting the UAA intron (trnL) chloroplast gene. Dietary taxa were identified from the resulting sequences and compared by frequency of occurrence. The arthropod results show that both species primarily consume moths, beetles, and flies and the plant results show that both species consume a variety of plant species including trees (magnolia, cherry, maple), shrubs (honeysuckle, rose, bramble), and vines (grapevine). These results indicate the importance of a variety of plant species from mature forests and early successional growth to support bird species. This study will aid in bird conservation, forest management, and habitat recovery efforts.

63: Identification and Validation of Intraspecific Haplotype Variation Using Environmental DNA Metabarcoding

Felicia Bedford | Biology, English | School of Science and Engineering | Senior
Faculty Advisor/s: Brady Porter, Ph.D.

ABSTRACT:

Environmental DNA (eDNA) can be sequenced through metabarcoding to reveal species identity, community assemblages, and intraspecific variation. One of the primary issues with this approach is the downstream phylogenetic analysis of eDNA metabarcoding data. For this project, we aim to use water samples for eDNA collection and tissue samples to compare phylogenetic analysis. Water samples were collected from Buffalo Creek, Armstrong County, in Southwestern Pennsylvania to amplify and sequence a 123 bp region of the mitochondrial COI gene. We analyzed the genetic haplotype variation of the Central Stoneroller *Camptostoma anomalum* from Illumina MiSeq metabarcoding data from eDNA water samples of the mitochondrial COI gene. We then compared these variants to haplotypes recovered from field-collected tissue samples. After this delineation, we were able to validate true haplotypes from PCR and sequencing artifacts. While expected haplotypes range from 1-3 for this geographic region, we identified 28 unique sequences from eDNA samples. Implementing minimum copy thresholds allowed us to identify true haplotypes and engineer a programming pipeline to process data efficiently.

64: Student Withdrew

65: Fish Community Surveys at the Union City Dam of French Creek

Bri Frantz | Biology | School of Science and Engineering | Senior
Faculty Advisor/s: Brady Porter, Ph.D.

ABSTRACT:

Union City Dam is a dry-bed reservoir impoundment in the Allegheny River watershed in northwestern Pennsylvania, managed as a flood-control facility by the U.S. Army Corps of Engineers (USACE). Situated on French Creek, one of the most biodiverse streams in the northeastern United States, it is known to be home to a wide variety of fish species. As the last USACE electrofishing survey at this site took place in 1989 and the invasive Round Goby *Neogobius melanostomus* have since entered the French Creek watershed, our understanding of the fish community at the dam needed updating. A 100-meter section of the dam outflow was surveyed by backpack electrofishing with all individuals sorted, identified, and enumerated. The survey reported 757 individuals across 32 species, with an Ohio IBI (Index of Biotic Integrity) score of 58, which falls into the Exceptional category and indicates a healthy fish community. The Round Goby was not detected, suggesting they have not yet expanded to the dam from the last known invasion front around 12 km downstream. The dam's position as a barrier between lower and upper reaches of French Creek makes it especially important in containing the spread of this invader, whose further proliferation upstream could have negative impacts on threatened darter and mussel species. Future surveys at this site will be important for tracking the spread of the Round Goby, planning management and prevention actions, and documenting changes to the fish community if and when goby colonization takes place.

66: IB4, a lectin molecular probe, differentially stains macrophages responding to chronic constriction injury of the rat sciatic nerve

Jeremy Jones | Biology | School of Science and Engineering | Junior

Faculty Advisor/s: John Pollock, Ph.D.

ABSTRACT:

Chronic neuropathic pain is a public health issue that affects millions in the U.S. and holds a significant healthcare cost to society. Persistent neuroinflammatory response to injury is a common cause of chronic pain. Understanding the neuroimmune interactions that lead to neuropathic pain will allow for the development of novel immunotherapeutics that will help prevent progression of an acute injury leading to the development of chronic pain. Macrophages are involved in neuroinflammation and can be activated in a variety of ways, which may be visualized using microscopy and fluorescently labeled molecular probes. Isolectin-B4 (IB4) is a lectin isolated from the plant *Griffonia simplicifolia* that has binding specificity for activated inflammatory macrophages. To investigate expression of activated macrophages in peripheral nerve injury, we used sciatic nerve derived from rats experiencing chronic constriction injury (CCI) of that nerve. Identification of IB4 binding to macrophages was measured through co-staining alongside anti-CD68 antibody; CD68 is a cytokine expressed by various macrophages. Staining of CCI sciatic nerve revealed co-staining of IB4 with CD68-positive cells, corroborating the idea that IB4 can stain for macrophages. However, some macrophages expressed only IB4 and some expressed only CD68 in the CCI group. IB4-positive macrophages were found only in CCI nerve. Nerve from groups treated with celecoxib nanoemulsion (CXB-NE), which relieves CCI inflammation and pain, revealed no IB4-positive macrophages. This suggests that IB4 may be a marker for a specific type of macrophage-activated in response to nerve insult. Further studies need done to investigate activation differences in macrophages co-presenting IB4/CD68 or CD68 alone.

67: Identification of Plastics and Microplastics in Cyanobacteria using Confocal and Fluorescent Microscopy

Gleb Nedelko | Biology | School of Science and Engineering | Senior
Faculty Advisor/s: John Stolz, Ph.D.

ABSTRACT:

Stromatolites are organo-sedimentary buildups composed of calcium carbonate. The formation of these microbial reefs occurs through the activities of microorganisms, including sediment trapping, binding, and carbonate precipitation. The microorganisms mostly responsible for the biogenesis of these structures are cyanobacteria as they can produce large amounts of extracellular polymer (EPS). We hypothesized that these cyanobacteria could also trap microplastics and incorporate them in the stromatolite structure. After demonstrating that certain plastics (i.e., #2, high density polyethylene) could be identified by their fluorescence under ultraviolet light, we proceeded to attempt to identify the presence of microplastics in cyanobacterial mats. Initially, a preparation of #2 HDPE, prepared by grinding, was introduced to a sample of cyanobacterial mat obtained from a saltwater fish tank. Controls included the microplastic suspended in seawater and a preparation of the cyanobacterial mat only. Images of the microplastic and cyanobacteria mixture were captured using the "Z-stack" option on the Nikon A1R Confocal microscope. 3-D reconstruction of the Z-stack images revealed that the microplastics were trapped in the cyanobacterial mat. This approach should be useful in future research of field samples and to determine whether the different plastics can be differentiated by their fluorescence emission spectra.

68: Biofluorescent Glands are Sexually Dimorphic in Desmognathine Salamanders

Taylor Reitz | Biology, Psychology | School of Science and Engineering | Junior
Faculty Advisor/s: Sarah Woodley, Ph.D.

ABSTRACT:

Biofluorescence occurs when organisms absorb light at one wavelength and emit it at another. Biofluorescence is widespread in animals and has recently been discovered in salamanders. In Red-back salamanders, males exhibit a higher density of biofluorescent speckling on their ventral tail than females, suggesting a function in social interactions related to reproduction. To determine if male-biased sex differences in biofluorescence are widespread among salamanders, we characterized biofluorescent patterns in males and females of three species of salamanders in the *Desmognathus* genus. Salamanders were anesthetized and biofluorescence was observed under a fluorescent microscope that was exciting the salamander skin at a wavelength of 480 nm and emitting light at 535 nm. The density of biofluorescent glands was measured using Image J. Contrary to expectation, females in all 3 species had a significantly greater density of biofluorescent glands compared to males throughout the body, including the ventral and dorsal tail, and the ventral head. Overall, we conclude, that there is an established pattern of greater biofluorescence in females than in males in the *Desmognathus* genus. Future research will seek to determine the function of the biofluorescent glands to better understand why females have more biofluorescent glands than males.

69: A dinucleotide repeat in the human relaxin (RLN2) promoter affects transcription levels in vitro

Tecora Tisdale | Biology | School of Science and Engineering | Junior
Faculty Advisor/s: Michael Jensen-Seaman, Ph.D.

ABSTRACT:

Complications with preterm birth are the leading cause of infant morbidity and mortality worldwide. Several factors contribute to susceptibility, but previous studies identified an association with the promoter region of the relaxin gene (RLN2) and with levels of the peptide hormone relaxin during pregnancy. We hypothesize that different compositions of a compound (CT)_n(GT)_m dinucleotide repeat (microsatellite) within the relaxin promoter produce different levels of relaxin. To test our hypothesis, we amplified the ~1kb upstream promoter region from four different genotyped human DNA samples, ligated the products into a luciferase reporter vector, and transfected into a human placental cell line and an ovarian cell line to quantify transcription in vitro. DNA sequencing confirmed the promoter alleles contained 23, 28, 33, and 36 dinucleotide repeat units. Additional controls included a promoterless luciferase reporter vector and the human relaxin promoter with the dinucleotide repeats excised with site-directed mutagenesis. Luciferase reporter assays and one-way ANOVA testing identified significant differences in transcription levels among human alleles. These results will be discussed in light of human genetic variation at RLN2 and susceptibility to preterm birth.

70: Baseline mammal surveys at Powdermill Nature Reserve using camera traps and environmental DNA.

Abigail Powell | Biology | School of Science and Engineering | Senior
Faculty Advisor/s: Bradt Porter, Ph.D.

ABSTRACT:

Traditional techniques for wildlife monitoring, such as biotic surveys and dietary analyses, rely on invasive methods that may disturb the species being studied. Noninvasive sampling through camera trapping and collection of environmental DNA (eDNA) serves as an alternative to these techniques. Each potentially has different capture probabilities. To monitor the impact of reclamation on mammals at two abandoned strip mines in Powdermill Nature Reserve (PNR), we installed 24 camera traps in the strip mines along with a control plot. Although camera trapping is reliable for detecting a subset of mammals, we hypothesized that eDNA metabarcoding will enable the detection of more elusive and small-bodied species. Thus, we also extracted eDNA from 24 water samples collected within the area of interest and sequenced the mitochondrial 12S ribosomal RNA barcode to identify mammalian species present at each site. We compared the diversity of mammals collected through both methods prior to reclamation as a baseline analysis. Between March and April of 2023, eight mammal species were detected in the camera traps while eDNA metabarcoding detected fourteen mammal species. Both methods detected four common species, including white-tailed deer (*Odocoileus virginianus*). The eDNA metabarcoding detected a greater number of small mammals, such as the southern bog lemming (*Synaptomys cooperi*), American mink (*Neogale vison*), and star-nosed mole (*Condylura cristata*). While both methods possess limitations in detection, integrated use provides a more effective tool for monitoring wildlife. They will continue to be utilized to monitor the changes in mammalian diversity after reclamation of the abandoned strip mines.

71: High Support Low-Cost Ankle Brace

Nicole White | Biomedical Engineering | School of Science and Engineering | Senior
Aidan O'Donnell | Biomedical Engineering | School of Science and Engineering | Senior
Jacob McKinley | Biomedical Engineering | School of Science and Engineering | Senior
Robert Rider | Biomedical Engineering | School of Science and Engineering | Senior
Elyse Barnes | Biomedical Engineering, Applied Mathematics | School of Science and Engineering | Senior
Holly McGarvey | Biomedical Engineering, Nursing | School of Science and Engineering | School of Science and Engineering

Faculty Advisor/s: Leda Kloudas, Ph.D.

ABSTRACT:

Ankle injuries due to musculoskeletal strain are very prevalent among members in the United States military, due to the extensive physical activity and training requirements expected of the soldiers. Studies have shown the prevalence of ankle of injuries are five times more likely in those who serve in the military than those who do not. Undertreatment of ankle injuries can cause chronic muscular weakness, instability, and pain. In addressing this unmet need, an improved, smaller, and more discrete ankle stabilization device was designed and developed to allow better ambulation in a retired U.S. veteran who suffered ankle injuries from a motorcycle accident. The veteran's unmet user needs were identified to determine areas of improvement in already existing ankle stabilization devices. Using an Ultra Zoom ankle brace as the base of the design, a 90-to-120-degree range locking mechanism will be installed to increase vertical ambulation when using the brace. The Velcro straps used in the base ankle brace are replaced with lace for increased ankle support. A 3D printed lattice created from thermoplastic 3D filament with plastic vertical supports on the lateral and medial aspects are installed into the bilateral hinges of the original ankle brace using Velcro for appropriate fitting modifications. Following appropriate protocols and user-device interactions, testing is used for verification and validation of design inputs. Further modification of the device is done to counteract failed testing in durability, stability, and comfort needs. The goal is to create a final, usable prototype for additional future improvement.

72: Development and Usability Testing of a Multimedia Enhanced Healthy Lifestyle Behavior Intervention for People with Spinal Cord Injury

Tessa Datte | Digital Media Arts, Integrated Marketing Communication | McAnulty College and Graduate School of Liberal Arts | Senior

Alex McElravy | Digital Media Arts | McAnulty College and Graduate School of Liberal Arts | Senior

Emily Talienco | Physical Therapy | Rangos School of Health Sciences | Freshman

Faculty Advisor/s: Theresa Crytzer, Ph.D., PT, DPT; Bill Gibbs, Ph.D.

ABSTRACT:

Background: WHEEL-LEARN, a healthy lifestyle behavior intervention program, aims to increase the physical activity levels of people with disabilities to the nationally recommended levels and encourage healthy nutritional choices through the enhancement and accessibility of multi-media engagement.

Methods: This usability study aids in developing interactive educational modules to support people with spinal cord injuries who are more susceptible to sedentary lifestyles due to the countless barriers they face as an underserved group. To empower this community, WHEEL-LEARN incorporates Web Content Accessibility Guidelines into iterations informed by this specific population through qualitative research taken from participant interviews and usability testing. And quantitative data through eye tracking, galvanic skin response testing, and surveys.

Results: We expect the usability testing and user interviews to provide feedback for iterative changes to the design of the interfaces. In the preliminary first round of testing, we were able to collect feedback on navigation, typography, content analysis, and user flow. Our upcoming testing with population-specific participants aims to receive feedback on target size and other design-specific details from people with SCI who have paraplegia and tetraplegia.

Conclusion: Utilizing this data, we can take an empathetic approach to the design of this e-learning platform to consider how we might display social cognitive theory in a digital interface.

***73: Pedagogy to Practice: Addressing the Differential Needs of At-Risk Gen-Z Students in Secondary and Post-Secondary Education**

Fatima Zahra Demlak | Communication Studies, Political Science | McAnulty College and Graduate School of Liberal Arts | Senior

Maria Ortiz Jaunarena | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior
Faculty Advisor/s: Aleina Smith, Ph.D.

ABSTRACT:

The events connected with the COVID-19 pandemic have exposed and amplified Gen-Z students' systemic educational vulnerabilities. As part of the pilot for year one of the teams Rangos Prize Project: Pedagogy to Practice, roughly 400+ students were surveyed from Strategies for Academic Success and Pathways to Success courses between 2020 to 2022. When first year students were asked how prepared they felt for college 69.3% (2020-21) vs. 78.2% (2021-22) responded that they felt very unprepared for college or life after high school. including students of color and first-generation, reported feeling unprepared for post-secondary education and subsequent career challenges. This ongoing multi-year research highlights programs designed to address vulnerable student populations in secondary and post-secondary education. The study uses the Community Capital Framework to explore the experiences of students, the influence of community resources and teachers, and the availability of support for parents or caregivers. It is projected that by 2025, there will be a significant decline in the number of students both graduating from high school and pursuing post-secondary education. Data collected to date has provided insight on how to potentially address enrollment and retention rates among these groups. Using Duquesne University students as peer interventionists is critical to understanding the impact of employing High Impact Practices to enhance the foundation of the lived experiences of vulnerable Gen-Z student populations. This endeavor exemplifies a cooperative, community-centered strategy for enhancing student outcomes but also showcases the importance of collaboration with schools and community organizations in addressing education

74: Facial Aesthetics: A Study on the Perception of Attraction with Artificial Intelligence

Lauren Bader | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior

Tyson Dick | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior

Cassie Patterson | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior

Faculty Advisor/s: Alexander Kranjec, Ph.D.

ABSTRACT:

With the rise of artificial intelligence, interactions with AI generated faces are becoming more common in our everyday lives. From dating apps, to fake news to online scams, the potential to misuse AI generated faces is a genuine threat. However, little is known about the perception of AI generated faces and how people judge faces when they are suspicious of AI. The present study investigates the relation between facial attractiveness and AI knowledge. Participants judged the same 48 faces in two conditions, the order of each presented randomly between two groups. Depending on their group, participants were first asked either to judge (1) whether a face was AI generated or real or (2) rate the faces' beauty before rating the faces again but in the other condition. The results found condition order effects for both groups of participants. As predicted, participants who were asked to judge the reality/artificiality of human faces first later rated the same faces as less attractive. However, unexpectedly, participants who rated faces for their beauty later judged more of those faces to be AI.

Both groups of participants also rated AI generated faces as more attractive than human faces. These results suggest that people may be reluctant to admit they find AI generated pictures more attractive, while also finding AI generated pictures to be more attractive than human faces.

75: World Youth Day: A Spiritan Pilgrimage

Jasmine Urzua | Physician Assistant Studies | Rangos School of Health Sciences | Junior

Emma Polen | Integrated Marketing Communications | McAnulty College and Graduate School of Liberal Arts | Senior

Faculty Advisor/s: Michele Wisnesck, MS

ABSTRACT:

The Spiritan community was first founded in Paris, France in 1703 by an unordained priest named Claude Poullart des Places. His goal was to create a community of men who were dedicated to the Holy Spirit and willing to travel wherever they're needed. After the French revolution in 1848 the Spiritan community spread to various continents following their mission to serve people whose needs are the greatest. While traveling with Duquesne University the research explores the Spiritan's various work within different countries and how community is fostered while being present in Portugal during World Youth Day (WYD). The first WYD was celebrated in 1986 in Rome, Italy after Pope John Paul II invited youths worldwide to gather in St. Peter's Square on Palm Sunday to celebrate the close of the Holy Year of Redemption in 1984. The purpose of WYD is centered on the idea of young people having the opportunity to discover the universality of the Catholic church and share with the world their commitment. Through a short film production of the eighteen-day experience, various interviews were captured with Spiritan priests and other members who shared their experience working with diverse communities. The use of video in storytelling captured the authenticity of a pilgrim experience with individuals from all over the world. The documentary revealed the theme of sharing being a key connecting factor in fostering communities among people from diverse backgrounds, in both the congregation of the Spiritans and within the context of World Youth Day.

76: Virtual Insights into Pain Management: A 3-D Computational Model of Pain-related Neurons in the Amygdala

Kayla Kraeuter | Biomedical Engineering, Applied Mathematics | School of Science and Engineering | Senior

Faculty Advisor/s: Rachael Neilan, Ph.D.

ABSTRACT:

Neuropathic pain is caused by injury to the nervous system and involves brain areas such as the central nucleus of the amygdala (CeA). Within the CeA, two populations of neurons play opposing roles in pain modulation. Neurons expressing protein kinase c-delta (PKC- δ) are generally pro-nociceptive (increase pain), while neurons expressing somatostatin (SST) are anti-nociceptive (decrease pain). We developed the first 3-D computational model of PKC- δ and SST neurons in the CeA and used this model to explore the role of these two neuron populations in pain regulation. Our computational model simulates the behaviors and interactions of PKC- δ and SST using biologically realistic parameters (13,000 neurons and 22,000+ neural connections) in a 3-D spatial domain that captures the structural properties of the CeA. In this poster, we describe our efforts to improve the computational efficiency of our 3-D model, which resulted in a 28% reduction in execution time for a typical simulation. With this upgraded model, we performed a sensitivity analysis to explore the impact of select model parameters on predicted pain-related output. Our results show that the quantity and localization of PKC- δ and SST neurons within CeA subregions are key parameters governing pain-related output. These results highlight the importance of

exploring spatial and neuron-type specific properties to develop optimal pain therapies. The enhanced usability of our computational model enables neuroscientists to efficiently perform resource-intensive wet-lab experiments in-silico. This work demonstrates the impact and importance of computational modeling and simulation in guiding the direction of neuropathic pain research.

77: Uncovering the Functional Spectrum of Amino Acid Residues of RsmE by Competing Naturally Derived Missense Mutants

Austin Summers | Biology | School of Science and Engineering | Senior

Faculty Advisor/s: Wook Kim, Ph.D.

ABSTRACT:

Laboratory colonies of the bacterium *Pseudomonas fluorescens* Pf0-1 naturally produce mutants with diverse altered sequences in the *rsmE* gene. RsmE is a posttranscriptional regulator that represses the production of extracellular secretions by inhibitive mRNA binding. Mutants in which RsmE has lost repressive function gain a spatial advantage against the wildtype via production of extracellular secretions. Such secretions are utilized by diverse bacterial species to form structured communities, referred to as biofilms, that greatly resist antibiotics and the immune system to manifest chronic infections. Our collection of naturally derived missense *rsmE* mutants provides a unique opportunity to assess the functional significance of the altered amino acid residues. We hypothesize that RsmE's functionality is differentially altered depending on the specific changes in its primary sequence. To test this hypothesis, select *rsmE* missense mutants were competed against an ancestral wildtype strain to assess their relative competitive advantage. A spectrum of relative fitness values was observed, confirming that specific amino acid residues uniquely contribute to RsmE's function. Moving forward, we will test all missense mutants to comprehensively categorize them across a single competitive scale, and select isolates from each category will be utilized to characterize differential mRNA binding and secretion production.

78: Investigating the role of host LSD1 during Herpes simplex virus type 1 infection

Maria Werner | Biology | School of Science and Engineering | Junior

Faculty Advisor/s: Jill Dembowski, Ph.D.

ABSTRACT:

Herpes simplex virus type 1 (HSV-1) infects most of the global population, causing a variety of diseases including cold sores, encephalitis, and keratitis. Previous studies in our lab have identified that host lysine-specific demethylase 1 (LSD1) associates with HSV-1 replication forks and replicated viral DNA. In the absence of infection, LSD1 acts as a transcriptional repressor or activator to regulate host cellular gene expression. Previous studies found that LSD1 inhibition reduces HSV-1 DNA replication, late gene expression, and viral yield. However, the mechanism by which LSD1 is recruited to the viral genome and how LSD1 inhibition blocks infection is unknown. For this reason, we performed LSD1 immunoprecipitations to determine which cellular and viral proteins associate with LSD1 during HSV-1 infection. This revealed which host and viral factors interact with LSD1 and how LSD1 could be recruited to the viral genome. By western blotting, we confirmed that LSD1 immunoprecipitation was successful by identifying an association with histone deacetylase 2, a known interactor of LSD1. Mass spectrometry revealed novel interactions between LSD1 with both host and viral proteins, including viral protein UL54, an mRNA export factor essential for HSV-1 infection, and host tumor protein p53 binding protein 1 (TP53BP1). In the future, we plan to determine how these interactions are disrupted by treatment with LSD1 inhibitors that have previously been shown to inhibit viral infection.

AFTERNOON POSTERS

1: Utilizing the MiSeq FGx™ Sequencing System for the Deconvolution of DNA Mixtures from Contrived Sexual Assault Swabs

Kirsten Littrell | Forensic Science and Law | School of Science and Engineering | Senior
Faculty Advisor/s: Lyndsie Ferrara, Ph.D.

ABSTRACT:

Massive parallel sequencing (MPS) is a novel, high-throughput DNA sequencing technique that has steadily made its way into the scope of forensic DNA analysis. MPS differs from traditional Capillary Electrophoresis (CE) methods in its ability to analyze short tandem repeats (STRs) and single nucleotide polymorphisms (SNPs) simultaneously. STRs are commonly used forensic markers for identification because their number of repeats vary in each person's DNA. SNPs are single nucleotide differences that occur normally throughout a person's DNA. SNPs are not typically analyzed for DNA profiling purposes, however, their characteristic genetic variation could be used to establish a greater discriminating power between profiles, especially in instances of complex DNA mixtures. The goal of this research is to deconvolute the female:male DNA mixtures obtained from contrived sexual assault swabs by utilizing MPS. To accomplish this goal, contrived sexual assault samples underwent differential extraction, quantification, library preparation, and MPS. Currently, there is a lack of research applying MPS to forensic casework samples, particularly for simulated sexual assault swabs. Previously published literature indicates that MPS has a higher sensitivity with regard to DNA mixture deconvolution, so it can be hypothesized that the female and male DNA components from the simulated samples will be able to be deconvoluted. Successful mixture deconvolution could emphasize MPS's application in the field of forensic DNA analysis, particularly in reducing sexual assault kit processing time, effectively decreasing the current backlog.

2: Ancient DNA analysis using massive parallel sequencing (MPS) on skeletal remains from Rhodes, Greece.

Erin Pyle | Forensic Science and Law | School of Science and Engineering | Senior
Faculty Advisor/s: Lyndsie Ferrara, Ph.D.

ABSTRACT:

Human civilization has evolved drastically, so to properly study it, history, anthropology, and genetics must be examined to gather as much information as possible. This study uses X-rays, osteology, and genetic data from Massive Parallel Sequencing (MPS) to obtain information from human skeletal remains recovered at a burial site in Rhoades, Greece. The remains date back to 500 A.D., which makes DNA recovery a challenge. There is currently no universal technique for ancient DNA (aDNA) extraction due to difficulties with degradation, contamination, and the environment. For this project, aDNA was extracted using a procedure from the UNT Center for Human Identification, quantified, amplified, and analyzed on the MiSeq FGx Sequencing System. Initial anthropological data indicates there were 2-4 individuals in the burial site. There is evidence that the individuals were well taken care of and had healthy diets. At least one individual had a robust build and at least one had a gracile build. This could indicate that both sexes were present in the burial site. Further genetic testing on the MPS will be completed to determine sex, ancestry, and phenotypic information. This research is relevant to the forensic science community because the identification of unknown human remains is important to forensic investigation such as those often found at crime scenes.

3: The Efficiency and Efficacy of Male DNA Extraction from Sexual Assault Kits with Variations in Washes

Ian Smilnak | Biochemistry, Forensic Science and Law | School of Science and Engineering | Senior Faculty Advisor/s: Lyndsie Ferrara, Ph.D.; Pamela Marshall, Ph.D.

ABSTRACT:

Rates of sexual violence experienced by women and men have continued to increase at an alarming rate in the United States. This research aims to assess modifications to the standard differential extraction utilized for processing sexual assault kit (SAK) samples, such as vaginal swabs, to reduce overall processing time while maintaining quality results. Technical inefficiencies and insufficient resources are commonly cited to explain the large backlog of SAKs. Contrived sexual assault kit samples were created with the collection of female vaginal swabs and purchased seminal fluid. The contrived samples underwent a modified differential extraction using Differex™. Variations of washes from the current protocol were evaluated to determine the optimal recovery of male DNA. Samples then followed traditional means of DNA purification with the QIAGEN® QIAamp® DNA Investigator® Kit, quantitation, amplification, and profiling. The modifications were assessed according to decreased processing times while maintaining or improving metrics of quantity, quality, and reproducibility. This research predicts that the reduction of washes will decrease sexual assault kit processing time without compromising the recovery of male DNA. The goal of this project is to provide an optimized method for implementation in crime laboratories to increase the throughput of cases and aid in SAK backlog reduction.

4: Implicit Bias and the Link to Juror Selection in Capital Punishment Cases

Zarena Nieves Figueroa | Biochemistry | School of Science and Engineering | Senior Faculty Advisor/s: Pamela Marshall, Ph.D.; Lyndsie Ferrara, Ph.D.

ABSTRACT:

Jury bias is a controversial term that has been popularized in recent decades due to its impact in sentencing. However, this is only one side of the issue. Although this phrase has been studied for years now, its counterpart juror selection bias has been forgotten. This study aims to address this gap in the field and show the impact that juror selection bias can also have on sentencing. In order to do this, the study has been divided into two phases. Phase I consists of literature review analyzing the available studies on the topic. The second phase consists of an interview process with prosecutors, defense attorneys, judges, and exonerees from capital punishment cases. For Phase I, the results have shown a lack of data on the jury make up of these cases. Additionally, although everyone has cognitive biases, the results specifically showed how the attorneys bring bias due to who they are as a person and how they are trained while judges bring it based on their professional experience. It is predicted that the results obtained through the interviews in Phase II will confirm the results from Phase I. Conducting this research will advance the field of knowledge in regard to juror selection bias by obtaining the true perspective of the legal parties through the interviews. These results will be used to make the parties involved in jury selection aware of the effects of their own biases leading to justice being served through fairer sentencing.

5: Utilizing Fragmentation of the Gentueri CollectEject™ Swab for CODIS Upload

Hannah Schaeffer | Forensic Science and Law, Biochemistry | School of Science and Engineering | Junior
Faculty Advisor/s: Pamela Marshall, Ph.D.

ABSTRACT:

The Gentueri CollectEject™ Swab is a DNA collection swab type, which is unique by the means of its ejection method, its desiccant drying technique, and its material. This study examined the smallest number of punches taken from the Gentueri CollectEject™ Swab to yield DNA profiles suitable for CODIS upload and explored its effectiveness of DNA collection. Typically, the protocol for extraction of DNA requires the entire swab tip. However, since there is a limited amount of DNA recovered at crime scenes, this proves to be an issue for forensic laboratories when testing crime scene DNA. Therefore, utilizing the Harris punch method leaves additional swab pieces for future testing. Preliminary results suggest that the smallest amount utilized for successful quantification, which provides a suitable profile for CODIS upload, is three punches. The impact of this research allows for retesting of DNA by the application of swab tip fragmentation for extraction.

6: The Body and Lying: The Discourse of the fMRI in the Legal Setting

Zachary Seddon | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior
Madison McKee | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior
Faculty Advisor/s: Pamela Marshall, Ph.D.

ABSTRACT:

This project explores the ethical considerations associated with the use of amygdala activity in a legal setting concerning memory repression. Memory repression, a concept fraught with controversy, has raised complex questions about the reliability of repressed memories as legal evidence. Recent research has examined the role of the amygdala, a key brain region in emotional processing, prefrontal cortex, anterior cingulate cortex, and right inferior frontal gyrus in potentially indicating the presence of repressed memories. This paper critically examines the ethical implications surrounding the utilization of neural activity as a diagnostic tool in legal cases involving memory repression. It delves into the challenges of informed consent, potential emotional distress to participants, privacy and confidentiality concerns, and the risk of false memory implantation. The paper also underscores the importance of transparency, responsible reporting, and the need for rigorous ethical guidelines when employing neuroimaging techniques in legal contexts. It concludes by offering recommendations for ensuring ethical standards are upheld when neural activity data is presented as evidence in the courtroom.

7: Healthcare Disparities: A Comparative Analysis of Forensic Nursing and Sexual Assault Prevalence

Chloe Rapp | Forensic Science and Law, Biochemistry | School of Science and Engineering | Senior
Faculty Advisor/s: Lyndsie Ferrara, Ph.D., Pamela Marshall, Ph.D.

ABSTRACT:

Sexual assault crime rates are dramatically increasing in the United States, with the number of victims outgrowing the number of healthcare professionals qualified to treat them. Sexual Assault Forensic/Nurse Examiners, SAFE/SANEs, are responsible for the medical and forensic examination of those seeking treatment via a sexual assault kit. For both victims and nurses, the collection of DNA and other forensic evidence to pursue a conviction is a rather strenuous and traumatic process. However, as DNA technology continues to advance, the procedures used in forensic nursing have remained relatively stagnant. This research investigates the scarcity of SAFE/SANEs by discussing the prevalence of sexual assault cases, the role of SAFE/SANEs, and the availability of resources for victims of sexual assault.

Further, these ideas are conveyed via a timeline detailing the role of forensic nurses in the United States compared to the implementation of DNA technology within the discipline. The development of a more efficient evidence collection technique may allow for a quicker passage through the criminal justice system, ideally decreasing the number of victims waiting to receive justice.

8: The Analysis of Cannabinoids in Oral Fluid by LC-QQQ-MS

Jessica Pichat | Forensic Science and Law | School of Science and Engineering | Junior
Faculty Advisor/s: Stephanie Wetzel, Ph.D.

ABSTRACT:

Drug testing has commonly been done using urine or blood tests, which can be invasive and time consuming. The testing of oral fluid can be collected with a quick swab and can be just as effective in detecting certain drugs. This study aims to analyze cannabinoids in oral fluid that have been collected via oral swabs. Previous research has shown a lack of methodology for analyzing oral fluid using liquid-chromatography triple-quad mass spectrometry (LC-QQQ-MS). The purpose of this study is to develop and test a method to analyze cannabinoids in oral fluid using LC-QQQ-MS at biological concentrations. The analytes included are delta 9 tetrahydrocannabinol (THC), cannabidiol (CBD), cannabinol (CBN), 11-nor-9-carboxy THC (THCOOH), and 11-hydroxy-THC (11-OH-THC). The metabolites THCOOH and 11-OH-THC are particularly important as they show that cannabis has been smoked and broken down by enzymes. It was found that this method was minimally successful in extracting cannabinoids from the oral fluid swab but successful in extracting from straight oral fluid. Therefore, the oral swab and provided buffer were found to inhibit the extraction of the cannabinoids. If adapted, this method will be able to provide quick and efficient drug testing for cannabis.

9: High throughput GPCR affinity assay to screen for potential non-opioid pain medication

Sara Knox | Biomedical Engineering, Nursing | School of Science and Engineering | Senior
Olivia Sullivan | Biomedical Engineering | School of Science and Engineering | Junior
Faculty Advisor/s: Melikhan Tanyeri, Ph.D.

ABSTRACT:

G protein-coupled receptors (GPCRs) are crucial targets for developing pain medications as they mediate the transduction of external stimuli into intracellular responses, leading to pain perception [1]. However, there is a pressing need for discovering novel compounds that selectively target GPCRs, to develop more effective and safe pain medications. Here, we developed an innovative assay for high-throughput drug screening using PsychLight, a genetically encoded fluorescent sensor based on the 5-hydroxytryptamine 2A receptor (5-HT_{2A}R) structure [2]. PsychLight is based on ligand-induced conformational changes in 5-HT_{2A}R and is capable of detecting endogenous serotonin (5-HT). We utilized PsychLight-expressing HEK293T cells to conduct a preliminary screening assay to determine hits from commercially developed compounds with similar characteristics to that of endogenous serotonin. Additionally, we conducted a study with six different concentrations of the previously evaluated hits, following the studies with serotonin where fluorescence signal increases in a concentration-dependent manner. Our cost-effective, high-throughput screening assay has the potential to expedite the identification of potential non-hallucinogenic therapeutic agents for pain management.

10: Microfluidic Platform for Generating and Analyzing Single-Cell Pairs

Gram Hepner | Biomedical Engineering | School of Science and Engineering | Senior
Jake Laws | Biomedical Engineering | School of Science and Engineering | Junior
Chandler Last | Biomedical Engineering | School of Science and Engineering | Sophomore
Faculty Advisor/s: Melikhan Tanyeri, Ph.D.; Merve Ertas Uslu, Ph.D.

ABSTRACT:

Here, we introduce a novel microfluidic device designed to facilitate the formation and study of single cell pairs, enabling comprehensive analysis of cell-cell interactions. Leveraging a combination of fluid flow and passive capture structures, our method enables precise manipulation of single cells and facilitates the formation of an array of cell pairs. Fabricated using soft lithography, the device features hourglass-shaped junctions that facilitate the rapid trapping of cells and the formation of cell pairs. Located at a 3-way microfluidic junction, the cell traps allow for the application of physiologically relevant forces (shear, compression, and tension) on single cells or doublets, and control the amplitude of these forces through adjustment of fluid flow. Real-time observation and analysis of particle or cell pairs, facilitated by advanced optical imaging techniques, offer insights into the dynamics of mechanotransduction between neighboring cells. This microfluidic platform will facilitate single cell mechanotransduction experiments and help deepen our understanding of intracellular force transduction. Our research aims to investigate how stem cells and cardiomyocytes, responsible for generating contractile force in the heart, sense and respond to mechanical forces, as well as how these mechanical forces are transmitted to neighboring cells. By elucidating molecular mechanisms underlying intracellular mechanotransduction, we seek to advance our understanding of signaling pathways implicated in various physiological processes and diseases.

11: Temporomandibular Joint Discs Reflect Dietary Signals in Bats

Kaitlyn Fedorak | Biology | School of Science and Engineering | Sophomore
Faculty Advisor/s: Anne Burrows, Ph.D.; Sarah Downing, MPIA

ABSTRACT:

Dietary signals are present in mammalian skulls and teeth but we know little about the role that temporomandibular joint discs (TJD's) may play in revealing dietary signals. Searching for craniodental and joint signals for dietary niches is desirable, partially to aid our understanding of evolutionary processes in a variety of animal taxa. Additionally, we know little about the dietary influences on bat craniodental morphology. To these ends, the present study tests the hypothesis that diet is reflected in TJD form in a range of bat taxa that consume different foods: *Carollia perspicillata* (frugivore), *Diaemus youngi* (sanguivore), *Megaderma lyra* (carnivore), and *Mysticina tuberculata* (insectivore). Histological preparations of one individual in each species were used that included the temporomandibular joint. We viewed all sections that included the TJD and photographed them under a light microscope. The average disc area was measured in each photograph using ImageJ and the mandibular condyle was observed for insight into condylar shape. Average disc areas were calculated for each species, scaled by average body length, and were compared between species using one-way ANOVA in RStudio. Post-hoc analysis revealed that *C. perspicillata* had significantly ($p < 0.05$) greater disc area than *D. youngi* and *M. tuberculata*, but was not significantly different from *M. lyra*, indicating that there is a dietary signal in the TJD. Additionally, these results improve our understanding of the role that the TJD plays in differing dietary niches and may contribute to better outcomes for humans with TJD disorders.

12: EXPLORING THE SPORT SPECIALIZATION DECISION-MAKING PROCESS OF YOUTH SPORT FAMILIES: A QUALITATIVE FOCUS GROUP STUDY

Chiara Golomb | Pharmaceutical Sciences | School of Pharmacy | Junior

Gia Diorio | Health Sciences | Rangos School of Health Sciences | Junior

Sydney Mundok | Health Sciences | Rangos School of Health Sciences | Junior

Faculty Advisor/s: Justin DiSanti, Ph.D.

ABSTRACT:

Youth sport specialization remains a key concern in contemporary sport settings, despite abundant research evidence and guiding recommendations against an early specialized approach. Understanding how youth sport families decide if, and when, their child will specialize remains critical. Therefore, the purpose of this study was to qualitatively explore youth sport parents' decision-making through an inductive, phenomenological semi-structured interview design. Parents of pediatric athletes (ages 6-18) participated in focus group sessions conducted via Zoom. Guiding topics of the interview included: 1) Factors influencing their child's sport pathway decisions; 2) Positive influences of their sport pathway; 3) Negative influences of their sport pathway. Focus groups were recorded and transcribed verbatim, then analyzed inductively to identify emerging themes and illustrative quotations which characterized our participants' experiences. 36 youth sport parents participated in this study. The emerging higher-order themes were: 1) Sport pathway-decision making; 2) Facilitators; and 3) Barriers. This thematic structure included a separation between internal and external factors, which were then further divided into stakeholder-specific sub-categories (e.g., Facilitators- internal family-oriented - family involvement in sports). Our results indicate that families' decisions on sport participation pathways are not solely grounded in their positive or negative views of sport specialization, also importantly including perceptions and characteristics of their child, family, and social setting. Further efforts should be made to understand specialization from a socioecological perspective to create environments that are more co

13: This is Getting out of Hand: Hand and Arm Limitations in Late Preterm Infants

Melanie Schultz | Health Sciences | Rangos School of Health Sciences | Senior

Melanie Tommer | Health Sciences | Rangos School of Health Sciences | Senior

Emma Costello | Nursing | School of Nursing | Senior

Aleena Purewal | Health Sciences | Rangos School of Health Sciences | Junior

Faculty Advisor/s: Regina Harbourne, Ph.D., PT, PCS

ABSTRACT:

Late preterm infants (LPT) are often not identified as having delays in early infancy by using standardized assessments. However, evidence points to motor and cognitive difficulties as these children age. Grasping and manipulating objects for infants is central to learning and progressing in cognitive skills. The purpose of this study is to examine hand function and the relation to overall posture between term and LPT infants during a challenging reaching and grasping task to determine differences that could aid early identification of developmental problems. 40 infants (20 LPT and 20 full-term) between 6 and 8 months old who could independently sit and reach but not crawl were included in the analysis. All infants were typically developing and scored within normal limits on the Bayley III motor screening assessment. Data collection occurred in participants' homes and were video recorded for later analysis. The infant was placed in a sitting position on a cushion to challenge sitting stability. Infants reached for toys through a reaching board positioned in front of them with two apertures side by side. LPT infants used less mature reaching and grasping techniques during the reaching task than the full-term infants. However, preterm infants successfully grasped the toy more than full term infants, suggesting the LPT infants sacrificed their postural motor skills to be able to successfully complete the task. Trade-offs of

motor skills when faced with a cognitive task may be important to assess in LPT infants to determine early difficulties in more complex skills.

14: Trying to Balance the Impossible: Cognitive and Motor Reaching in Late Preterm vs Term Infants

Melanie Tommer | Health Sciences, Biology | Rangos School of Health Sciences | Senior

Melanie Schultz | Physical Therapy | Rangos School of Health Sciences | Senior

Emma Costello | Nursing | School of Nursing | Senior

Aleena Purewal | Health Sciences | Rangos School of Health Sciences | Junior

Faculty Advisor/s: Regina Harbourne, Ph.D., PT, PCS

ABSTRACT:

Background and Objectives: Late preterm (LPT) infants are often not identified as having delays when using standardized assessments. It is not known the discrepancies between full term and preterm infants when challenged in an intensive motor and cognitive activity. The purpose of this study was to analyze reaching and factors contributing to errors and delays in the task.

Study Participants & Setting: Forty infants (20 preterm and 20 full term), all between 6-8 months old, were recruited from local announcements to parents. All infants were typically developing and could sit and reach independently but were not yet crawling.

Materials/Methods: Data collection in the home and was videotaped for later analysis. Infants retrieved toys through a reaching board in two alternating locations. Infants sat on a cushion to slightly challenge their sitting stability during the testing. The researcher presented a toy through one side 5 times, and then switched to the other side for the 6th reach. Datavyu video coding software was used to code for variables such as the length of time it took them to reach for the toy once presented (reach duration) and posture adjustments. SPSS Statistics 29 was used to perform t-tests and regression analysis on the data.

Conclusions/Significance: Preterm infants were more likely to use compensatory body mechanisms, leading to slower total reach time. These indicate that preterm infants may experience challenges to their postural control when faced with a simultaneous cognitive task. To complete the cognitive task, the LPT infants utilized compensatory postural strategies.

15: How do early motor and cognitive skills differ between full term and late preterm infants?

Aleena Purewal | Health Sciences | Rangos School of Health Sciences | Junior

Melanie Tommer | Physical Therapy | Rangos School Of Health Sciences | Senior

Melanie Schultz | Physical Therapy | Rangos School of Health Sciences | Senior

Emma Costello | Nursing | School of Nursing | Senior

Faculty Advisor/s: Regina Harbourne, Ph.D., PT, PCS

ABSTRACT:

Background: Infants born prematurely are at risk for sleep disturbances, developmental delays, and potential developmental disabilities. However, these risks are thought to be less for late preterm infants (34-37 weeks) who are thought to "catch up" developmentally without intervention.

Purpose: In a larger study we examined group differences between late preterm infants and infants born at term. However, group comparisons do not explain individual differences in late preterm infants. This presentation describes four infants to examine variability in behaviors during a problem-solving task.

Methods: Four infants, two late preterm (36 weeks) and two full-term, between 6-8 months of age, reached for toys presented in alternating locations through a reaching board. A Nanit sleep monitor was used to quantify sleep. Videos of the reaching task were coded on Datavyu software to quantify movement. Variables to measure postural control included trunk velocity, lean, high-guard, and falls. Reach time reflected overall motor skills.

Results: Preterm infants differed on average from the full-term infants on their trunk velocity, lean, high guard, sleep quality, reaching times, and falls. However, the differences primarily stem from one preterm infant who had more sleep disturbances, greater trunk velocity, more falls and leans, and slower reaching times. Preterm infant #2 did not show these differences.

Conclusion: Not all late preterm infants differ from term infants in their early motor and cognitive skills. However, some, like preterm infant #1, can differ. It is important to examine late preterm infants individually for delays so that intervention can begin earlier.

16: Brain Injury Perceptions of Pediatric Patients Following Concussion: A Preliminary Investigation

Caitlin Mackey | Biology | School of Science and Engineering | Sophomore

Lexie Dzadovsky | Biology | School of Science and Engineering | Senior

Faculty Advisor/s: Erica Beidler, Ph.D., LAT, ATC

ABSTRACT:

Background: A patient's perceptions about their injury may impact recovery outcomes and quality of life.

Purpose: To describe brain injury perceptions in pediatric patients (11-18 years old) following concussion.

Methods: Pediatric patients (n=56) seen for an acquired brain injury at a concussion clinic completed a 10-minute cross-sectional survey. Injury perceptions were captured using the 38-item Brain Injury Perception (BIP) questionnaire. Likert responses from individual BIP items were summed into the following composite scores: timeline acute/chronic, timeline cyclical, consequences, personal control, treatment control, injury coherence, emotions. Frequencies of individual items and measures of central tendency for composite scores were calculated.

Results: The most common BIP item responses were that 98.2% (n=55) of pediatric patients strongly disagreed/disagreed that their "brain injury will never go away", 92.9% (n=52) strongly disagreed/disagreed that their "brain injury will stay for the rest of my life", and 92.9% (n=52) agreed/strongly agreed that their "brain injury will get better in time." These were all individual Timeline Acute/Chronic items. Composite score means (standard deviations): timeline acute/chronic [10.6(3.1); max 30], timeline cyclical [13.1(2.5); max 20], consequences [14.1(3.9); max 30], personal control [21.4(3.1); max 30], treatment control [19.0(3.1); max 25], injury coherence [16.9(4.3); max 25], emotions representations [14.7(5.4); max 30].

Conclusion: These results provide preliminary evidence regarding brain injury perceptions of pediatric patients following concussion. Clinicians should consider patients' injury perceptions in their person-centered care approaches.

17: Examining Relationships Between Single Vs. Multisport Participation and the Development of Perceived Sport Competence, Social Competence, and Self-Esteem Among Swedish Club Sport Participants

Hanna Pawela | Biology | Rangos School of Health Sciences | Junior

Allison Gass | Health Sciences | Rangos School of Health Sciences | Sophomore

Faculty Advisor/s: Justin DiSanti, Ph.D.

ABSTRACT:

Proponents of youth sport posit participation as a positive impactor of youth development "" not just in terms of physical fitness and sport skills, but also as holistic individuals. Participating exclusively in one sport is generally viewed as a less optimal pattern in promoting positive youth development in comparison to a diverse multi-sport experience. In this study, athletes who were actively participating in club sports in Sweden were investigated over the course of three timepoints to examine how their single or multi-sport participation pathway related to their developmental trajectories of perceived sport competence, social competence, and self-esteem. 460 participants (M age = 12.81±2.40; 40% female (n=184)) were included in the study's analysis, 273 of which (59%) competed in a single-sport across these timepoints, while 187 (41%) participated in multiple sports. Our results showed no significant effect between the sport pathway groups in terms of their ratings of self-esteem or social competence, though there was a significant difference for sport competence ($F(1, 439) = 33.71, p < .001, \hat{\eta}^2 = .071$), with multi-sport athletes exhibiting higher perceptions of sport competence. These findings indicate that there may be some benefits of multi-sport participation in terms of youth athletes' perceptions of their sport competence, but that overall single sport athletes and multi-sport athletes exhibited similar perceptions and developmental trajectories. These findings suggest that further research should be conducted to determine more nuanced recommendations for optimizing youth athletes' sport pattern selections to maximize their holistic developmental potential through sport.

18: Contemporary Effects of Redlining: Literature Review & Application to Allegheny County in the Context of the Covid-19 Pandemic

Hayley Willis | Health Sciences | Rangos School of Health Sciences | Junior

Faculty Advisor/s: Justin DiSanti, Ph.D.

ABSTRACT:

The historical influence of redlining, a discriminatory housing practice that emerged in the 1930's, continues to exert a profound impact on social vulnerability observed in cities across the United States. The practice was used by financial institutions and government agencies to systematically deny loans, insurance, or other financial services to certain neighborhood demographics. The term originated from the practice of marking these neighborhoods on maps with "red lines" to indicate their undesirability for investment. The purpose of this research is to explore existing literature related to the contemporary effects of redlining, specifically applying this knowledge in understanding Allegheny County during the Covid-19 pandemic. Using correlational research methods, the neighborhood divisions outlined by the original Home Owners Loan Corporation map will be used as a framework for examining health disparities that may have already existed, and been exacerbated by the conditions of the pandemic. Historically redlined areas are hypothesized to have higher rates of chronic disease, limited access to healthcare services, and poorer overall health outcomes compared to non-redlined areas. Therefore, data that was gathered and made available during the global pandemic will be examined to demonstrate correlations between socioeconomic/geographic variables and community health outcomes under these unique circumstances. The findings of this study will then be interpreted in terms

of future public health interventions and policies to address the legacy of redlining, while working towards promoting more equitable development in these communities.

19: Nurse Education Effects on Kidney Disease Management and Patient Outcomes: A Literature Review.

Maura O'Neill | Nursing | School of Nursing | Senior

Faculty Advisor/s: Elizabeth Skrovanek, Ph.D.; Kevin Henderson, MPhil

ABSTRACT:

Chronic kidney disease (CKD) presents a substantial health challenge, marked by an escalating prevalence and complex methods for managing this chronic ailment. CKD arises when the kidneys fail to function properly, hindering the excretion of fluids, electrolytes, and waste products. Left untreated, CKD can be fatal, particularly in cases of End Stage Renal Disease (ESRD) where hemodialysis becomes a primary treatment option. Hemodialysis involves a machine connected to the patient, filtering waste from the blood. Non-adherence to treatment can lead to complications, such as fluid overload, shortness of breath, and electrolyte imbalance. Compliance with treatment is key in preventing adverse effects in CKD. The literature review dives into the effect of nurse led education on the management/adherence of patients with kidney failure and those undergoing hemodialysis. The review encompasses an analysis of literature spanning from 2019 to 2023, highlighting various aspects and techniques of nurse education directly influencing the quality of care provided to patients with kidney failure. Special attention is given to recurrent education and follow-up with CKD and hemodialysis patients to ensure proper management. Educational techniques include telehealth, training programs, motivational interviewing, knowledge surveys, and the teach-back method. Nurses armed with advanced knowledge in nephrology significantly contribute to patient education, promoting self-management and encouraging patients to actively participate in their care. This will aid in reaching the goal of proper adherence to treatment plans for CKD patients. Findings show that nurse education does improve patient compliance with treatment plans.

20: Exploring Social Communication and Language Use in Infants and Toddlers by Age and Type of Children's Book

Michelle Catão | Speech Language Pathology | Rangos School of Health Sciences | Senior

Faculty Advisor/s: Abigail Delehanty, Ph.D., CCC-SLP

ABSTRACT:

This observational, cross-sequential study investigates the social communication and language development of infants and toddlers during shared book reading. A package including up to six types of children's books (i.e., vocabulary-building board books, rhyming books, lift-the-flap books, predictable books, texture books, and picture books that included story lines) were sent out to 28 participants with children between 6 months to 3 years of age. Each family received an email request to record videos in which they read specified books to their child at 3-month intervals from 6 months to 24 months, and then at 6-month intervals for the subsequent year. Books and book types were counterbalanced among participants to minimize order effects, given the repeated measures design of the study. In each email, they were also asked to fill out questionnaires (e.g., MacArthur Bates Communication Development Inventories, Communication and Symbolic Behavior Scales Caregiver Questionnaire, and a researcher-developed home literacy questionnaire) to monitor their child's social communication and language development. Videos were coded using Noldus Observer XT, to measure the gestures (deictic and representational), vocalizations, and communicative intentions of the children. The videos were divided into four age groups, which are in the process of being analyzed for the varying frequencies and

modalities of communicative acts through early development. Descriptive statistics will be presented and patterns of social communication and language across 1) age groups, and 2) book types, will be explored. Results will be presented in full at the 2024 Undergraduate Research Symposium.

21: The Effect of Gesture Size and Type on Frustration Perception

Grace Kovalcik | Speech Language Pathology | Rangos School of Health Sciences | Junior

Faculty Advisor/s: Heather Rusiewicz, Ph.D., CCC-SLP

ABSTRACT:

In any kind of professional setting, communication between a client and professional is extremely important for making progress in clients' goals but is not always a perfectly smooth process. Hand gestures are one of many supplemental tools we can use to communicate and have the potential to be a tool for professionals trying to understand their patients more thoroughly and identify emotions present in therapy sessions. Frustration is an especially prominent feeling often present in medical, therapeutic, and educational settings and can be a factor in an individual's motivation and subsequent impact of therapy. This study presents research from an experimental investigation of the relationship between frustration and different sizes and types of hand gestures, specifically large and small gestures, and iconic and beat gestures. Participants participated in a single session in which they engaged in a subjective frustration-rating task by watching a series of short videos featuring a single spoken utterance and a controlled gesture. Participants were asked to rate each one based on the level of frustration they perceived. It is hypothesized that participants perceive greater frustration from smaller beat gestures, leading them to rate these videos higher than those featuring large iconic gestures. Exploring emotions as perceived by others has implications for the growing literature base on the importance of gestures. Likewise, having the ability to identify emotions, namely frustration, via gestures and other nonverbal cues has the potential to benefit professionals in many fields, including speech-language pathology, potentially leading to an enhanced effectiveness of sessions.

22: Developing Low-cost 3D Printed Microscope for Imaging Cell-laden Droplets in a Cell Culture Incubator

Maria Luiza Hermann | Biomedical Engineering | School of Science and Engineering | Senior

Faculty Advisor/s: Bin Yang, Ph.D.

ABSTRACT:

Many studies require monitoring cell growth throughout the incubation process, but conventional microscopes are not designed to work in that environment. Imaging cells outside the incubator presents a challenge in monitoring the continuous growth of the same cell group. Dedicated incubator microscopes have been developed; however, these are often expensive. Our study aims to develop a low-cost microscope using inexpensive components and 3D printing. We tested our incubator microscope by imaging and tracking alginate droplets encapsulated with human pluripotent cells (hPSCs). The incubator microscope was configured in an inverted fashion to facilitate live-cell imaging. We incorporated a tunable lens for electronic focusing. A 45-degree mirror to redirect the light towards the camera and make it more compact. Image acquisition was controlled by a Raspberry Pi single-board computer. A white LED was used as illumination source. The microscope was packaged into a 3D printed case. Waterproof tapes were used to cover gaps, minimizing the effects of the moist environment. Cell-laden alginate droplets were generated using air-jetting bioprinting technique. Droplets were transferred to a 12 well-plate filled with cell culture media for cell culture and imaged for 48 hours. The incubator functioned as expected during imaging. The temperature and moisture did not seem to affect its performance. Incubator imaging showed many cell activities within the droplets over the 48

hours, including growth, division, and movement. In conclusion, we demonstrated that our microscope is a viable solution to imaging and studying the growth dynamics of cells in an incubator.

***23: Engineering a Novel Bioreactor for Mechanobiological Studies in Congenital Heart Disease**

Gram Hepner | Biomedical Engineering | School of Science and Engineering | Senior

Norah Delaney | Biomedical Engineering | School of Science and Engineering | Freshman

Heran Pradhan | Biomedical Engineering | Science and Engineering | Junior

Faculty Advisor/s: Melikhan Tanyeri, Ph.D.

ABSTRACT:

Here, we present a novel bioreactor specifically designed to mimic myocardial tissue, facilitating investigations into the impact of mechanobiology on congenital heart disease (CHD). The bioreactor integrates simultaneous imaging and experimentation capabilities, enabling the application of cyclic mechanical strain on cardiomyocytes while characterizing strain in correlation with the pressure exerted across a flexible membrane supporting the cell culture. To quantitatively assess strain, we imaged and quantified membrane deflection as a function of flow rate (pressure) through the pneumatic chamber. Leveraging fluorescent polystyrene beads as fiduciary markers and an automated focusing algorithm based on image processing, we determined the membrane's axial location using a motorized XYZ positioning stage. Using the axial position, we generated a 3D representation of the membrane deflection and determined the strain across the membrane. Our cardiovascular bioreactor allows for the precise application of cyclic mechanical strain on cardiomyocytes while concurrently characterizing the resulting 3D strain correlated with pressure applied across a flexible membrane. The bioreactor design complemented with strain analysis enables in-depth mechanobiology studies and enhances our understanding of how cardiac tissues respond to mechanical forces, particularly in the context of CHD.

24: Analysis of Singular Hydroponic Tower

Margaret Lutz | Biomedical Engineering | School of Science and Engineering | Sophomore

Anitha Niyingenera | Biomedical Engineering | School of Science and Engineering | Sophomore

Faculty Advisor/s: Kimberly Williams, Ph.D.; Tony Carbino, B.S.

ABSTRACT:

Food insecurity is a large issue in many communities around the world, and access to proper nutritional fresh produce is limited for many individuals. Hydroponics is a technique for growing plants where water rather than soil is the primary means for nutrient delivery, allowing for plants to be grown in low access areas. Small garden plants and herbs can be grown in a variety of substrates or even without substrate and designed to recapture water to minimize overall water usage. A single unit system was constructed by Tony Carbino in the Biomedical Engineering Department, and our goal is to analyze this system to optimize it for community use. The first step in our plan has been to analyze the water distribution within the single hydroponic tower. We have analyzed the kinetics of water absorption for each growth chamber to assist in addressing how pumping time could be minimized while maintaining good nutrient delivery to chambers. Initial studies were based on absorbance of water by cloths placed in individual chambers but, given our interest in using husk materials as seed holders, we compared whether that materials absorption properties would alter our initial findings. We also looked at compartment variability based on tower placement as a link to plant selection. With further work on the towers, we hope to implement the towers as a community resource for both students and surrounding communities, in which understanding the mechanics of the system is important to proper use and engagement.

25: Mapping the Binding Site of a Novel Paroxetine Analog on the Serotonin Transporter with Crosslinking and Mass Spectrometry

Elizabeth Stahovich | Biochemistry | School of Science and Engineering | Sophomore
Faculty Advisor/s: Michael Cascio, Ph.D.

ABSTRACT:

Serotonin transporter (SERT) dysfunction is implicated in psychiatric diseases such as depression and anxiety. Selective Serotonin Reuptake Inhibitors (SSRIs) are antidepressants that target SERT. Paroxetine, an SSRI, was derivatized with a photoreactive diazirine in efforts to develop a SERT-selective probe. To determine its efficacy, this novel ligand was incubated with purified rat SERT reconstituted into lipid vesicles. After photoactivation, mass spectrometry (MS) was utilized to identify sites of covalent crosslinking to this paroxetine ligand. Following in-gel proteolysis, analyses of bottom-up MS data identified mass-shifted peptides derivatized by paroxetine. These peptides were then selected for further fragmentation (MS/MS). Our studies reproducibly confirmed and refined the sites of crosslinking to the paroxetine ligand within these peptides and showed that the novel ligand was specifically binding in the known paroxetine binding site within SERT. Future research will involve click chemistry with the alkyne on the paroxetine ligand in hopes of exploiting this SERT-selective probe in subsequent physiological studies. These studies are a step in the direction of creating more effective antidepressants.

26: ATP induces distinct effects on the activity of mammalian dehydrogenase enzymes

Olivia Kohler | Biochemistry | School of Science and Engineering | Senior
Faculty Advisor/s: David Seybert, Ph.D.

ABSTRACT:

Several recent studies have reported that adenosine triphosphate (ATP) and other model polyanions can alter protein stability through weak, nonspecific interactions. These polyanion effects differ from both intracellular ionic strength effects and the effects of binding to specific high affinity sites and appear to operate in the millimolar concentration range. Despite these findings and the high concentration of ATP in the intracellular milieu, the effects of polyanions on enzyme catalysis remain unexplored. This project aims to determine the effect of ATP on the steady state kinetic behavior of model enzymes. The enzymes mitochondrial and cytoplasmic malate dehydrogenase (mMDH and cMDH respectively) and two isozymes of lactate dehydrogenase (LDH-1 and LDH-5) were selected for this study. In addition to catalyzing similar NADH-dependent reactions, these enzymes, with the exception of cMDH, also exhibit a phenomenon known as substrate inhibition at high substrate concentrations (oxaloacetate for mMDH and pyruvate for LDH). In mMDH, substrate inhibition diminishes with physiological concentrations of ATP. Further experiments reveal that ATP mimics trends seen in competitive inhibitors with variable NADH kinetics. In contrast, experiments with LDH and cMDH show that these enzymes are insensitive to similar concentrations of ATP. The results of a detailed comparative study of the effects of ATP on these four dehydrogenase enzymes suggests that this polyanion effect may reflect a previously unrecognized level of metabolic regulation.

27: Impact of abandoned open strip mines on mammalian occupancy

Greta DeRienzo | Biology | School of Science and Engineering | Sophomore

Faculty Advisor/s: Jan Janecka, Ph.D.

ABSTRACT:

In the mid-1900s, open-pit strip mining in Pennsylvania resulted in the removal of forest habitats, landscape alterations, and soil and water contamination. Elimination of this practice in the Laurel Highlands has resulted in the recovery of mammalian species, such as the black bear (*Ursus americanus*) and bobcat (*Lynx rufus*). Powdermill Nature Reserve provides a great resource to study the impacts of abandoned open-pit strip mines. In May 2022, we installed a network of 24 camera traps in two mine plots and one control plot to compare mammalian diversity and occupancy. Cameras were placed in random locations with equal density across all three plots. Mammal diversity and occupancy was compared over a 14 month period (May 24th 2022-July 25th 2023). In a preliminary analysis, the strip mine plots contained higher diversity, likely due to fine-scale variation in topography and vegetation. Prey species, like white-tailed deer (*Odocoileus virginianus*) and eastern gray squirrel (*Sciurus carolinensis*) had higher occupancy in the mine plots while predator species such as black bear and coyote (*Canis latrans*) had higher occupancy in the control plot. However, species like bobcat and red fox (*Vulpes vulpes*) had no difference in occupancy between sites. The variation of terrain and vegetation in the mines possibly allow prey species to remain undetected by predator species. Occupancy modeling will be done on these and other species in the future. Camera trapping observations will continue through the planned reclamation of these strip mines in Fall 2024 to evaluate changes in mammalian diversity and occupancy.

28: Functional Evolution of KLK2 and KLK3 Proteases in Hominoid Primates

Hayley Jenkins | Biology | School of Science and Engineering | Senior

Faculty Advisor/s: Michael Jensen-Seaman, Ph.D.

ABSTRACT:

The large kallikrein-related peptidase (KLK) gene family encodes tissue-specific serine proteases. KLK2 and KLK3 arose from a gene duplication event in an ancestral primate ~40 million years ago and encode prostate-specific enzymes that break down the seminal coagulum to mobilize sperm, with unique trypsin-like and chymotrypsin-like substrate specificities, respectively. Interestingly, genomic deletions have independently occurred in gorillas and gibbons, resulting in chimeric genes (cCLK) that have four exons from KLK3 and one from KLK2. To functionally assess the substrate specificity of the chimeric gorilla and gibbon cCLK proteins, I cloned, transfected, expressed, and purified these proteins using a mammalian cell culture system. Gorilla and gibbon recombinant cCLKs were not able to efficiently cleave the chymotrypsin-like or the trypsin-like substrate, suggesting that these newly evolved proteins have not retained the ancestral activity of KLK2 or KLK3. These cCLK genes are likely evolving to become nonfunctional pseudogenes, paralleling the loss of function of several of other male reproductive genes in gorillas and gibbons, presumably due to the low intensity of sperm competition, a form of sexual selection.

29: Functional Significance of Sequence Variation in the C-terminus tail of RsmE in Pseudomonas fluorescens

McKenna Carroll | Biology | School of Science and Engineering | Senior
Faculty Advisor/s: Wook Kim, Ph.D.

ABSTRACT:

The post-transcriptional regulator RsmE inhibits extracellular secretions across diverse bacterial species, including our model organism, *Pseudomonas fluorescens*. Mutations in the *rsmE* gene are naturally selected in densely populated colonies of the wildtype (WT) *P. fluorescens* grown in the lab, since functionally altered RsmE leads to the de-repression of extracellular secretions. These secretions collectively function to create space of low population density around the mutant cells, conferring a striking growth advantage compared to the neighboring WT cells that remain overcrowded. RsmE homologs are highly conserved in sequence with the exception of their C-terminus tail. The tail region is generalized to be functionally insignificant since it has neither predicted nor resolvable structure. However, a mutant that lacks the tail region produces the same dominant spatial phenotype within a crowded colony as other *rsmE* mutants. I thus analyzed twelve naturally occurring *rsmE* mutants, each with a unique mutation in the tail region, and classified them into four groups using comprehensive phenotypic screens and bioinformatics analysis. Under the hypothesis that these four groups should exhibit distinct levels of competitive advantage, each of the twelve mutants was competed against the WT to compare their relative fitness. I found that specific variations in the tail sequence correlate with variations in the production of the secretion of a biosurfactant and relative fitness. Although additional experiments are necessary to define the underlying molecular mechanism, my study presents the first evidence that the C-terminus region of RsmE is functionally significant.

30: The Effect of Nature: Is the Impact Always Positive?

Alexis Jantzi | Biology | School of Science and Engineering | Sophomore
Faculty Advisor/s: Kristin Klucsevsek, Ed.D.

ABSTRACT:

Many aspects contribute to a person's mental and physical health. As society progresses into a screen-dependent lifestyle, there is concern that the lack of time in nature, or "green-space", contributes to many health issues. However, current research primarily focuses on the benefits of green-spaces on the healthy portion of the human population, neglecting those who have pre-existing conditions. These populations of individuals with health conditions may not benefit from green-spaces in the same way healthy individuals do. This poster evaluates the impact nature has on these minority groups, specifically children with ASD, individuals with allergies, and pre-existing mental health concerns. After analyzing scientific research and reviews, I find evidence that not all of these populations receive the same positive impact from green spaces as the general public. By addressing the impact of nature across the entire population, we can form more accurate recommendations for improving mental and physical health within nature.

31: Do Mutations in a Nucleoid-Associated Protein Gene Suppress a Defect in Cell Division?

Paige Ladowitz | Biology | School of Science and Engineering | Junior
Faculty Advisor/s: Joseph McCormick, Ph.D.

ABSTRACT:

Streptomyces are filamentous, Gram-positive bacteria that provide antibiotics and biologically active compounds for medical uses. A *Streptomyces coelicolor* *ftsQ* mutant (important in cell division and

efficient sporulation), accumulates multiple suppressor mutations. One group of those suppressor mutations is in *lsr2*, but those strains have additional mutations in other genes. *Lsr2* is a nucleoid-associated protein (homolog to *E. coli* H-NS) that organizes DNA and also acts as a transcription factor. The main goals of this project are to demonstrate *lsr2* suppresses *ftsQ* by deleting *lsr2*, deleting *ftsQ*, and then integrating a copy of the point mutations of *lsr2* at a non-native location. Methods used to achieve these goals included interspecies conjugation, recombineering, polymerase chain reaction, and gel electrophoresis. I am currently isolating a strain with an unmarked deletion of *lsr2*. Once the deletion mutant is obtained, the *ftsQ* deletion will be introduced, and point mutation *lsr2* alleles will be integrated.

32: Differential Expression of the Interferon-Induced Dynamin-Like GTPase MX-1 During the Neuroinflammatory Response.

Eli Bartholomew | Biology | School of Science and Engineering | Senior
Faculty Advisor/s: John Pollock, Ph.D.

ABSTRACT:

Chronic pain is a debilitating disorder that reduces the quality of life of many people who are afflicted. Further research into the molecular mechanisms of chronic pain and potential therapeutic targets are required. Previous research in our lab has shown that male and female rats develop pain from equivalent injury to the sciatic nerve to the same degree over the same time course^{1,2}. However, RNASeq data revealed that mRNA expression is different between the sexes in the associated dorsal root ganglia¹. Among the genes that are differentially expressed, MX-1 is found to be specifically upregulated in male dorsal root ganglia when neuronal damage has occurred, but not in females. MX1 is an interferon-induced dynamin-like GTPase that is thought to play a role in the modulation of the neuroinflammatory response. Using immunohistochemistry, we find that MX-1 protein expression is increased in select neurons of the dorsal root ganglia corresponding to injured sciatic nerves. Further investigation of MX-1 will explore expression in males vs. females with and without pain-relieving drug therapy to better understand the difference in the neuroinflammatory response. The project was supported with funding to J.A.P from the NSF DBI-1726368 for confocal imaging. J.A.P. also acknowledges support from the Charles Henry Leach II Fund.

33: Rediscovery of a Relict Population of Brindled Madtom in Crooked Creek

Nelson Squires | Biology | School of Science and Engineering | Senior
Faculty Advisor/s: Brady Porter, Ph.D.

ABSTRACT:

Crooked Creek is a mine-impacted tributary to the Allegheny River located in western Pennsylvania. Most of the stream lies upstream of a dam maintained by the U.S. Army Corps of Engineers (USACE), as well as its reservoir, Crooked Creek Lake, a popular fishing and recreation area. Backpack electrofishing surveys conducted by Duquesne University and USACE from 2020-2021 revealed not only a healthy fish community but also a previously unknown population of Brindled Madtom *Noturus miurus*, a state-threatened catfish species that had not been recorded in the area since 1905. All of the Brindled Madtoms were found in the mainstem, upstream of the reservoir. The purpose of this study was to collect additional information on the fish community upstream of Crooked Creek Lake as well as to gain further understanding of the newly-rediscovered Brindled Madtom population. Three backpack electrofishing surveys were conducted at different points along the stream using a seine and dip nets. Results from 2023 indicate a relatively healthy fish community, and a persistent population of Brindled Madtom with multiple size classes indicating successful reproduction. Although the dam may genetically

isolate this relict population, it can also protect it from invasive species. Future surveys will determine the upstream extent of this state-threatened species and its habitat requirements.

34: Characterization of Manganese reducing bacterial isolates from AMD passive remediation systems

Alexa Lovelace | Biology | School of Science and Engineering | Junior

Faculty Advisor/s: Nancy Trun, Ph.D.

ABSTRACT:

Acidic Abandoned Coal Mine Drainage (AMD) is rich in heavy metals due to oxidizing reagents (water and oxygen) interacting with sulfide bearing rocks. Pennsylvania is the leader in constructing passive remediation systems to treat acidic AMD that rely on geochemical reactions to raise the pH and precipitate metals from solution through limestone beds, settling ponds, and constructed wetlands. The Boyce Park passive remediation system, located in Plum Boro, PA, was constructed in 2008 to treat acidic AMD with an aerobic wetland, settling ponds, and a vertical flow pond to filter out high levels of metals like manganese (Mn). Low levels of Mn are required to sustain life, but over-exposure can lead to neurological problems. The microbial community's ability to improve or decrease remediation efficiency within passive remediation systems has been poorly characterized. Microbes contribute to the solubilization of Mn by acidifying the water around them. We identified microbes from Boyce Park PRS (AL1, AL13, AL15, AL26, AL31, AL33, AL35) that demonstrated solubilization of manganese oxide. Understanding the way in which the microbe metabolism acidifies its environment and solubilizes Mn can help us better understand passive remediation system function and develop improved remediation plans.

35: Nanoemulsions Loaded with Natural Products Protect M2 Macrophages from Ferroptosis

Stelio Maris | Pharmaceutical Sciences | School of Pharmacy | Senior

Faculty Advisor/s: Jane Cavanaugh, Ph.D.; Jelena Janjic, Ph.D.

ABSTRACT:

Macrophages are one of the first responders following injury. The activation and infiltration of macrophages to the site of injury initially induces inflammation. After the elimination of the insult, a switch in macrophage phenotype from M1 (pro-inflammatory) to M2 (anti-inflammatory) is required to prevent excessive inflammation. In inflammatory disease states, such as rheumatoid arthritis, M1 macrophages outnumber M2 macrophages and remission of these diseases are characterized, in part, by a switch of macrophages from the M1 to the M2 phenotype. M2 macrophages are particularly susceptible to ferroptosis, a type of cell death. Our project focuses on the effect of nanoemulsions loaded with curcumin and resveratrol, natural products and reactive oxygen species (ROS) scavengers, on ferroptosis in M2 macrophages. As ferroptosis is induced by ROS, we hypothesize that curcumin and resveratrol nanoemulsions will protect M2 macrophages from ferroptosis. We will examine cell death following treatment of RAW 264.7 macrophage cells with ferroptosis inducers +/- curcumin or resveratrol nanoemulsions. Prevention of ferroptosis of M2 macrophages may provide therapeutic value in inflammatory diseases.

36: Demyelination Exacerbates α -Synucleinopathy in Experimental DLB in Vivo

Reese Landes | Biology | School of Science and Engineering | Senior

Faculty Advisor/s: Rehana Leak, Ph.D.

ABSTRACT:

Dementia with Lewy bodies (DLB) is characterized by toxic alpha-synuclein protein aggregates that worsen cognition and olfaction, and increase anxiety. Clinical histopathological reports suggest that non-myelinated neurons are more likely to develop these aggregates, but it is not clear whether this relationship is causal. To address this question, we tested the effect of forced demyelination in an experimental model of DLB. To simulate DLB, we infused performed alpha-synuclein fibrils into the anterior olfactory nucleus of the caudal olfactory bulb (OB/AON) in 9 to 11-month-old mice of both sexes. Forced demyelination was induced by dietary exposure to cuprizone (0.3%), a known demyelinating agent, for 8 weeks. Fibril-infused mice of both sexes displayed the expected increase in aggregated α -synuclein, according to biochemical assessments of α -synuclein insolubility and hyperphosphorylation, and histological measurements of Lewy-like inclusion counts. First, we found that cuprizone further increased alpha-synuclein aggregation in fibril treated animals. Second, hyperphosphorylated α -synuclein was negatively correlated with proteolipid protein (PLP), one of two major myelin proteins in the myelin sheath, in diseased animals that were placed on the control diet. However, this inverse link between PLP levels and pathological α -synuclein was uncoupled by cuprizone exposure. In conclusion, these findings reveal that demyelination enhances vulnerability to alpha-synucleinopathy in experimental DLB.

37: Analysis of gabapentin adverse events and misuse reported through tweets: A feasibility study

Katrina Lepro | Pharmaceutical Sciences | School of Pharmacy | Senior

Lia Ferraccio | Pharmaceutical Sciences | School of Pharmacy | Senior

MacKenzie Kirsch | Pharmaceutical Sciences | School of Pharmacy | Senior

Maddie Arndt | Pharmaceutical sciences | School of Pharmacy | Senior

Faculty Advisor/s: Branden Nemecek, Pharm.D., BCPS; Jordan Covey, Pharm.D., Ph.D., BCPS

ABSTRACT:

Introduction: Adverse event (AE) reporting occurs through the FDA Adverse Event Reporting System (FAERS), although data submitted are not always reflective of the full AE landscape. Social media can offer additional safety surveillance from the patient perspective, particularly for medications with a misuse risk, such as gabapentin, or for AEs not reported to FAERS.

Research Question: Describe patterns related to gabapentin AEs and misuse via user-generated Twitter data.

Study design: Retrospective cross-sectional (January 2012 to September 2022)

Methods: Tweets were collected from SafeRx, a database utilizing a natural language processing engine to identify tweets related to a potential AE. De-identified English tweets collected from public accounts, relating to an identifiable person/use episode, which mentioned gabapentin were included. Researchers individually assessed each potentially AE-related tweet identified for: (1) presence of an AE, (2) presence of intentional misuse, (3) type of misuse, (4) type of AE, and (5) mention of other drugs/substances. A consensus was reached and Tweets with less than 50% consensus as to the presence of AE, duplicate tweets, and tweets about animal usage were excluded. Descriptive analysis (using Microsoft Excel) was performed.

Results: Overall, 7113 tweets related to gabapentin were analyzed, with 6285 (88.4%) included for analysis. A total of 4255 (67.7%) tweets identified an AE, with the most common type being neurological (1675; 39.4%). Intentional misuse was identified in 278 (4.4%) tweets. A total of 1187 (18.9%) tweets discussed the use of gabapentin with another drug/substance.

Conclusion: Data from Twitter suggests a high prevalence of gabapentin tweets related to AEs

38: STAT1 cleavage as a mechanism for dampening inflammatory signaling during a persistent juvenile brain infection

Natalie London | Biology | School of Science and Engineering | Senior
Faculty Advisor/s: Lauren O'Donnell, Ph.D.

ABSTRACT:

Virus infections in the brain can induce encephalitis and enduring neurological sequelae, especially in the very young. Often, an immune response is mounted in the brain, but viral clearance fails. We hypothesized an infection in a juvenile host would induce prolonged but unproductive neuroinflammation in the brain. To study this, we used juvenile CD46+ mice, where measles virus infection is limited to neurons and neurological disease is age-dependent. Using western blot analysis, we found that STAT1, a key antiviral signaling protein, had greater expression and activation (e.g. phosphorylation) in brains of juvenile mice during acute infection (9 days post-infection, dpi). STAT1 expression was also elevated in surviving mice at 90 dpi, suggesting a sustained but unproductive antiviral response. Surprisingly, activated STAT1 was cleaved into a 50kDa fragment at 90 dpi, separating the transactivation domain from the dimerization domain. These findings suggest an alternative mechanism for STAT1 inactivation in the inflamed brain. Current studies aim to determine the cleavage site within STAT1 and whether this cleavage event is mediated by caspases, reflecting death of the responding brain cells.

***39: Assessing the role of endogenous melatonin in a transgenic mice model and exogenous melatonin with osteogenic loading in an osteopenic population to understand its role in musculoskeletal disorders**

Kyle Schulze | Pharmacy | School of Pharmacy | Senior
Faculty Advisor/s: Paula Witt-Enderby, Ph.D.

ABSTRACT:

Age related declines in bone and muscle health are on the rise resulting in osteopenia, osteoporosis and/or sarcopenia. Fat accumulation in bone marrow and muscle can occur making these tissues weak and susceptible to bone fracture. Except for tension-based exercise, therapeutic interventions to prevent such losses are limited. Melatonin, due to its ability to modulate bone marrow-derived mesenchymal stem cell (MSC) differentiation into osteoblasts, myocytes, and adipocytes along with its antioxidant properties, may prevent these conditions and maintain musculoskeletal health throughout aging. Melatonin, by inhibiting PPAR γ in MSCs, promotes myoblast or osteoblast differentiation while preventing adipocyte differentiation. In this study, the focus was to determine if melatonin decreases PPAR γ expression in muscle using a transgenic aralkylamine N-acetyltransferase knock-out mouse model that no longer synthesizes melatonin from the pineal gland and comparing to muscle-expressed PPAR γ levels in melatonin-replete wildtype (WT; C3H) mice. Using western blot analysis, Odyssey and LiCor Imaging systems, PPAR γ levels were significantly higher in AA-NATKO mice vs WT (P value=0.0026). These findings indicate that melatonin attenuates PPAR γ in muscle favoring myogenesis

over adipogenesis. Melatonin effects on the musculoskeletal system is being assessed in a one-year randomized controlled trial, MelaOstrong Study, to determine the efficacy of melatonin (5mg, nightly, po) alone or combined with osteogenic loading on musculoskeletal health in a population with osteopenia using objective (i.e., DXA, muscle function tests, and markers of bone health by ELISA) and subjective (i.e., PSS, STAI, CES-D, QualiOst, and FRAX) assessments.

40: Testing Cognitive Decision Making in Athletes and Nonathletes

Addison Ciecierski | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior

Gary Anastasi | Psychology | McAnulty College and Graduate School of Liberal Arts | Junior

Faculty Advisor/s: Alexander Kranjec, Ph.D.

ABSTRACT:

When playing team or individual sports, decision-making skills play an important role. Athletes' abilities to rapidly make decisions may have benefits outside of sports. For example, previous research has shown that participation in sports can lead to better outcomes within the classroom. To more deeply understand the relationship between sports participation and decision making, the present experiment measures decision-making skills using two classic cognitive decision-making tasks. Both tasks will be delivered online using the Gorilla platform. In both tasks, participants will be required to quickly report if a shape is either square or rectangle, or if it is blue or green depending on where it is on the screen. In addition, by recruiting non-athletes, and athletes from team and individual sports, we seek to explore how different kinds of athletic experience contribute to individual differences in decision-making abilities. We hypothesize that athletes will tend to perform better on decision-making tasks as compared to non-athletes, as athletes are predicted to have generally better decision-making skills. Whether team or individual athletes show better decision making is an open empirical question that this study seeks to further explore.

41: Duquesne University Sleep Survey

Rebecca Ulinski | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior

Seebe Proper | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior

Faculty Advisor/s: Alexander Kranjec, Ph.D.

ABSTRACT:

At American universities, there are common sense reasons to think that sleep quality may be affected by roommate number and housing location, with both of these factors also impacting housing cost. Background research showed that a higher number of roommates may impact sleep quality negatively. To assess the relationship between Duquesne University students' sleep quality and these factors empirically, students were asked to complete the Pittsburgh Sleep Quality Index, a comprehensive questionnaire that results in a composite sleep quality score. The higher the score, the worse the sleep quality. This score was then paired against variables like number of roommates, housing location, and housing cost to determine the relations between these factors and sleep quality.

***42: Black Doulas Perspectives of and Experience with the Edinburgh Postpartum Depression Scale**

Isabelle Ebenhoch | Nursing | School of Nursing | Senior

Grace Yeretian | Nursing | School of Nursing | Senior

Sofia Rush | Nursing | School of Nursing | Senior

Faculty Advisor/s: Jessica Devido, Ph.D., APRN, CPNP

ABSTRACT:

Postpartum depression negatively impacts long-term health outcomes for birthing persons and their offspring. Due to systemic and structurally embedded racism in the Black and African American population, women are more likely to have personally experienced inadequate care and discrimination which contribute to symptoms of postpartum depression. The Edinburgh Postnatal Depression Scale (EPDS) is a widely used screening tool, generally regarded as one of the best methods to assess for postnatal depression. However, concerns about how culturally relevant the EPDS is to non-white women prompt further examination of its ability to capture exposure to other stressors unique to Black women. Often, this screening is performed by doulas, trained birth workers who provide mental, physical, and emotional support and act as advocates during the prenatal, intrapartum, and postpartum periods, giving them a "front row" view to EPDS's usage. The purpose of this study is to explore Black doulas perspectives of and experience with the Edinburgh Postpartum Depression Scale. A qualitative description design utilizes a semi structured guide for focus groups with Black doulas and assessment of demographic characteristics. Data is transcribed, coded and analyzed for themes. Data from this study is still being analyzed, therefore results are forthcoming. While the Edinburgh Postnatal Depression Scale may appear to be effective among populations, there is a paucity of research related to its relevancy and efficacy for Black women. Further exploration of the perspectives of Black birth workers who have lived experience and support Black birthing people on a daily basis will strengthen understanding.

43: "I am Hypervigilant to Behaviors and Conversations": Nurse Parents' Challenges on Caring for Victims of Child Maltreatment

Kaylynn Hawkins | Nursing | School of Nursing | Senior

Megan Ravert | Nursing | School of Nursing | Senior

Faculty Advisor/s: Angela Karakachian, Ph.D., RN

ABSTRACT:

Nurses caring for victims of child maltreatment face many professional and personal challenges. Evidence shows, that nurses who care for victims, experience secondary traumatization. There is a gap in the current nursing literature regarding the lived experiences of nurses who are parents and care for victims of maltreatment. The purpose of this study is to determine the effects of caring for victims of child maltreatment on nurses who are parents. A secondary data analysis was conducted on data retrieved from a descriptive phenomenological study. Participants were recruited through the Society of Pediatric Nurses (SPN) and the International Association of Forensic Nursing (IAFN). A total of 21 transcripts of recorded interviews were read and analyzed based on Giorgi's phenomenological descriptive model. In the final analysis of data, five meaning units are found: (1) hypervigilance with their own children, (2) the need to protect victims and their own children, (3) loss of trust in others, (4) feelings of compassion towards victims, and (5) emotional distress. The research shows that nurses who are parents and care for victims of child maltreatment experience not only professional challenges but also distress on a personal level. Educating and training nurses on caring for victims of child maltreatment is necessary as it may improve their preparedness on caring for victims, which in turn may help reduce nurses' initial emotional impact of caring for this vulnerable population. This may improve nurses' personal and professional well-being.

44: GENDER AS A MODERATOR OF DRINKING BEHAVIORS AND PERCEIVED COVID-19 RISK AMONG COLLEGE STUDENTS

William Buchholz | Nursing | School of Nursing | Senior

Tanrak Ploykao | Nursing | School of Nursing | Senior

Faculty Advisor/s: Mai-Ly Steers, Ph.D.

ABSTRACT:

Literature indicates that college students who engage in heavy drinking are more likely to contract COVID-19. It has also been shown that young women are more susceptible to experiencing alcohol-related problems, such as contracting transmitted diseases versus young men, perhaps due to their risk perceptions because of their drinking. Consequently, this study evaluates the relationship between perceived COVID-19 risk, drinking, and gender. We hypothesize gender will play an important role as a moderator of the association between drinking and perceived COVID-19 risk, such that heavy drinking female students are less likely to perceive COVID-19 risk. Four hundred undergraduate students from two universities in the Midwest completed an online survey regarding their drinking and COVID-19 risk perceptions during the pandemic (Mean age=20.32, SD=2.33, 68% Female). To execute a linear regression model, drinks per week (a positively skewed count variable) underwent a log transformation to better conform to a normal distribution with COVID-19 risk as the outcome variable. Results revealed that male students were likely to perceive the same amount of COVID-19 risk, irrespective of their drinking. As expected, we found an inverse relationship between drinking and perceived COVID-19 risks among female students. Understanding the dynamics between perceived COVID-19 risk, gender, and drinking provides valuable insights for designing public health initiatives and targeted interventions tailored to college students. This information can be used to educate male and female college students regarding how their perceptions of risk may contribute to their contracting highly contagious communicable diseases in the future.

45: Standardized Nursing Handoffs: Gold Standard

Saule Gabrenaite | Nursing | School of Nursing | Senior

Ghazaleh Razmi | Nursing | School of Nursing | Senior

Emma Foy | Nursing | School of Nursing | Senior

Faculty Advisor/s: Mayra Toney, DNP, RN

ABSTRACT:

Nursing handoffs involve transferring patient data between caregivers to ensure continuity of care. Handoff is essential in sharing information about the patient's condition. During handoffs, the patient's diagnosis, medical history, hemodynamic status, procedures, and care plan are shared between nurses. However, The Agency for Healthcare Research and Quality and The Joint Commission have found that inadequate handoff communication has contributed to inappropriate and delayed treatment, prolonged hospital stays, and omissions in care. The handoff process has been unstructured and informal. The omission of critical data has been a leading contributor to care continuity disruption. The purpose of this integrative review was to identify standardized tools that facilitate effective handoff communication. Educating clinicians and providing standardized tools can increase clinician comfort and patient information retention. An integrative review was conducted to investigate the effectiveness of implementing standardized change-of-shift reporting tools, ISHAPED and SBAR, to reduce communication errors. Additionally, nurses were taught to use this tool to conduct effective handoffs. The tools facilitated active communication. The tools standardized patient-centered handoff and allowed for face-to-face communication between nurses. Subsequently, the healthcare providers reported a reduction in errors. Implementing standardized tools has significantly decreased the number

of adverse events associated with communication errors and has fostered a culture of awareness in healthcare. Healthcare providers should consider implementing a standardized tool to improve handoff communication.

46: Does Instruction in Using a Physical Activity App Improve Outcomes in a Diabetes Prevention Program?

Katherine Bukowski | Nursing | School of Nursing | Senior

Maura O'Neill | Nursing | School of Nursing | Senior

Kelly Gullo | Nursing | School of Nursing | Senior

Faculty Advisor/s: Melanie Turk, Ph.D., RN, FTNNS

ABSTRACT:

Our project focused on the delivery of the Diabetes Prevention Program (DPP) at Duquesne University, which addresses lifestyle change in patients with prediabetes. Our focus was to determine if iPhone/Android apps could improve weight loss and increase activity levels. We aimed to determine if an educational demonstration of an app called "Google Fit" would encourage and motivate participants to increase and track their physical activity, lessening their risk of diabetes through weight loss. During the year-long DPP, participants attended 16 weekly sessions within the first 6 months followed by 6 monthly maintenance sessions. During the third week of the program, we presented an hour-long presentation via Zoom to Cohort 5 on how to track fitness activities using the Google Fit app. Screenshots were used so participants could visually see how to navigate the app and add their weight/activity data. Participants were sent handouts on the presentation for future reference. We compared results from Cohort 4 (control group) and Cohort 5 to determine if our educational session affected activity levels and weight loss. Results showed our singular session did not impact Cohort 5, as their physical activity and weight were not different compared to the control group. Using multiple, individual sessions on physical activity tracking may have had a higher impact on weight loss, instead of one large group session. Education is a cornerstone of nursing, reminding us that each patient has different educational needs; we must incorporate each patient's learning needs when teaching a person about their healthcare.

47: The Impact of Affordances in the Home Environment in Reaching Skills in Pre-Crawling Infants

Emma Costello | Nursing | School of Nursing | Senior

Aleena Purewal | Health Sciences | Rangos School of Health Sciences | Junior

Melanie Tommer | Physical Therapy | Rangos School of Health Sciences | Senior

Melanie Schultz | Physical Therapy | Rangos School of Health Sciences | Senior

Faculty Advisor/s: Regina Harbourne, Ph.D., PT, PCS

ABSTRACT:

The early ability to reach and explore objects even at 5 months of age has been linked to greater academic success in later years, indicating that early reaching skill may be a factor in learning over time. The Affordances in the Home Environment for Motor Development-Infant Survey (AHMED-IS), is a caregiver survey that quantifies movement opportunities in the home. We questioned whether home affordances influenced the ability of infants to reach efficiently. Our purpose was to characterize reaching and sitting control that supports reaching and the effect of affordances in the home. We recruited 23 infants, 12 females, Mage= 232 days.

Infants reached for toys through an opening in a reaching board in the A or B location. Datavyu video coding software was used to determine reach and balance errors. AHMED-IS was filled out via an online

form during the visit by the parent and later scored for 1) variety of gross motor opportunities, and 2) number of toys for infants.

Bivariate correlations revealed a significant relationship only between reach duration and balance errors: $r(21) = .369$ ($p = 0.042$), with no significant relationships between reach duration and either of the AHEMD variables. Only errors contributed significantly, $R^2 = .25$, $F(2,21) = 4.42$, $p = .02$. Thus, infants who made more balance errors had longer reach times regardless of age or environmental affordances. Balance control in the infants' newly achieved sitting, appears to impact the ability of infants to reach efficiently and explore the environment.

48: Clickbait: Do Words Bias Judgements About Headlines Related to Social Justice

Sophie Levitt | Psychology, Sociology | McAnulty College and Graduate School of Liberal Arts | Senior
Kristen Fisher | Psychology | McAnulty College and Graduate School of Liberal Arts | Junior
Faculty Advisor/s: Alexander Kranjec, Ph.D.

ABSTRACT:

What makes a headline go viral? Social language about race, gender, religion, and political identity can elicit an emotional response from readers, and not only affects their perception of a story, but their decision to click on a headline in the first place. To investigate the effects of social language on reading headlines, we are conducting a study that will determine whether the specific language used in a headline affects a reader's engagement and the perceived believability of its content. The study seeks insight into how certain words and phrases about social categories, in headlines that imply social justice topics, may introduce biases affecting engagement or believability. The study will be conducted online using Qualtrics. Participants will rate the engagement likelihood and believability of 40 headlines, 20 with social language and 20 without. We expect headlines containing social language to be more or less believable but always more engaging as compared to similar headlines without social language. This study will create awareness of how social language can bias readers, with the hope that future headline editors will take a cautious approach when composing headlines.

49: Victim Assistance/Advocacy programs in Law Enforcement

Sophie Levitt | Psychology, Sociology | McAnulty College and Graduate School of Liberal Arts | Senior
Faculty Advisor/s: Anita Zuberi, Ph.D.

ABSTRACT:

Every crime has a victim. Victims focused care is the new mission of many law enforcement agencies as well as victim focused agencies. Throughout the last few decades, the push for victim advocacy has increased as new programs and laws have been created. The question that this research centered around was, how do victim advocacy programs support victims through the criminal investigation? To better understand victim advocacy programs, literary analysis was conducted as well as firsthand interviews of Victim Advocates at Homeland Security Investigations and Center for Victims. Through this research, it is made clear how important and valuable having roles that focus on the victim's journey through an investigation process is. The role of a victim advocate is crucial to not only the healing that a victim goes through, but also the success of an investigation regarding getting a conviction. This research suggest that it is crucial to maintain victim advocacy roles across different agencies, as well as the creation of programs and laws for victims' rights so that moving forward victims are at the heart of all criminal investigations.

50: STUDENT WITHDREW

51: Uncovering the History of Jungfernhof Concentration Camp in Riga, Latvia

Emma McConnell | Environmental Science | School of Science and Engineering | Senior

Faculty Advisor/s: Philip Reeder, Ph.D.

ABSTRACT:

Research was conducted at the former site of the Jungfernhof Concentration Camp in Riga, Latvia. The objectives were to define the soil properties, and to determine the location of former camp buildings, and possible mass graves at the site. Jungfernhof, created in 1941, housed nearly 4,000 Jewish prisoners. During the harsh winter of 1941-1942, 800 prisoners died from exposure, disease and execution. In spring 1942 a mass grave was created, using dynamite to blast a hole in the frozen ground. Methodologies were focused towards searching for the mass grave using a pulseEKKO Pro ground penetrating radar (GPR) system, quantify building locations using comparative spatial analysis of German military air photos, Google Earth satellite images, and maps from 1942 and 1947, and identifying soil physical characteristics using soil auguring and field analysis. The area's soil texture was mostly silt, with sand, and a distinct clay layer, which indicates that the soil formed in over-bank deposits from the Daugava River. Determining soil physical characteristics is important because they effect the penetration of the GPR signal. GPR detected probable building foundations that spatial analysis indicated were locations where buildings formerly existed. Using GPR a circular anomaly was also located which is possibly the location of the mass grave. Additional research is required to confirm this conclusion. Therefore, future research will include additional GPR and soils analysis to confirm the anomalies precise origin, and the presence or absence of anthropogenic features within the soils that point towards the exact nature of the anomaly.

52: Environmental Impact of the Train Derailment in East Palestine, Ohio

Christina Adam | Health Sciences | School of Science and Engineering | Senior

Faculty Advisor/s: John Stolz, Ph.D.; Tetiana Cantlay, Ph.D.

ABSTRACT:

On February 3, 2023, a Norfolk Southern freight train with 150 train cars derailed in East Palestine, Ohio. Among the different cars, at least 11 tankers were filled with vinyl chloride, ethylene glycol, monobutyl ether, ethyl-hexyl acrylate, butyl acrylates, isobutylene, and benzene residues. On February 6, 2023, Norfolk Southern commanded a controlled release of the vinyl chloride tanks that were increasing in temperature. There was a fire and spill, with over 115,000 gallons of chemicals, discharging into a ditch that feeds Sulphur Run. Sulphur Run runs through the local park, then into Leslie Run and Bull Creek further downstream. Months after the spill, a visual inspection of Sulphur Run in the park revealed residual organic contamination once the creek sediments were disturbed. Details from releases from the U.S. Environmental Protection Agency, Ohio Environmental Protection Agency, and the White House have been reviewed in an effort to assess the extent of the environmental impact. Samples were collected from Leslie Run almost a month after the derailment. Analysis via Gas Chromatography with Flame Ionization Detection was used to determine 40 ppt of 2-ethylhexyl-acrylate was found after the sediment in Leslie Run was disturbed. This indicates Leslie Run was contaminated and thus exposure posed a risk to mammal and aquatic life as well as the surrounding environment.

53: Science and Frankenstein: or, The Science in Fiction

Agaretha Kosasih | English, History | McAnulty College and Graduate School of Liberal Arts | Sophomore
Faculty Advisor/s: Erin Speese, Ph.D.

ABSTRACT:

There is a lack of consensus in defining what the genre "science fiction" can encompass. While some argue that science fiction began around the Scientific Revolution and the Industrial Revolution, certain archetypes existed even prior to the invention of the genre itself. The most popular accepted argument today, perhaps, is that Mary Shelley's *Frankenstein* was the first true piece of science fiction, as suggested by Isaac Asimov, and whose work marks out the first science fiction writer, as suggested by Brian W. Aldiss. Many other arguments can arise based on how we define "science fiction" itself, such as Johannes Kepler's *Somnium* as referred to by Asimov, or the later likes of Jules Verne and H. G. Wells as approached by Hugo Gernsback in the science fiction magazine *Amazing Stories*. Shelley's *Frankenstein* serves a unique standpoint through the way the science of fiction being applied comes from Shelley's present and onto her present, while written with the Gothic tradition in mind. This differs from our common view of contemporary science fiction that orients more onto a futuristic setting, written with a focus on science and technological advancement. This paper aims to examine how science has been used and displayed in literature, and how it has been applied contextually within the works characterized as science fiction.

54: Liberal Arts at Work: Utilizing an English Degree in the Workplace

Anna Gartland | Music, English | Mary Pappert School of Music | Junior
Faculty Advisor/s: Emad Mirmotahari, Ph.D.

ABSTRACT:

When pursuing a liberal arts degree, the uncertainty surrounding appropriate career paths and work often deters undergraduate students from pursuing their true passions to pursue seemingly more practical majors. Using my firsthand experience interning at Literacy Pittsburgh, I will demonstrate how the English major may be used as a foundation to work in a variety of career areas such as non-profit work, research, marketing, event planning, and administration. The purpose of this project is to present that the English major alone can be harnessed to fit many different career paths post-undergraduate without need for graduate school, law school, or teaching certification. Further, the English major lends itself to doing work that empowers and serves the community, a principle of both an English degree and a Duquesne University education.

55: The Hero's Masked Companion

Bailey Martini | English | McAnulty College and Graduate School of Liberal Arts | Junior
Faculty Advisor/s: Sarah Miller, Ph.D.

ABSTRACT:

In 1949, Joseph Campbell published his foundational working theory regarding the hero's journey in his book, *The Hero with A Thousand Faces*. While this book adequately traces the steps of any ancient or modern hero, it lacks crucial evidence regarding the notable voices of those who aided the victor on their journey. It is evident in these myths that a "companion" has a designated path to journey on their own. Most noteworthy is the moment in which the companion replaces their own persona with the mask of the hero. Patroclus, functioning as the companion in *The Iliad* by Homer, turns the tides of war by wearing Achilles' armor, borrowing the hero's identity of power and honor. Medea – extraordinary for her transformative female heroism in Euripides' work, *Medea* – aided Jason on his heroic journey to

retrieve the Golden Fleece but was cast off. The act of adopting the hero's persona initiates a crucial shift in the characters' arc and, at times, the narrative's plot. The goal is not to remove the hero from the narrative but instead create a newfound appreciation for mythological characters who, thus far, have lacked acknowledgment. Until this point, the companions – as masked heroes – have been overshadowed by the protagonists of their stories. Here, attention will be paid to fully appreciate their indispensability and analyze their multilayered character development.

***56: Examining Trading Networks Between Imperial Rome and Imperial Han China during the 1st and 2nd Centuries AD**

Juan Corujo | History, Classical Civilization | McAnulty College and Graduate School of Liberal Arts | Senior

Faculty Advisor/s: Sarah Miller, Ph.D.; Jing Li, Ph.D.

ABSTRACT:

At the turn of the first century AD, two monolithic empires in Western and Eastern Eurasia firmly established themselves in their respective territories. The mighty, ever-expanding Western Roman Empire and the expansionist Imperial China controlled much of the world's population at their highest reigns. Although the two powers were separated by thousands of miles, cultural differences, and kingdoms in between, they knew of each other's existence, and both embarked on a profitable trade relationship that connected them. The goal of this research is to analyze and understand the trade networks and artifacts along the Silk Road and the relationship between the two continental powers. By determining if there was recognition or conflict between the two great powers, we can learn lessons on the implications of globalization today so that we can avoid grand scale mistakes. A critical analysis of primary documentations by the Roman historian Florus and the primary text *Periplus* on the arrival of Han ambassadors in Augustus's court reflects the concerted and difficult effort made by the Han Dynasty to identify what type of economic and political relationship was possible between the regional powers. Additionally, the discovery of Roman coins, glassware, and silverware in Guangzhou establishes direct evidence of physically traded goods that crossed Eurasia and were sold in China during this period. Conversely, the documentation of spices natively found in China in the works of Apicius such as pepper provide factual evidence of trade efforts made by the East towards the West.

***57: Taylor Swift's *Folklore* as an Epidemiological Study of Socio-Cultural Responses to Pandemic**

Olivia Bigler | Music Therapy | Mary Pappert School of Music | Junior

Faculty Advisor/s: Nicole Vilchner, Ph.D.

ABSTRACT:

Taylor Swift's 2020 album *Folklore* has been perceived as a triumphant return to the artist's storytelling roots and acoustic capabilities, being praised by *The Rolling Stone* as containing "the most head-spinning, heartbreaking, emotionally ambitious songs of her life" (Rosen, 2020). Although the album has received abundant attention, critics have not yet considered how *Folklore* could be viewed as a cultural response to the COVID-19 pandemic, during which period it was created. Researchers have shown that epidemics provoke specific social responses (Neeraja, 2020). First, as communities are quarantined and discouraged from close social contact, humans experience an increased desire for social cohesion. Second, communities stigmatize previously normative behaviors for the sake of community health through both moralized and legislative consequences for "high-risk" behaviors. Subsequently, there is a greater emphasis on the role of the sacred in everyday life to account for the loss of relational intimacy as well as to find solace in turning to a higher power for support. Scholars have shown that these epidemic responses can be traced in musical compositions such as the folk music and chants created

amid the smallpox, influenza, and HIV/AIDS epidemics in South Africa (Okigbo, 2017). Through the close analysis of tracks from *Folklore* such as "Illicit Affairs," "epiphany," and "Mad Woman," this study argues that Taylor Swift's *Folklore* can be understood as a characteristic, epidemiological response to COVID-19 that reverberates the culture's corresponding pivot to mourn communal cohesion, stress individual responsibility, and return to the sacred.

58: Metal to Mainstream: Do Headbangers Have Hearts?

Angelica Bohurjak | Music Education | Mary Pappert School of Music | Junior

Faculty Advisor/s: Nicole Vilknor, Ph.D.

ABSTRACT:

Heavy metal music was controversial in the 1970s and 1980s. Many people attacked the lyrical content and style, believing the music promoted violence, drug use, and "sinister" topics (Agnes). In response to the Music Television (MTV) music videos released by bands in the 1980s, the Parents Music Resource Center (PMRC) sued multiple artists over lyrical content and dubbed them the "Filthy Fifteen." Musicians such as Dee Snider and Frank Zappa went to court to defend their music and moral character. In 1985, however, Ronnie James Dio, Jimmy Bain, and Vivian Campbell of the band Dio planned a charitable project that could change the public perception of metal musicians. Ronnie James Dio organized the compilation album *Hear N' Aid* at Sound City Studios, featuring forty musicians of bands such as Judas Priest, Iron Maiden, Motley Crue, and Journey. Raising over \$1 million in album sales for the initial release, the album has continued to raise over \$3 million with the proceeds going directly to famine relief efforts in Ethiopia. My project examines how this charitable album was perceived by audiences, investigating if and how it affected the public perspective on metal musicians. Drawing from documentary interviews, journals, and newspaper articles, I acknowledge that some audiences continued to view rock n' roll musicians as rebellious and inducing panic. I illustrate that *Hear N' Aid* did have a modest effect, moving the needle in a positive direction for metal musicians. While the *Hear N' Aid* event did not convert public opinion initially, I argue that it helped pave the way for "unconventional" musicians to show their positive moral character and participate in social causes.

59: Sibelius Symphony No. 2: The Role of Weather and Climate in the Fight for Finnish Autonomy

Kaytoya Ichoku | Music | Mary Pappert School of Music | Sophomore

Faculty Advisor/s: Nicole Vilknor, Ph.D.

ABSTRACT:

Scholars have claimed the music of composer Jean Sibelius (1865-1957) reflects his Finnish nationalism. Watson Lyle believes that his music is nationalistic because it strays from the Germanic styles of Bach and contains polyphonic harmonizations. On a similar note, Tina Ramnarine claims that Sibelius' music is nationalistic because it incorporates folk music. My research supports this idea, however, I argue that Sibelius does so by aurally depicting Finland's geography and climate, thereby establishing the spatial autonomy of the nation. Sibelius' second symphony is a prime example. Depicting Finnish scenery, it fostered national pride while protesting the Russification of the territory. Sibelius began formulating ideas for his Symphony No. 2 in 1899, the year when Russia began to integrate Finland into the Russian Empire, quenching cultural pride through stifling measures outlined in the February Manifesto. I argue that Sibelius resists cultural subjugation in his symphony by depicting the climate and geography of Finland, known for its brutal snowstorms. In a close analysis of movements 1 and 4, I show how Sibelius uses brass to represent harsh winter gales and pizzicato strings to represent flurries. I contextualize this analysis with climate studies of Finland that reveal that snow remains on the ground for up to seven months of the year. Drawing from these sources and the translated letters from the composer, I argue

that Sibelius based his second symphony on a snowstorm because the one thing that could not be taken from his homeland was the geography and climate itself.

60: A Look at Mental Illness in Music Through the Late Works of Robert Schumann

Alexa Krznicaric | Music Education | Mary Pappert School of Music | Junior

Faculty Advisor/s: Nicole Vilkner, Ph.D.

ABSTRACT:

Robert Schumann, a famous composer from the romantic period, suffered greatly from mental illness. Near the end of his life, those close to him started to hold his compositions from being published in fear of being viewed as unstable, which caused his late music to be viewed as nonsense today. One of his compositions was not heard for eighty years after it was written and another was destroyed to avoid poor public appearance. I am exploring whether Schumann's music exposed symptoms of mental unwellness or if this poor perception was caused by knowing he was sick and judging his music based on the mania. Does music speak where words fail, or can the public not objectively view an artist's work once they've learned about their mental state? Data used in this project includes Peter Ostwald's *Schumann: The Inner Voices of a Musical Genius's* interpretations of Schumann's diary entries. Laura Tunbridge's *Schumann's Late Style* was used as it suspects cultural changes that aided in his changing musical style. The aspects of his music representing madness include difficult passages, eerie scene depictions, and contemporary ideas for the 19th century. While mental illness is considered the reason his music's quality faltered, there is more to blame for this change. Schumann composed music during manic episodes, but the spaces and ensembles he wrote for also changed during his later years. I will be exploring how Schumann's mental illness influenced the style of his late music, but was not the sole reason for this transformation.

61: Cross-Cultural Gestures in Music Performance and Their Application to Music Education

Jackson Rogers | Music Education | Mary Pappert School of Music | Senior

Faculty Advisor/s: Benjamin Binder, Ph.D.

ABSTRACT:

Embodied music cognition is a burgeoning field of research suggesting that gesture and embodiment are not only helpful for music learning, but also necessary for understanding abstract musical ideas. It proceeds from the foundational idea that the brain does not perceive the state of the world directly, but instead constructs models of the environment through corporeal mediators. Though bodily gestures have been used by music pedagogues to communicate musical expression for centuries, their role in music teaching has been underemphasized in American educational environments. By conducting interviews with performers and pedagogues in the Indian Classical and Scottish Bagpiping music traditions, ethnomusicologists Gina A. Fatone, Martin Clayton, and Laura Leante (2011) have identified musical gestures that cross cultural boundaries. Both traditions use physical gesture, like the bouncing of an imaginary ball to mirror the gravity of a descending musical phrase, or the drawing of a circle with the hand to mark points of elongation and stress, to communicate ideas that cannot be easily put into words. My research examines the connections between these traditions and expands on them by tying them to similar, observable gestures in American musical performance. By identifying and utilizing these gestures, music educators can turn complex musical patterns into manageable objects which are dealt with physically. In today's schools, which call upon teachers to implement Universal Design for Learning by representing ideas in a variety of forms, the use of gesture can help reach students who have trouble learning music by traditional means.

62: The Impact of Music and Movement on Encouraging Socialization in Autistic Children

Emma Bernardi | Music Therapy | Mary Pappert School of Music | Junior

Faculty Advisor/s: Noah Potvin, Ph.D., LPC, MT-BC

ABSTRACT:

Autistic children often experience a sense of isolation due to a lack of opportunities for social interaction among others with similar communication techniques. When music and movement activities are introduced, participants are provided with a chance to synchronize their mind and body to communicate their internal thoughts externally. Participation in a group-based music and movement intervention encourages synchronized movement and joint attention, a skill that can assist autistic children in interacting with those around them. To create a positive experience for participants and keep them engaged, one must consider sensitivities to external stimuli such as sound, lighting, and the scaffolding of an experience. With these considerations, music can have a significant influence on the group response because of its constantly moving nature and its action as a natural motivator.

63: Impact of an Intensive Short-Term Intervention Program on an Adolescent with Residual Speech Errors

Sara Tuddenham | Speech Language Pathology | Rangos School of Health Sciences | Senior

Gianna Baker | Speech-Language Pathology | Rangos School of Health Sciences | Junior

Faculty Advisor/s: Heather Rusiewicz, Ph.D., CCC-SLP

ABSTRACT:

Residual speech errors are common speech sound distortions persisting beyond the age of typical acquisition, affecting the individual's communication, social interactions, and self-esteem. To target residual speech errors in therapy, research has shown speech sound improvement through interventions of auditory perceptual training, motor learning, multi-sensory support, biofeedback, and integration of music such as beatboxing. Additionally, findings support positive outcomes of intensive treatment programs targeting residual speech errors across two weeks. An exploratory study was conducted to analyze the impact of an intensive short-term intervention program on an adolescent with residual speech errors. The program was developed based on the implementation of multiple evidence-based intervention techniques and implemented in the Duquesne University Speech-Language-Hearing Clinic through a team of mentored graduate student clinicians. Data from the participant was collected during the initial and final session using the Goldman-Fristoe Test of Articulation 3, Challenging Word Task, "The Caterpillar" passage, and probes of specific sound targets. Through data analysis, the impact of this program on the participant's speech sound errors will be evaluated. Implications regarding the role of an intensive intervention program for future clients with residual speech sound errors will be discussed.

64: Visualizing Rosenbluth Separations

Tyler Williams | Physics | School of Science and Engineering | Sophomore

Faculty Advisor/s: Fatiha Benmokhtar, Ph.D.; Douglas Higinbotham, Ph.D.

ABSTRACT:

The electromagnetic form factors of the proton can be determined by making measurements at the same four momentum transfer, Q^2 , but with different beam energies. This is a technique known as a Rosenbluth separation. The results of this type of measurement are typically plotted as the reduced cross-section against the values of epsilon, a value calculated from the beam energy and scattering angle, and fitting a line to the data; but, this method makes it very hard to see the physical quantities of

interest from such a plot. Back in the late 60's, Nobel laureate Robert Hofstadter proposed a different way to visual Rosenbluth data. In this paper we will use classic SLAC elastic scattering data to show these two different ways of presenting the data and illustrate the value of Hofstadter's visualization technique.

65: Proton Target Fragmentation

Daniel Terrero | Physics, Mathematics | School of Science and Engineering | Junior
Faculty Advisor/s: Fatiha Benmokhtar, Ph.D.

ABSTRACT:

Studies of the properties and the azimuthal distributions of hadrons produced in the Target Fragmentation Region serve as a test of our complete understanding of the different mechanisms in the SIDIS production of hadrons and provide additional information on the QCD dynamics that are not accessible with single hadron production in the Current Fragmentation Region. We present studies of beam SSA for semi-inclusive protons ($ep \rightarrow e' p' X$), produced in the TFR, that can be related to higher twist Fracture Functions. Such measurements were performed with the CLAS12 detector in Hall B at Jefferson lab using a longitudinally polarized 10.6 GeV electron beam on an unpolarized hydrogen target. Preliminary results of this study captured the transition between the TFR and CFR regions showing a clear sign change of the SSA for protons produced in the backward region in CM, dominated by TFR protons providing a criteria for experimental separation of CFR and TFR regions. These findings are opening a new avenue for studies of nucleon structure.

66: Expanding Audience: The Optimization of Media Usage for Non-Profit Outreach

Elizabeth Majka | Applied Mathematics | School of Science and Engineering | Sophomore
Jacob Mazurkiewicz | Data Science | School of Science and Engineering | Junior
Faculty Advisor/s: Rachael Neilan, Ph.D.; Josef DiPietrantonio, Ph.D.

ABSTRACT:

Bethlehem Haven, a Pittsburgh-based non-profit organization devoted to providing aid to the homeless, relies on social media to advertise their services, promote their mission, and connect with potential donors. However, they have faced challenges in effectively expanding their digital audience. The ambiguous nature of what drives a successful social media post has proven to be an impediment. Our project aims to determine effective strategies for expanding the reach of non-profit organizations on social media through the analysis of Bethlehem Haven's Instagram and LinkedIn posts.

By inspecting variables such as likes, impressions, and audience reach for each post by Bethlehem Haven, we amassed a rich dataset describing the organization's success in engagement over the past year. We included parameters like timing, word and punctuation count, and content to discern the weight these factors influence post performance. Furthermore, we performed a textual analysis using Natural Language Toolkit (NLTK) sentiment analyzer to categorize based on emotional undertone. We then conducted statistical hypothesis testing to uncover potential links between post features and the key success variables.

Our results provide insights into the features that drive successful social media posts for non-profit organizations, with an overarching objective to utilize these findings and help Bethlehem Haven enhance their digital presence. By doing so, it ensures their social media content resonates within their community, and Bethlehem Haven can ensure their mission reaches a wide audience using measured posting strategies.

67: Cuspidal ribbons in affine type C

Bella Deborah Uwase | Mathematics | School of Science and Engineering | Junior
Faculty Advisor/s: Robert Muth, Ph.D.

ABSTRACT:

We classify and construct cuspidal skew shapes associated to positive roots of affine type C. These combinatorial objects correspond to cuspidal skew Specht modules for the Khovanov-Lauda-Rouquier algebra of affine type C. This extends the work of Abbasian, Difulvio, Muth, Pasternak, Sholtes, and Sinclair, who proved that in affine type A, cuspidal skew shapes are ribbons and every skew shape has a unique ordered tiling by cuspidal ribbons. Stemming from their work, we prove that cuspidal skew shapes are cuspidal ribbons in affine type C as well. We also investigate whether the construction algorithm of affine type A cuspidal ribbons works for affine type C too and if type C has unique cuspidal ribbons for given roots. We show that even though the construction algorithm for type A cuspidal ribbons works for type C, type C doesn't have unique cuspidal ribbons for each root in a convex preorder. In type C, some roots produce symmetrical cuspidal ribbons" which remain the same when reflected so they're unique, while other roots produce non-symmetrical cuspidal ribbons" which can be reflected to make another cuspidal ribbon. As a result of these findings, for future research, we will determine if type C has unique ordered tiling by cuspidal ribbons like type A or if the non-symmetrical cuspidal ribbons allow for more than one ordered tiling.

68: Properties of Twisted Torus Knots

Holden Eagle | Computer Science | School of Science and Engineering | Sophomore
Faculty Advisor/s: Samantha Allen, Ph.D.

ABSTRACT:

Whether it's the way you tie your shoes, the way you tie a hook to a fishing line, or even the way you tie anything, you use different knots all the time in everyday life. While many people know about knots, not many people could tell you the properties of a mathematical knot, or the differences between two knots, or if two knots are just the same knot. My project is interested in torus knots, which are knots that can lie on a torus in such a way that it will be able to wind around a torus, which is a topological term for a solid object with a hole in it, such as a donut shaped object. Specifically, this project involves looking at the properties of a knot that has only in recent years become of interest to researchers, the twisted torus knot, which is a torus knot with extra twisting operations done to it. Some properties that we are looking at include the Siefert surfaces of the knots, different knot invariants, and even computational methods to analyze these knots more efficiently. Discoveries in this area would be useful in developments in low-dimensional topology, including manifold theory, which helps us understand spaces that resemble familiar Euclidean spaces. Knot Theory's uses can extend to other fields as well, such as polymer science, specifically how the chains can be entangled, and the study of the complex knots and links that form in DNA molecules.

69: Improving Pittsburgh Transit through Data Science

Ethan Shearer | Data Science | School of Science and Engineering | Junior
Faculty Advisor/s: Lauren Sugden, Ph.D.

ABSTRACT:

Pittsburgh is one of the most geographically challenging cities in the world for public services like transit and sidewalks. The public organizations in Pittsburgh have done a great job making the city walkable,

having the most publicly owned sets of stairs out of any city in the world. Nonetheless, there's no doubt that walking up a set of stairs is much more physically taxing than walking on a flat ground. Pittsburgh Regional Transit is currently undergoing a network redesign of the city's transit system. One problem they faced is that they currently have no way to tell how far uphill (or downhill) an individual may have to walk from the bus stop they utilize in the old system, to a new (more efficient) stop. This could create issues in the community, as even asking a Pittsburgher to walk an extra quarter-mile could be the difference of walking up a large hill--something that may not even be physically plausible for all individuals. I aim to solve this issue by building a Python tool that can tell a user how far an individual will have to travel from an old stop to a new stop. I will use this tool to confirm the feasibility and benefits of possible new transit stops. The effect any new stop or current stop has on the network will be analyzed in a way to aid Pittsburgh to a more carbon-friendly, public-transit-friendly version of itself.

70: Campaigning Correctly: The Impact of Social Platform and Donor Location on Non-Profit Fundraising

Noah Lane | Data Science | School of Science and Engineering | Senior

Kayla Kraeuter | Biomedical Engineering, Applied Mathematics | School of Science and Engineering | Senior

Isabella McCollum | Biomedical Engineering, Applied Mathematics | School of Science and Engineering | Senior

Faculty Advisor/s: Rachael Neilan, Ph.D.; Josef DiPietrantonio, Ph.D.

ABSTRACT:

Bethlehem Haven is a local non-profit organization located next to Duquesne's campus. Their mission is to fight homelessness and promote self-sufficiency by providing shelter and care for individuals in need. To achieve this, Bethlehem Haven relies on outside donations from individuals and organizations. Donations are solicited predominantly via advertising campaigns, which are communicated to potential donors through email, social media, and the Bethlehem Haven website. The aim of our work is to quantify the impact of Bethlehem Haven's campaign techniques, including platform type (i.e., email, social media, website) and geographical reach, on donations received. We analyzed Bethlehem Haven's donation data from the past year with a focus on their three big campaigns: Pittsburgh Gives Critical Needs Day, Legacy-Making Housewarming Gala, and Give Big Pittsburgh. Our selection of analytical methods and interpretation of results were informed by the perspectives of both the analyst and the business. Thus, our results provide a rigorous and practical guide for promoting the financial success of Bethlehem Haven's campaigns. To maximize the utility of our findings for use by Bethlehem Haven, we provide (1) statistical analyses and visualizations (completed using R programming language) illustrating the success of their campaigns and (2) an interactive tool (developed using Microsoft Power BI) for analyzing reach and donor location across geographic regions. Our results provide valuable insights into the success of Bethlehem Haven's reach and engagement during their campaigns and highlight the importance of social platform type and donor location on non-profit fundraising.

71: PadiAD Incontinence Intervention

Malik Thomas | Biomedical Engineering | School of Science and Engineering | Senior
Daniel Bardin | Biomedical Engineering, Applied Mathematics | School of Science and Engineering | Senior
Jules Ciniello | Biomedical Engineering | School of Science and Engineering | Senior
Nicholas Taylor | Biomedical Engineering | School of Science and Engineering | Senior
Ana Utrilla Benito | Biomedical Engineering | School of Science and Engineering | Senior
Gian Cuchapin | Biomedical Engineering, Nursing | School of Nursing | School of Nursing
Faculty Advisor/s: Leda Kloudas, Ph.D.

ABSTRACT:

Incontinence-associated dermatitis (IAD) affects millions annually, potentially leading to severe complications. Timely detection of soiled incontinence pads is crucial for preventing IAD, but current methods rely on manual checks by healthcare professionals (HCPs), creating an inefficient and inconsistent process. This study proposes a novel Incontinence Associated Dermatitis incontinence pad intervention to efficiently detect moisture and alert HCPs of overexposure to urine and feces. The device combines standard hospital wet pads with integrated hydrosensors to trigger an LED and timer upon detecting specific moisture levels, once at time of soiling, once at time of over exposure. Wireless data transmission to wristbands or integrated hospital system alerts will signal HCPs of overexposure. The device has undergone testing for bed fit, absorption, detection accuracy, and alerting functionality. Gathered from core stakeholders, our user needs require the pad to be comfortable, have a proper bed and patient fit, detect and absorb moisture, and notify HCP. Successful verification through performance assessment will ensure the device meets all requirements, including bed fit, absorption capacity, detection accuracy at varying moisture levels, and alerting functionality with different notification systems (wristbands and standard hospital screens & nurse call systems). Further cost analysis will determine financial viability. This device has the potential to improve IAD prevention by enabling timely detection of soiled pads, improving HCP efficiency, and reducing healthcare costs. Future research will evaluate the device's impact on IAD rates and overall clinical effectiveness, and associated healthcare costs.

72: Preemieum Reflux Detection: A Nasogastric Tube for Dual Monitoring and Feeding in Neonates

Conner Polacek | Biomedical Engineering | School of Science and Engineering | Senior
Max Ujhazy | Biomedical Engineering | School of Science and Engineering | Senior
Maria Luiza Hermann | Biomedical Engineering | School of Science and Engineering | Senior
Raegan Gouker | Biomedical Engineering | School of Science and Engineering | Senior
Katherine Flannery | Biomedical Engineering | School of Science and Engineering | Senior
Manoela Rocha Neves | Biomedical Engineering | School of Science and Engineering | School of Science and Engineering
Faculty Advisor/s: Leda Kloudas, Ph.D.

ABSTRACT:

Approximately 400,000 preterm infants are born each year in the United States alone. Once born, it is standard procedure to place these infants in the neonatal intensive care unit and begin feeding them with a nasogastric feeding tube (NGT). About 2/3 of these neonates end up having Gastroesophageal Reflux Disease (GERD), caused by repetitive flow of stomach acid back into the esophagus. GERD consequently leads to additional invasive monitoring and tests. A high resolution manometry (HRM) probe, used to detect reflux, is placed into the esophagus the same way that an NGT is, leading to at least twice as many insertions and removals within a 24 hour period. To best detect GERD and prevent

the need for unnecessary and expensive procedures, our proposed singular multi-faceted device ultimately aims to minimize the invasion by simultaneously monitoring and feeding the neonates. The device will feature sets of flexible pressure sensors wrapped around a hollow silicon tube, mimicking the typical NGT in combination with the HRM that is placed within the esophagus. Our current prototype utilizes a microcontroller to power the inexpensive sensors attached to the tube, as well as a buzzer that has successfully delivered an audible signal once a certain threshold of fluid flow/pressure is detected, indicating the presence of reflux. Future improvements involve adding multiple positions of sensors, creating a sheath to protect the sensors, and testing different liquids of various viscosities to validate the sensors' detection mechanisms.

***73: Mechanically Pressurized Tunable Lens**

Philip Stark | Biomedical Engineering | School of Science and Engineering | Junior

Thomas Teehan | Biomedical Engineering | School of Science and Engineering | Junior

Faculty Advisor/s: Bin Yang, Ph.D.

ABSTRACT:

Mechanically tunable lenses are a growing advancement of optical technology. Unlike traditional optical lenses, mechanically tunable lenses have adjustable focal lengths that can be altered in real-time. By developing a device with a ridged body capable of pressurization and flexible membrane aperture, a simple tunable lens can be designed and fabricated using a 3D printer. To develop a simple mechanically pressurized lens we have prototyped a ridged 3D printed square frame with apertures on each side. One side holds a layer of ridged glass and the other a deformable clear silicone membrane. Both the top and bottom of the lens have openings so the device can be filled with a clear liquid. One opening is connected to a syringe and the other to a hose that will be tied off after liquid is added, sealing the internal chamber. By pumping fluid in/out the silicone layer will deform, changing the focal length of the lens. We have started to conduct tests focused on understanding the relationship between the amount of liquid pumped into the device, the deformation of the lens, and the change in its focal length. After this, the next stage of this project includes the use of several 3D printed lenses assembled in a simple optical arrangement. This arrangement will be a series of lenses capable of magnifying objects, narrowing in on the purpose of this project- to develop a device that acts as a telescope or microscope.

74: Effectiveness of Environmental Disability Accommodations at Duquesne University

Julianna Faber | Psychology | McAnulty College and Graduate School of Liberal Arts | Sophomore

Ghourni Hannon | Psychology | McAnulty College and Graduate School of Liberal Arts | Junior

Faculty Advisor/s: Alexander Kranjec, Ph.D.

ABSTRACT:

How visible are the accommodations for students at Duquesne University? The office of disability services has provided access to elevators, spaced hallways, ramps, wheelchair buttons, door handles, and other accommodations to provide an accessible environment during their time studying at the university. This study aims to evaluate student perceptions of the effectiveness of these accommodations in social, academic, and residential locations on campus. We define environmental accommodations as mobility access and adaptations within the learning environment for students who can benefit from them. We use an 18-question mixed methods survey on Qualtrics, that includes demographic, Likert-scaled, and open-ended questions asking participants to assess the effectiveness of environmental accommodations from their perspective. The quantitative and qualitative data collected will be used to determine the effectiveness for each environmental disability accommodation in every building. We anticipate that participants will be able to provide more detailed information about the

building they have more experience with on campus, both in terms of their residence and academics. Their comments and opinions about buildings they are not regularly present in are expected to be more. In essence, we believe that more experience means more visibility. We hope the variety of perspectives offered from participants will inform administrative decision-makers when developing strategies for creating more accessibility in academic, social, and residential locations for all students at Duquesne University.

75: The Effects of Different Aesthetic Evaluations on AI Detection

Anna Zabriskie | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior
Alyssa Willis | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior
Ivory Wheatley | Psychology | McAnulty College and Graduate School of Liberal Arts | Sophomore
Faculty Advisor/s: Alexander Kranjec, Ph.D.

ABSTRACT:

Interactions with AI-generated faces are becoming more common in our everyday experience. However, little is known about how aesthetic evaluations may be affected by suspicions of AI. A previous study from our lab investigated the interaction of aesthetic evaluation ("Is it beautiful?") and AI detection ("Is it real?") while people made these different judgments about the same faces. The researchers found condition-order effects for both groups of participants. Participants who were first asked to judge artificiality later rated the same faces as less beautiful (compared to the beauty-first group). However, participants who first made aesthetic judgments later judged more of those faces to be AI-generated (compared to the AI-first group). The present study is designed to expand upon the previous study but using a rigorously normed set of stimuli in a replication study. It also seeks to further interrogate the beauty and AI "effects" from the previous study. Participants from three groups will be presented with the same set of 48 faces. Each group will be asked to first make a different judgement about each face (1- rating symmetry, 2- rating skin smoothness, and 3- rating trustworthiness), then asked whether each face was real or AI-generated (1&2), or beautiful (3). We hypothesize that when asked to make judgements related to aesthetics, participants will be more likely to rate faces as AI-generated, and when asked to make judgments about trustworthiness, participants will rate faces as less beautiful.

76: Dogs and College Students' Wellbeing

Shae Clayton | Psychology | McAnulty College and Graduate School of Liberal Arts | Senior
Jessica Ward | Psychology | McAnulty College and Graduate School of Liberal Arts | Sophomore
Nikki Bastianini-Merigo | Psychology | McAnulty College and Graduate School of Liberal Arts | Junior
Faculty Advisor/s: Alexander Kranjec, Ph.D.

ABSTRACT:

Student life can be stressful, and individual wellbeing can fluctuate over the course of a college experience. The purpose of this study is to determine whether interacting with dogs can enhance a positive mood and alleviate stress and anxiety in students. Previous studies have used physiological measures, such as reduced pulse rates, blood pressure, and cortisol levels, to prove the benefits of dogs in stressful situations. The current approach uses field study methods to measure college students' receptiveness to dogs. We are also interested in individual differences, in particular, whether students who have pets at home are more likely to stop and interact with a friendly dog and benefit from the experience. We expect college students who have pets at home to be more accepting of therapy dogs and, in turn, have lower stress levels and a more positive mood as a result of their interaction. Better understanding the effects that dogs have on the mood of college students can allow for college policies that decrease student stress and anxiety during difficult times.

77: Akira Ifkuba's Godzilla main theme and its relationship to Japanese culture at the time.

Eric Schaefer | Music | Mary Pappert School of Music | Senior

Faculty Advisor/s: Benjamin Cornelius-Bates, DMA

ABSTRACT:

For my project I will be looking at the original 1954 Godzilla main theme written by Akira Ifkuba and its relationship to Japanese culture and the societal fears at this time. Godzilla symbolizes the nuclear holocaust from Japan's perspective. It highlights the fears that many Japanese people held about the atomic bombings of Hiroshima and Nagasaki and the possibility of recurrence. Producer Tomoyuki Tanaka stated, "The theme of the film, from the beginning, was the terror of the bomb." We hear the main theme repeat throughout the movie highlighting that fear of the recurrence of another nuclear bomb. In that main theme we hear a mix of minor, augmented, and diminished intervals giving a very unsettling feeling. From there it moves into a march representing the war being fought. For my presentation I plan on using a table so that I can have a tablet set up for my orchestration of the intro to be heard.

LIST OF PARTICIPANTS BY SCHOOL

Last, First – Poster Session Time – Abstract Number

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A.J. Palumbo School of Business

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Crivelli, Cameron – MORNING – 11

*Greene, Olivia – MORNING – 43

Martin, Sarah – MORNING – 43

Novak, Kaitlin – MORNING – 39

Mary Pappert School of Music

Bernardi, Emma – AFTERNOON – 62

*Bigler, Olivia – AFTERNOON – 57

Bohurjak, Angelica – AFTERNOON – 58

Gartland, Anna – AFTERNOON – 54

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Anastasi, Gary – AFTERNOON – 40

Bader, Lauren – MORNING – 74

Baker, Maya – MORNING – 26

Bastianini-Merigo, Nikki – AFTERNOON – 76

Capretta, Mia – MORNING – 25

Ciecierski, Addison – AFTERNOON – 40

Clayton, Shae – AFTERNOON – 76

*Corujo, Juan – AFTERNOON – 56

Datte, Tessa – MORNING – 72

*Demlak, Fatima Zahra – MORNING – 73

Donato, Isabella – MORNING – 24

Faber, Julianna – AFTERNOON – 74

Failor, Dominic – MORNING – 35

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Gorman, Hannah – MORNING – 24

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Hannon, Ghourni – AFTERNOON – 74

Harbert, James – MORNING – 40

Jenkins, Gabrielle – MORNING – 33

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Miklos, Kyra – MORNING – 31

Mitchell, Anna – MORNING – 56

Moore, Deagan – MORNING – 36

Nigh, Kendall – MORNING – 33

Ortiz Jaunarena, Maria – MORNING – 73

Patterson, Cassie – MORNING – 74

Polen, Emma – MORNING – 75

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Willis, Alyssa – AFTERNOON – 75

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Zabriskie, Anna – AFTERNOON – 75

Rangos School of Health Sciences

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*Buttino, Emma – MORNING – 10

Catão, Michelle – AFTERNOON – 20

Clark, Hannah – MORNING – 14

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*Mirza, Laiba – MORNING – 20
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