HYBRID EVENT

In-Person: Wednesday, April 8, 2026: 8:00 am to 3:00 pm
Featuring Posters & Podium Presentations

Online: Monday, April 6 – Friday, April 10
Virtual Posters & Videos via Symposium by Forager One

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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.

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 Integrative Health
- Center for Teaching Excellence
- Department of Biomedical Engineering
- Department of Environmental and Energy Engineering
- Department of Peace, Justice, and Conflict Resolution
- Mary Pappert School of Music
- McAnulty College and Graduate School of Liberal Arts
- School of Education
- School of Nursing
- School of Pharmacy
- School of Science and Engineering
- Department of Sociology
- Office of the Provost
- Office of Research & Innovation
- Palumbo-Donahue School of Business
- Rangos School of Health Sciences
- University Sustainability Committee

SCHEDULE

Week of Events	
Monday, April 6	
All Day	**Welcome - Symposium Site Launch!** Browse through posters and accompanying videos all week long! Comment and ask questions.
Tuesday, April 7	
All Day	**Virtual Symposium** Browse through posters and accompanying videos all week long! Comment and ask questions.
Wednesday, April 8	
8:30 am to 3:30 pm	**URSS In-Person Event – Location: Charles Dougherty Ballroom, Power Center** **Poster Session and Oral Podium Presentations** Please stop by to view posters in person and ask students questions about their work! ***Detailed schedule on the next page***
Thursday, April 9	
All Day	**Virtual Symposium** Browse through posters and accompanying videos all week long! Comment and ask questions.
Friday, April 10	
All Day	**Virtual Symposium** Browse through posters and accompanying videos all week long! Comment and ask questions

SCHEDULE FOR IN–PERSON EVENT

Wednesday, April 8, 2026 | Power Center @ Duquesne University

8:00 a.m. – 8:30 a.m.	**Registration and Breakfast** Coffee, Tea and Sweet Breads are provided for participants. Poster set up for those who were not able to set up on April 7.
8:30 a.m. – 9:00 a.m.	**OPEN POSTER SESSION AND JUDGING** Guests are invited to walk around, peruse student projects, and engage with students.
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. - 11:00 a.m.	**OPEN POSTER SESSION AND JUDGING** Guests are invited to walk around, peruse student projects, and engage with students.
11:00 p.m. - 12:00 p.m.	**ORAL PRESENTATION SESSION 2** Students participating in the poster sessions should attend the formal presentations.
12:00 p.m. - 1:00 p.m.	**OPEN POSTER SESSION, LUNCH AND JUDGING** Boxed lunches are provided for participants.
1:00 p.m. - 2:00 p.m.	**ORAL PRESENTATION SESSION 3** Students participating in the poster sessions should attend the formal presentations.
2:00 p.m. - 3:00 p.m.	**FINAL OPEN POSTER SESSION AND JUDGING** Guests are invited to walk around, peruse student projects, and engage with students.

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: Darnell Duncan**
9:00 am – 9:15 am	**Connor Gallagher** Pharmaceutical Sciences | School of Pharmacy Faculty Advisor(s): Paula Witt-Enderby, Ph.D. *Muscle-atonin: Exercise and melatonin as a means to regulate metabolic function through circadian/hormonal realignment, musculoskeletal improvement and adipocyte inhibition*
9:15 am – 9:30 am	**Caroline Ellis** Biology | School of Science and Engineering Faculty Advisor(s): Sarah Woodley, Ph.D. *Growth Differentiation Factor 15 (GDF-15) Promotes Retinal Ganglion Cell Neurite Outgrowth by Activating the RET/AKT Signaling Pathway*
9:30 am – 9:45 am	**Anthony Wehrli** Biomedical Engineering |School of Science and Engineering **Tyler Williams** Mechanical Engineering & Physics |School of Science and Engineering **Connor McDonaugh** Environmental Science|School of Science and Engineering **Sofia Lopez-Linares Perez** Mechanical Engineering |School of Science and Engineering **Elif Sebnem Kalayci** Mechanical Engineering | Swanson School of Engineering Faculty Advisor(s): Melikhan Tanyeri, Ph.D. *TrussWorthy – A Lunar Module Truss System*
9:45 am to 10:00 am	**Adelaide Stark** Health Sciences |Rangos School of Health Sciences Faculty Advisor(s): Justin DiSanti, Ph.D. *The "3 A's" of Sport Specialization: Emerging Themes to Characterize Athletes' Sport Participation Pathway Decisions*

Oral Presentations – Detailed Schedule	
SESSION 2 **Charles Dougherty Ballroom A**	**Moderator: Tessa Haffey**
11:00 pm – 11:15 pm	**Grace Trimpey-Warhaftig** Occupational Therapy | Rangos School of Health Sciences Faculty Advisor(s): Elena Donoso Brown, Ph.D. *The Development of Accessible surveys for Individuals with Intellectual and Developmental Disabilities (IDD).*
11:15 pm – 11:30 pm	**Anh Le** Nursing | School of Nursing Faculty Advisor(s): Andrew Simpson, Ph.D. *From Crisis to Reform: How the 1819 Influenza and COVID-19 Pandemics Redefined Relationship between Nurses and the American Healthcare System.*
11:30 pm – 11:45 pm	**Dasara Slova** Biology | School of Science and Engineering Faculty Advisor(s): Sarah Woodley, Ph.D. *Glow and Behold: Investigating Salamander Skin Proteins*
11:45 pm to 12:00 pm	**Senia Duganhodzic** Music Therapy | Mary Pappert School of Music Faculty Advisor(s): Nicole Vilkner, Ph.D. *Hidden Diplomacy in Eurovision: Songs of Bosnia and Herzegovina*

Oral Presentations – Detailed Schedule	
SESSION 3 **Charles Dougherty Ballroom A**	**Moderator:**
1:00 pm – 1:15 pm	**Billy Sanchez** |Biomedical Engineering |School of Science and Engineering **Dominic Dezort** |Biomedical Engineering |School of Science and Engineering **Domenico Fusca** |Biomedical Engineering |School of Science and Engineering **Ashley Mingrino** |Biomedical Engineering |School of Science and Engineering **Benjamin Betz** |Biomedical Engineering |School of Science and Engineering Faculty Advisor(s): Leda Kloudas, Ph.D. *Adaptive Residual Limb Warming Sleeve for Winter Para-Athletes*
1:15 pm – 1:30 pm	**Alexia Caldwell** |International Relations |McAnulty College and Graduate School of Liberal Arts **Dominic Failor**|International Security Studies |McAnulty College and Graduate School of Liberal Arts **Veronica Noel**|International Security Studies| McAnulty College and Graduate School of Liberal Arts **Max Stokley**|International Security Studies |McAnulty College and Graduate School of Liberal Arts **Zack Kane**|International Security Studies| McAnulty College and Graduate School of Liberal Arts Faculty Advisor(s): Aimee Kane, Ph.D. *Lessons from Medicine for Shift Handovers in Intelligence Analysis: A Review of the Literature*
1:30 pm – 1:45 pm	**Lei'asha Battle** | Nursing |School of Nursing Faculty(s): Quincy Stephenson, Ph.D. *Philosophy of Black Hair*
1:45 pm to 2:00 pm	**Matthew Theodros** |Business Analytics |A.J. Palumbo School of Business Administration **Jennica Henry** |Psychology | McAnulty College and Graduate School of Liberal Arts **Katelyn Ganter** | Business Analytics |A.J. Palumbo School of Business Administration **Rocio Garzon** |Political Science | McAnulty College and Graduate School of Liberal Arts Faculty Advisor(s): Aleina Smith, Ph.D. *University–School Partnerships and Community Capital in East Allegheny*

AWARDS

Center for African Studies

Award for Undergraduate Research in African Studies

The award is intended to encourage and reward undergraduate research in African Studies and related areas that engage Duquesne's ongoing commitment to Africa.

Award for Undergraduate Research in Global Health

The award is intended to encourage and reward undergraduate research in Global Studies.

Center for the Catholic Faith and Culture

Mission Animation Undergraduate Research Award

This award recognizes an undergraduate student whose research embodies Duquesne University's Spiritan identity in action. The recipient's work reflects openness to the Spirit, builds authentic relationships, and walks with those on the margins, demonstrating academic excellence shaped by compassion, hope, and a growing sense of vocation.

Center for Community-Engaged Teaching and Research

CETR Award for Undergraduate Research

Center for Global Health Ethics

Award for Undergraduate Research in Ethics

Center for Integrative Health

Award for Undergraduate Research

The Center for Integrative Health (CIH) Award for Undergraduate Scholarship recognizes outstanding research and scholarly projects in any field of study that aligns with the commitment of the CIH to improve the health and wellness of our campus and neighboring communities with an emphasis on rural and urban health care disparities through interdisciplinary practice, teaching and research.

Center for Migration, Displacement, and Community Studies

Award for Outstanding Undergraduate Research

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 Women's and Gender Studies
Award for Undergraduate Research

Counselor Education Program
Award for Undergraduate Research (2)

Department of Biomedical Engineering
Duquesne Award for Excellence in Biomedical Engineering
Biomedical Engineering Capstone Award

Department of 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 award for research related to peace or conflict studies. The award hopes to stimulate undergraduate awareness of factors contributing to sustainability, social and political stability, the obstacles to peace, and the building blocks of justice. This award can apply to research at a local, national, or global level. Any undergraduate research paper or project related to Peace, Justice, and/or Conflict Resolution is eligible. The student submitting the paper need not be a PJCR minor. The paper/poster should convey at least one of the following topics:
· Outlining solutions to a local, domestic or international problem
· Examining the causes of war, violence, and/or oppression
· Articulating techniques or skills in building peace, achieving justice, or proposing ideas on conflict analysis or resolution

Grefenstette Center for Ethics in Science, Technology, and Law
Outstanding Undergraduate Research Project

Gumberg Library
Award for Undergraduate Research
Honorable Mention

Honors College
Outstanding Poster
Outstanding Oral Presentation

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

Best Themed Project addressing Peace, Justice and Conflict Resolution

Pre-Law Center

Award for Undergraduate Research by a Pre-Law Student

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 Education

Outstanding Undergraduate Research
Runner-up
The School of Education Award for Outstanding Undergraduate Student Research offers a prize and runner-up prize to undergraduate students who demonstrate research *for* and *with* schools and community. To be eligible, the student must be enrolled in a School of Education program, conduct a study where data were collected and analyzed (preliminary proposals and literature reviews are not eligible), and must be first author on the work presented.

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

Award for Excellence in Research in the Basic Sciences: 10 awards

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

*All prizes, awards, etc. are considered as a financial aid resource and will be treated as such when determining student eligibility. The Financial Aid Office will make the final decision on all awards made to students.

ABSTRACTS

Note: The number in front of each title corresponds with the physical place where the student's poster will be located at the in-person event on April 8.
*Indicates live in-person oral presentation on April 8. See above for the detailed schedule of oral presentations.

All posters/presentations are also available throughout the week of April 6 – April 10 on our Symposium site.

POSTERS

1: The Effect of an Alternate Positioning and Seating Device on the Development of Postural Control of a Child with Developmental Disabilities: A Case Study
Jacqueline Maendel | Occupational Therapy | Rangos School of Health Sciences
Faculty Advisor(s): Jeryl Benson, Ph.D.

ABSTRACT: Therapists often work on core strength with children by engaging them in activities to promote development. In addition to direct services, use of a seating & positioning device used periodically throughout the day could provide a child the opportunity to work on core strength. The seating & positioning device would allow the child to work on core strength without hands on support increasing daily opportunity for development. This project will explore the design and fabrication of dynamic seating options to support the development of core strength and postural stability in young children. It could support practitioners in the fields of occupational therapy, physical therapy, and assistive technology. This case study project will include working with the therapists and a child at the Watson Institute, a special education school. The process includes meeting with therapists to determine need, gathering data based on a young child, designing and fabricating a prototype seating device, and modifying it based on additional data collection and analysis. This device will have the potential to assist not only a young child at the Watson Institute but also many other children with diagnoses such as cerebral palsy, severe down syndrome, or a genetic disorder to develop the postural control needed to participate in daily activities that require a stable core. It will also create a niche product for further research into adaptive seating.

2: Expanding the [3+2] Cycloaddition: Synthesis and Modification of N-Heterocyclic Products
Joshua Graber | Biochemistry | School of Science and Engineering
Faculty Advisor(s): Thomas Montgomery, Ph.D.

ABSTRACT: N-Heterocyclic molecules, molecules containing a nitrogen within a cyclic motif of their structure, are frequently found in nature and possess potent activity as drugs, poisons, and stimulants. Common molecules with N-heterocycles include penicillin, strychnine, and caffeine to name only a few. This makes N-heterocycles attractive targets for drug development and the

pharmaceutical industry. Accessing these structures is essential for expanding the library of potential drugs and allows for further exploration of the biological functionality of these molecules. Through employing a [3+2] cycloaddition reaction, our lab aims to develop a simple process for creating these biologically interesting molecules from simple precursors. Taking inspiration from epibatidine, a natural product with pain relieving qualities, and its N-heterocyclic core, a family of molecules with similar structures have been synthesized to explore their modification and functionality. During our investigations we made a serendipitous discovery; when the aforementioned molecules were heated a new compound was produced in high yields. These new products were then characterized, and we discovered that they represented a different N-heterocycle, which we could now make in a very efficient manner. Transformations and a substrate scope for both N-heterocyclic products will be explored, with current results showing promising versatility and excellent yields.

3: Publishers' Search for the Ethnic Narrative

Kathryn Zacharatos | English | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Emad Mirmotahari, Ph.D.

ABSTRACT: My project falls under the English Literature discipline. The project examines the recent surge in published narratives written by non-white authors—and specifically in the wake of COVID-19 and George Floyd's murder—about their experiences as non-white individuals in the United States. These narratives are published and marketed as a means of making a white readership "understand" what it's like to exist as a minority in a primarily white society. Publishing houses assume that white, middle-class readers will find such "ethnic narratives" entertaining because they center around experiences that they themselves do not have. However, this assumption can and has led to a certain expectation for non-white authors to discuss their racial identity within their work, whether they feel its relevant to the story they set out to tell or not. At times, when non-white authors attempt to produce complex narratives that include but are not limited to their race, they may not be as appealing to publishers because they are not catering to the mass-marketability of the "tragic immigrant" story. I plan to meet with publishers and discuss the nuances of this issue; through conversation with those at the forefront of this industry, I hope to create an in-depth overview of this paradoxical "inclusion" of non-white voices. The final outcome of my project—a scholarly and researched essay—will address the tension between inclusion and expectation, and posit a new direction for the publishing industry that would allow non-white voices to be heard in all their complexity and depth.

***4: Growth Differentiation Factor 15 (GDF-15) Promotes Retinal Ganglion Cell Neurite Outgrowth by Activating the RET/AKT Signaling Pathway**

Caroline Ellis | Biology | School of Science and Engineering
Faculty Advisor(s): Sarah Woodley, Ph.D.

ABSTRACT: The development of the eye is a complex process that begins in early embryogenesis. The retina, a critical component of the eye, utilizes multiple developmental pathways that remain poorly understood. Continued research is essential because retinal ganglion cells (RGCs) extend axons to form the optic nerve, enabling vision. Like many other central nervous system (CNS) neurons in mammals, RGCs cannot regenerate once damaged; injury to these cells or their connections can lead to irreversible blindness. Despite this clinical importance, the molecular pathways involved in axon regeneration are not fully characterized. This work investigates how growth differentiation factor-15 (GDF-15) promotes neurite outgrowth in RGCs. Human retinal organoids (hROs) treated with GDF-15 were used to visualize neurite extension by analyzing post-culture images and measuring neurite length. Treated hROs were also assessed for axonogenesis markers such as Tubb3. Compared to PBS-treated controls, GDF-15-treated hROs showed increased expression of axonogenesis markers and enhanced neurite growth. Additionally, phosphorylation within the RET/AKT signaling pathway was elevated in GDF-15-treated hROs, indicating activation of downstream growth signaling. These findings are significant because few studies have examined GDF-15–mediated RGC neurite outgrowth using an hRO model, and interactions between GDF-15 and the RET/AKT pathway remain largely uncharacterized. This work provides evidence that GDF-15 engages RET to activate AKT signaling, promoting neurite outgrowth. Understanding how GDF-15 and RET/AKT regulate retinal development may help identify therapeutic targets for neurological disorders and vision loss.

5: Electric Vehicle Tax Benefits

Jenna Corigliano | Accounting | A.J. Palumbo School of Business Administration
Faculty Advisor(s): Bryan Menk, Ph.D., CPA

ABSTRACT: In the tax world, rules for deductions and benefits are often made with the idea of promoting sustainability. This research paper examines new tax laws and regulations put in place over the last five years regarding electric vehicles and the degree to which those initiatives have succeeded in motivating taxpayers to make more environmentally conscious choices. The rules of electric vehicle purchase deductions vary between states and are constantly changing, and people from different parts of the country are motivated in different ways. This research takes a closer look at what type of taxpayer benefits from this type of initiative and how much of a benefit it really gives to both the taxpayer and the environment. Research includes reviewing both federal and state policies as well as evaluating effectiveness through both economic and environmental impact. Results show that these electric vehicle tax credits are motivating taxpayers to buy them, but it is mainly favorable to higher income households.

Making the policies surrounding electric vehicles more accessible to the average working family may increase effectiveness of long-term environmental goals.

6: A Review of Dietary Strategies to Limit Enteric Methane Emissions in Bovine Operations
Alexander Smaroff | Biology | School of Science and Engineering
Faculty Advisor(s): Kristin Klucevsek, Ph.D.

ABSTRACT: Bovine husbandry is the practice of raising cattle for consumer-desired products, normally dairy or beef. Although cattle have been raised for centuries, their numbers have risen exponentially in recent years in order to meet the increasing global demand. With this increase in population, there has been a parallel increase in methane emissions, which is one of the main biproducts of bovine digestion. A large portion of global warming is associated with methane emissions, and approximately 30% of all methane emissions come from cattle. More specifically, these emissions come from the rumination process bovines use to digest their forage. They rely heavily on microbial fermentation to break down fibrous plant matter, as it produces a more digestible food source. Research has specifically investigated several dietary adjustments aimed at reducing methane. Dietary techniques include improving feed quality and rations, while supplementation techniques add compounds such as 3-Nitrooxypropanol (3-NOP). This review summarizes the dietary strategies found to limit methane emissions, including the addition of fatty acid supplements, forage improvements, and chemical-based supplements. Although none of these solutions have been completely adopted, this review's goal is to increase public awareness in hopes that universal implementation can lead to lower enteric methane emissions in the future.

7: Curating Campus: The People and the Archive
Agaretha Kosasih | History | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Jennifer Taylor, Ph.D.

ABSTRACT: For the commemoration of the centennial of The Duquesne Duke, Duquesne University's student-run newspaper, students enrolled in Public History courses at Duquesne University were assigned to present an exhibition and create oral history interviews. From the exhibition, strengths and weaknesses emerged in researching a century of newspaper articles, designing an exhibit, and navigating the controversial history of institutional threats to freedom of the press. Conversely, the oral history project required a narrower scope as each student interviewed a previous editor-in-chief, compared to the broader overview needed for the exhibition.

This poster explores and analyzes these differences and the influencing factors in interacting with archival materials that determine their interpretation and public presentation.

8: Nanoplastic detection in water with fluorescence spectrophotometry

Madison Fitzgerald | Environmental Science | School of Science and Engineering
Faculty Advisor(s): David Kahler, Ph.D.

ABSTRACT: Plastic degradation in the environment or food packaging can produce microplastics (less than 5 micrometers in diameter) and nanoplastics (less than 1 micrometer in diameter). Exposure to plastics has been shown to cause oxidative stress in humans, neurodegenerative disease, and other health effects. Plastics are typically detected with fluorescence microscopy, micro-Raman spectroscopy, and attenuated total reflectance-Fourier transform infrared spectroscopy. We degraded polyethylene terephthalate via mechanical fragmentation and microwave radiation in ultrapure water. The resultant samples were divided and half of the samples were filtered with a 0.7 micrometer glass fiber filter. The samples were tested with a spectrofluorophotometer to detect characteristic fluorescence. The fluorescence of the plastics were determined from undegraded plastics. Fluorescence that aligns with the undegraded plastics were detected in unfiltered and filtered samples. We conclude that spectrofluorophotometry can be useful in the detection of nanoplastics with the proper assessment of potential interferences. Furthermore, mechanical and radiative degradation releases plastics less than 0.7 micrometers in size and could be overlooked by microscopy methods.

9: Differences in Risk Perception and Risk Tolerance Among Student Pilots and Non-Pilots

Madeline Griffin | Psychology | McAnulty College and Graduate School of Liberal Arts
Ava Lee | Psychology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Alexander Kranjec, Ph.D.

ABSTRACT: This study examines whether student pilots differ from non-pilots in their perceptions of risk and their willingness to engage in risky behavior. Drawing from the Domain-Specific Risk-Taking (DOSPERT) Scale, participants will complete an anonymous online survey assessing perceived risk and likelihood of engagement across ethical, financial, health/safety, social, and recreational domains. Participants will rate scenario-based items using a 1–7 scale. The sample will include approximately 200 participants (100 student pilots and 100 non-pilots), all aged 18 or older. Data will be collected via Qualtrics and analyzed using group mean comparisons and correlational analyses to examine differences in risk perception and risk tolerance between groups. This research aims to better understand how structured training environments, such as pilot training, may shape decision-making and attitudes toward risk, with potential implications for safety education and risk management practices. One possible finding would be that non-pilots and student pilots have similar risk perception but student pilots have a higher risk tolerance than non-pilots. Something that the study cannot account for is the extent to which one's personality affects risk perception and risk tolerance.

10: Investigating behavioral impairment and therapeutic modalities in a model of juvenile demyelinating disease

Kyah Thompson | Biology | School of Science and Engineering
Faculty Advisor(s): Lauren O'Donnell, Ph.D.

ABSTRACT: During childhood, the brain undergoes extensive myelination to support developing neurons. Viruses, including measles (MV), can disrupt myelination in children. We previously showed delayed and progressive demyelination in juvenile mice (10 days old) when infected with MV. Here, our goal was to identify a therapeutic window to rescue myelination using the promyelinating drug Clemastine. We tested infected mice 30 days post-infection (dpi), after the peak immune response but before neurological symptoms develop. Markers of proper myelination were measured via western blot. Memory and anxiety were measured through standard behavioral tests (e.g., Y-maze, open field). Preliminary results suggest demyelination is not yet induced at 30 dpi, suggesting a potential window of intervention. Ongoing studies include treatment with Clemastine before and during 30 dpi to determine if we can prevent demyelination in survivors. These studies will provide a framework for testing other promyelination agents in the context of juvenile viral infections.

11: A Comparative Review of Terrestrial and Marine Carbon Dioxide Removal (CDR) Methods

Juliana Stabile | Biomedical Engineering | School of Science and Engineering
Faculty Advisor(s): Katherine Hornbostel, Ph.D.

ABSTRACT: Carbon dioxide removal (CDR) is the process of deliberately removing pre-existing carbon dioxide from the atmosphere to achieve net-zero emissions and slow the rate of climate change. The purpose of this project is to assess and organize CDR methods to aid in the acceleration of research and development of CDR technology. This review separates CDR methods into four categories: marine biological, marine nonbiological, terrestrial biological, and terrestrial nonbiological. The fundamental mechanisms governing carbon dioxide separation, infrastructure needs, and key CDR methods within each category are discussed, along with a comparison of the four categorical CDR methods based on cost, scalability, and carbon storage duration. A quantitative study is performed to estimate the costs of moving seawater vs. air to remove carbon dioxide, and the operational footprints of various CDR approaches are compared on a 1 Mt/y capture scale.

12: Perspectives and Experiences of Black Doulas Screening for Pregnancy/Postpartum/Postnatal Depression Symptoms

Sandy McGugan | Nursing | School of Nursing
Alexa Cook | Nursing | School of Nursing
Gabriella DiPrinzio | Nursing | School of Nursing
Sandy McGugan | Nursing | School of Nursing
Faculty Advisor(s): Jessica Devido, Ph.D., CPNP, Angela Karakachian, Ph.D., RN

ABSTRACT: Doulas are trained professionals who provide birthing persons with physical and emotional support throughout pregnancy, labor, and the early postpartum period. Nationally, approximately one in eight postpartum individuals experience symptoms of postpartum depression (PPD), however many cases go undiagnosed. A disproportionate number of these individuals identify as Black. Symptoms of postpartum depression include anxiety, mood swings, suicidal ideation, psychosis, and difficulty bonding with the infant, which can significantly affect both the birthing person and the child. The Edinburgh Postnatal Depression Scale (EPDS) is a widely used screening tool administered by healthcare professionals, including birthing doulas, to assess individuals for postpartum depression symptoms.

The purpose of this study is to explore Black doulas' perspectives and experiences with the EPDS. A qualitative descriptive design utilizing a semi-structured interview guide is used to conduct a total of four focus groups with Black doulas to explore their perspectives and experiences using the EPDS. The interview guide addresses whether and how frequently they use the scale, whether they use alternative assessment tools, patterns they have observed in the scale's limitations, modifications they would recommend, and the resources or referrals they provide to high-risk clients. Additionally, participants' demographics are assessed using a self-administered questionnaire. Data is analyzed using a directed thematic analysis informed by the interview domains. Comprehensive findings are forthcoming. Research on the perspectives of Black doulas, with experience supporting Black birthing persons, is needed to adequately address disparities around PPD.

13: Beam Single-Spin Asymmetry dependence on longitudinal photon polarization

Blake Williams | Physics | School of Science and Engineering
Faculty Advisor(s): Fatiha Benmokhtar, Ph.D., Harut Avakian, Ph.D.

ABSTRACT: In Hall B of Jefferson Lab, Semi-Inclusive Deep Inelastic Scattering (SIDIS) is studied using the CLAS12 spectrometer. Single Spin Asymmetries (SSAs) are extracted at beam energies of 6.5, 7.5, and 10.6 GeV to analyze SIDIS cross sections, which can be decomposed into structure functions dependent on key kinematic variables. This project aims to extract, for the first time, the dependence of the SSA in electroproduction of inclusive protons ($ep \rightarrow e'pX$) on the virtual photon longitudinal polarization (ε). Kinematic cuts (i.e., sections of data) enabled a clean event selection across three energy levels, enabling a near point-like extraction of the SSA

as a function of ε. Multi-dimensional analysis of several asymmetries reveals the SSAs dependance on ε. This approach enables more efficient data processing, reduced dependence on experimental variables, and improved precision over traditional techniques.

14: Addressing School Shootings and Protecting Our Kids

Cala Armenise | International Relations | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Dina Huehn, Ph.D.

ABSTRACT: Throughout the history of the United States, but specifically in the past couple decades, there has been an astonishing amount of school shootings across the nation. Government officials, one after another, no matter how powerful, have been unable to cease these terrible attacks from occurring. This project examines the troubles around handling school shootings, specifically the legislation that was created in attempt to stop these shootings. Legislation has been consistently ineffective in ending this nation-wide issue. The project explores the idea that if we truly want to see the end of school shootings, there needs to be a focus on local-level prevention and intervention tactics. Local programs that are run and implemented through communities are shown to be more effective in addressing the root causes of school shootings because not one attack is the same and local organizations can reach individuals at a deeper level and therefore, get to the problem before they choose to attack. The project then looks into two case studies of local initiatives that attempt to prevent violent tendencies including the Big Brother Big Sisters of America Program and Safe2Tell. The project also gives potential solutions for moving forward in terms or preventing, addressing, and eliminating school shootings in America.

15: PASCALIAN INTENTIONS: OBSCURITY & UNCERTAINTY IN GREAT POWER POLITICS

Deagan Moore | Political Science | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Mark Haas, Ph.D., Jennie Schulze, Ph.D.

ABSTRACT: The following is a description of my Endowed Honors Fellowship project: The theory of intentions pessimism asserts that states are incapable of determining one another's intentions with confidence. There are multiple schools of intentions optimism that maintain that there are ways of discerning intentions, be it through assumptions based on ideology, or actions and relations between states. This project examines cases in which states make assumptions about intentions, which appear to be cases that would disprove intentions pessimism. In these cases, the states exhibit behavior that does not follow the theory of Realism, which intentions pessimism literature is born from. In assuming intentions, both benign and malign, there is great consequence in being wrong. After defining Realist behavior and examining the historical cases for states that do not adhere to those behavioral prescriptions, this project will assert that there is reason to remain uncertain of intentions rather than to make leaps of faith in assuming a state is friend or foe. In my analysis, I employ decision theory modeling and logic following that of Pascal's Wager to provide a rational critique of intentions assumptions. I then follow with case analysis of the rare instances in which states make assumptions of intentions to explain why

these exceptions occur and whether they support intentions pessimism or if they are contradictory evidence. I conclude with the implications of the theory on Sino-American relations.

16: The Power of Dissent at the U.S. Supreme Court

Nicholas Freilino | Political Science | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Sara Grove, Ph.D.

ABSTRACT: This project explores the power of dissenting opinions in landmark cases, focusing on cases from the post-Reconstruction era to modern day. The cases examined deal with issues such as free speech, the right to privacy, and equal rights. The language, tone, and structure of the opinions will be evaluated, as well as the dissent's impact on future cases.

***17: Philosophy of Black Hair**

Lei'asha Battle | Nursing | School of Nursing
Faculty Advisor(s): Quincy Stephenson, Ph.D.

ABSTRACT: Black hair is often expressed culturally, politically, and artistically, through identity, yet is less frequently addressed through a philosophical lens. Throughout the philosophical analysis, Black hair has been examined through various frameworks in relation to discrimination and Eurocentric beauty standards, but philosophy has never been recognized for its implications for embodied and colonized consciousness. Utilizing postcolonial philosophy and phenomenology frameworks allows a conceptual analysis of Black hair within a colonial consciousness. This philosophy research analysis asks: How does colonization shape the lived experience of black hair, and in what ways is Black Hair interpreted into society's existence, rather than being allowed to exist without the black body? Within society, Black hair is not able to exist on its own, but rather it is interpreted into existence, separated from the Black body, because colonization shapes the reality and lived experience. Black hair exists as its own entity through interpretations, regulations, values, etc., due to colonial perceptions being embodied in everyday lived experience. The lived experience becomes the embodied experience that is shaped by the anticipation of perception and the cultural norm. This philosophical analysis of Black hair functions as a colonized consciousness that structures embodied experiences across the past, present, and future. This philosophical analysis is crucial because it portrays how colonial perceptions continue to regulate the entity of Black hair. This philosophical comprehension of Black hair through this research will demonstrate that it’s not simply worn, but it is a lived experience.

18: Ecocentrism in Decision-Making as a Pathway to Sustainable Development and Climate-related Public Health

Kayce Wills | Environmental Studies | School of Science and Engineering
Faculty Advisor(s): Philip Reeder, Ph.D.

ABSTRACT: This project aims to investigate the impacts that ecocentrism and anthropocentrism have on human health and sustainable development. This is a significant area for research because a better understanding of these interconnected processes and the worldviews that support them is essential to inform decision-making. This research will be carried out via the collection, evaluation, and synthesis of peer-reviewed digital articles. The results of this project will include a flowchart summarizing the influences of various economic and environmental systems on sustainability and public health. Analysis of these results will show that ecocentrism is essential in supporting long-term sustainability and public health initiatives. The Earth's systems also play a significant role in these processes, as climate-related disruptions create conditions that endanger human health through changes in exposure to toxicants, rising temperatures, and extreme weather events. In addition, sustainable development is influenced by the ability of the Earth's systems to support ecosystem function and services. The connection between sustainability and public health is important because it allows climate change to be understood as a complex issue that impacts both the health and well-being of the current population, as well as the ability of future generations to support themselves.

19: EsophoGuard: A preventative device for aspiration pneumonia during upper GI endoscopy procedures

Megan Kwiatkowski | Biomedical Engineering | School of Science and Engineering
Mitchell Livengood | Biomedical Engineering | School of Science and Engineering
Chandler Last | Biomedical Engineering | School of Science and Engineering
Neil Nayyar | Biomedical Engineering | School of Science and Engineering
Faculty Advisor(s): Leda Klouda, Ph.D.

ABSTRACT: Esophagogastroduodenoscopy (EGD) is a procedure for the diagnosis and treatment of various gastrointestinal diseases. While a relatively safe procedure, one rare but deadly complication is aspiration pneumonias, where stomach contents travel back up into the esophagus and enter the lower respiratory tract. About 1.9% of patients undergoing an EGD will develop aspiration pneumonia, leading to a serious burden to patients due to increased hospital stay time and cost, as well as a burden on the healthcare system. We are developing a device, called EsophoGuard, to reduce the incidence of aspiration pneumonias from EGD procedures in anesthetized patients.

To prevent aspiration pneumonias, the device design includes a concentric tube device that will surround the endoscope. On this tube, umbrella-like flaps can be opened and closed by the physician, allowing smooth entry into the esophagus, as well as easy deployment once

adequate placement is reached. The flaps will form a barrier in the esophagus by pressing against the esophageal walls, not allowing aspirated fluid to pass. EsophoGuard is made of a medical-grade silicone material, ensuring flexibility, safety, and biological inertness.
Initial testing of our prototype includes functionality testing to ensure fluid is blocked and stress testing to investigate device flexibility and reliability. Further testing includes dimensional analysis, deployment time, and biocompatibility. EsophoGuard is designed to be a single use device in conjunction with endoscopes. We intend for EsophoGuard to become a standard of care for EGD procedures.

20: Stabilizing Handheld Dynamometry to Provide Precise Force Measurements in Physical Therapy

Miriam Freer | Biomedical Engineering | School of Science and Engineering
Miriam Freer | Biomedical Engineering | School of Science and Engineering
Teresa Steffens | Biomedical Engineering | School of Science and Engineering
Anitha Niyingenera | Biomedical Engineering | School of Science and Engineering
Margaret Lutz | Biomedical Engineering | School of Science and Engineering
Faculty Advisor(s): Leda Klouda, Ph.D.

ABSTRACT: The handheld dynamometer (HHD) is a tool with built-in force sensors widely used in physical therapy to track patients' muscle strength throughout treatment. HHDs measure upper and lower limb strength through physical therapists' placement of the device against tested muscle region while instructing patients to apply force to full capacity. Since the HHD is lightweight, it is considered a standard tool in the muscle testing field; however, error is associated with the device due to clinician/subject attributes, testing procedures, and instrument characteristics. Initial testing using known force loads and an externally fixed setup showed negligible measurement variability. When the HHD was manually held and stabilized, there was significant variability observed. Our design aims to reduce inconsistency in HHD testing and better recovery progress tracking for patients in physical therapy by securing and stabilizing HHD during testing. An extensive user needs survey was conducted which established our design criteria. The frame and holder are designed to stabilize and hold available HHDs on the market while providing portability, alongside a standardized protocol. The frame is made of steel, maximizing stability while minimizing weight. Foam/rubber cushions pad the device to maintain comfortability and avoid injury risks. After the final design is completed, additional tests will compare clinician fixed variability and frame fixed variability. Creating a portable HHD stabilization device will help reduce errors and improve physical therapy regimens associated with clinical use of HHD in force assessments.

21: NasoFit Kit: A comprehensive, customizable fixation kit for supplemental oxygen delivery systems.

Lydia Kutzer | Biomedical Engineering | School of Science and Engineering
Hannah Von Geis | Biomedical Engineering | School of Science and Engineering
Skyler Wrubleski | Biomedical Engineering; Nursing | School of Science and Engineering and School of Nursing
Kalin Wilson | Biomedical Engineering | School of Science and Engineering
Faculty Advisor(s): Leda Kloudas, Ph. D.

ABSTRACT: Standard nasal cannulas are the most commonly prescribed devices for supplemental oxygen delivery due to their low cost, simplicity, and preservation of patient mobility; however, their one-size-fits-all design is not always compatible with every patient anatomy, frequently resulting in poor anatomical fit, tubing displacement, inconsistent oxygen delivery, patient discomfort, and pressure injury formation, particularly among geriatric patients requiring prolonged oxygen therapy. These complications increase hospital stays, reduce patient adherence, and negatively affect clinical outcomes. This project aims to design a customizable nasal cannula accessory kit consisting of five attachments to optimize anatomical fit, reduce device displacement, and prevent pressure injury formation. A stakeholder and literature review identified user needs among patients, clinicians, and manufacturers, informing design requirements including anatomical anchoring, pressure redistribution, adjustability, biocompatibility, and ease of application with standard-issued cannulas. Prototyping produced a five-component kit: an adjustable wired nasal stabilizer to prevent prong displacement, cheek pressure-relief pads, a contoured post-auricular fastener, a two-piece clamp and slider to secure split tubing, and a garment anchor. Benchtop testing is planned across three domains: flow rate testing will compare outlet oxygen delivery against an unmodified cannula control; interface force testing will use miniature load cells at the nares, cheek, and post-auricular sites to quantify contact pressure, and displacement testing will apply incremental tensile loads via a spring scale with prong movement measured using digital calipers.

22: ConfiDose: A Nonvisual Syringe System for Accessible Liquid Medication Measurement

Norah Delaney | Biomedical Engineering | School of Science and Engineering
Riley Davis | Biomedical Engineering | School of Science and Engineering
Alexis Mulroy | Biomedical Engineering | School of Science and Engineering
Teresa Steffens | Biomedical Engineering | School of Science and Engineering
Faculty Advisor(s): Leda Klouda, Ph.D.

ABSTRACT: Low vision individuals face significant challenges in liquid medication measurement, given that standard syringes rely on visual confirmation of volume. Current assistive devices lack reliable nonvisual feedback, which poses a serious risk when administering medication to oneself, a child, or a service animal, underscoring the need for an improved accessible option. This issue could be solved with our proposed device ConfiDose, a syringe attachment that

provides continuous, nonvisual feedback for liquid medication measurement. ConfiDose integrates a color sensor attached to the overhang of a plunger attachment that detects color-coded volume markings along the syringe barrel as the syringe is aspirated. The registered color markings are then converted to an audio output to alert the user of the current measurement in real time as the user draws up medication. In addition to the hardware, ConfiDose's companion app enables users to log and track medication and was built with accessibility practices. The dual approach ensures that both the act of measuring and managing medication is accessible to low vision users.

Initially, testing demonstrated that ConfiDose could reliably detect volume changes in 5 mL increments with simple audio feedback recognizable to the user. The program shows promise for improvement in precision to 1 mL increments. Additionally, 3D modeling of the attachment was shown to be successful via a functionally printed product, indicating feasibility in the reproduction of the device. ConfiDose embodies a step toward inclusive healthcare technology by enabling low vision individuals to independently and accurately measure liquid medications

***23: Adaptive Residual Limb Warming Sleeve for Winter Para-Athletes**

Billy Sanchez | Biomedical Engineering | School of Science and Engineering
Dominic Dezort | Biomedical Engineering | School of Science and Engineering
Domenico Fusca | Biomedical Engineering | School of Science and Engineering
Ashley Mingrino | Biomedical Engineering | School of Science and Engineering
Benjamin Betz | Biomedical Engineering | School of Science and Engineering
Faculty Advisor(s): Leda Kloudas, Ph.D.

ABSTRACT: Cold weather exposure presents persistent challenges for individuals with amputations, particularly veterans and winter para-athletes, as reduced circulation in residual limbs can cause pain, discomfort, and limited mobility. Existing warming solutions often lack adaptability and compatibility with prosthetics. These solutions also rely more on passive warming methods rather than being a heat generating source. This project aimed to develop a customizable, temperature-controlled warming sleeve to improve comfort, safety, and functional performance in cold conditions. A user-centered design process incorporated feedback from veterans, winter para-athletes, and prosthetists to define comfort thresholds, usability needs, and design requirements. Iterative prototyping focused on lightweight, flexible, and thermally efficient materials suitable for use on the residual limb or prosthetic socket. The design integrates flexible heating elements, embedded k-type thermocouples, an arduino nano, and a closed-loop feedback system to maintain the set temperature within one degree Celsius. Planned testing includes laboratory thermal regulation trials, simulated cold environments, and user evaluations to assess comfort, fit, and usability. Preliminary testing demonstrated stable temperature control and safe operation across expected use conditions. The current prototype meets core functional requirements and supports ongoing iterative refinement based on quantitative data and user feedback. Results support the feasibility of a customizable warming

sleeve to reduce cold-induced discomfort, improve mobility, and enhance quality of life for individuals with amputations. Our solution represents a meaningful advancement toward inclusive, user-centered prosthetic winter technologies.

24: Progress or Plunder: The Hidden Cost of AI

Khondokar Araf Rahman | Computer Science | School of Science and Engineering
Faculty Advisor(s): John Slattery, Ph.D, Mia Briceño, Ph.D.

ABSTRACT: AI is often seen as a weightless existence, overlooking the physical and environmental footprint it comes with. It is run on massive infrastructure of data centers powered by energy-intensive servers and cooling systems that require vast amounts of electricity and freshwater. This research focuses hidden environmental costs of AI, focusing on its growing demand for energy and water resources.

Recent data implies that data centers use a lot of electricity, and much of that electricity still comes from sources like coal and gas that produce carbon emissions. Because of this, data centers add a significant amount to global climate change. They also use a large share of some countries' total electricity supply. On top of that, advanced AI systems need powerful computers that generate a lot of heat, so they require large amounts of water to keep the machines cool. As more companies and industries start using AI, the amount of electricity and water needed will likely keep increasing, which could put even more pressure on the environment.

However, at the same time, AI is not fully destructive, rather it can be used to improve energy efficiency, optimize renewable power systems, reduce waste, and support climate solutions. The real issue is not the technology itself, but how it is developed, powered, and governed.
This research further argues that the environmental impact of AI must be understood as both a technical and ethical challenge. Sustainable energy integration, responsible water management, and transparent accountability are essential to ensure that AI contributes to long-term environmental well-being rather than resource depletion.

***25: University–School Partnerships and Community Capital in East Allegheny**

Matthew Theodros | Sports Information and Media | A.J. Palumbo School of Business Administration
Jennica Henry | Psychology | McAnulty College and Graduate School of Liberal Arts
Katelyn Ganter | Business Analytics | A. J. Palumbo School of Business Administration
Rocio Garzon | Political Science | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Aleina Smith, Ph.D.

ABSTRACT: Pennsylvania demonstrates some of the widest disparities in educational opportunities in the nation, with high-poverty schools facing significantly fewer resources and persistent racial and income inequities (Research for Action, 2022). This study examines how university–school partnerships in Pennsylvania's Mon Valley region build community capital and

strengthen collaboration between higher education researchers and district leaders. The Pathway Scholars project contributes to emerging scholarship within a community-engaged research framework by advancing a sustained, cohort-based model that promotes equitable post-secondary outcomes in resource-constrained districts. Beginning in 2022, this multiyear mixed-methods study includes 60–120 11th and 12th grade students, along with teachers, counselors, and administrators. Data are collected through surveys, interviews, and focus groups to generate quantitative and qualitative insights. Guided by the Community Capitals Framework (Flora & Flora, 2008), the study asks: How do school leaders leverage university–school partnerships to enhance equitable post-secondary preparation outcomes for vulnerable student populations? Specifically, the study examines (1) the lived experiences of historically vulnerable high school students, (2) the impact of community resources, and (3) resource access for school staff and parents/caregivers. Preliminary findings indicate that strengthening social and institutional capital through peer-led engagement and structured collaboration produces an adaptable, equity-centered partnership framework that enhances post-secondary readiness and institutional alignment across partnering school districts.

26: Encoding Equity: Technical Solutions for Biased Molecular Latent Spaces

Brooke Soike | Chemistry | School of Science and Engineering
Faculty Advisor(s): Mia Briceno, Ph.D.

ABSTRACT: Artificial Intelligence (AI) has revolutionized the traditional drug design process by significantly accelerating therapeutic production through computational (in silico) modeling. These algorithms project chemical structures into latent spaces, mathematical representations that encode molecular structure and properties, to predict and optimize drug-like candidates. However, current in silico technologies face a critical representation gap: most chemical databases are heavily biased toward North American and European viral strains. Consequently, latent spaces become mathematically biased, leading to poor out-of-distribution performance on global viral variants. Furthermore, the "black box" nature of these models obscures whether predictions stem from genuine biochemical interactions or artifacts of geographic data bias. To address these gaps, I conducted a review of bias-mitigation and interpretability frameworks in computational chemistry and machine learning, identifying two approaches as most technically promising. InfoCORE uses variational information maximization to unlearn batch identifiers, stripping geographic bias from molecular representations and ensuring accuracy across diverse viral subtypes. Explainable AI (XAI) tools provide transparency, shifting drug design from opaque prediction to justified biochemical reasoning. My findings suggest that combining these frameworks transforms AI-driven drug design into a transparent, globally generalizable system. These improvements help establish a new standard of algorithmic justice in medicinal chemistry so that AI-driven innovation does not leave vulnerable global populations behind.

27: Sequence-Dependent Inner-Sphere Mg^{2+} Coordination Shapes HIV-1 DIS Stability

Brooke Soike | Chemistry | School of Science and Engineering
Faculty Advisor(s): Jeffrey Evanseck, Ph.D.

ABSTRACT: The dimerization initiation site (DIS) of HIV-1 is a highly conserved structural RNA motif that drives genomic dimerization through the formation of a kissing complex (KC) essential for viral replication. The surrounding ionic atmosphere plays a central role in RNA structure and biology, as electrostatic interactions and divalent cations dictate folding pathways, structural stabilities, and tertiary RNA elements such as the DIS. Magnesium ions (Mg2+), key constituents of the ionic environment, are known to stabilize RNA structures, but the mechanisms of subtype-specific Mg2+ interactions with the HIV-DIS remain poorly understood. Here, targeted molecular dynamics (TMD) simulations assessed the Mg2+-mediated stabilization of hydrogen bonding within the palindromic regions of the Lai (subtype B) and Mal (subtype A) HIV-DIS variants. Twenty replicate TMD trajectories under Mg2+-bound and Mg2+-free conditions, analyzed using Jarzynski's equality, demonstrated that Mg2+ raises the dissociation barrier of the Lai complex by ~13.6 kcal/mol, while Mal exhibits only ~3.4 kcal/mol stabilization. This disparity likely arises from sequence differences in the palindromic regions, which shape inner-sphere Mg2+ coordination according to established Mg2+ nucleotide coordination preference (G > U > A > C). Radial distribution functions (RDFs) show that Lai exhibits a sharp inner-sphere Mg2+–guanine O6 coordination peak at ~2.0 Å, absent in Mal, which only displays outer-sphere interactions between 3.6 and 4.0 Å, consistent with its lack of stabilization. This work establishes the sequence-dependent role of Mg2+ in DIS stabilization and identifies conserved viral RNA elements as exploitable targets for antiviral design across RNA viruses.

28: Withdrawn

29: Data Centers, Nuclear Energy, and the Next Era of Waste Management

Annaliese Sauve | Political Science | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Michael Jarrett

ABSTRACT: The rapid expansion of data centers for artificial intelligence is driving unprecedented energy demand, reaching a record high in 2024 and projected to continue rising. Nuclear energy offers a viable response to this demand, given its energy dense qualities and low-carbon profile. Pennsylvania, which hosts eleven data centers and four nuclear power plants, demonstrates the emerging relationship between digital infrastructure and reliable nuclear generation.

Despite its efficiency, nuclear energy produces long-term radioactive waste. In the United States spent nuclear fuel from 68 nuclear power plants is primarily stored in concrete or stainless-steel dry casks, an interim measure to a problem that will persist for generations. As these casks

reach the end of their lifespans, degradation risks increase, with potential implications for surrounding ecosystems, groundwater, and wildlife.

This research evaluates multiple nuclear waste management strategies, including continued dry-cask storage, development of a permanent geological repository, and investment in nuclear fuel reprocessing. Drawing on France's established waste management policies, the analysis argues that fuel reprocessing is a sustainable and economically advantageous strategy. By recovering unused uranium and plutonium from spent fuel, reprocessing minimizes waste volume while enhancing resource efficiency. Considering renewed federal support for nuclear energy, fuel reprocessing emerges as a viable long-term solution for nuclear waste management in the United States.

30: Exploring Predictors of Employment Change Among Caregivers of Primary Malignant Brain Tumor Patients

Mia Dougherty | Nursing | School of Nursing
Isabella Vanek | Nursing | School of Nursing
Faculty Advisor(s): Grace Campbell, Ph.D., RN

ABSTRACT: Caregivers of patients with primary malignant brain tumors (PMBT) experience significant challenges, including emotional distress, physical strain, and disruptions in meaningful life roles, including employment. The healthcare problem addressed in this project is role strain experienced by employed caregivers of individuals with PMBT. The purpose of this project was to explore factors associated with changes in employment among caregivers of individuals with PMBT.

We conducted a secondary data analysis using data from the SmartCare caregiver support intervention trial. Predictor variables included baseline caregiver gender, caregiver reactivity (self esteem, abandonment, and burden sub-scales), depressive symptoms, anxiety, and optimism; the outcome was change in employment status four months after baseline. Univariate associations among variables were calculated using correlations and chi-square analysis; predictors were then entered into a logistic regression model to determine significant predictors of change in employment status.

Our sample (n = 53) included 34 females (64%), 18 males (34%), and 1 unreported. The Self Esteem scale of Caregiver Reaction, p= 0.04 significantly predicted change in employment. Caregiver Abandonment sub-scale trended toward significance, p=0.7, suggesting that feelings of abandonment could be associated with employment change in a larger sample. Surprisingly, caregiver gender and psychosocial symptoms did not predict employment change.
These results highlight the need for nurses to assess caregiver well-being in addition to patient needs. This can be accomplished through routine screening for caregivers, providing education, positive feedback and skill building.

31: Retention of Knowledge and Skills Associated with Acoustic Voice Analysis Using an Experiential Learning Model

Alyssa Ball | Speech-Language Pathology | Rangos School of Health Sciences
Faculty Advisor(s): David Ford, Ph.D.

ABSTRACT: Current literature suggests the current generation of students desire community-engaged, hands-on learning opportunities. This led to the development of a community-engaged voice screening for teachers in conjunction with the Speech Science course at Duquesne University. This study investigates the effect of student participation in the community-engaged voice screening on the retention of knowledge and skills necessary to perform acoustic analyses learned in class, one year after participation. A voice screening was delivered to teachers at a local school district by students of the Speech Science class at Duquesne University. The protocol consisted of acoustic analysis of the following tasks: production of a sustained vowel at habitual pitch and loudness, pitch glides, reading a standardized passage, and a conversational sample of voicing. The analysis included fundamental frequency and intensity, measures of voice quality, and cepstral measures. The students conducted all aspects of the screening, supervised by a practicing clinician. There were 11 students who participated in the screenings and 11 who abstained. A survey was sent to all 22 students. The survey asked them to complete a simple acoustic analysis, explaining the procedure and results. Students were also asked about their perceived comfort level with/confidence in performing acoustic analysis.The results of the survey will be discussed, in the context of students' ability to perform acoustic analysis and their perceived confidence/comfort level in performing the analysis. The implications of these findings will support the use of community- engaged voice screenings as experiential learning activities in Speech Science coursework and beyond.

32: Major Histocompatibility Complex II and Isolectin B4 Expression Patterns in the Dorsal Root Ganglia of Female Rats Following Chronic Constriction Injury

Piper Pardee | Biology | School of Science and Engineering
Faculty Advisor(s): John Pollock, Ph.D.

ABSTRACT: The role of T-cells in the development and persistence of neuropathic pain in females is poorly understood. A complex, known as MHC-II, presents antigens to activate CD4+ helper T-cells that modulate the adaptive immune response. MHC-II was previously understood to be exclusively expressed in immune cells; however, recent research revealed MHC-II expression in the dorsal root ganglion (DRG) of female mice suffering from chemotherapy-induced neuropathy. To observe if MHC-II is associated with neuropathic pain using a chronic constriction injury model, we conducted immunohistochemical fluorescent staining on DRG tissue from a female rat twelve days post injury. These experiments revealed expression of MHC-II in the DRG of the injured rat, as well as its co-expression with the cell bodies of Isolectin B4 (IB4) positive pain-sensing neurons. In female rats, MHC-II expression is evident in DRG

neurons under different treatment conditions. Further analysis will aim to explore the role that MHC-II plays in the distinct neuroinflammatory response.

33: The Physiology of a Lie: Using Polygraph Data to Teach Biostatistics
Darnell Duncan | Biology | School of Science and Engineering
Faculty Advisor(s): Sarah Woodley, Ph.D.

ABSTRACT: The polygraph test, also known as the lie detector test, is used to record changes in respiration, blood pressure, heart rate, and skin conductance when a person answers deceptively. Many classrooms use the polygraph test to gather information regarding sympathetic nervous system activation in response to deception. The polygraph test serves as an exemplary educational tool for demonstrating physiological principles and promoting competency across several Common Core Standards in Statistics. Students in Dr. Woodley's Physiology Capstone Course (BIOL 372W) have measured changes in skin conductance (GSR) annually for the last 14 years to study the sympathetic nervous system (SNS). Our poster demonstrates how the polygraph test promotes competency in biostatistics. For example, analysis of the class data demonstrates (1) the impact of sample strategy and sample size on outcomes, (2) the ability to assess data variability to identify outliers, (3) effective data presentation through plots and histograms, and (4) hypothesis testing. The class data support the hypothesis that lying activates the sympathetic nervous system; however, the difference between honest and deceptive responses was very small. In conclusion, analysis of polygraph data is an engaging way to teach biostatistics in a physiology class. In the future, the poster can serve as a basis for a lesson plan that addresses common core standards in biostatistics.

34: Prediction of Ovulation with Progesterone Patterns in individuals with and without PCOS
Brianna Folino | Data Science | School of Science and Engineering
Faculty Advisor(s): Lauren Sugden, Ph.D.

ABSTRACT: Understanding the menstrual cycle is essential for diagnosing reproductive disorders & improving fertility tracking, yet the natural variation in hormone patterns throughout the menstrual cycle is still understudied.

We use data collected with the Mira ovulation tracker to analyze the Progesterone(PDG)pattern across the menstrual cycle, focusing on individuals with PCOS compared with healthy controls. Mira provides quantitative urine hormone measurements, & collects self-reported PCOS status, making this data well-suited for analyzing PDG patterns in this context.

A common hallmark of PCOS is anovulatory cycles, or cycles in which ovulation does not occur. Confirming ovulation typically requires an ultrasound, but a spike in Luteinizing Hormone followed by a sustained rise in PDG can also indicate that ovulation has occurred. The main objective of this analysis is to assess how this hormone-based approach performs in both typical & PCOS-affected cycles.

We first streamlined & structured hormone recordings, resolved multi-reading days, & aligned hormonal data to defined cycle phases. Then, by setting different thresholds & defining how many days a PDG rise must be sustained, we can assign each cycle a label of ovulatory/anovulatory.

Preliminary results indicate distinct differences in the dynamics of PDG. Well-timed increases in PDG following the predicted ovulation window characterize baseline ovulatory cycles. In contrast, PCOS cycles are more often characterized by delayed or inconsistent PDG patterns, suggestive of lack of ovulation or irregularity. These distinctions make apparent a way hormonal data can enhance accuracy in the prediction of ovulation & cycle variability.

35: The impact of Post-Concussion Symptoms on Classroom Engagement and Academic Stress

Chloe Danaher | Psychology | McAnulty College and Graduate School of Liberal Arts
Shannon Brady | psychology | McAnulty College and Graduate School of Liberal Arts
Angelina Zamperini | Psychology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Alex Kranjec, Prof., Josie Lee, TA

ABSTRACT: Concussions are frequently underrecognized as "invisible injuries," which can limit the availability of appropriate resources and institutional support during recovery. Both student-athletes and non-athletes may experience variability in the level of academic support they receive, potentially influencing recovery outcomes and the emotional challenges that affect academic functioning. To examine the emotional impact of concussion on academic performance, this study surveyed a sample of college students at a private university in Pennsylvania. who participate in a variety of sports. Participants completed an anonymous online survey consisting of fifteen items, including multiple-choice, Likert-scale, and short-answer questions. Survey items assessed demographic characteristics, concussion history, emotional symptoms that affect academic performance, and the nature of participants' support systems during recovery. Participants were above 18 years and had sustained at least one concussion within the past three years. Results indicate that concussions are associated with significant emotional disruptions that negatively affect academic functioning. Results also indicate that the availability and quality of support systems play a critical role in the recovery process. These findings highlight the need for improved recognition and management of concussions at the collegiate level and suggest that student-centered, support-focused recovery approaches may enhance emotional and academic outcomes.

36: Experimental investigation of the proton

Daniel Prada | Physics | School of Science and Engineering
Maxwell Buckner | Physics | School of Science and Engineering
Michael Lagola | Physics | School of Science and Engineering
Faculty Advisor(s): Fatiha Benmokhtar, Ph.D.

ABSTRACT: The central goal in nuclear physics is to understand the structure of the proton, which requires precise measurements of particle detection in scattering experiments. We focus on the study of asymmetries in ep → e'hX, where electron beam "e" is scattered on a proton target "p" and we detect the scattered electron "e'" and the ejected hadron "h" in coincidence. X is everything else that is not detected. The data is collected at the Thomas Jefferson National Accelerator Facility; we analyze the scattering data using the CLAS12 detector in Hall B. To analyze particles which contain strange quarks, the use of the Ring-Imaging Cherenkov Detector (RICH) is required. The capabilities of the RICH detector allow us to collect data on momentum events ranging from 3 to 8 GeV/c. The RICH detector uses aerogel and particles to radiate Cherenkov light which can be used to measure particles' velocity and thus determine its identity. When the angle of the particle is too large then mirrors are used to refocus the Cherenkov light, which can then be used for particle identification. Data analysis is performed with CERN ROOT, and we are presenting the analysis steps and our recent findings from our study.

37: User-Collected Hormone to Model Luteal Phase Progesterone Dynamics

Tara Wills | Data Science | School of Science and Engineering
Faculty Advisor(s): Lauren Sugden, Ph.D.

ABSTRACT: Understanding hormone patterns during the luteal phase of the menstrual cycle is necessary for determining normal menstrual physiology and identifying symptoms that may point to polycystic ovary syndrome (PCOS). Most studies on PCOS focus on single-day measurements or broad cycle length statistics. New cycle tracking technologies allow for daily hormone sampling across different populations. This project uses user-collected hormone data from the fertility app Mira to evaluate whether machine-learning can provide a more accurate way to study progesterone (PDG) rise.

I analyzed three linked datasets: a hormone-level dataset containing daily estrogen (E3G), luteinizing hormone (LH), and progesterone (PDG), a cycle-level dataset containing cycle length, and derived summary hormone features, and an individual-level dataset containing disease status (PCOS vs. healthy controls), number of cycles recorded, and overall regularity of cycle length. For each cycle, each day is also mapped to one of six defined cycle phases using a hidden Markov model (HMM). For each cycle, I computed the mean PDG in two important windows: cycle days 19-22 which is typically the post-ovulation PDG rise and cycle phase 5, which corresponds to the same window, but allows for variation in cycle timing.

Preliminary results shows PDG levels differ by cycle regularity and PCOS status, and suggest that phase 5 shows a stronger PDG rise than days 19-22 across most groups, showing that single-day recordings may miss individualized hormone rises. Paired t-tests also show that the HMM model may reveal more accurate hormone transitions.

38: The Impact of Functional Voice Impairment on Acoustic Measures of Vocal Quality in Teachers

Jenna Miller | Speech-Language Pathology | Rangos School of Health Sciences
Faculty Advisor(s): David Ford, Ph.D.

ABSTRACT: Background/Rationale: There has been a wealth of literature supporting the notion that teachers are at very high-risk for voice disorders. 57.7% of teachers reported >1 incidence of voice problems throughout their careers. Prevalence factors have been reported as high as 94% and teachers are estimated to be 2-3 times more likely to develop a voice disorder than the general population. Due to the demanding nature of the job, teachers find it difficult to seek outside services that benefit voice use.
Method/Procedures: A voice screening protocol was developed to allow undergraduate students (supervised by practicing clinicians) to evaluate voice characteristics of primary education teachers. 10 teachers participated in this screening, none of which reported that they were experiencing voice problems at the time of the screening. During the screening, teachers completed the Voice Handicap Index-10 (VHI-10) and the students collected audio samples of sustained vowels, pitch glides, standardized sentences, a standardized reading passage, and a conversational speech sample from each of the teachers. Cepstral Peak Prominence (CPP) was calculated and analyzed from the sustained vowel and conversational speech sample using Praat voice analysis software.
Results: Correlational analyses and simple linear regression models were used to analyze the relationship between VHI-10 scores and CPP gathered from teacher voice screenings. Descriptive and statistical results will be discussed, to better understand the impact of the voice screenings on quality-of-life and objective acoustic voice measures in primary education teachers.

39: Multi-Method Monitoring of the State-Threatened Brindled Madtom (Noturus miurus) in Crooked Creek, Pennsylvania

Dominic Belko | Biology | School of Science and Engineering
Faculty Advisor(s): Brady Porter, Ph.D.

ABSTRACT: The brindled madtom (Noturus miurus) is a small ictalurid catfish species native to portions of the central and eastern United States. The species is listed as threatened in Pennsylvania, known from only a handful of isolated populations in the western third of the state. Since 2020, work at Duquesne University has examined a population of N. miurus in Crooked Creek, a tributary to the Allegheny River in Armstrong and Indiana counties. Prior to 2020, the brindled madtom had only been documented three times in Crooked Creek, initially in 1905 and twice in 1986, with a total representation of 3 individuals. In a collaboration with The U.S. Army Corps of Engineers (USACE), which manages a section of the stream including Crooked Creek Lake reservoir, electrofishing surveys in 2020 and 2021 confirmed the continued presence of brindled madtoms in the mainstem above the reservoir. Targeted surveys in

Autumn 2024 sought to evaluate the brindled madtom population and evaluate habitat preference during the non-breeding season. These surveys documented N. miurus in greater numbers than have been noted in any previous study, as well as evidence suggesting multiple distinct size classes. This suggests a healthy age distribution and ongoing reproductive activity. To evaluate the habitat preferences of N. miurus within Crooked Creek, hundreds of data points for physical habitat metrics including depth, flow rate, and sediment size were also collected and analyzed during the 2024 surveys. A species-specific qPCR method has been developed to help facilitate the upstream limit using environmental DNA monitoring to determine the full geographic extent of N. miurus within the Crooked Creek watershed.

***40: The "3 A's" of Sport Specialization: Emerging Themes to Characterize Athletes' Sport Participation Pathway Decisions**

Adelaide Stark | Health Sciences | Rangos School of Health Sciences
Faculty Advisor(s): Justin DiSanti, Ph.D.

ABSTRACT: A key focus within the current world of youth sports is whether athletes play multiple sports or specialize in a single sport, which has been linked to differential developmental outcomes and experiences over time. In this study, former youth sport participants were grouped by their developmental sport pathways (i.e., whether and when specialization occurred) to identify emerging themes underlying the pathway selection process and its impact on participants' sport experiences. A total of 948 participants completed a retrospective survey detailing their sport histories. Based on their specialization trajectory, participants were sorted into one of three participation pathways – Early Specialization, Late Specialization, or Continued Multi-Sport. Participants responded to open-ended questions exploring the decision-making processes that shaped specialization or multi-sport participation across developmental stages. Inductive, conventional content analysis of participants' responses revealed three higher-order themes related to athletes' selections of their respective participation pathways: the Three A's—Ability, Affect, and Agency. Moreover, inter-group analysis revealed nuanced similarities and differences in how the Three A's manifested across participants' experiences throughout their pathways. The results of this exploratory study provided critical insight regarding key factors influencing athletes' sport pathway decisions. Emerging themes suggest how these factors may differentiate positive and negative sport experiences, while also challenging assumptions of inherent advantages within any one pathway, indicating that positive sport experiences may rely more on contextual and perceptual factors than timing alone.

41: Exploring What College Seniors Prioritize in Their First Job

Sophie Heberlein | Management | A.J. Palumbo School of Business Administration
Faculty Advisor(s): Aimee Kane, Ph.D.

ABSTRACT: The purpose of this project is to explore what college seniors prioritize when searching for their first job after graduation. Specifically, the study examines the extent to which students consider purpose, social impact, vocational calling, and compensation. Duquesne's mission is to serve God by serving students through concern for moral and spiritual values. These university values create an environment that encourages students to reflect on their ethical responsibility towards others. As students prepare for the workforce, this context may influence their career priorities.

Participants were Duquesne seniors who completed a questionnaire asking to identify their academic program. Then, participants answered an open-ended question, "What makes a first job attractive?" These responses were coded for mentions of compensation. Next, participants completed the Calling and Vocation Questionnaire (Dik et al., 2012), to measure three dimensions: purposeful work, prosocial orientation, and transcendent summons. Then, participants were given the option to enter a raffle to win a $30 gift card or donate $30 to a non-profit.

The raffle choice will be used as a behavioral measure to see if stated priorities align with behavioral intentions. We expect higher levels of purposeful work, prosocial orientation, and transcendent summons will be associated with choosing the donation option. To further explore these dynamics, an exploratory subsample analysis will compare business and non-business majors to identify potential differences in career priorities. Because Duquesne's Spiritan mission integrates ethics into its business curriculum, we expect business students will value both compensation and purpose, rather than viewing them as mutually exclusive.

42: Growth Factor Signaling through ERK5: A Mathematical Model Involving Feedback Loops

Riley Davis | Biomedical Engineering | School of Science and Engineering
Faculty Advisor(s): Kimberly Williams, Ph.D.

ABSTRACT: Growth factor signaling in mammalian cells is often initiated at the cell surface, but the transduction pathway to the nucleus involves a series of intracellular molecules that relay information to one another, generally through phosphorylation and dephosphorylation events that permit and prevent interactions. These pathways are critical for cell proliferation and are often the site of mutations that can lead to dysregulation in some cancers. One of the most well-studied signaling pathways is epidermal growth factor (EGF) mediated proliferation, acting through a MAPK cascade with the final signaling molecule being ERK1/2, which can translocate into the nucleus when phosphorylated. A related but distinct alternative MAPK pathway leads to the phosphorylation of ERK5. It is also able to move into the nucleus like ERK1/2, but the nuclear targets are distinct.

Mathematical models of ERK1/2 have been previously developed, but our focus was on how the presence of ERK5 and its pattern of phosphorylation would be distinct and act as a competitor or enhancer for ERK1/2. ERK5 is distinct but interdependent with the ERK1/2 pathway. Simulations suggest a unique phosphorylation profile for ERK5 that is dependent on both ERK and AKT, with downstream molecule p90RSK serving as a key regulator for both MAPK pathways. Modeling and in silico studies of cell signaling pathways are one way to gain insight into how loss of regulation of cell proliferation might occur due to mutations and might suggest ways that investigators could introduce restorative measures.

43: Membrane Modeling Framework for Industrial Carbon Capture

Ashley Freel | Mechanical Engineering | School of Science and Engineering
Faculty Advisor(s): Katherine Hornbostel, Ph.D.

ABSTRACT: Atmospheric carbon dioxide emissions continue to rise at an alarming rate, contributing to detrimental effects on the environment. Industrial plants like cement and steel represent a major source of these emissions. To combat rising emissions, carbon capture membranes are in development and offer a promising solution, but the performance of these membranes depends strongly on the material properties and design. The effectiveness of carbon dioxide capturing membranes with varying properties can be modeled to identify the optimal membrane for different industries. The model was developed in MATLAB and then validated using a zero-dimensional and a one-dimensional Excel model. Once the validation was complete, the model was converted to Python, where the applications of the model were expanded. A Python model of MTR's (Membrane Technology and Research) Polaris membrane was successfully developed. The model evaluates carbon dioxide purity and capture from cement and steel plants of membranes with various material properties and configurations. In the future, the model will be adapted to perform optimization studies with a variety of membrane types in multiple industries.

44: Exploring AAC and Inclusivity: A Narrative Review and Pilot Survey

Riley Haring | Speech-Language Pathology | Rangos School of Health Sciences
Faculty Advisor(s): Abigail Delehanty, Ph.D.

ABSTRACT: As generative artificial intelligence (AI) becomes increasingly widespread in healthcare fields, significant gaps remain in inclusivity for individuals with disabilities. Many clients and patients rely on assistive technology (AT) and augmentative and alternative communication (AAC) devices, ranging from mobility aids to eye-gaze systems, to facilitate meaningful participation in everyday activities. These technologies help their users perform functions they would otherwise have difficulty with. However, the boundaries between assistive and general-purpose technology are becoming less distinct every day. Tools like predictive text,

hearing devices, screen readers, and custom gestures are embedded in mobile devices and serve communicative and functional purposes for all users, disabled and non-disabled alike. This narrative review of the literature aims to update knowledge about inclusivity, AT, and AAC through the perspectives of individuals with disabilities. The results of this review will inform the development of survey questions for a pilot instrument targeting undergraduate Health Sciences students, with the long-term goal of extending the survey to healthcare professionals. This research aims to close a gap in the literature regarding how generative AI intersects with AT and AAC use in clinical and educational contexts. This study works to promote inclusivity by highlighting how everyday technologies assist all users, thereby bridging the gap between disabled and non-disabled experiences.

45: Simulated Drug Smuggling Through Cardboard

Georgia Lampenfeld | Biochemistry | School of Science and Engineering
Faculty Advisor(s): Stephanie Wetzel, Ph.D.

ABSTRACT: Drug smuggling has worldwide implications that are constantly evolving. Various materials and techniques can be used to smuggle, including envelopes, body cavities, and luggage. The mail system has historically been used to transport illicit drugs, with many notable instances throughout history. Smuggling through the mail system can be done using cardboard package material. In addition to local communities, smuggling into prisons is also a concern. Detecting the change in concentration of the smuggled drug on cardboard can be used as key evidence in criminal proceedings. This research examined whether the porous nature of cardboard affected the amount of drug retained during theoretical smuggling. A 3.33 mg/mL solution of caffeine in acetone was used in place of an illicit drug. Caffeine was chosen due to not only its safety, but its detectability using GC-MS. The caffeine solution was used along with other standards to determine if a change in concentration occurred The solutions were sprayed onto the cardboard, mailed, and then analyzed using GC-MS detection methods. Quantification of drug smuggling can prevent the flow and access of drugs in communities and minimize the global trade. This research aims to bridge the gap between the growing drug trade and detection methods.

46: Sensory Processing and Self-Regulation in Children With ADS: Vestibular Therapy vs Virtual Reality

Abbey Surdy | Occupational Therapy | Rangos School of Health Sciences
Faculty Advisor(s): Jeryl Benson, EdD, OTR/L, FAOTA, Richard Simpson, Ph.D., ATP

ABSTRACT: Children with autism spectrum disorder (ASD) often experience sensory processing differences that can affect self-regulation and inhibit participation in daily activities (Feldman et al., 2020). Sensory stimulation (SS) is commonly used to support central nervous system regulation, and recent evidence suggests that technology-based sensory input, such as virtual reality (VR), may enhance emotional regulation and arousal modulation (Ayres, 1979; Zhao et

al., 2022). The purpose of this study is to examine the effects of SS on the self-regulation of children with ASD and to compare traditional SS delivered through VR and iPad technology.

A convenience sample of children aged 6–18 years with ASD and identified emotional regulation goals was recruited from the Watson Institute. 6 participants were identified and enrolled following parental consent and child assent. Using a single-subject research design, baseline data was collected. Each participant then received three intervention conditions presented in randomized order: (1) traditional SS, (2) SS provided via a VR room, and (3) SS provided via an iPad. Each behavior will be analyzed individually to determine changes in self-regulation across the conditions.

Self-regulation outcomes will be measured using physiological data collected via a Fitbit Versa 2 smartwatch or a pulse oximeter, as well as team observations of behavior. This study aims to contribute to the evidence base for sensory-based interventions in occupational therapy and to inform clinical decision-making regarding the use of VR as a tool to support self-regulation in children with ASD. Data collection and analysis are ongoing; results will be available upon completion.

47: The Teach Back Method: A Nursing Perspective

Abigail Stanley | Nursing | School of Nursing
Brynn McCafferty | Nursing | School of Nursing
Faculty Advisor(s): Alison Colbert, Ph.D., PHCNS-BC, FAAN, Angela Karakachian, Ph.D., RN

ABSTRACT: Teach Back (TB) is an evidence-based teaching method utilized by healthcare providers for effective patient education. It assesses patient knowledge and meets patients at their health literacy level by having them re-explain their understanding of a specific skill or topic to their nurse. While it is the gold standard for patient education, many barriers to its use in the hospital setting challenge its application (Eloi, 2021) (Talevski et al., 2020) (Yen et al., 2019).
We conducted semi-structured interviews with 27 registered nurses from diverse inpatient settings following a hospital-wide Teach-Back (TB) training. The interview guide was theory-informed and mapped to Normalization Process Theory (NPT) to examine barriers, facilitators, and appraisal of TB use in routine care. Interviews were audio-recorded, transcribed, and analyzed using directed content analysis aligned with the NPT domains.

Our findings indicate that TB is incorporated into the nursing role already, with many using it naturally and spontaneously as part of their routine care. The TB method is often not documented specifically, which further disguises the use in day-to-day care. Additionally, nurses see TB as a style of communication, not a task. Our findings highlight challenges that nurses must navigate, as well as facilitators and cues that make TB easier. These findings illustrate implications for TB in the hospital setting and may lead to strategies to further enable its use.

48: Glow with the Flow: Tissue Structure of Salamander Biofluorescent Skin Glands

Jasper Kopfinger | Biology | School of Science and Engineering
Faculty Advisor(s): Sarah Woodley, Ph.D., Michael Kardos

ABSTRACT: Salamander skin is rich with glands that function in predator and pathogen defense, protection against desiccation, and pheromonal communication. Some skin glands are biofluorescent and fluoresce green when excited with blue light. We utilized staining techniques and microscopy to better understand skin gland structure in four species of plethodontid salamanders (Plethodon cinereus, Plethodon electromorphus, Plethodon glutinosus, and Desmognathus ochrophaeus). Tissue samples from males and females of each species were fixed, embedded, and sectioned at a thickness of 25 µm. Slides were stained to identify cell nuclei (DNA), glandular secretions (carbohydrates and proteins), and myoepithelial cells (actin). Mucous glands were enclosed in a discontinuous layer of myoepithelial cells. Granular and biofluorescent glands were enclosed in a continuous layer of myoepithelial cells. The relative amount of carbohydrates and proteins varied according to the gland type and species. Our findings work towards better categorizing gland types across a variety of salamander species. This will aid future research in the function of salamander skin glands.

49: 3D Scanning and Characterization of Skin Lesions

Joshua Hergan | Biology | School of Science and Engineering
Faculty Advisor(s): Bin Yang, Ph.D.

ABSTRACT: Skin lesions of all kinds are characterized by several key physical properties: size, shape, and coloration. Because manual inspections are subjective and non-repeatable, assessing the state of wounds with accuracy is critical for adequate patient treatment and recovery. This study evaluated the feasibility of characterizing skin wound properties, where measures were facilitated using an iOS device and 3D-scanning techniques. Lack of depth in two-dimensional imaging renders these types of models inaccurate for all measures of interest, as they fail to capture surface irregularities when measuring area. Three-dimensional scans were captured by repurposing an iOS device's dot projection module, an essential component of the "Face ID" function. Such methods were chosen based on consistent scaling and faster scan speed offered by dot projector scanning, which is more preferable than something like photogrammetry. Using MeshLab in unison with CloudCompare, affected skin regions were segmented accurately based on user inputs. Geometrical information, such as distance, surface area, and volume measures of specific deformations could be quantified. Results determined that the calibrated linear measurements were within a 5% error, while surface area measurements showed less than 1% error when applied to objects with known dimensions. Circumference and volumetric measures are still under investigation, and we expect to gather some preliminary data by the URSS conference. The study demonstrated the feasibility of characterizing skin wounds using 3D models acquired with an iOS device. The results imply that

high-fidelity 3D imaging can support clinical efforts to assess skin injury severity and monitor treatment responses.

50: An Analysis of DNA Loss During the Wash Steps of the Promega Differex™ Extraction Process

Margaret King | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Pamela Marshall, Ph.D., Lyndsie Ferrara, Ph.D.

ABSTRACT: According to a study done by the Center for Disease Control and Prevention it is estimated that 1 in 5 women have experienced sexual assault (Smith et al. 2018). In sexual assault investigations, cases with DNA profiles that match to a known perpetrators are more likely to proceed through the judicial system and result in convictions or guilty pleas (Cross et al. 2022). Oftentimes, the amount of victim DNA is much higher than the perpetrator presenting the need for differential extraction. Currently there is a lack of research regarding extraction efficiency and if male DNA is lost during the early wash steps in the Promega Differex DNA extraction method. This study aims to help fill this gap by quantifying DNA loss in the wash steps of Promega Differex™ DNA extraction using contrived sexual assault samples and assessing the amount of alleles detected. It is predicted that most DNA will be lost in the first wash step and that full profiles will not be obtained. The determination of what step and how much DNA is lost on average can help forensic DNA analysts improve differential extraction and potentially improve case outcomes in the justice system.

51: Modeling Glioma-Associated Seizure Activity Using hNSC-Derived Neural Culture

Nicole Sumabon | Biomedical Engineering | School of Science and Engineering
Faculty Advisor(s): Melikhan Tanyeri, Ph.D.

ABSTRACT: Gliomas, the most common primary malignant brain tumors, are frequently associated with seizures arising from disruptions in excitatory and inhibitory neural signaling. Existing in vitro platforms lack the stability, scalability, and functional resolution required to quantitatively characterize these dynamics. To address these limitations, a neural cell culture platform derived from human neural stem cells (hNSCs) was developed and integrated with microelectrode array (MEA) technology to monitor electrical activity under drug-induced pro-seizure conditions. hNSCs were cultured, expanded, and differentiated into electrically active neural networks using a standardized protocol developed by MD Anderson collaborators, with cell health monitored via microscopy and cultures cryopreserved for long-term use. Differentiated neural cultures remained viable for approximately two months. Preliminary transfer of cultures onto custom-built MEAs with PDMS wells using the same protocol resulted in reduced viability and insufficient cell density for reliable signal detection, indicating the need for MEA-specific optimization. Despite these limitations, this work establishes a foundational framework for integrating hNSC-derived neural cultures with MEA platforms to study glioma-associated seizure activity.

52: Factors affecting older adults' participation in the Medicare Diabetes Prevention Program

Sydney Pesarsick | Nursing | School of Nursing
Lucas Guernon | Nursing | School of Nursing
Kacie Salva | Nursing | School of Nursing
Faculty Advisor(s): Melanie Turk, Ph.D., RN, FTNSS

ABSTRACT: Despite its proven effectiveness, participation and adherence to the Medicare Diabetes Prevention Program (MDPP) remain a challenge among older adults. The MDPP is a lifestyle prevention program aimed at reducing type 2 diabetes risk through structured education, dietary modification, physical activity, and behavior change. To explore barriers of engagement, this study examined three areas: factors influencing enrollment and completion of online diabetes prevention programs, personal health perceptions shaping engagement, and the influence of social support networks on participation and adherence. Ten interviews with MDPP participants were analyzed using the Rapid Group Analysis Process. Eight major themes emerged: (1) online meetings removed some barriers to participation while adding others; (2) virtual delivery inhibited engagement and reduced accountability; (3) technology acted as a barrier to participation; (4) internal motivation influenced engagement; (5) a desire to avoid medical interventions motivated participation; (6) concerns about consequences of not making lifestyle changes encouraged adherence; (7) participants valued collaborative, team-based environments; and (8) participants favored smaller groups that fostered connection and accountability. These findings suggest that tailored program delivery, enhanced technological support, and intentional incorporation of social support may improve MDPP participation and adherence. Implications for nursing practice include advocating for accessible program formats, strengthening motivation through preventive health education, and fostering supportive group environments to promote sustained engagement in diabetes prevention efforts among older adults.

53: Assessing Sharpie® Markers as Vectors for Human DNA Contamination in Forensic Casework

Kiley Roman | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Pamela Marshall, Ph.D.

ABSTRACT: Sharpies are markers frequently used in crime laboratories to mark evidence and outline biological stains; however, their porous felt tips have the potential to retain and transfer human DNA. Because many laboratories reuse the same marker across multiple pieces of evidence, Sharpie markers may represent an overlooked source of intra- and inter-case contamination. A contamination incident in Texas in 2023 demonstrated that DNA transfer from a reused Sharpie marker can compromise casework, highlighting the need to evaluate current decontamination practices. This study assesses whether Sharpie markers used in forensic laboratories contain detectable human DNA and evaluates the effectiveness of common decontamination methods. DNA was extracted from donated, previously used Sharpie markers,

then quantified and amplified before capillary electrophoresis and profile analysis. The markers ranged in ink colors, brands, and tip sizes. Additional testing was done with intentionally contaminated markers, where they were cleaned using bleach wipes, isopropyl alcohol pads, and ethyl alcohol wipes to compare decontamination efficacy. Effectiveness was assessed based on the presence or absence of amplifiable DNA. If the quantitation values obtained from the Sharpie markers were below the minimum amplification amount of DNA required, the samples were considered negative. Possible limitations, such as variability in Sharpie marker usage, DNA load, or donor identity/shedder status, exist in the study. Findings from this research will support the development of standardized national protocols for cleaning or replacing Sharpie markers to minimize preventable DNA transfer and improve contamination control in forensic biology laboratories.

***54: Muscle-atonin: Exercise and melatonin as a means to regulate metabolic function through circadian/hormonal realignment, musculoskeletal improvement and adipocyte inhibition**

Connor Gallagher | Pharmaceutical Sciences | School of Pharmacy
Faculty Advisor(s): Paula Witt-Enderby, Ph.D, Yong Myoung

ABSTRACT: Melatonin, a circadian hormone recognized for its role in coordinating metabolic homeostasis, regulates glucose, mitochondrial bioenergetics, and cellular energy. Disruption of one's melatonin rhythms leads to obesity and T2D. Within cells, melatonin regulates adipose tissue remodeling through actions on metabolic molecules (e.g., lncGas5, PPARγ, PTEN). In mesenchymal stem cells (MSCs), melatonin drives their fate away from adipocyte formation and more towards myoblast and osteoblast formation. The objectives of this study were two-fold—the first to evaluate how structured exercise interventions influence circadian (rest/activity) rhythms and influence markers related to metabolic health; and the second to investigate molecular mechanisms regulating melatonin-mediated actions on adipocyte formation derived from MSCs. For objective one, participants in a randomized controlled trial were assigned to two resistance training groups and asked to complete 15min of daily exercise over 6mos while tracking protein intake. Health parameters [i.e., blood pressure, body fat percentage, and urine dipstick measures (specific gravity, protein, nitrates)] were assessed at baseline and follow-up visits. Improvement over time occurred. For objective two, melatonin actions on adipocyte formation in MSCs with lncGas5 silenced were examined using Oil Red O stains. Using semi-quantitative microscopic analyses (Odyssey), silencing of lncGas5 in mMSCs enhanced melatonin-mediated decreases in adipocyte differentiation. Deep learning (AI)–based image analysis, a more quantitative approach, will be used to substantiate these findings. Currently, validation of deep learning is occurring. This translation study highlights melatonin in metabolism.

55: Left vs. Right: Computational Insights into Neuron Asymmetries and Impact on Bladder Pain

Fatima Zhantibiyeva | Applied Mathematics | School of Science and Engineering
Megan Kwiatkowski | Biomedical Engineering | School of Science and Engineering
Faculty Advisor(s): Rachael Neilan, Ph.D.

ABSTRACT: The brain region known as the central nucleus of the amygdala (CeA) plays a crucial role in modulating bladder pain. Research has shown that the left CeA is anti-nociceptive (decreases pain), while the right CeA is pro-nociceptive (increases pain). CeA neuron populations that express protein kinase c-delta (PKC-δ), calcitonin gene-related peptide receptor (CGRPR), and phosphorylated extracellular signal-regulated kinase (pERK) contribute to pain signaling within both left and right hemispheres through their distinct asymmetric firing properties and specific responses to injury. This raises a central question for our work: Can these asymmetries in neuron-level properties drive the progression of bladder-pain output from the CeA?

We developed a 3-D agent-based computational model of the left and right CeA to investigate how hemispheric asymmetries in these neuron populations influence emergent pain output during bladder injury. Our model includes more than 24,000 PKC-δ, CGRPR, and pERK co-expressing neurons with detailed spatial and functional properties. Model parameters were estimated from wet-lab data showing clear left-right differences in neuron firing rates and pERK expression in the CeA, allowing the model to reflect experimentally observed neuron activity patterns across hemispheres.

Simulation of the model yields an emergent measure of pain-related output from the left and right CeA in response to bladder injury, and shows how left-right differences in neuron-level properties can impact system-level pain output from the CeA. Mice with higher initial pERK expression exhibit greater pain responses, with firing-rate asymmetries emerging as the primary contributor to pain and with pERK asymmetries further amplifying pain following injury.

56: Withdrawn

57: Incorporation of a Laser-Cut Acrylic Tip into a Droplet-on-Demand Bioprinter

Mikayla Bartos | Biomedical Engineering | School of Science and Engineering
Tori Davis | Biomedical Engineering | School of Science and Engineering
Faculty Advisor(s): Kimberly Williams, Ph.D., Bin Yang, Ph.D.

ABSTRACT: Three-dimensional (3D) bioprinting is an emerging technology derived from additive manufacturing for wide-ranging applications in biomedical research and translational medicine. Through the printing of biological materials as a compilation of cross-sectional layers, 3D bioprinting ultimately has the potential for constructing functional tissues and organs for in vitro research and implantation in vivo.

Droplet-on-demand bioprinting systems operate by extruding individual droplets through a nozzle onto a substrate in a controlled manner. Droplet quality, consistency, and accuracy of droplet placement are key performance factors which are heavily dependent on nozzle design. The goals of our research include investigating the feasibility of laser ablation-assisted nozzle fabrication and characterizing how specific nozzle design modifications impact print quality of alginate beads, a potential material for tissue engineering applications.

The initial piezoelectric-based DoD system used a resin-printed nozzle, which exhibited undesirable side spray due to roughness within the nozzle interior. After investigating properties of candidate materials and evaluating various methods of nozzle manufacturing, we developed a protocol for excising a nozzle tip of custom diameter from a sheet of acrylic using a Dremel Digilab LC40 laser cutter. The acrylic nozzle tip was successfully integrated into the bioprinting system, where it demonstrated compatibility with the other system components and was used successfully in droplet extrusion. The poster presentation will describe our process and protocol as well as present optimized results with the new nozzle tip.

58: Using Ground Penetrating Radar (GPR) and Soil Conductivity Analysis to find Buried Features from the Jungfernhof Concentration Camp Site in Riga, Latvia

Darren Johnson | Environmental Science | School of Science and Engineering
Faculty Advisor(s): Philip Reeder, Ph.D.

ABSTRACT: Jungfernhof Concentration Camp near Riga, Latvia, used barns and stables from the former Mazjumprava Manor to house prisoners. The camp operated from December 1941 to July 1944, and housed at times over 4,000 Jews. The barns and stables were destroyed in spring 1942 because they were thought to be contaminated with disease after 800 prisoners died during the harsh 1941-1942 winter. A new barracks was constructed in April and May 1942. After the return of the red Army to this area just after World War II, the Soviets demolished the barracks to make way for a military airport runway. One of the main objectives for this research was to locate the remains of camp buildings, including the barracks, now buried beneath a park built on the site in 2020. Methodologies included using ground penetrating radar (GPR), an EM 38-4 electromagnetic soil conductivity meter, soil probing, survivor testimony, and the comparison of World War II air photographs and modern satellite images. GPR and EM 38-4 data revealed reflection patterns very likely associated with the buried foundation of the barracks, as well as other camp buildings. Probing the soils above these reflective anomalies exposed stones that are likely part of the barrack's foundation. Future plans include incorporating the remains of the barracks foundation into a memorial planned at the site by the Locker of Memory Project, and additional GPR and Em 38-4 research to locate other remains of the camp.

59: Determining Whether College Major Predicts Levels of Career Anxiety

Kieran DeLoatch | Biology | School of Science and Engineering
Sadie Rollins | Psychology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): ALex Kranjec, Ph.D.

ABSTRACT: Ever-evolving labor markets have created environments of uncertainty; intensifying college students' worries about future employment. There is still little research when it comes to understanding how specific academic pathways may affect levels of career anxiety. The current study specifically asks, "Do students with majors with relatively predetermined careers (e.g., Nursing) have different levels or dimensions of anxiety than majors with more ambiguous paths (e.g., philosophy)? We use the Future Employment Anxiety Scale (FEAS). It defines future employment anxiety as a multidimensional construct including Personal Ability, Knowledge Application, Career Replaceability, and Social Relations. Approximately 100 college students aged 18 or older will complete a survey requesting demographic information and answer the FEAS questions. Analyses will examine responses for connections between major types and anxiety scores. Prior research, (Wang et al. 2025) found that multidimensional employment anxiety is linked to the ever-evolving labor market and perceived competence. Building on prior research, this study hypothesizes that students with less-structured majors will have higher anxiety, especially in Knowledge, Application, and Career Replaceability domains.

60: Combating Extensively Drug-Resistant Pseudomonas aeruginosa: Additive Efficacy of the Trojan Horse Antibiotic Cefiderocol and Ciprofloxacin

Samantha Ramsey | Biology | School of Science and Engineering
Faculty Advisor(s): Robert Shanks, Ph.D., Emily Young, Ph.D.

ABSTRACT: In 2023 an outbreak of Pseudomonas aeruginosa keratitis (corneal eye infections) was linked to the use of artificial tears purchased online. Patients affected by the outbreak had severe outcomes such as blindness and death. The outbreak strain was considered extensively drug-resistant (XDR) to all topical antibiotics used to treat keratitis. This outbreak highlighted the need for novel treatments to defend against XDR bacteria. This research evaluated in vitro the antibacterial efficacy of ciprofloxacin and cefiderocol separately and their potential synergistic effect against P. aeruginosa keratitis isolates including an outbreak isolate acquired from the Centers for Disease Control and Prevention. Minimum Inhibitory Concentrations (MIC) were found using broth dilution method and epsilometer strips (E-strips) for both drugs. Mueller-Hinton agar or iron depleted Mueller-Hinton broth were used with assays that followed Clinical and Laboratory Standards Institute guidelines. Synergy testing was performed using checkerboard assays or overlapping E-strips and calculating fractional inhibitory concentration indices (FICI) to classify drug interactions as antagonistic, indifferent, additive, or synergistic. For a group of 25 P. aeruginosa keratitis isolates, the median MIC to cefiderocol was 0.094 (µg/ml for MIC values) and 0.190 to ciprofloxacin. The median FICI was 0.755, which indicates an additive effect. A similar FICI was observed with the XDR strain (0.750), with the MIC for

ciprofloxacin going from 32 alone to 8 with cefiderocol. This study supports a positive interaction between these drugs and justifies further development of this combination therapy for treatment of keratitis caused by XDR Gram-negative bacteria.

61: The Tempo of Certainty: The Relationship Between Tempo of Music, Confidence, and Accuracy.

Claire Zwahlen | Psychology | McAnulty College and Graduate School of Liberal Arts
Trevor Henthorn | Psychology/Sociology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Alex Kranjac, Ph.D.

ABSTRACT: It's known that music affects emotions, but little is known about how it directly impacts confidence in task performance. The present study explores the relationship between tempo, confidence, and accuracy. Participants were put into two groups: a slow-tempo music group, and fast-tempo music group. While listening to music, participants completed a series of ten Remote Association Test (RAT) questions of varying difficulties. After each question, the participant rated their confidence. We expect that participants who listen to slow-tempo music will display higher confidence higher than those who listen to fast-tempo music. Additionally, we predict more accuracy errors in the fast tempo music group. These findings may be applied to the real world, potentially in academic settings. For example, professors might use these findings to promote higher test scores by playing slower music in the background as their students complete tasks. Students can use this information to their benefit in studying by playing slower background music, so they feel more confident in the content they are studying.

62: How Far Does the Apple Actually Fall from the Tree? Exploring Rebellion vs. Replication of Parenting Styles

Alayna Smith | Psychology | McAnulty College and Graduate School of Liberal Arts
Jes Cunion | Psychology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Alex Kranjec, Ph.D.

ABSTRACT: Every parent has a different approach to parenting. According to Parenting Styles Theory (Baumrind, D. (1967), approaches fall into four main categories: authoritarian, authoritative, permissive, and uninvolved. The present study explores the extent to which an individual's parental upbringing influences the way they think a child should be parented. To understand how people respond to their parental upbringings, we constructed an online survey with three parts: Part 1 measures childhood experiences with parenting styles; Part 2 measures how people respond to specific parenting scenarios; and Part 3 measures the specific parenting style that people align with most by choice. We are interested in the extent to which an individual may either rebel against, or reproduce the parenting styles of their upbringing, with respect to both their parenting decisions and their parenting preferences. The consistency of responding across these three aspects of our study is of main interest. How an individual responds to their parental upbringing compared to the way they might choose to become

parents themselves, may allow us to better understand the impact of different parenting styles in novel ways.

63: Hemlock Intoxication: Using New Methodologies to Analyze an Ancient Form of Suicide
Paula Metro | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Stephanie Wetzel, Ph.D.

ABSTRACT: Hemlock (Conium Maculatum L.) is a highly toxic plant found across North America, Europe, Asia, and North Africa. Its main toxic component, the piperidine alkaloid coniine, can be fatal when ingested; however, forensic toxicology laboratories lack standardized methods for its extraction and detection. This study aims to develop and optimize a solid phase extraction (SPE) method for the detection of coniine in urine using Liquid Chromatography Triple Quadrupole Mass Spectrometry (LC MS/MS). Synthetic urine spiked with coniine was used to evaluate multiple SPE samples, one of which successfully recovered coniine at low concentrations. This method was then performed on a human urine sample provided by Jennifer Hammers Pathology Lab from a decedent who had committed suicide by hemlock ingestion. Within the decedent's urine, coniine was extracted successfully proving the validation of this method. Method optimization included the incorporation of piperidine as an internal standard to assess accuracy and extraction efficiency. Future work will involve establishing calibration curves and determining the method's limit of detection. This development of a sensitive, reproducible extraction method will support forensic laboratories in accurately identifying coniine in suspected hemlock poisonings.

64: Ancient DNA Analysis of Fossilized Remains from Latvia: Species Identification and the Role of Modern Genome Techniques
Cassandra Ward | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Pamela Marshall, Ph.D.

ABSTRACT: The Holocaust claimed the lives of over 6 million Jewish people with many remains still being found today. Of that number, approximately 70,000 people were killed in the present-day country of Latvia, and many are still lost. Researchers have a responsibility to attempt to find these lost victims in an ethical and respectful manner. The purpose of this project to is evaluate whether biological remains found in a mass burial site in Latvia are human, and if not, to perform species identification on animal remains. Three sets of bone and soil samples were collected from three separate locations in Latvia: Skede, Jungfernhof, and Aizpute. Preliminary soil analyses (pH and PXRD) did not indicate significant bone deterioration attributable to soil conditions. A DNA analysis, examining autosomal DNA, will then be conducted with each bone sample. aDNA (ancient DNA) rarely yields a full profile, so mtDNA (mitochondrial DNA) may be analyzed as well. The final examination of the human samples would be to obtain and analyze a partial DNA profile. No more analysis will be done of any samples that are concluded to be human as to preserve the rest of the bone samples. Samples that are determined to be animals will then undergo an Ouchterlony test to attempt to determine a species. Control samples for

this test will include deer, cow, raccoon, skunk, squirrel, horse and sheep. Results suggesting human origin may contribute to the documentation of Holocaust-era burial sites.

65: To Glow or Not to Glow: Regeneration of Biofluorescence in Salamander Skin Glands
Autumn Carroll | Biology | School of Science and Engineering
Faculty Advisor(s): Sarah Woodley, Ph.D.

ABSTRACT: Salamanders are widely studied for their ability to regenerate lost limbs, tails, and other organs, such as the heart. They also exhibit rapid healing of wounded skin without producing scars. Salamander skin is extremely glandular, having numerous glands with different functions. Many species of salamanders, including Plethodon shermani, have biofluorescent glands. These glands emit green light when excited with blue light, are sexually dimorphic, and are often concentrated on the tail. However, it is unknown if these glands repopulate in the skin when it has healed. Based on previous knowledge of the regenerative abilities of salamanders, we hypothesized that biofluorescent glands are restored when damaged skin heals. To test our hypothesis, we assessed changes in the number of biofluorescent glands on the ventral tail of P. shermani four weeks and two years after removing skin punches. After four weeks, skin was healed, but biofluorescent glands were extremely small and infrequent. After two years, biofluorescent glands were clearly visible in six salamanders, but were not present in two salamanders. Although variable among salamanders, glands were generally smaller and fewer in number compared to initial images. The new glands reappeared in different locations when compared to initial images. Our study indicates that biofluorescent glands must play an important role in salamander biology due to their ability to return after loss, potentially indicating their role in fat stores or intraspecific communication. In the future we hope to further categorize the regenerative ability of biofluorescent skin glands.

66: How Vocal Fold Lesions Affect Vibration and Airflow: A Computational Study
Anitha Niyingenera | Biomedical Engineering | School of Science and Engineering
Norah Delaney | Biomedical Engineering/ Nursing | School of Science and Engineering
Faculty Advisor(s): Rana Zakerzadeh, Ph.D.

ABSTRACT: Vocal fold (VF) phonation is determined by the airflow through the glottal gap that elicits a vibratory response from the VFs, causing oscillation. Excessive VF vibration has been demonstrated in clinical studies to cause masses to develop, known as VF lesions. Benign VF lesions represent common soft tissue pathologies that disrupt normal vibratory behavior, that are characterized by mechanical changes in tissue stiffness as well as geometric protrusions that alter the contour of the glottal channel. The level to which lesion morphology or mechanical properties impact oscillatory disruption remains unclear. The objective of this study is to evaluate the combined effects of lesion size and elasticity on VF vibration using a parametric FSI approach.

A three-dimensional bi-layered VF model with a lesion embedded in the VF cover membrane and the surrounding laryngeal airflow domain was constructed in Fusion 360. Nine cases were developed by varying elasticity values of 40, 200, and 500 kPa and three lesion sizes of 0.2, 0.375, and 0.5 cm; these cases were then compared to a baseline non-lesioned case. The ANSYS software performs coupled FSI simulations by solving the Navier-Stokes equation for the laminar unsteady glottal airflow and the momentum equation for the balance of total forces for the VF and lesion domains. Fluid flow characteristics and mechanical deformation results were compared across all cases to analyze the roles of lesion geometry and stiffness in phonatory dysfunction. Observations show that lesion size primarily affects vibratory disruption, whereas elasticity variations have minimal effects on deformation behavior.

67: DNA Recovery from Blood Under Fingernails Submerged in Water for Varying Periods of Time

Leah Blackford | Biochemistry | School of Science and Engineering
Faculty Advisor(s): Lyndsie Ferrara, Ph.D.

ABSTRACT: Physical assaults in the form of scratching result in the transfer of DNA in the form of blood onto under the victim's fingernails. This study assesses the survivability and STR profile completeness of DNA found under fingernails after submersion underwater for different increments of time. In many cases, the perpetrator will dispose of their victim in bodies of water such as bathtubs or lakes. The survivability of DNA under nails once immersed in water for long time periods is underexplored with limited and older published articles addressing this field. The expectations of this project are to extract, quantify, amplify, detect, and analyze this DNA using standard forensic DNA protocols. Silicon hands with glued-on acrylic nails treated with blood underneath will be submerged underwater. Profiles will be compared to a reference sample, and profiles are expected to be produced from the low amount of DNA. Analyzing DNA from under nails after water submersion can aid in water related homicide investigations.

68: How do toddlers with and without autism explore and use objects during toy play in the home environment?

Natalie Rees | Speech-Language Pathology | Rangos School of Health Sciences
Faculty Advisor(s): Abigail Delehanty, Ph.D., CCC-SLP

ABSTRACT: Children on the autism spectrum have been observed to explore and play with objects differently than children with typical development. For example, they may focus intently on objects, gather them, or sorting and organize them into rows. Children with autism may also show delays in symbolic and imaginary play with their peers. For these reasons, speech-language interventions for children on the autism spectrum often target functional, symbolic, social, and pretend play. However, very little research has examined play development in very young autistic children. The purpose of this study was to describe and compare patterns of object exploration and play in 210 toddlers identified with autism, developmental delays, or typical development. In this study, the author of this proposal coded actions with objects during

toy play from video-recorded home observations at 20 months of age. Videos were coded using Noldus Pro Observer XT software for exploratory, functional, constructive, symbolic, and imaginative play actions. This study includes comparison groups of children with and without autism, which expands an earlier project that included 50 toddlers on the autism spectrum. Findings from this study will deepen understanding of the development of play in very young children on the autism spectrum. It is important to increase our understanding of these skills so that speech-language pathologists can build on children's strengths, help them make meaningful connections with other people, and take a neurodiversity-affirming approach to teaching social interaction and play.

69: Withdrawn

70: Synthesis of Novel Benzofuran Aza-BODIPY Dyes for Bioimaging

Kayla Pugliese | Chemistry | School of Science and Engineering
Faculty Advisor(s): Thomas Montgomery, Ph.D.

ABSTRACT: Bioimaging is a vital, non-invasive technique that plays a crucial role in the identification and treatment of diseases. Among the techniques available, fluorescence imaging has emerged as a powerful method, using molecules capable of absorbing and emitting light to illuminate biological systems. For clinical usage, these molecules must be water-soluble, cost-effective, and exhibit minimal side effects. To achieve deep tissue tumor imaging, fluorescence dyes must operate within the near-infrared (NIR) region, as NIR wavelengths penetrate tissues effectively while minimizing autofluorescence issues associated with longer light wavelengths. Aza-dipyrromethene (aza-DIPY) cores represent an underexplored class of NIR-fluorescent molecules with excellent tunability and comparably low toxicity. In this study, groups of novel benzofuran substituted aza-BODIPYs are synthesized making use of a surprising intramolecular cyclization.

71: Detection Divide: Evaluating AI Recognition Accuracy Between Professors and Students

Abigail Tills | Psychology | McAnulty College and Graduate School of Liberal Arts
Roland Cox | Psychology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Alexander Kranjec, Ph. D.

ABSTRACT: As AI-generated writing becomes more common in academic settings, both students and instructors are increasingly expected to recognize and respond to it. However, the extent to which professors and students might differ in their effectiveness at identifying AI-generated text remains unclear. In order to explore and understand differences about AI detection ability between these groups, we presented participants who were either students or instructors with 10 paragraphs, 5 of which were written by humans and 5 of which were generated by AI. AI-generated paragraphs were based on each human-written paragraphs to match their writing style. Each text differed in thematic content and was presented one at a time in a randomized order. Participants attempted to identify whether each paragraph was written by AI and rated

their confidence in their answer as well as the quality of the writing on a 5-point Likert scale. Between-group analyses will investigate differences in accuracy between professors and students in regard to identifying which paragraphs are generated by AI. Secondary analyses will be conducted investigating differences in detection confidence and perceived quality for each paragraph. If professors perform poorly or worse than students in accurately identifying AI-generated writing, it could suggest that AI-related punishments should be reconsidered, given the potential for misidentification. Understanding differences between generational groups can reveal the limits of AI detection and force the education system to rethink how learning, integrity, and evaluation should function in an increasingly AI-driven world.

72: Fear on Demand: Does Anxiety Drive Preferences for True Crime Media Consumption?
Alexandria Ponzetti | Psychology | McAnulty College and Graduate School of Liberal Arts
Riley McDonough | Psychology | McAnulty College and Graduate School of Liberal Arts
Jashyra Saunders | Psychology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Alexander Kranjec, Ph.D.

ABSTRACT: True crime media is widely consumed in the United States in the form of podcasts and documentaries. True crime seems particularly good at drawing people into a world different than their own. But why in particular is this genre so appealing? This study looks at traits associated with true crime consumption (e.g., anxiety) and motivations for engaging with true crime media, such as watching for the kind of entertainment true crime affords (experiencing realistic "horror" in a safe setting) versus watching to learn about personal safety. Approximately 100 participants 18 and older will complete an online survey. The survey consists of 20 imaginary situations where participants will rate how anxious they would feel using a 5-point scale. Participants will then be asked to describe their true crime consumption in terms of frequency, form (media and content types), and personal motivations for consumption. Anxiety levels will be compared between people who watch more or less true crime and correlated with variables associated with true crime viewing preferences. The goal of this study is to better understand how true crime media consumption relates to feelings about anxiety in daily life.

73: Evaluating DNA Recovery from Compromised Bone Samples Using the Applied Biosystems™ RapidHIT™ ID System and RapidINTEL™ Plus Cartridges
Kendall Mallarnee | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Pamela Marshall, Ph.D.

ABSTRACT: Rapid DNA technology offers the ability to generate a DNA profile in under two hours, providing a potential advantage in situations requiring rapid human identification. Although this "lab on a chip" system is most commonly used on buccal swabs, its application to bone is equally critical, particularly in disaster scenarios where remains are degraded and conventional DNA profiling requires significant processing time. Limited research exists on the performance of the novel RapidINTEL™ Plus Cartridges when challenged bone samples are used. This study evaluates the Applied Biosystems™ RapidHIT™ ID System on bones exposed to

heat and water, mimicking real-world scenarios, to determine whether reliable DNA profiles can be generated. Bones will be degraded using a kiln or submerging in ultrapure water, then pulverized to two substrate consistencies, rock salt and fine powder, to compare Rapid DNA preparation methods. The surface area of the bone will differ between the two methods, possibly affecting the DNA yield. Resulting DNA profiles will be assessed for allele recovery and overall profile quality and compared between methods to evaluate the cartridge's performance and identify when conventional testing may be more suitable. Expanding the understanding of RapidINTEL™ Plus Cartridge capabilities will support the development of faster, effective identification workflows for degraded remains.

74: Data Acquisition for Compton Polarimetry

Matthew Thomas | Physics | School of Science and Engineering
Faculty Advisor(s): Fatiha Benmokhtar, Ph.D., Alexsandre Camsonne

ABSTRACT: Jefferson lab has a uniquely high electron beam polarization. High accuracy experiments require constant measurement of the electron beam polarization since it can vary slightly with time during the experiment. Measurement of the observables is proportional to beam polarization- less-accurate monitoring with high beam polarization causes larger errors in the data. The best way to constantly monitor this is with a Compton polarimeter. The Compton polarimeter takes the electron beam and runs it through a photon target (laser). This process can cause electrons and photons to scatter. Through detection of the scattered photons and electrons, you can calculate the beam polarization with high accuracy. This is non-invasive, allowing for continuous precision measurement without affecting the experiment- making this technique appealing for all projects at the lab.

75: Using Ground Penetrating Radar (GPR) to Locate Buried Features From the Holocaust in the Livas Cemetery in Liepaja, Latvia

Joe Reeder | Environmental Science | School of Science and Engineering
Faculty Advisor(s): Philip Reeder, Ph.D.

ABSTRACT: During World War II, Nazi Germany and local collaborators repurposed Jewish cemeteries to bury Jews murdered in the Holocaust in mass graves. Many of these cemeteries possessed a long history and were in some cases used as Jewish burial grounds for centuries. The Jewish section of the Livas Cemetery in Liepaja, Latvia is a location where historical accounts document the burial of Jews killed in the Holocaust in mass graves. This study investigates whether the location of these mass graves can be found, and if the buried remains of buildings from the past history of the cemetery can be discovered. The methodology included ground penetrating radar (GPR), archival research, survivor testimony, and historic map/satellite image comparison. GPR from two areas of the cemetery devoid of gravestones indicates subsurface reflection patterns that may be associated with a mass grave or the buried remains of a building. Archival sources and testimony indicate that in June 1941, Jews were killed and

buried in a nearby park, exhumed weeks later and reburied in Livas Cemetery. Additionally, a 1903 map identified a powder storage building near this location, thus complicating interpretation of the reflection patterns. These results highlight the importance of integrating geophysical and historical data and point towards the need for additional archival and geophysical research in other areas of the cemetery, and in other cemeteries, to clarify if mass graves and other buried features associated with the Holocaust are present.

76: Chasing Strangeness with Electron Beams

Cooper Bell | Physics | School of Science and Engineering
Nathan Carpenter | Physics | School of Science and Engineering
Faculty Advisor(s): Fatiha Benmokhtar, Ph.D.

ABSTRACT: Dihadron studies of semi-inclusive deep inelastic scattering (SIDIS) of electrons off nucleons have been the subject of thorough theoretical and experimental investigations during the last decade. Spin-orbit correlations between target and current fragments can be tested by studying back-to-back target fragmentation and current fragmentation hadrons in coincidence. Such measurements on target-fragmentation h+ were performed with the clas12 detector in Hall B at Jefferson Laboratory. Building upon prior preliminary research into the non-zero single spin asymmetries of these reactions, for the first time, the Ring Imaging Cherenkov detector (RICH) has been used in analysis of ep -> e'p'h+X channels (where h+ is any positively charged hadron) to differentiate between particles. Using this new detector, analysis was conducted of the single spin asymmetries of the ep->e'p'h+X channels including the sin(delta-phi) modulations, where delta-phi is the difference between the proton and hadron azimuthal angles. Multidimensional analysis of these channels will be investigated further.

77: Application of the MiSeq FGx™ Next-Generation Sequencing System for the Deconvolution of DNA Mixtures

Renee Mercer | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Lyndsie Ferrara, Ph.D.

ABSTRACT: Sexual assault kit (SAK) evidence often contains highly imbalanced mixtures of male and female DNA, complicating the generation of a male profile when contributors share alleles. Massively Parallel Sequencing (MPS) offers sequence-level data and increased sensitivity that may assist in the interpretation of complex mixtures compared with traditional Capillary Electrophoresis (CE). This study evaluates the ability of the MiSeq FGx™ system to recover informative male profiles from contrived and casework-like SAK mixtures. Known mixtures will be prepared using male and female buccal swabs combined at 95:5, 90:10, 60:40, and 50:50 ratios, ensuring the presence of shared alleles as determined from prior single-source profile generation. Casework-like mixtures will be prepared by adding seminal fluid to vaginal swabs to generate dilutions ranging from 1:10 to 1:250. All mixture samples will undergo extraction, quantification, amplification, and analysis by both CE (GlobalFiler™ PCR Amplification Kit) and MPS (ForenSeq™ DNA Signature Prep Kit, Primer Mix A). Data from both platforms will be

compared in terms of allele recovery, profile completeness, and detection of the male contributor. It is anticipated that MPS will provide more interpretable and comprehensive profiles across all mixture types. Continued evaluation of MPS for SAK mixtures may enhance mixture deconvolution strategies, reduce processing delays, and improve the effectiveness of SAK testing workflows.

78: Identification of Biofilm-associated Genes in Pseudomonas fluorescens via Transposon Mutagenesis

Anthony Valletta | Biology | School of Science and Engineering
Faculty Advisor(s): Wook Kim, Ph.D.

ABSTRACT: Biofilm formation is responsible for most chronic bacterial infections in humans, as these complex bacterial communities confer resistance to chemical and immunological interventions. Therefore, it is crucial to understand the spatial structure of biofilms to develop more effective therapeutics and reduce the burden of bacterial infections. A key contributor to biofilm formation is the extracellular matrix (ECM), a network of excreted proteins, lipids, polysaccharides, and DNA. Under biofilm-forming conditions, this matrix acts as scaffolding to hold the colony together and provide protection from the environment. In Pseudomonas fluorescens, activated ECM-associated genes result in a rugose, or wrinkly, colony morphology. This phenotype is likely the result of secreted exopolysaccharides, which act as an extracellular glue to hold individual cells together. This study aimed to identify ECM genes by randomly mutagenizing a biofilm-forming strain of P. fluorescens using a transposon and selecting for mutants that no longer produce the rugose phenotype. The genomes of selected mutants were analyzed to identify specific biosynthetic genes associated with ECM components. Future studies will determine how the identified genes contribute to the spatial structure of P. fluorescens biofilms.

79: The People in the Middle of Intergenerational Living: Staff Experiences Supporting Older Adults and College Youth Under One Roof

Haley Yacoviello-Andrus | Health Sciences | Rangos School of Health Sciences
Faculty Advisor(s): Kasey Stepansky, CScD, OTR/L, C/NDT, CBIS

ABSTRACT: Intergenerational living (IGL) in older adult communities provides an environment for older adults to live as neighbors with college age youth; decreasing social isolation. Occupational therapy can advocate for the integration of IGL to support social participation and quality of life outcomes. To support advocacy efforts, it is critical to understand staff perceptions of IGL since benefits and challenges remain unknown. An exploratory study was completed to assess the benefits and challenges of novel IGL communities from the perceptions of staff including administrative staff, clinical staff, and facilities management to determine how this intergenerational context impacts job satisfaction. Survey data reported includes quantitative data regarding benefits, challenges, and job satisfaction. Additionally, staff identified benefits and challenges in their own words to describe their lived experience. Preliminary analyses show

that IGL staff have high job satisfaction. They felt most satisfied with the value of their work and the friendly atmosphere; however, almost half (46%) of staff reported feeling burnt out. Staff identified benefits of IGL to include decreasing loneliness in older adults and the value of positive intergenerational relationships. Identified challenges included maintaining staff interest in intergenerational initiatives and funding. Facilities with IGL offer opportunities to decrease loneliness and promote quality of life through participation in leisure and social occupations across generations. Occupational therapy practitioners must advocate at a population level to promote IGLs, and provide education to IGL staff to support meaningful intergenerational engagement.

80: The Impact of 9/11 on the Rehnquist Court

Cami Claytor | Political Science | McAnulty College and Graduate School of Liberal Arts
Brennan Baker | Political Science | McAnulty College and Graduate School of Liberal Arts
Phia Feigh | Political Science | McAnulty College and Graduate School of Liberal Arts
Reina Green | Political Science | McAnulty College and Graduate School of Liberal Arts
Sarah Hazo | Political Science | McAnulty College and Graduate School of Liberal Arts
James Sorg | Political Science | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Sara Grove, Ph.D., J.D.

ABSTRACT: At the start of the George W. Bush administration, terrorists attacked the United States on September 11, 2001. These attacks raised questions about national security which led to legislation aimed at protecting Americans. However, newly-enacted laws restricted civil liberties and civil rights in the name of security.

This project examines how the U.S. Supreme Court decided civil liberties and civil rights cases arising from post-9/11 legislation. Under the leadership of Chief Justice William Rehnquist, the Court decided cases involving detainment and surveillance of individuals prosecuted under the newly-passed legislation. The project will discuss the Court's rulings and the impact of these decisions over the past two decades.

81: Exploring Youth Sport Coaches' Perceptions and Experiences of Sport Specialization: A Qualitative Focus Group Study

Madeline Hollingsworth | Health Sciences | Rangos School of Health Sciences
Faculty Advisor(s): Justin DiSanti, Ph.D.

ABSTRACT: To understand why youth athletes commit to sport specialization despite established risks, our lens of inquiry must expand beyond the individual's attitudes and behaviors, to account for the influences of their surrounding stakeholders and environment. One key stakeholder group are youth sport coaches, who play a meaningful role in youth athletes' sport decisions and experiences.

Therefore, the purpose of this study was to qualitatively explore perceptions of youth sport coaches to identify strategies, barriers, and points of tension related to a coach's role in guiding athletes toward appropriate sport pathways.

Twenty youth sport coaches participated in this study, split between 6 virtual focus group sessions. A semi-structured interview guide ensured that key topics were addressed (e.g., barriers and facilitators of selecting a sport pathway). Each interview was analyzed through a phenomenological, inductive consensual qualitative research approach to identify emerging themes.

Eight main themes emerged to characterize responses across focus groups. The resulting nested thematic structure detailed broad and specific factors of these coaches' practical understanding of sport specialization, including how coaches define specialization, what may lead athletes to choose a specialized or multi-sport pathway, and how characteristics of the athlete and their context may influence their experiences.

Our results indicate that coaches perceive their athletes as under pressure to specialize, stemming from sources both internal and external. By identifying tension points and strategies for navigating these challenges, coaches can make more targeted efforts in their individual approach and in the environment they create.

82: An Examination of Human Perception of Time as it Relates to Eyewitness Statements

Alexandra Hess | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Matthew Regentin, M.S.

ABSTRACT: Constructing timelines, based on witness statements, digital records, and other evidence, is a key step in the investigative process. Witness statements are heavily relied upon even though memories and experiences are often inaccurate and inconsistent, diminishing their reliability. There has been extensive research on the improvement of reliability of witness statements, although there is limited research on how people's sense of time is altered based on their experience of stressors. Experienced time has been a topic of recent study, with psychologists attempting to discern environmental and cognitive factors that impact time perception. This study examines how people perceive time under neutral circumstances versus circumstances involving unexpected environmental stressors. Participants will be asked to remain in a room for a short time interval of fifteen minutes. One group of participants will experience external disturbances during this time. Participants will then provide written responses to a series of survey questions regarding their perceived time during the study. Perceived time estimates will be compared to the actual elapsed time to determine trends of accuracy and variability in responses across differing conditions. The findings of this study may be used to inform investigators of the weight of time statements from witnesses when constructing investigative timelines. With a clear understanding of time perception under

neutral and high stress conditions, investigators can more effectively utilize witness statements to aid in the investigative process.

83: Pressure-Sensitive Steering for Hands-Free Operation of an Omnidirectional Wheelchair
Ashley Mingrino | Biomedical Engineering | School of Science and Engineering
Faculty Advisor(s): John Viator, Ph.D.

ABSTRACT: Over one million individuals in the United States rely on mobility aids to maintain independence in daily activities, yet maneuverability challenges persist in constrained environments that require frequent repositioning. This study presents the development and feasibility evaluation of a hands-free pressure-sensitive steering interface integrated into an omnidirectional wheelchair to enhance accessibility, independence, and multitasking capability for users with preserved trunk control. The system employs four bending beam load cells mounted beneath the seat to detect dynamic shifts in body pressure to meet user needs for hands-free mobility. Sensor signals were amplified and processed by a Teensy microcontroller to estimate the user's center of mass. This data generated joystick-equivalent X and Y controls to translate trunk leans to wheelchair movement. Calibration established a linear load-voltage relationship for each sensor. During validation, the system estimated seated weight at 144.79 lbs compared to a true weight of 150 lbs, corresponding to an absolute error of 5.21 lbs (3.47%). Across eight directional leaning trials, the mean measured seated weight was 137.03 ± 26.77 lbs. The platform achieved maximum center of mass displacement ranges of +1.7/-1.6 inches (X) and +1.3/-2.1 inches (Y), with mean calibrated displacements of 0.01 ± 1.31 inches (X) and -0.64 ± 1.22 inches (Y). Directional trunk leans produced distinct, interpretable control signals across tested conditions. Although sensor saturation and directional asymmetry were observed due to hardware limitations, results demonstrate the feasibility of posture-based, hands-free wheelchair steering.

84: Feature Prioritization to Improve User Satisfaction of the WHEEL-LEARN Website: A Healthy Lifestyle Behavior Intervention for People with Spinal Cord Injury
Emily Talierco | Health Sciences | Rangos School of Health Sciences
Jacob Orlofske | Computer Science, Philosophy | School of Science and Engineering
Faculty Advisor(s): Theresa Tartamella, Ph.D., PT, DPT, William Gibbs, Ph.D.

ABSTRACT: Over 305,000 people live with a spinal cord injury (SCI) and 50% do not engage in physical activity (PA). WHEEL-LEARN is a web-based lifestyle behavior intervention to increase PA in people with SCI. The study goal was to create a website for the WHEEL-LEARN intervention that met the needs of users with SCI.

This mixed methods study conducted feature prioritization of usability testing data of the WHEEL-LEARN website in people with SCI and healthcare professionals. Participants used a "think aloud" approach while completing a series of tasks during usability testing, followed by completion of the System Usability Scale (SUS) and Post-Study System Usability Questionnaire

(PSSUQ). Descriptive statistics were calculated for SUS and PSSUQ. Feature prioritization enabled decisions on the most important website components to iteratively redesign. Feature prioritization was based on user satisfaction, research priorities, and cost of implementation. Participants (n=4) with SCI were manual wheelchair users, two complete and two incomplete injuries; one cervical, two thoracic, and one thoracolumbar neurological level. Healthcare professionals (n=5) were also included, three females and two males. Average scaled SUS and PSSUQ scores were calculated for participants with SCI and healthcare professionals. Feature prioritizations identified, were the need for progress tracking, varied learning methods, robust accessibility options, and content reorganization.

To improve user satisfaction, iterative website refinements included adding a goal and PA tracker, a custom accessibility tool, and layout changes. Usability testing led to a more intuitive website experience, with potential to engage people with SCI to meet PA guidelines.

***85: Glow and Behold: Investigating Salamander Skin Proteins**

Dasara Slova | Biology | School of Science and Engineering
Faculty Advisor(s): Sarah Woodley, Ph.D, Michael Kardos

ABSTRACT: Salamanders have numerous specialized skin glands that secrete defensive compounds as well as pheromones. In several species, biofluorescent skin glands (BFGs) are present in both the dorsal and ventral tail, with fluorescence concentrated along the ventral tail surface. Although biofluorescence has been documented across multiple amphibian lineages, the molecular source and functional significance of salamander fluorescence remain largely unknown. Understanding the biochemical basis of this fluorescence is essential for determining its functional significance. This study aims to characterize the protein components of BFGs and other skin glands from dorsal and ventral tail tissue. To harvest gland products, tail tissue was homogenized in Amphibian Ringer's solution supplemented with protease inhibitors to preserve protein integrity. Samples were centrifuged to isolate soluble protein fractions, and total protein concentration was then quantified. Proteins were then isolated using SDS-PAGE to analyze banding patterns and identify distinct molecular weight ranges. We expect to observe distinct protein bands in BFG-rich tissue, suggesting that BFGs produce different protein components than other granular glands that surround the BFGs. Isolating these proteins will provide foundational insight into the biochemical nature of salamander biofluorescence and establish a framework for future studies investigating the BFGs functional role and how these glands contribute to salamander's biological roles and environmental factors.

86: 3D Printing and Polymer Recycling: Mechanical Breakdown

Domenico Fusca | Biomedical Engineering | School of Science and Engineering
Dominic Dezort | Biomedical Engineering | School of Science and Engineering
Faculty Advisor(s): Kimberly Williams, Ph.D., Leda Kloudas, Ph.D.

ABSTRACT: Commercially used plastic waste is accumulating in office buildings, hospitals, research labs, and our very own homes. The products used in each of these settings are often used once and then thrown away or recycled inefficiently. Polylactic acid (PLA) in the form of 3D printable filament and Polyethylene Terephthalate (PET) as syringes and soda bottles are two types of plastics used every day in different settings that can be easily repurposed into extruded filament for 3D printing applications. This project focuses on protocols to break down these materials for extrusion. Because each material has a different structure and thickness, unique protocols were developed. For the PLA, filament strands were cut into sections by hand and placed into a Sew-Eurodrive grinder for further breakdown providing refined samples. The same grinder was used for the breakdown of syringes, but because of their different shape and material properties, another preliminary size reduction was required – a ratcheting cutter provides a simple way to separate the syringes into parts that can easily fit into the grinder. The PET soda bottle protocol began with cutting them by hand and separating them into two categories depending on thickness. The thinner sections were processed with a commercial paper shredder and blender, and the thicker portions were processed with the blender solely. Two unique protocols were developed for PET to produce viable samples. The optimization of parameters as well as continued sample production will allow for an efficient extrusion protocol to be developed in the future.

87: Remote Sensing of Turbidity

Rachele Lavagno | Civil Engineering | School of Science and Engineering
Faculty Advisor(s): David Kahler, Ph.D.

ABSTRACT: Remote sensing allows periodic measurement of water quality parameters without installed specialized equipment. Turbidity is a key water quality parameter that is needed for environmental standards and domestic use. Previous algorithms based on band differences and ratios to calculate turbidity were successful with larger rivers (over 100 m). The purpose of this research train a machine learning algorithm to estimate the turbidity of smaller rivers (less than 100 m). We are beginning with a selected area of the Olifants River, South Africa, where we have long-term turbidity sensor data and images from Sentinal-2. With image data, we used a Convolutional Neural Network (CNN) in MATLAB to train the machine learning program. CNNs are particularly useful for finding patterns in images to classify or recognize objects and categorize images. The model would be designed to map a relationship between images and turbidity. By using this high-level programming language, we aim to achieve a high degree of predictive accuracy. This research demonstrates the potential for a low cost and high frequency

water quality monitoring, supporting better informed water management and compliance with environmental standards in regions where physical monitoring is limited.

88: Strengthening Forensic Facial Reconstruction: Current Practices, Limitations, and Paths Forward

Sydney Garmus | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Pamela Marshall, Ph.D.

ABSTRACT: Forensic facial reconstruction is the process of shaping a face onto a human skull using specialized techniques and bio-anthropological information. To do this, facial soft tissue thickness (FSTT) measurements are taken from a population and averaged to approximate a visual depiction of what that person might have looked like when alive. Though one of the earliest forensic identification techniques, facial reconstruction is not considered a primary source of identification in cases. Therefore, the purpose of this research was to conduct a structured review of current literature, identifying the limitations and optimization opportunities of facial approximation in forensic science. Databases such as ScienceDirect, SciFinder, and PubMed were used to find articles with information concerning facial reconstruction. Additionally, for articles specifically focused on primary research of geographical populations, data was collected pertaining to the geographical population of study, the publication date, the country of publication, as well as the method used for FSTT measurement collection. Analysis of these variables allowed for an understanding of existing gaps in current facial reconstruction research. This study aims to address the limited accessibility of imaging-based FSTT methods, the lack of standardization of newer FSTT methods, unbalanced utilization of methods across populations, as well as skewed focus towards certain geographical areas in publishing. Continuing to identify these limitations and create solutions will allow for the technique's optimization, creating opportunities of use as an investigative aid for missing persons, as well as victims of natural disasters, wars, massacres, and mass gravesites.

89: Bioethics as Seen on Stage: Can Theater Change the World?

Sarah Cavanaugh | Health Sciences | Rangos School of Health Sciences
Faculty Advisor(s): Laura Engel, Ph.D.

ABSTRACT: This research paper investigates the extent to which theatrical works can influence societal reform through the depiction of bioethical dilemmas through time, analyzing performative theater's ability to change the world through great societal impact. By examining four plays from distinct historical periods—Philoctetes by Sophocles (409 BCE), Whose Life is it Anyway? by Brian Clark (1972), The Waiting Room by Lisa Loomer (1994), and Next to Normal by Brian Yorkey (2010)—this study analyzes how theater has consistently engaged with evolving issues of medical ethics and patient autonomy. Each play presents ethical conflicts reflective of the medical and social dilemmas of its time, including physician and pharmaceutical responsibility, euthanasia, women's health, and mental health stigma. These theatrical representations contributed to heightened public awareness and, in several cases,

corresponded with producible, real-world developments; some of these developments included the early formation of medical ethical standards, legal decisions affirming patient autonomy, increased focus on women's health research, further regulations on pharmaceutical practices, and modern movements aimed at reducing stigma surrounding mental illness. While theater does not give direct solutions to these bioethical challenges, it functions as an influential societal force that has inspired public action towards developing collective, societal responses to bioethical dilemmas. By following the historical relationship between pieces of theatrical work and real-world reform, this study concludes that theater possesses the ability to influence societal progress in bioethics by facilitating societal response to the issues that they portray.

90: Forgiveness as a Pathway to Mental Well Being: The Role of Christian Faith in Adults

Sophie River | Psychology | McAnulty College and Graduate School of Liberal Arts
Karen Jaramillo | Psychology | McAnulty College and Graduate School of Liberal Arts
Zhanyang Shen | Psychology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Alexander Kranjec, Ph.D.

ABSTRACT: Forgiveness is increasingly conceptualized as a dispositional psychological process associated with reduced emotional distress, improved relational functioning, and enhanced overall well-being. Emotional well-being refers to a person's ability to understand, manage, and express emotions in a healthy way navigating life's challenges. Although Christian traditions emphasize forgiveness as a central moral and relational virtue, limited empirical work has examined forgiveness as a measurable dispositional construct within faith-identified adults or explored whether it relates to mental well-being beyond general religious intensity. The present study investigates the relationship between dispositional forgiveness and mental well-being among Christian-identifying adults, with religious intensity included as a contextual individual-difference variable. Using a cross-sectional survey design, participants (ages 18+) will complete validated measures of religious centrality (Centrality of Religiosity Scale), dispositional forgiveness (Heartland Forgiveness Scale), psychological well-being (Warwick–Edinburgh Mental Well-Being Scale), and psychological distress (PHQ-4). Correlational analyses will examine the extent that forgiveness in the self, other, and situational domains predicts well-being and reduced distress. It is hypothesized that higher levels of dispositional forgiveness will be positively associated with greater well-being and inversely associated with anxiety and depressive symptoms, supporting the idea that forgiveness functions as a resilience-related trait within faith-identified adult populations.

91: The Effect of Heat and Fire on the Ability to Identify and Characterize Puncture Wounds and Blunt Force Trauma

Olivia Kilbourne | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Matthew Regentin, M.S.

ABSTRACT: In criminal death investigations, attempts to conceal evidence and the manner of death of victims may involve the use of fire as this alters a victim's physical evidence. Specifically, understanding how heat and fire impacts puncture wounds on a victim can help investigators understand what wounds were inflicted on the victim before burning. Violent fire related deaths are relatively rare, which has limited the amount of experimental research in this field. This can be contributed to the complexity and ethical limitations associated with experimental fire exposure on human remains. In this experiment, porcine tissue samples were inflicted with controlled puncture wounds and blunt force trauma injuries followed by direct flame impingement for pre-established time intervals. The porcine samples were examined to determine how the soft tissue was affected by the flame and to assess post-burn wound identifiability. This research will aid forensic professionals in the identification and analysis of pre-burn trauma.

92: From Panic to Adaptation: A Mixed-Method Analysis of University Faculty Perspectives on AI

Luke Masters | Information Systems & Technology | A.J. Palumbo School of Business Administration
Faculty Advisor(s): Pinar Ozturk, Ph.D.

ABSTRACT: The rapid emergence of generative AI tools, particularly following ChatGPT's November 2022 launch, has sparked intense debate within higher education about academic integrity, pedagogical innovation, and teaching practices. This study investigates how university faculty attitudes toward artificial intelligence evolved from 2020 to 2025, capturing perspectives before and after widespread AI adoption. Using a mixed-methods approach, we analyzed 3,866 posts from eight academic subreddit communities to identify temporal patterns, thematic concerns, and sentiment variations regarding AI in academia.

Our methodology combined computational and qualitative techniques. We collected AI-related discussions using Python and the Reddit API, then conducted sentiment analysis to classify posts by emotional valence. To ensure methodological rigor, we hand-coded 250+ posts using a 19-category coding scheme developed through iterative refinement. Categories included AI-generated work detection, academic integrity concerns, pedagogical strategies, course redesign, faculty burnout, and AI benefits. We analyzed highly-engaged posts (top 20 positive and negative by upvotes) alongside a random sample to capture prominent and representative perspectives.

Findings reveal shifts in faculty discourse following ChatGPT's release. Discussion volume increased 485% (from 16 to 95 posts monthly), with 2023 showing 184% more posts than 2022. Academic integrity concerns dominate, appearing in 33% of posts and 45% of highly-negative posts, though declining from 51% in 2020 to 23% in 2025, suggesting adaptation. Qualitative coding revealed complex attitudes: academic integrity appeared equally in positive (43.5%) and negative (40%) high-engagement.

93: Congenital Heart Disease in Pediatric Patients

MaryKate Leon | Nursing | School of Nursing
Madyson McGowan | Nursing | School of Nursing
Tess Hopkins | Nursing | School of Nursing
Faculty Advisor(s): Rebecca Kronk, Ph.D., MSN, CRNP, FAAN CNE, ANEF

ABSTRACT: Due to major medical advances, more than 90% of newborns with congenital heart disease (CHD) now survive into adulthood. Although mortality has decreased substantially, many of these individuals continue to face emotional, behavioral, and social challenges at higher rates than their healthy peers. This study examined whether children with CHD and co-occurring developmental or behavioral problems (N = 830) receive less adequate care within a well-functioning healthcare system compared to those without such problems, whether they experience a greater number of adverse childhood experiences (ACEs), and whether adolescents ages 12–17 receive services that support transition to adult healthcare.This study used secondary data from the 2023 National Survey of Children's Health and was limited to children ages 5–17 diagnosed with CHD. Those without CHD were excluded. Chi-square analyses assessed associations among developmental or behavioral problems, ACE exposure, healthcare adequacy, and receipt of transition services. Results showed a small association between co-occurring developmental or behavioral problems and receiving less adequate healthcare, and a small association with receipt of transition support services. In contrast, a moderate association emerged between developmental or behavioral problems and greater exposure to ACEs. Overall, findings suggest that medical complexity and life stressors frequently intersect for children with CHD. Greater adversity was also associated with household financial strain, further complicating chronic condition management. These results highlight the importance of addressing social and family context alongside medical needs when supporting children with CHD.

94: The Impact of Fire Exposure on the Stability & Detonation Risk of PETN Core Detonating (DET) Cord

Tessa Haffey | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Matthew Regentin, M.S.

ABSTRACT: Catastrophic events such as the West, Texas explosion and the Beirut Port disaster have highlighted the potential for otherwise stable explosives to detonate unexpectedly under fire exposure. This ongoing study systematically investigates the impact of fire on PETN-core

detonating (DET) cord, employing a two-stage approach. Stage 1 assesses the degradation of PETN under both direct and indirect flame exposure. Stage 2 will investigate whether mechanical insult (friction or impact) during flame exposure can cause unintended detonations. Post-burn PETN degradation products were analyzed using liquid chromatography-tandem mass spectrometry (LC-MS/MS). A multimode ionization (MMI) source operated in atmospheric pressure chemical ionization (APCI) negative mode was employed. It is hypothesized that PETN decomposition products and nitrogen dioxide (NO_2) off-gassing during thermal exposure may contribute to localized pressure increases and hot-spot formation. This process could weaken the structural integrity and increase the risk of detonation following mechanical perturbation. In Stage 1, 1.25-inch segments of 25-grain PETN PRIMACORD were subjected to direct flame from a roofing torch for varying durations (3 min, 1 min, 45 s, 30 s, 15 s), with each condition replicated three times (n = 15). Temperature measurements and immediate post-burn radiographic analyses were conducted. The samples were then cooled and sealed in paint cans. By elucidating the relationship between thermal degradation chemistry and secondary initiation risk, this work provides critical empirical data to inform improved safety protocols for handling and disposal of DET cord. The primary goal is to mitigate accidental detonations and associated casualties.

95: Detection and Retention of Ethyl Mercaptan in Crime Scenes: Forensic Implications in Propane Exposure Cases

Emily Mong | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Matthew Regentin, M.S., IAAI-CFI1

ABSTRACT: Since 1937, ethyl mercaptan (ethanethiol) has been added to propane as an odorant to facilitate leak detection. Following an explosion involving this fuel, mercaptan would typically be expected in post blast debris; its absence may suggest untreated fuel or alternative leak origins. However, no validated forensic method currently exists to detect mercaptan in post blast materials. In this study, cotton t-shirts and a fleece blanket were subjected to propane and an ignition source for post-blast evaluation of materials for detection of mercaptan. Utilizing charcoal extraction and gas chromatography – Mass Spectrometry, preliminary testing successfully identified ethyl mercaptan in pure standards. The data gathered from testing pure mercaptan shows feasibility, however tests have not yet been successful on exposed textile samples. Possible sample loss or failure of detection could be contributed to combustion loss, volatility, system artifact, or co-elution during chromatography. Continued method refinement, including optimized extraction conditions, improved sorbent materials, and expanded testing across additional matrices, is needed. Establishing a reliable post blast detection method for mercaptan would strengthen forensic fire investigations and aid in determining the source and nature of gas related explosions.

96: Deceptive Discourse: A Forensic Linguistic Analysis of Kenneth Bianchi's Post- Incarceration Communication

Travisia Wyatt | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Pamela Marshall, Ph.D.

ABSTRACT: Forensic linguistics, a study of forensic science, is the analyzation of text via style, vocabulary, speech patterns and usage to determine authorship, threat assessment, false confession analysis, linguistic profiling, etc. One of the highest profile uses of forensic linguistics is the Unabomber Theodore Kaczynski. Comparing letters written by Kaczynski provided by his brother, analysts identified him as the author of his manifesto. Deception detection is a sub-category of linguistic studies. Deception is the act of lying using words or actions, sometimes to avoid accountability or manipulate another. There has been research conducted to determine deception indicators such as physical factors and nonverbal reactions, but little on verbal/written indicators. Little application of deception detection has been done on serial killer writings. By combining deception detection and forensic linguistics, another field of forensic science can be studied. Social psychologist, Dr. James W. Pennebaker, created the Linguistic Inquiry and Word Count (LIWC-22) software which analyzes researched written deception indicators to determine a level of authenticity in writing. This was used for this study. The "Hillside Strangler" Kenneth Bianchi, was a serial killer primarily in California. He committed crimes of rape and strangulation of 12 women. 326 of his letters categorized by date from 1986 to 2010 were examined for written deceptive indicators via LIWC-22. This study showed that Bianchi had varying levels of authenticity; however, more research needs to be conducted to determine the usage of this study in future instances of mass killings or serial killings.

97: Locomotor Influence on Hindlimb Muscle Fiber Composition in Primates: An Analysis of Gastrocnemius and Soleus

Josie Rosenberry | Biology | School of Science and Engineering
Faculty Advisor(s): Anne Burrows, Ph.D., Sarah Downing

ABSTRACT: Primate hindlimbs exhibit different compositions of muscle fibers, reflecting their locomotion styles: climbing, endurance, swinging, branch walking, and more. Samples of these muscle fibers were obtained from six distinct primate species that used various locomotory styles. The samples were sectioned, stained, and subjected to immunohistochemistry. This study examined the distribution of slow-twitch (Type I) and fast-twitch (Type II) myosin in primate hindlimb muscles focusing on the gastrocnemius and soleus. Fiber types were quantified with the use of light microscopy, and the data were visualized in R.

Amongst all species, the gastrocnemius displayed more fast-twitch fibers than the soleus. Species possessing extensive hindlimb use, including Callithrix argentata and Chlorocebus aethiops, displayed the largest quantity of fast-twitch fibers, with the highest percentage particularly in the gastrocnemius. In contrast, Nycticebus spp., a tree dwelling primate,

displayed the lowest percentage of fast-twitch fibers, in both the gastrocnemius and soleus. More quantification and visualization will be performed for Macacca fasicularis, Varecia variegata, and Miopithecus talapoin to ultimately determine which species and muscle possess the most fast-twitch muscle fibers, with a larger sample size.

Preliminary findings support the hypothesis that there is an association with locomotor influence and muscle-fiber composition. Understanding the evolutionary basis of muscle fibers in primates could provide us with more information regarding human muscles and our physiology.

***98: The Development of Accessible surveys for Individuals with Intellectual and Developmental Disabilites (IDD).**

Grace Trimpey-Warhaftig | Occupational Therapy | Rangos School of Health Sciences
Faculty Advisor(s): Elena Donoso Brown, Ph.D.

ABSTRACT: Client-centered care is at the core of occupational therapy. While this is often thought of on the individual level, gaining client perspectives and goals is also important when developing programming for clients in group settings. This project looks at the development of surveys for individuals with intellectual and developmental disabilities (IDD) to allow for their input as a part of future programming decisions at a local community site.

People with IDD may have a difficult time expressing themselves when using current survey measures, experiencing decreased understanding and frustration (Nicolaides et al.,2020). Additionally, assessments with complex sentence structure and confusing grammar increase difficulty for individuals with IDD. Common adaptations to improve surveys include adding images to increase clarity and using simple sentence structure.

For this project, we were interested in learning from individuals with IDD in a community program about their perceptions of the current program and areas they would like to work on more. First, we drafted a series of questions, which were then reviewed by our professor and a content expert to support the use of modifications. The final survey used question formats that included a Likert scale, multiple select, and multiple choice. To address the potential communication barriers in the survey, we added emojis to the Likert scale and clip art images to each question. To further support these adaptations, the survey was conducted via in-person interview. The survey was used to complete interviews with the population, and the importance of both auditory and visual support was noted.

99: The Effect of Water-Based Fire Suppression on the Characteristics of Bloodstain Patterns and Blood Spatter Analysis.

Cassandra Harding | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Matthew Regentin, M.S.

ABSTRACT: Blood pattern analysis (BPA) is a technique used at crime scenes where blood stains are identified and may assist in reconstruction of the scene. There are many different bloodstain patterns and many variables that can affect and alter these patterns. However, there is limited research on the effects of water-based fire suppression on the characteristics of bloodstain patterns in fire scenes and the overall BPA interpretation This research examines bloodstains introduced into a mock house fire suppressed with water. Five different bloodstain patterns are replicated: a shoe impression, handprint, gloved print, spatter patter, and a cast-off pattern. The shoe impression is imprinted onto linoleum flooring, the cast-off pattern is cast onto a drywall ceiling, and the spatter pattern, along with the two handprints, is applied onto drywall walls. A medium-sized fire with synthetic and natural fuels is ignited nearby, after which the stains are sprayed with a fine water mist. The bloodstain patterns are documented before and after the fire and suppression water. The patterns are then analyzed by a trained blood spatter analyst and evaluated. This study aims to inform the forensics community on the survivability of BPA evidence in fire scenes that were subjected to water suppression.

100: Analysis of the Quantity and Quality of Human DNA Recovered from Synthetic Hair

Maria Hickman | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Pamela Marshall, Ph.D.

ABSTRACT: Hair can be valuable trace evidence from crime scenes as nuclear or mitochondrial DNA can be extracted and used for identification purposes. However, there is a large and increasing number of individuals who are wearing synthetic hair. Synthetic hair fibers are frequently overlooked as evidence that can be used for DNA testing. The purpose of this research is to determine the quantity and quality of human DNA that is extracted from synthetic hair. Quantity values will be assessed with DNA yield and quality analysis will be assessed with the completeness and concordance of the profile with the reference sample. Participants in this study will donate samples of synthetic hair and DNA on the synthetic hair will be extracted, quantified, and STR-typed using standard forensic protocols and compared to a buccal reference swab. Questionnaire data about donated hair will be used to assess potential degradation, sources of secondary transfer, and DNA mixtures. This study hypothesizes that the results will show that DNA is able to be extracted and quantified from synthetic hair and when compared to the buccal swabs will show concordant alleles. It is also hypothesized that some hair samples may result in mixed DNA profiles if the participant indicated having roommates or romantic partners. Further research can be done into how various hair treatments, such as chemical and heat treatments, affect the DNA found on synthetic hair. Synthetic hair is a growing industry

with millions wearing synthetic hair every day, solidifying its usefulness as valuable forensic evidence.

101: An Investigation of DNA Profiling Outcomes from Plant & Soil Material in Experimental Burial Scenarios

Leah Burggraf | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Pamela Marshall, Ph.D.

ABSTRACT: The integrity of profiling DNA from plant material remains under-explored in the field of forensic science. After a body has been buried, the feasibility of DNA profiling in the overlying plants has not yet been systematically evaluated. It was hypothesized that low-level human DNA could be detected in plant material directly associated with burial sites, albeit with variable profile completeness. Once the DNA was extracted using the DNeasy Plant Mini Kit to remove inhibitors, it went through quantification using the Quant Trio kit along with the QuantStudio instrument. The DNA was then amplified using the GlobalFiler PCR Amplification Kit along with the Thermal Cycler instrument. The samples were then run through capillary electrophoresis using the SeqStudio and analyzed using Osiris software to visualize a DNA profile. This ongoing study has evaluated allele recovery from low-level plant-absorbed DNA and examined whether the recovery of genetic information is sufficient to contribute to human identification. The impact of this research has strengthened human identification efforts while also providing insight into allele recovery/dropout and potential inhibitors.

***102: From Crisis to Reform: How the 1819 Influenza and COVID-19 Pandemics Redefined Relationship between Nurses and the American Healthcare System.**

Anh Le | Nursing | School of Nursing
Faculty Advisor(s): Andrew Simpson, Ph.D.

ABSTRACT: The 1918 Influenza and COVID- 19 pandemic have become two major public health crises that reshaped the role of nurses in the America healthcare system. Although a hundred years apart, both pandemics revealed how deeply the country depends on nurses during emergencies without proper and efficient strategies. This paper argues that these pandemics acted as turning points that redefined the social contract between nurses and the U.S. healthcare system. By examining historical context, nurses' responsibilities, public perception, and long-term effects, this research show how pandemics expanded nurses' authority while also exposing long-term weakness of the systems. In 1918, nurses were praised for their sacrifice and viewed mainly through a moral and gendered lens, limiting recognition for their professional skills. During COVID-19, there was a significant change in the nurses' roles, nursing has become much more professional at that time. Nurses took on visible leadership roles in infection control, communication, and policy advocacy, yet were still framed as "heroes" rather than highly trained professionals. Both pandemics exposed similar structural problems, including understaffing, inadequate protection, and limited leadership representation. Understanding these realities is essential to preparing for future crisis. Nurses should be

involved in decision-making positions, provided with advanced training, and fully protected in their workplaces. At the same time, the health care system must be strengthened, reformed to better support both nurses and patients during emergencies.

103: Determining the reliability of a tool to support goal setting and outcome measurement for people with aphasia post-stroke

Maggie Brown | Health Sciences | Rangos School of Health Sciences
Faculty Advisor(s): Elena Donoso Brown, Ph.D., OTR/L

ABSTRACT: Aphasia is a communication impairment after stroke that impacts a person's ability to speak, read, write, and understand. Having impacted communication in turn impacts the ability to set goals which is a crucial part of the intervention process with the post-stroke population (Brown et al. 2022). There are limited validated tools for this population that allow for efficiency and autonomy when setting goals and measuring outcomes. The purpose of this study is to enhance the goal-setting process for clients with post-stroke aphasia, allowing them to be more actively involved in establishing goals and measuring their progress.

A cross-sectional psychometric design is being used to determine acceptability and test-retest reliability of the LIV cards(+), a modified version of the Life Values and Interest cards which adds aphasia friendly rating scales on how people currently do an activity and how they feel about it. We aim to recruit 30 persons with post-stroke aphasia (PWA) who will complete two sessions, 2-3 weeks apart. During the study, PWA complete a demographic survey, the Quick Aphasia Battery, the LIV cards(+) procedures, and a semi-structured interview about their experience.

Data collection and analysis are ongoing. Preliminary results from the first three participants indicate the most frequently selected activity category when choosing activities of most importance was physical activities. Findings from PWA2 showed repeated selection of three/five of the same items of most importance from the first session. Analysis of all data available will be presented.

104: Music therapy and dyadic treatment during stroke rehabilitation: Exploring the perceptions of persons post-stroke and their caregivers'

Dakoda Mock | Occupational Therapy | Rangos School of Health Sciences
Senia Duganhodzic | Music Therapy | Mary Pappert School of Music
Tabby Sheyko | Music Performance | Mary Pappert School of Music
Faculty Advisor(s): Elena Donoso Brown, Ph.D., OTR/L, Meng-Shan Lee, MMT, Ph.D., MT-BC

ABSTRACT: Holistic interdisciplinary rehabilitation, which considers how personal, cultural, and neurologic factors influence deficits, is a key part of stroke recovery. As a part of holistic rehabilitation, caregivers serve as critical partners, providing emotional encouragement, physical support, and relational comfort. Recent evidence, while limited, suggests that

rehabilitation received together with both the person post-stroke and the caregiver (i.e., dyad) supports stroke recovery. In addition, music therapy is an evidence-based practice focused on achieving health-related goals through music experiences and has shown effectiveness for neurorehabilitation in various health domains. However, there is limited literature exploring dyad based music therapy. Therefore, the aim of this study is to understand stroke survivors' and their caregivers' perceptions of music therapy as a part of interdisciplinary rehabilitation post stroke, as well as their perceptions of dyadic treatment.

Utilizing criterion convenience sampling, six dyads were interviewed after obtaining informed consent. Participants engaged in an in-person semi-structured interview to discuss their perceptions of music therapy and dyadic treatment. Participants were first interviewed together and then separately to expand on personal perspectives outside of the dyad. The completed interviews have been transcribed and reviewed for accuracy by the research team. Data analysis is ongoing via thematic consensual coding in MAXQDA. Preliminary results will be presented. The findings from the study will be used to inform the creation of music therapy programs in the greater Pittsburgh area that are directly tailored to the needs of stroke survivors and their caregivers.

105: Antibiotic and metal resistance in microbial communities from an abandoned mine drainage system

Abigail Strassner | Biology | School of Science and Engineering
Faculty Advisor(s): Nancy Trun, Ph. D.

ABSTRACT: Abandoned mine drainage (AMD) is a form of water pollution that arises from abandoned coal mining sites, which are widespread across Pennsylvania. Kentucky Hollow is a passive AMD treatment system in Pittsburgh that has been shown to have a low pH and high concentration of dissolved metals, including rare earth elements. The bacteria in Kentucky Hollow routinely grow in these high metal concentrations. Resistance to certain heavy metals has been linked to resistance to specific antibiotics through structural or biochemical mechanisms.

Bacteria from Kentucky Hollow were grown under aerated and non-aerated conditions. Serial dilutions were plated on R2A agar with tetracycline, kanamycin, and ciprofloxacin (25 and 100 µg/mL, 25 and 50 µg/mL, 1 and 5 µg/mL, respectively). Twelve colonies were isolated and screened in 96-well plate assays, evaluating resistance to a wide range of antibiotics and metals. Growth was assessed by optical density measurements that were taken over two days. Results indicate widespread antibiotic and metal resistance among isolated bacteria. Seven isolates are continuing to be tested at length because of their high tolerance to metals that trend with rare earth elements and heightened resistance to antibiotics. These isolates exceed tolerances that we would expect for normal environmental bacteria. Future work will involve cloning genes from these bacteria into an E. coli strain to identify the genes involved with these

resistances. This work will contribute to a deeper understanding of how microbes adapt to extreme environments and how antibiotic resistance evolves in these conditions.

106: Can daily bouts of 10 minutes of intentional walking improve college student wellbeing?
Megan Elliott | Occupational Therapy | Rangos School of Health Sciences
Faculty Advisor(s): Kimberly Szucs, Ph.D., OTR/L

ABSTRACT: The long-standing gold standard recommendation for physical activity (PA) has been 150 minutes a week of moderate to vigorous levels of PA for improving overall health. More recent research suggests that shorter bouts of these levels of PA can produce similar benefits and have been shown to have better adherence. Student success is impacted by several factors, and currently, many college students are experiencing high levels of stress and anxiety, as well as poor sleep quality and a lack of regular physical exercise. This study takes a modified approach to incorporating 150 minutes of physical activity per week and focuses on walking with focused awareness for 2-3 10-minute bouts a day. The primary objectives of the study were to assess whether college students' overall well-being increased with the addition of 10-minute bouts of physical activity throughout the week. Data were collected through a physical activity plan filled out by participants at the beginning of each week, and an activity monitor was provided to the participants at the beginning of the study. The two items were cross-referenced with each other to both check for adherence and levels of intensity. Surveys were administered to the participants before and after the study. These surveys focused on wellness, including sleep status, mindfulness, and happiness. Future research can build upon this study by continuing to look at the effects of adding 10-minute bouts into daily routines on college students' overall mental and physical well-being.

107: Characterization of Noncanonical DNA/RNA Structures in DNA Methylation Genes
Mia Seyfarth | Biochemistry | School of Science and Engineering
Faculty Advisor(s): David Heisler, Ph.D.

ABSTRACT: Recent work has shown that DNA methylation plays a role in the pathophysiology of many different diseases, including cancer, multiple sclerosis, and Alzheimer's disease. DNA methylation is an epigenetic modification involving the addition of a methyl group to DNA sequences to modulate the expression of a gene. Here, we identified sequences within the 5'-untranslated regions (5'-UTRs) of multiple genes related to DNA methylation that have the potential to form two noncanonical secondary DNA/RNA structures: Guanine-quadruplexes (GQs) or i-Motifs (iMs), which are also known to play regulatory roles in gene expression. To investigate the impact of GQs and iMs on gene expression, we compared wildtype and mutated 5'-UTR sequences of Methyl-CpG binding domain protein 2 (MBD2) and DNA methyltransferase 3 alpha (DNMT3a) in mammalian cell-based luciferase reporter assays. We found that the 5'-UTR of MBD2 suppresses gene expression. Levels of luciferase messenger RNA were comparable between wildtype and mutant MBD2 5'-UTR sequences, suggesting that the RNA GQ is responsible for translational suppression of the gene. Future work will determine whether this

model is accurate. We will also determine whether DMNT3a is regulated by these secondary structures and if it is on the transcriptional or translational level. Together, these studies will provide information on the potential for the formation of noncanonical secondary DNA/RNA structures in the 5'-UTRs of DNA methylation genes, which could serve as novel therapeutic targets.

108: Burning Grid Graphs: Spreading Processes on Networks
Jasmyn Wallace Milling | Mathematics | School of Science and Engineering
Madison Toline | Mathematics | School of Science and Engineering
Faculty Advisor(s): Robert Muth, Ph.D.

ABSTRACT: The graph burning problem studies how quickly a contagion-like process can spread through a network when one new "fire source" may be chosen at each time step. Originally motivated by models of social contagion, information diffusion, and network vulnerability, the problem captures the balance between local spread (from existing fires) and strategic global placement of new ignitions. Researchers care about this problem because it provides a mathematical framework for measuring how efficiently influence, failure, or information propagates through structured systems.

The central concept is the burning number of a graph, defined as the minimum number of steps required to burn all vertices. A major conjecture in the area states that every connected graph on n vertices has burning number at most $\lceil \sqrt{n} \rceil$. Related results connect the burning number to structural properties such as diameter, paths, trees, and other families of graphs.

Our work focuses on grid graphs, which model structured networks such as city layouts. We study how dimensional structure and source placement strategies affect burning efficiency. By analyzing small cases and extending observed patterns to larger rectangular grids, we explore constructive strategies that suggest improved bounds and highlight how geometry influences optimal burning behavior.

109: Creating a Predictive Checklist for Ethnic and Nationalists Intrastate Conflicts.
JJ Glaneman | Political Science | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Jennie Schulze, Ph.D.

ABSTRACT: In the study of ethnic and nationalist conflict, scholars will craft and author theories and explanations in order to fully understand such conflicts. Each theory emerging from the literature is accompanied by various explanations and causal frameworks, only to be constantly discussed and debated while lacking a causal mechanism and a predictive model. This begs the question, how do we decide which theories are correct and grant the most purchase in the explanation and mitigation of ethnic conflict? Henceforth, the purpose of this research would be to evaluate the validity of each theory in specific case studies by crafting a point system with

the intent of determining which theories of ethnic conflict grant the most purchase. Using the case studies of former Yugoslavia, the Rwandan Genocide and the Chechen war, this research intends to create and utilize an analytical point system to evaluate and weigh the causal factors of these conflicts, with the purpose of predicting future instances of intrastate ethnic and nationlist violence. Keeping in mind each theory of ethnic and nationalist conflict will come with varying policy solutions, the further purpose of this research is to grant policy makers a visual on what theory or theories are most prominent in a certain instance of conflict. This is important because it will aid practitioners in determining the theories and applying the corresponding policy solutions. Therefore, this research aims to develop an efficient, comprehensive and analytical system for policy makers to adjudicate between varying theories and implement the optimal policy solutions.

110: Withdrawn

111: The Effects of Medically Induced Testosterone Levels on Forensic Serological Analysis
Miranda Johns | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Pamela Marshall, Ph. D.

ABSTRACT:
Testosterone hormone replacement therapy (T-HRT), prescribed for female-to-male (FtM) transition or as treatment of menopausal symptoms, may be associated with the endogenous production of PSA. This study reviews existing biomedical and forensic literature to evaluate the potential association between medically induced testosterone levels and false-positive results in forensic serological testing for p30. T-HRT for FtM transition is related to the alternation from female to male secondary sex characteristics. There are limited reports of the development of ectopic prostatic tissues in the vaginal and urethral tissues in individuals receiving T-HRT. Sexual assault kits use PSA testing to determine the presence of semen. The endogenous production of PSA in people receiving T-HRT may contribute to an increased rate of false-positive identifications of semen. This work highlights the need for forensic laboratories to consider hormone-related biological variability when interpreting p30 results in sexual assault kits.

112: The Weight of the World on His/Her Shoulders: Understanding the Cellular Nature of Shoulder Muscles.
Joel Blake | Health Sciences | Rangos School of Health Sciences
Faculty Advisor(s): Matthew Kostek, Ph.D.

ABSTRACT: Rotator cuff injuries are highly prevalent throughout the world's aging population, with treatment being complicated. As we age, our ability to repair tissues decreases dramatically which leads to persistence of rotator cuff injuries. Understanding the physiological make-up of these muscles may provide further methods of treatment for rotator cuff injuries.

Our study identified differences between age and sex of the rotator cuff muscles. Rotator cuff muscle samples were collected from human cadavers (n=42). Analyzed using H&E staining to determine general histology and antibodies against fast and slow isoforms of myosin heavy chain to identify fiber type composition (Type I and Type II). We identified differences in fast twitch muscle fiber percentage between men and women (p < 0.06). Further statistical comparison revealed individual muscle differences, i.e., the teres minor has the lowest fast-twitch fiber percentage (p < 0.01). Final data collection and analysis are ongoing. There is a clear difference in fast twitch muscle fiber percentage of the rotator cuff muscles not only as we age but also across sex. Current findings indicate that age plays the largest role in fiber type composition. Due to the increase in incidence of rotator cuff injuries as people age, this information can be used to tailor an individualized treatment plan to improve rehabilitation outcomes.

***113: Hidden Diplomacy in Eurovision: Songs of Bosnia and Herzegovina**

Senia Duganhodzic | Music Therapy | Mary Pappert School of Music
Faculty Advisor(s): Nicole Vilkner, Ph.D.

ABSTRACT: When we turn on the T.V. to watch song competitions, we're excited to see the glitz and hear new artists and music. But beneath the surface, deeper political messages are shared. Eurovision is an annual, televised international song competition that has been around since 1956. Participating nations submit an original song that is performed live, which then gets judged by a professional jury and the public. While the contest presents itself as a neutral, non-political show, scholar Jessica Carniel argues that Eurovision is a site of "participatory diplomacy" where audience members are involved in shaping the perception of nations. International song competitions are sites where political messages and geopolitical tensions are made visible. In 1993, "Sva bol svijeta"("All the Pain the World") was performed by Fazla, representing Bosnia and Herzegovina. The song debuted during the Bosnian War, and marked the first time Bosnia participated in the competition as an independent country. The world was aware of the war in Bosnia, yet there was limited international intervention. The song conveyed the message that Bosnia was in pain and needed global assistance. In this project, I consider performance choices, television commentary, and newspaper reviews, offering a close analysis of this song. I argue that this song was understood by viewers to be a message of resistance and survival from a country under siege. This song performance was a pivotal moment for Bosnia and Herzegovina because it legitimized their sovereignty on a global stage.

114: Investigating Early Speech Production During Shared Book Reading

Natalie McEvoy | Speech-Language Pathology | Rangos School of Health Sciences
Faculty Advisor(s): Abigail Delehanty, Ph.D., CCC-SLP

ABSTRACT: In the field of speech-language pathology, it is relatively rare to receive a referral for concerns about speech sound production until after children are 3 years of age. However, even in very young children, researchers have documented negative impacts associated with having

speech that is difficult for others to understand. There is a need to identify early delays in speech sound production so that children can receive early intervention to help them develop functional communication skills. The purpose of this accelerated longitudinal study was to investigate typical speech sound development during naturalistic shared book reading interactions in 8 children between 6 months and 3 years of age. Approximately 100 videos were coded using Noldus Pro Observer XT software for a variety of increasingly difficult syllabic shapes (i.e., consonant-vowel combinations) while the child shared books with a parent. To minimize bias, videos were randomized and the coder was unaware of child age. Twenty percent of videos were double coded to ensure adequate inter-rater reliability. Over time, syllabic complexity increased. Very young children used a large proportion of single consonant or vowel sounds or non-transcribable utterances like laughs or cries. Older children used a larger proportion of words and phrases that included several syllables like "dinosaur." Results have the potential to inform early developmental surveillance efforts. Screening and monitoring early speech production during naturalistic activities like book sharing may be useful for identifying different trajectories of communication development in populations that are at heightened risk of speech and language delays.

115: Examining the perceptions of music therapy to address work stress for forensic professionals.

Jennifer Krizner | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Lyndsie Ferrara, Ph.D.

ABSTRACT: Work stressors, methods to alleviate stressors, and vicarious trauma within the forensic science field are often overlooked despite the field's unique work. Stress affects decision-making accuracy and overall job performance, with unique pressures faced across different demographics of forensic professionals.. The purpose of this research is to evaluate music therapy as a possible intervention to address work stress for forensic professionals. A literature review was conducted to determine the primary work stressors identified by forensic professionals. Additionally, a survey was developed that will gather information about forensic scientists' perceptions of music therapy. Future work will present all this data to a board of certified music (psycho)therapists to provide realistic pathways for implementing music therapy in forensic workplaces. The lack of information regarding music therapy as a possible intervention for forensic scientists indicates a need to enhance education for both parties about the potential benefits. Forensic professional's mental health is often overshadowed, leading to the need for mental health education and additional techniques for stress reduction/management. Addressing mental health needs within the forensic sciences remains a critical priority, and music therapy may offer a novel, accessible, and evidence-informed option for supporting the well-being of this essential workforce.

116: Study on the sleep time, waking numbers and visual attention difference between pre-term and full-term infants

Eric Davis | Health Sciences | Rangos School of Health Sciences
Katelyn McKee | Physical Therapy | Rangos School of Health Sciences
Amanda Eadie | Physical Therapy | Rangos School of Health Sciences
Faculty Advisor(s): Regina Harbourne, DPT

ABSTRACT: This study examined the relationship between sleep duration, number of awakenings during the night, and visual attention in infants, comparing full-term and preterm infants. We believe that the quantity of sleep and rate of night wakings are crucial to an infant's learning capacities through their visual attention.

Data was collected from 36 full-term infants and 14 preterm infants, using a Nanit baby monitor to track sleep over several nights. The mean sleep duration for full-term infants was 10.19 hours (standard deviation = 1.17), significantly longer than the 8.87 hours (standard deviation = 2.20) recorded for preterm infants ($p = .003$). For number of wakings during the night, full-term infants averaged 3.81 wakings per night (standard deviation = 1.41), compared to 2.80 wakings (standard deviation = 1.47) for preterm infants ($p = .012$).

Visual attention was assessed through measuring the time it took an infant to focus its attention on a specific object from the start of the trial. Full-term infants exhibited a mean visual attention time of 2.38 seconds (standard deviation = 2.21), which was shorter than that of preterm infants (standard deviation = 75.61; $p = .026$). We found that full-term infants experienced more extended sleep and greater frequency of wakings than pre-terms infants. We also found that it took full-term infants much less time to focus on an object than pre-term infants.

In conclusion, full-term infants, wake more often and have longer sleep durations, which may decrease the time taken to achieve visual attention relative to preterm infants.

117: The Pancake Sorting Problem with Repetition

Madelyn Klosky | Mathematics | School of Science and Engineering
Faculty Advisor(s): Robert Muth, Ph.D.

ABSTRACT: The Pancake Sorting Problem asks for the minimum number of prefix reversals, or "flips", required to sort a stack of pancakes in order of size. This problem is known for its connections to genome rearrangement and for providing mathematical models of genomic evolution. The primary objective is to determine bounds on the number of flips required as a function of the stack length N.

While there are many results and refinements known for stacks with all distinct pancake sizes, there lacks fewer results for sorts with repeated sizes. In this work, I examined restricted cases in which pancakes come in only two or three distinct sizes. I first studied stacks of length N containing two sized pancakes and analyzed two alternating groups. For these cases, we established formulas for the number of flips required depending on the parity of N.

Building on this approach, I extended the problem to stack containing three distinct pancake sizes and examine how the added complexity affects the flip strategy and sorting behavior. By studying the structure arrangements and identifying patterns, I have gained insight into how limiting the number of pancake sizes has changed the complexity of the original problem. These results contribute to a deeper understanding under constraints and indicate potential directions for future research on more general repeated-sized stacks.

118: Synthesis of metal-chelated alkyne-functionalized aza-DIPY ligands: optimization of the scaffold to promote NIR-II absorption

Abbigail Black | Biochemistry | School of Science and Engineering
Faculty Advisor(s): Thomas Montgomery, Ph.D.

ABSTRACT: The use of fluorescence imaging has led to major advancements in medicine, enabling clearer visualization of internal structures and facilitating more accurate diagnoses and improved patient outcomes. Two fluorescent dyes commonly used in the medical field today are rhodamine and cyanine. However, both have significant drawbacks: rhodamine demonstrates acute toxicity, and cyanine requires high doses for clear imaging due to poor photostability and an isomerizable molecular structure. As a result, there is a persistent need for safer fluorophores that offer high contrast at low concentrations. Fluorescent molecules that absorb in the near-infrared II region (1000nm-1700nm) are of particular interest for medical imaging due to deep tissue penetration, low scattering, and low autofluorescence. To address this gap in the field, our group is currently working towards the synthesis of alkyne-functionalized aza-dipyrromethene (aza-DIPY) ligands. The design of the alkyne aza-DIPY ligand allows for an extended pi system, resulting in absorption and emission bands shifting farther into the near-infrared region. The novelty of the scaffold lies in its high tunability, a result of the post-synthetic functionalization that can occur at the reactive alkyne positions. Here, we report on the optimization of our 5-step synthesis for the alkyne-functionalized aza-DIPY ligand.

119: Regulating Algorithmic Justice in the Courtroom

Donay Allen | Political Science | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Mia Briceno, Ph.D.

ABSTRACT: Artificial Intelligence risk assessment tools such as the Correctional Offender Management Profiling for Alternative Sanctions (COMPAS) are commonly used in U.S courts to assist judges with bail decisions. Although intended to promote efficiency, the algorithms may

promote inequalities by reinforcing biases embedded in historical criminal data. This poster examines how AI-driven risk assessment tools can influence judicial decisions and assess how legal safeguards could prevent algorithmic biases. This would allow courts to benefit from this innovative tool while still providing justice. To explore this issue, I reviewed various scholarly articles, legal analyses, and court-related research on the AI risk assessment tools. Also, identified the legal and ethical issues surrounding bias, transparency, and accountability in the decision-making process. I found that most of the research shows that COMPAS's risk scores disproportionately affect certain demographic groups as opposed to others. Additionally, the black box design nature outputs biases, and there is currently no legal framework to ensure that judges are ethically making decisions based on the scores. These ethical issues are important because they affect fairness, trust, and accountability in the judicial system, which was meant to uphold these said values. Overall, this research shows that technology, especially in the judicial setting, should include legal safeguards to ensure that justice is being served.

120: A Strange Enemy: Internal Discrimination in Me

Ana Victoria Covarrubias Rodríguez | Biomedical Engineering | School of Science and Engineering
Faculty Advisor(s): Jack Murphy, Ph.D.

ABSTRACT: On a 22 of April of 1519, calm was all that reigned, as the ocean waves danced back and forth, a terrible prediction was about to become reality, the fall and doom of Tenochtitlan was dangerously approaching. As land became nearer for the strangers that shine like 'gold', the objective was becoming clearer. The following essay explores how the scars of colonialism evolved into becoming deeply rooted internalized racist and classist ideologies within modern contemporary Mexican society. By combining historical analysis and daily life in modern Mexico, this research uses personal testimonies of the white Mexican experience, as well as modern Mexican cinema to illustrate how the colonial hierarchies between Spanish and Natives repurposed into deeply rooted social barriers. The following essay searches to argue that the legacies of the Conquest are not things of the past, but rather still haunts and dominates daily interpersonal prejudices within modern Mexican society, revealing that in many ways, the biggest enemy of a Mexican is all along another Mexican.

121: The Impact of Virtual Reality Therapy Combined with Pulmonary Rehabilitation Therapy in Patients with Chronic Obstructive Pulmonary Disease: A Critically Appraised Topics Project

Emma Almghrabi | Health Sciences | Rangos School of Health Sciences
Faculty Advisor(s): Jason Scibek, Ph.D., LAT, ATC

ABSTRACT: Clinical Scenario: Chronic Obstructive Pulmonary Disease (COPD) is an umbrella term that covers respiratory illnesses that affect one's ability to breathe. Rehabilitation in those who have COPD is crucial in limiting symptoms, increasing quality of life, and reducing the chances of developing other illnesses. However, with the availability of emerging technologies, there is a need for more scientific research to compare existing rehabilitation techniques with

new techniques for treating COPD. This critically appraised topic project aims to critically evaluate and summarize three randomized controlled trials (RCTs) comparing virtual reality (VR) therapy with traditional pulmonary rehabilitation (TPR/PR) among COPD patients. Focused Clinical Question: Among COPD patients, does VR therapy combined with TPR/PR therapy compared to TPR/PR therapy alone improve physical health and wellbeing? Search Strategy & Criteria: Terms used to guide the research included: Patient/Population: adult male and female patients with COPD, Intervention: VR therapy & TPR/PR therapy, Comparison: TPR/PR therapy, and Outcome: improve health. Sources(s) of Evidence: PubMED was utilized for obtaining all three sources. Critical Appraisal: All three studies scored a 7/10 or higher on the PEDro scale. The studies revealed improvements in physical health and/or well-being as measured by clinical tests and patient reported outcome measures. Clinical Bottom Line: These studies provide evidence that VR therapy combined with TPR/PR therapy improves functional capacity, quality of life, and physical fitness as well as reduces symptoms of depression, anxiety, and dyspnea in COPD patients. These benefits tend to be larger as compared to performing TPR/PR alone.

122: Optimizing Extraction and Detection of Designer Benzodiazepines in Urine for LC-MS/MS Analysis in Forensic Toxicology

Evelyn Rudich | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Stephanie Wetzel, Ph. D.

ABSTRACT: Most benzodiazepines (BZDs) were developed in the second half of the 20th century, with development continuing into the 21st century. BZDs are a class of central nervous system (CNS) depressants that are prescribed for anxiety and insomnia. Because of their sedative effects they are commonly used in drug facilitated crimes. Designer benzodiazepines (DBZDs) are illegally produced BZD analogs that are sold on the illicit drug market as well as on grey market pharmaceutical websites though counterfeit pills and powders. DBZDs can be detected in urine with the use of solid-phase extraction (SPE) and Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS). Many DBZDs have poor cross reactivity in immunoassays, requiring LC MS/MS for reliable detection. The increasing popularity of DBZDs requires a standardized method to detect samples in biological matrices like urine. This research aims to develop a standardized method for the detection of DBZDs in urine samples. Using three common DBZDs, Clonazolam, Bromazolam, and Etizolam, a LC-MS/MS method was developed to detect similarities between the three different DBZDs. The early findings from this experiment suggest that the three DBZDs each have unique retention times despite having very similar precursor ions.

123: Balancing the Benefits and Ethical Responsibilities of Artificial Intelligence Recommendation Systems

Kassidy Cambal | Finance | A.J. Palumbo School of Business Administration
Faculty Advisor(s): Mia Briceno, Ph.D., Rachel Neilan, Ph.D.

ABSTRACT: Artificial Intelligence is rapidly expanding into many aspects of our everyday lives. This includes AI recommendation systems, as exemplified by the DeepBrew System developed by the Starbucks Coffee Company. The Starbucks recommendation system, fueled by data dating back to 2011, uses hybrid filtering to generate highly personalized recommendations for customers, optimize in-store operations, and support corporate decision-making processes. The objective of this research is to examine how the Starbucks Coffee Company implements artificial intelligence technologies within its operations and analyze the ethical responsibilities in designing and deploying recommendation systems. This study reviews highly cited scholarly literature addressing ethical challenges in AI implementation, corporate reports and publicly available information outlining Starbucks' AI strategy on their company website.

This research identifies the three primary ethical challenges in recommendation system deployment as job displacement and loss of autonomy, data privacy concerns, and issues of fairness and algorithmic bias. The Starbucks Company has taken steps to address these concerns by positioning AI as a tool to augment rather than replace employees, implementing data minimization techniques, providing transparency on their data collection, and promoting consumer education regarding data usage.

To further study these ethical considerations, this study positions Starbucks as a benchmark for comparison against other companies that have implemented AI recommendation systems in terms of strategy, ethical responsibility, operational outcomes, and workplace morale.

124: Chemical Identification of 9 mm Bullets Based on Manufacturer

Alexis Johnson | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Stephanie Wetzel, Ph.D.

ABSTRACT: Firearm and toolmark identification rely heavily on physical attributes of a bullet and/or its shell casings. This type of identification faces challenges where degradation is present, or the perpetrator happens to scatter or take the bullet case(s) with them. While research exists in terms of comparing bullets based on their lead isotopes, this study evaluates whether elemental composition analysis can distinguish 9 mm bullets by manufacturer, even after firing. Bullets from five major manufacturers were analyzed pre and post firing using a scanning electron microscope (SEM) and an inductively coupled plasma-mass spectrometer (ICP MS) to evaluate elemental composition and assess manufacturer specific chemical signatures. Thirty cartridges were used overall, a single bullet of each manufacturer for preliminary testing, and twenty-five, five from each manufacturer, for chemical analysis. Rather than relying solely

on physical attributes, this study assesses whether manufacturers have unique chemical characteristics associated with their cartridges, and by incorporating chemical composition analysis, may provide an additional evidentiary tool for ammunition attribution when traditional toolmark features are compromised.

125: Examining the Recovery of Foreign DNA from Neck Samples

Hailey Hofmann | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Lyndsie Ferrara, Ph.D.

ABSTRACT: Survivors of non-fatal strangulation face are 750% more likely to be killed by an intimate partner later. Strangulation is defined as a mechanical force applied externally to the neck and surrounding areas that result in compressing air passages to impair the oxygen delivery to the brain, leading to asphyxia. In non-fatal strangulation cases, it may be possible to retrieve touch DNA from a survivor's neck to detect the DNA profile of the perpetrator. This study evaluates whether controlled contact to the neck results in detectable and distinguishable foreign DNA beyond background levels from daily activity. The controlled, simulated contact event was designed to mimic non-fatal strangulation of the neck. This research aims to impact the forensic science community by identifying the evidentiary value and interpretability of neck swabs. A foreign DNA provider performed a non-harmful, controlled contact event to the neck of the participant. Neck swabs were collected before and after the controlled contact event to evaluate the quantity and quality of foreign DNA present. Additionally, buccal swabs were collected and used to separate the DNA of the participant from the DNA of the provider. All swab samples were processed using standard forensic STR typing protocols and compared to the reference buccal profiles to mirror the standard protocols and compared to the reference buccal profiles to mirror the standard protocols used in forensic biology. It is important to evaluate differences between DNA present from everyday activities and after a contact event, such as a non-fatal strangulation.

126: Institutional Design or Drift: Presidential Primacy in Foreign Affairs and the Efficacy of Congressional Checks in Modern American Politics

Nathan Cox | Political Science | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Kristen Coopie, Ph.D.

ABSTRACT: Since the ratification of the United States Constitution in 1789, constitutional scholars have debated the balance of power between the legislative and executive branches. The Constitution specifically delegates the President international affairs powers under the Vesting Clause and the Commander-in-Chief Clause, and also grants Congress powers under Article I, Section 8, and the Treaty Clause (shared with the President). This debate persists in modern politics and is important for interpreting contemporary foreign affairs. Some historical institutionalist scholars argue that the President's power is a product of 20th-century institutional drift. This paper challenges that line of thought and argues that this dominance is the product of the Founders' original design. This paper examines founding documents,

Supreme Court case law, and historical case studies to demonstrate the office's evolution within the bounds of the Constitution, while also evaluating the effectiveness of the remaining checks on executive power. Overall, the research concludes that presidential autonomy in foreign policy reflects the Founders' constitutional design rather than a deviation from it.

127: Prolonging Life through Artificial Life Support

Jaysa Capone | History | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Andrew Simpson, Ph.D.

ABSTRACT: My research examines how advancements in medical technology reshaped the legal precedent on the definition of death and transformed a medical professional's role on responsibilities when it comes to end-of-life care. Historically, medicine's sole purpose was to preserve the health of individuals, and when a person's heart stopped, so did their life. However, with the rise of artificial life support technologies, the heart can circulate blood throughout the body without the functioning of a key organ, the brain. The boundary between life and death has been confused and this has contributed to a new perspective that death is no longer inevitable.

Through the study of landmark cases, Karen Ann Quinlan and Terri Schiavo, my research analyzes how these cases determined a legal precedent within the legal field. Quinlan's case highlighted the right to refuse extraordinary medical treatment, supporting the right to privacy and recognizing autonomy. Schiavo's case sprouted a national debate over the ethical and legal principles involved when determining death through artificial life support. These cases shaped the legal standard in end-of-life care establishing the ability to support autonomy even with the advancements of life-sustaining treatment.

Along with that, my research examines how artificial medicine has challenged the traditional medical framework towards end-of-life care. Artificial life-support technologies not only complicate the therapeutic determinations of when death happens but also prompts society to question the fundamental values of medicine – whether to preserve health or to prolong life without a defined endpoint even in the absence of consciousness.

128: Identifying Non-Polar Compounds in Spices and Essential Oils using the Linear Ion Trap Quadrupole Mass Spectrometer (LTQ-MS)

Chloe Bassil | Biochemistry | School of Science and Engineering
Faculty Advisor(s): Michael Van Stipdonk, Ph.D.

ABSTRACT: Drug overdoses are a leading cause of death in the U.S., especially for people between ages 18 and 44. This emphasizes the need for continued research to improve the forensic drug analysis. This study investigates the fragmentation behavior of aromatic alcohols (eugenol, geraniol, nerol and citronellol) with various functional groups to improve the analysis

of mass spectral data. While Gas Chromatography Mass Spectrometry (GC-MS) is the standard instrument to use in forensic drug analysis, the Linear Ion Trap Quadrupole (LTQ-MS) is a suitable and accurate instrument to use on these compounds as it provides a multistage fragmentation pathway as well as it clarifies the fragmentation mechanisms and structural pathways. These aromatic alcohols were analyzed under silver cationized [M+Ag]+, protonated [M+H]+, and radical cationized [M·]+ species. They were found to ionize with different efficiencies and with altered fragmentation patterns. This could be done to simulate the modifications of a drug to make it undetectable and the adulterants used to cut the drugs; and therefore, can be used as model for drug analogs. Each of these molecules has unique fragmentation patterns that can serve as signature fragmentation patterns for identification. The same explainable fragmentation peaks are observed as the experiment is repeated. Observed fragmentation patterns were consistent with proposed mechanistic pathways and produced reproducible, compound specific diagnostic ions. These differences mirror the impact that ionization chemistry has on the fragmentation behavior of these aromatic alcohols. The fragmentation patterns unique to these chemicals could help in the detection of similar compounds used to alter drug samples.

129: Gubernatorial Elections and Political Ambition

Allie Pitcock | Political Science | McAnulty College and Graduate School of Liberal Arts
Jack Barnhisel | Political Science | McAnulty College and Graduate School of Liberal Arts
Alice Bowman | Political Science | McAnulty College and Graduate School of Liberal Arts
Brayden Melia | Political Science | McAnulty College and Graduate School of Liberal Arts
John Murphy | Political Science | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Sara Grove, Ph.D.

ABSTRACT: Pathways to the White House have run through the U.S. Senate and governorships. While seventeen Senators have been elected President, twenty individuals served as governor prior to their election. This project examines gubernatorial elections, subsequent re-elections, and the political ambition of governors over the last four election cycles in each state. Factors such as partisanship, control of the state legislature, and margins of victory will be analyzed their impact.

130: Collision-induced Dissociation of Protonated Phenethylamine: A Model Study to Aid Peak Annotation in Tandem Mass Spectrometry of Illicit Drugs

Amina Ihabi | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Michael Van Stipdonk, Ph.D.

ABSTRACT: Tandem mass spectrometry (MS/MS) is widely used in forensic science to identify illicit substances, yet accurate structural assignment of fragment ions generated by collision-induced dissociation (CID) remains a persistent challenge. Although high-resolution m⁄z measurements enable molecular formula annotation, many reference MS/MS libraries contain incorrect fragment-structure assignments, limiting their reliability for de novo

identification. To address this issue, this study investigates the CID fragmentation mechanisms of protonated phenethylamine, the simplest representative of the substituted phenethylamine drug class that includes amphetamines and MDMA. Understanding its fundamental fragmentation behavior offers a pathway to improve structure-based annotation of closely related psychoactive compounds. Multi-stage tandem mass spectrometry experiments were performed using an LTQ-XL ion trap with electrospray ionization, complemented by infrared multiple-photon dissociation (IRMPD) spectroscopy conducted at the FELIX Laboratory. Density functional theory (DFT) calculations were used to optimize precursor, product, and intermediate structures and to model vibrational spectra and reaction pathways. CID of protonated phenethylamine (m⁄z122) yields major fragment ions at m⁄z 105 (NH_3 loss) and m⁄z 79 (C_2H_4 loss). Experimental IRMPD spectra, supported by computed vibrational profiles, identify the m⁄z 105 ion as protonated styrene and the m⁄z 79 ion as protonated benzene. These results clarify long-standing ambiguities in phenethylamine fragmentation and improve structural assignment strategies for amphetamine-class compounds in forensic analysis.

131: Understanding the Role of Social Constructivism in Lebanese Civil War

Kyler Brosius | International Security Studies | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Jenni Schulze, Ph.D.

ABSTRACT: From 1975 to 1990 the small country of Lebanon was embroiled in a fifteen-year civil war fought over the distribution of power and representation within the government. Fought between its four major confessional communities Christians, Sunni Muslims, Shia Muslims, and Druze the war was noted for brutal acts of sectarian violence. This violence was motivated by the political elites in the country known as the zu'ama in order to maintain their political power within the country. The purpose of my research is to examine the role of social constructivism in both starting the conflict and inciting sectarian-based violence during the conflict. Social construction theory is combination of the two most prominent theories of ethnic and nationalist conflict. In which states that elites motivated by their own greed will use socially constructed identities that have validity with their targeted audience to wage conflict for the elite's own interests. In the context of Lebanon can be seen through the instances of elites using socially constructed religious identities to organize and order militias to commit violence. Part of my research will focus on the notable acts of violence, the role of elites in the conflict and what were consequences of this conflict on modern Lebanon. Finally, I will present policy recommendations into how the conflict could have been prevented and conclude on why political scientists should study this conflict in order to better understand the conditions in which sectarian-based violence is allowed to happen.

132: Degradation of Hydrogen Peroxide in HMEs

Ethan Sadoski | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Matt Regentin, M.S.

ABSTRACT: Liquid explosives are a component of improvised explosive devices (IEDs) that use a liquid chemical as a main source of fuel. These explosives are commonly created using household liquids like Hydrogen Peroxide. There is little success in research on the identification of post-blast residue due to their low molecular weight, causing the destruction of identifying characteristics. Due to this, Forensic Laboratories have a difficult time identifying the post-blast residue of homemade liquid explosives (HME). This review will focus on the types of homemade liquid explosives and previous methods of identification for similar explosives. This knowledge in conjunction with a better understanding of Hydrogen Peroxide degradation may be applied to the identifying of liquid explosives. The ability to successfully identify homemade liquid explosive residue after detonation would empower law enforcement agencies with the ability to attain adequate information to greater aid their investigations.

133: The Impact of Inclusive Higher Education Programs on Students with and without Intellectual and Developmental Disabilities

Chrissy Bober | Occupational Therapy | Rangos School of Health Sciences
Abigail Bull | Occupational Therapy | Rangos School of Health Sciences
Cyniah Farmer | Undeclared | Rangos School of Health Science
Faculty Advisor(s): Meghan Blaskowitz, Ph.D., Alia Pustorino-Clevenger, Ed.D.

ABSTRACT: Individuals with intellectual and developmental disabilities (IDD) have fewer opportunities to pursue higher education, creating a gap in educational level, employment, and quality of life between those with and without IDD (Blaskowitz et al., 2022). Although college attendance among students with IDD has increased, program availability still does not meet growing demand (Blaskowitz et al., 2022). At Duquesne University, the Compass Program provides students with IDD in Pennsylvania (PA) the opportunity to pursue an authentic college experience and get a college degree. The PA Inclusive Higher Education Consortium (PIHEC), a consortium of eighteen PA schools that offer inclusive higher education opportunities to individuals with IDD, conducted two research studies since its inception. Study 1 focused on the peer mentors who support PA-college students with IDD. A survey of 107 mentors from four PIHEC institutions found that most mentors valued relationship-building (85%) and goal development (95%). However, mentors reported difficulty establishing clear expectations and supporting students in career exploration (25%). Study 2 assessed self-determination in 75 students with IDD across five universities using the Self-Determination Inventory (SDI). Over four semesters, overall SDI scores increased from 84 to 87. Although students showed increased self-belief, they struggled to turn that confidence into them taking action. Our team will present findings from these studies and the important steps occupational therapists and mentors can

take to support students with IDD. Overall these findings showcase the meaningful impact of inclusive higher education programs on the IDD community.

134: Flexible Silver Screen-Printed Silver Electrode Platform for Stretchable Potentiometric pH Sensing

Macy Vignolini | Biomedical Engineering | School of Science and Engineering
Sofia Serrano Arreses | Biomedical Engineering | School of Science and Engineering
Jillian Misselwitz | Biomedical Engineering | School of Science and Engineering
Faculty Advisor(s): Melikhan Tanyeri, Ph.D.

ABSTRACT: This study presents the development of highly flexible and scalable electrochemical pH sensing platform fabricated using screen-printable conductive materials for wearable and point-of-care applications. Silver paste electrodes were fabricated via screen-printing onto a flexible polyimide substrate to provide reliable conductivity, strong substrate adhesion, and stable performance under mechanical deformation. A polyaniline (PANI) layer was employed as the pH-sensitive material for potentiometric detection. Electrochemical detection principles commonly implemented in paper-based microfluidic systems were incorporated to ensure stable signal acquisition and compatibility with compact measurement systems. By combining scalable screen-printing fabrication with PANI-based electrochemical transduction, the platform achieves good electrical performance, mechanical durability, and adaptability to flexible substrates. The proposed approach establishes a mechanically resilient framework for flexible pH sensing in continuous health monitoring and wearable point-of-care testing.

***135: Lessons from Medicine for Shift Handovers in Intelligence Analysis: A Review of the Literature**

Alexia Caldwell | International Security Studies | McAnulty College and Graduate School of Liberal Arts
Dominic Failor | International Security Studies | McAnulty College and Graduate School of Liberal Arts
Veronica Noel | International Security Studies | McAnulty College and Graduate School of Liberal Arts
Max Stokley | International Security Studies | McAnulty College and Graduate School of Liberal Arts
Zack Kane | International Security Studies | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Aimee Kane, Ph.D.

ABSTRACT: Shift handovers are a critical process where information is shared between colleagues who are collaborating to ensure continuity between shifts and generate an efficient work environment. During crises and other events that require 24-hour operations, intelligence analysts work in shifts to review voluminous information to assess threats and provide reports to policy makers (Kane et al., 2023). Research on shift handovers has largely been done in the medical field and is under-studied in the intelligence setting (c.f., Kane et al., 2023; Kane et al.,

2025). Our research aims to uncover how medical shift handover practices may be adapted to address long-standing issues in intelligence analysis (e.g., information overload, Lowenthal, 2025), while also considering how technological advances, including artificial intelligence (Paletz et al., 2025), may offer support for information sharing across shifts.

Our review of medical research on shift handovers indicates that effective medical shift handovers tend to be highly procedural (e.g., checklists) and also benefit from interpersonal communication during the shift changes (Clark et al., 2012; Randell et al., 2011). We are analyzing similarities (e.g., need for knowledge sharing) and differences (e.g., operational versus conceptual tasks) in the medical and intelligence contexts to identify supports most likely to be applicable in the intelligence shift handovers. For example, we see high value in interpersonal communication during shift changes due to the need to establish common ground in both settings, but the form of communication in the intelligence setting may need to be digital rather than in person.

136: Probing the Structure of the Serotonin Transporter Using Ibogaine, Crosslinking, and Mass Spectrometry

Madison Fellabaum | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Michael Cascio, Ph.D., Pamela Marshall, Ph.D.

ABSTRACT: Serotonin is a neurotransmitter that affects mental wellbeing. The purpose of this research was to understand the structure of the serotonin transporter (SERT) by tagging the extracellular loops with the mutation L406C. L406C SERT, a mutated form containing a single cysteine residue, tagged SERT on the fourth extracellular loop, so that crosslinking studies could be performed. With crosslinking studies, the structure could be understood so selective serotonin reuptake inhibitors (SSRIs) could be made better. Overexpressed SERT was purified, reconstituted, and tagged with a crosslinker that crosslinks upon photoactivation. Ibogaine was added to stabilize SERT in an inward-open-facing state during crosslinking. Mass spectrometry is being used to determine the location of crosslinked residues within the vicinity of the introduced mutation. With further understanding of the structure of SERT, SSRIs can be made better in the future. Further understanding of ibogaine and its interactions with SERT will also aid in mental wellbeing.

137: The Hidden Curriculum in Gross Anatomy - Fostering Humanistic Values in Health Science Students Through Anatomy Pedagogy

Peyton Nolan | Health Sciences | Rangos School of Health Sciences
Kalliopi Makricostas | Health Science | Rangos School of Health Sciences
Faculty Advisor(s): Kimberly Szucs, Ph.D.

ABSTRACT: Foundational knowledge of anatomy is essential to occupational therapy as it directly supports a clinician's ability to interpret and apply anatomical information effectively in the care of patients (Fillmore et al., 2016). As noted by Schofield (2018), "The primary learning

objectives of gross anatomy courses are typically focused on understanding concrete concepts, such as muscle functions and location." However, anatomy courses that include donor dissection offer a unique opportunity to explore humanistic themes that extend beyond concrete concepts. The fundamental motive of this study is the need to demonstrate the correlation between Occupational Therapy's values of a holistic and empathetic viewpoint for our patients and the engraving of morals and curriculum of the profession as a whole, while learning functional anatomy. This study seeks to examine how occupational therapy students perceive the donor body, and how these perceptions influence their interaction during dissection lab. Three online surveys were distributed at three points in the semester to the third year class of occupational therapy students at Duquesne University who participated in the cadaver anatomy course and lab, evaluating how the students view and work on the donor bodies. Surveys included questions regarding their emotions/feelings towards dissection, level of comfort with their dissection group, and their perspective on how they viewed the cadaver. These responses were recorded at the time of distribution and compared at the end of data collection.

138: Does Sleep Matter? The Relationship Between Sleep and Infants' Attention

Katelyn McKee | Physical Therapy | Rangos School of Health Sciences
Eric Davis | Health Sciences | Rangos School of Health Sciences
Amanda Eadie | Physical Therapy | Rangos School of Health Sciences
Faculty Advisor(s): Regina Harbourne, PT, Ph.D., FAPTA

ABSTRACT: Background and Objective: Sleep is important for learning and functioning in infants' daily lives and the tasks they complete. It is known that sleep supports attention and learning but specific features of sleep remain undescribed. The objective of this study is to examine the impact sleep has on an infant's attention and ability to complete a motor problem-solving task.
Methods: 24 infants, between 6 and 8 months old, who could independently sit and reach but not crawl were tested in their homes. A Nanit baby Monitor was used to record data on the infants sleep the night prior to completion of the problem-solving task. A cluster analysis using sleep duration, number of wakings, number of parent visits and sleep efficiency yielded 2 groups: short-interrupted sleepers and long sleepers. During the reaching task the following day, the infants sat and reached for toys in two locations. Datavyu video coding software was used to code for trial duration, looks away from the areas of interest, the duration of those looks, and the distraction (parent, toy, feet, general surroundings, etc.).
Results: The short-interrupted group sleep time was significantly shorter (mean = 8.75 hours) than the long sleep group (mean = 10.25 hours). Infants with short-interrupted sleep were more likely to look off the reaching board while completing the reaching task, mean=2.5sec (sd = 2.8), vs mean=1.04 seconds (sd = 1.34) for the long sleepers (p=0.05). Infants with short-interrupted sleep may show less ability to attend to tasks, which could affect learning over time.

139: How do collegiate athletes perceive that sustaining a concussion impacted their mental health and wellness? A Qualitative Interview Study.

Caitlin Mackey | Biology | School of Science and Engineering
Faculty Advisor(s): Justin DiSanti, Ph.D.

ABSTRACT: Mental health remains a key, under researched area in collegiate athletes' concussion recovery. The purpose of this study was to qualitatively explore collegiate athletes' perceptions of their mental health after sustaining a sport-related concussion. Additionally, we sought to identify emerging internal and external themes that influenced collegiate athletes' lived experience with a concussion.

Collegiate athletes who suffered a concussion, but were 3-12 months after being cleared for return, participated in 45-60 minute interviews conducted via Zoom. Guiding topics of the interview included: 1) sports background and experience with sport-related concussion; 2) impact of concussion on health-related quality of life; 3) positive and negative aspects of recovery; 4) individual factors of recovery; 5) mental health impact; 6) reflections and lessons learned. Interviews were recorded and transcribed verbatim, then analyzed inductively to identify themes and illustrative quotations which characterized our participants' experiences. The emerging themes of the study were: 1) Barriers to reporting; 2) External and internal pressures; 3) Lived experience. This structure was then divided into sub-categories to further our understanding.

Our results indicate that athletes' mental health after concussion varies from person to person, though emerging common factors can inform our understanding and treatment. Athletes often struggled due to the loss of athletic identity (which in turn intertwines with their social life), as well as external pressures surrounding them with athletics and schooling. Further efforts should be made to understand how to navigate these internal and external factors affecting their health and recovery.

140: Evaluating the Aesthetics of Soccer Goals

Cole Goodman | Psychology | McAnulty College and Graduate School of Liberal Arts
Blaize Hardy | Psychology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Alexander Kranjec, Ph.D.

ABSTRACT: What makes a soccer goal "beautiful"? Soccer is widely considered the most popular sport in the world, yet existing literature on the aesthetics of sport performance has seemingly overlooked the need for an evaluation of soccer goals. Employing a quantitative design, we investigate the relationship between specific performance characteristics – such as shot trajectory and team combinations – and participants' beauty ratings. While certain goals are widely regarded as more aesthetically pleasing than others, the features that shape these aesthetic judgements are poorly understood. Clarifying these relationships will contribute to a

greater scientific understanding of what makes a goal “beautiful” and how humans perceive beauty in general.

In this study, 100 participants aged 18+ with prior experience as a soccer player and/or fan will be recruited through email, social media, and personal networks. A screening survey will collect basic demographic information, and participants with no soccer experience will be excluded. Participants will then complete a brief survey administered via Qualtrics. During the survey, participants will view brief video clips of soccer goals and rate each clip on several parameters. All participants will view the same set of clips presented in a randomized order, and ratings will be conducted on a 1-7 Likert agreement scale.

Data will be analyzed using descriptive and correlational statistics to identify which technical characteristics best predict aesthetic ratings. We hypothesize that goals characterized by higher perceived difficulty, precise ball placement, and fluid team combinations will obtain significantly higher beauty ratings than goals defined primarily by power and/or speed.

141: Effectiveness of BCTT in Concussion Recovery Timelines in Collegiate Athletes

Alexa Duda | Athletic Training | Rangos School of Health Sciences
Mary Cate Kitsmiller | Health Sciences | Rangos School of Health Sciences
Faculty Advisor(s): Erica Beidler, Ph.D., LAT, ATC

ABSTRACT: Purpose:To determine the influence of early aerobic exercise prescription following concussion on recovery timelines (i.e., days from injury to symptom resolution and return-to-sport) in collegiate athletes at a single institution.. We hypothesize that addition of early exercise prescription protocol will result in more favorable recovery outcomes to return to sport and time to symptom free timelines. Method:We conducted a retrospective cohort study of NCAA Division I athletes at one institution using medical record–confirmed diagnosed concussion cases from August 2019–December 2025. Implementation of the Buffalo Concussion Treadmill Test (BCTT) and post-concussion exercise prescription in August 2022 created pre- (n = 83) and post-exercise intervention implementation (n = 127) groups. The dependent variables of interest were represented by the days from injury until the athlete reported being asymptomatic and days from injury until the standardized, 6-step Return-to-Sport strategy was completed as determined by the institution’s sports medicine team. Data was extracted from medical files by two trained research assistants, spot checked for accuracy, and de-identified for analyses. After data cleaning is complete, we will conduct independent-samples t-tests and Kaplan–Meier survival analyses to compare recovery outcomes between groups. Potential Practice Implications:This study informs clinical practice evolution for post-concussion management by evaluating the real-world implementation of the new sub-acute aerobic exercise recommendation into care. Findings contribute to understanding whether graded, sub-

symptom exercise improves recovery timelines and supports future evidence-based updates to return-to-sport protocols

142: Early Detection of Bacteria in Dilute Solutions

Emily Allison | Biomedical Engineering | School of Science and Engineering
Hannah Neely Aldridge | Biomedical Engineering | School of Science and Engineering
Cecilia Morrow | Biomedical Engineering | School of Science and Engineering
Claire Rickard | Biomedical Engineering, Nursing | School of Science and Engineering and School of Nursing
Faculty Advisor(s): Melikhan Tanyeri, Ph.D.

ABSTRACT: Sepsis is a rapidly progressing and potentially fatal condition that requires early detection. Conventional blood culture diagnostics require 24-48 hours due to colony growth on agar plates. Our microfluidics approach aims to reduce the time from sample collection to diagnosis to 4-6 hours by compartmentalizing bacterial growth into thousands of isolated microreactors.

Polydimethylsiloxane (PDMS) microfluidic devices were used to generate monodisperse aqueous droplets (~75µm) containing bacteria suspended in growth medium within a fluorinated oil phase. Each droplet functions as an individual growth chamber, enabling digital colony formation from single bacterial cells. The droplets are transferred into a secondary microfluidic device that immobilizes the droplets in an array, allowing us to track the bacterial growth over time.

During incubation, droplets containing viable bacteria become optically dense due to colony expansion, enabling binary classification of growth-positive and growth-negative droplets. Bacterial concentration is then calculated using the dilution rate and the fraction of positive droplets. Machine learning algorithms automate droplet identification, growth classification, and bacterial concentration estimation, reducing analysis time and enabling rapid, quantitative diagnosis.

143: Van-demonium: Analyzing Alternative Transportation Effects on Student Attendance and Engagement with Afterschool Programs in South Pittsburgh

Margaret Lutz | Biomedical Engineering | School of Science and Engineering
William Sutherland IV | Applied Mathematics | School of Science and Engineering
Quentin Brambley | Data Science | School of Science and Engineering
Faculty Advisor(s): Josef DiPietrantonio, Ph.D.

ABSTRACT: The Brashear Association is a nonprofit organization that serves the communities of South Pittsburgh. This organization works to give everyone a “fair shot”, focusing on groups facing social, educational, health, and economic issues. One service the Brashear Association

provides to Pittsburgh's Arlington K-8 school is the "Adopt-A-Nanna" program, which helps students with transportation needs by providing them a ride to and from school, with an additional opportunity to receive transportation to Brashear's after-school program. In our study, we observed differences in Brashear's afterschool program attendance between students using the "Adopt-A-Nanna" program and students who are not. From data provided by the Brashear Association, we engineered a dataset using Python's pandas package. The data was cleaned for testing by removing days that the program was not running and merging the data sets from each program. We were able to perform statistical tests, such as the Ansari-Bradley test, and use visualization techniques, including the use of Geographic Information System (GIS) and bar charts with Python's seaborn package. Through our tests, we found that the difference in the variance between Nanna and non-Nanna students is statistically significant. Through the use of GIS visualization, we were also able to represent the municipalities in which the "Adopt-A-Nanna" program serves and compare them with areas that show community need. The findings in this applied research highlight the transportation needs students might face and student engagement with afterschool programs. We hope that these findings will positively impact the program's and the Brashear Association's growth.

144: The Detection of Various Ignitable Liquids Exposed to Various Durations of Fire

Caitlyn Patton | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Matthew Regentin, M.S.

ABSTRACT: When investigating a fire scene, it is crucial to rule out the possibility of arson by identifying if ignitable liquids (ILs) are present. The detectability of ILs under extended burn conditions remains unclear since ILs are often degraded or consumed by the fire. Gas Chromatography-Mass Spectrometry (GC-MS) is commonly used in fire debris analysis to detect compounds commonly found in ILs such as gasoline, lighter fluid and diesel fuel. Mass spectra data is then compared to peak presence and patterns outlined in ASTM E1618. Previous research investigated the survivability of gasoline at short burn durations (1-5 minutes). This project evaluates longer burn times using gasoline on carpet samples help determine the point at which gasoline residues become undetectable. The exposure time may be variable due to the unpredictability of fire activity. Results from this study will contribute to understanding the survivability of ILs at extended burn durations. Beginning to understand this aspect of ILs can better equip fire investigators and aid in the analysis and identification of evidence at fire scenes by establishing reference data for IL survivability and improving the interpretation of negative findings.

145: Bioinformatic Analysis of the Stability of a Therapeutic Fusion Protein

Natasha Karlik | Pharmaceutical Sciences | School of Pharmacy
Xiyue Li | Pharmaceutical Sciences | School of Pharmacy
Diana Tawab | Pharmaceutical Sciences | School of Pharmacy
Sanjana Harshadbhai Chavda | Pharmaceutical Sciences | School of Pharmacy
Faculty Advisor(s): Wilson Meng, Ph.D.

ABSTRACT: Autoimmune diseases, such as rheumatoid arthritis and psoriasis, are commonly treated with tumor necrosis factor-α (TNF-α) inhibitors, such as the biologic drug named Enbrel (etanercept). These biologics are often expensive, limiting the access patients have to such drugs. This introduces the importance of biosimilars, a cost-effective and safe alternative to biologics. Biosimilars can be developed using computational strategies to mimic the action of reference biologics. This project presents a theoretical, risk-based development plan for Vigorcept, a proposed biosimilar to Enbrel. Using Aggrescan3D, an analysis of the proposed drug's structure identifies key aggregation and degradation hot spots to consider when formulating the Vigorcept therapeutic. These methods were deployed to ensure a high similarity to the Enbrel reference product. Vigorcept is also compared with Humira (adalimumab), an IgG1 monoclonal antibody, to highlight the vulnerabilities of TNFR-Fc fusion proteins. This integrated approach supports the development of safe, effective, and accessible biosimilar therapies for autoimmune disease.

146: Using Changes in the Microbiome of a Fingerprint to Determine Time-Since-Deposition

Michaela Baer | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Pamela Marshall, Ph.D.

ABSTRACT: The recovery of fingerprints at a crime scene can establish if an individual was present but not determine when the fingerprint was deposited. Being able to determine when a fingerprint was left at a location would allow investigators to corroborate timelines, alibis, and could broaden or narrow the suspect pool. When a fingerprint is deposited onto a surface, there is a transfer of microorganisms, e.g. bacteria, from the finger to the surface. The microbiome is the community of microorganisms that live on and in the human body. A review of literature was performed to determine how this transfer could be used in time-dating fingerprint evidence. It has been seen that these microorganisms are consistently transferred from the pad of the finger to the new surface when a fingerprint is deposited, and that the composition of the microbiome of the deposited fingerprint changes over time. While everyone's skin microbiome is unique to them, there are common bacteria that are present across the population. Future research into how the bacteria on a deposited fingerprint change in relative abundance over time using 16S rRNA sequencing could be a solution to the need for a method to determine time-since-deposition of a fingerprint. Further laboratory research into this concept would explore the validity of analyzing microbes for time-dating and broaden the use of microbiology in the field of forensic science.

147: RNAi Knockdown of unc-61 in Caenorhabditis elegans

Teagan Starenchak | Biology | School of Science and Engineering
Faculty Advisor(s): Kasey Christopher, Ph.D.

ABSTRACT: Caenorhabditis elegans (C. elegans) is a transparent, microscopic worm with a very rapid life cycle of about 3 days from embryo to adult. The unc-61 gene of C. elegans encodes septins that are involved in GTPase activity. Mutations in the unc-61 gene can result in several phenotype differences including cytoskeletal abnormalities. This research aims to examine the effects of introducing dsRNA complementary to unc-61 mRNA to C. elegans, and understand by what mechanism these effects are occurring. Two worm strains were fed E. coli expressing dsRNA against unc-61 through a plasmid. Results from the rrf-3 strain were analyzed through phenotyping and PCR/RT-PCR with gel electrophoresis, while results from the GFP-AG400 strain were analyzed using DIC imaging. Analysis revealed that RNAi did not result in the knockdown of unc-61. This result may have been due to unsuccessful transformation of E. coli or insufficient efficacy of the delivery method. Future research should aim to examine this concept using the injection method to attain more robust results. The unc-61 gene is homologous to human genes SEPT6, SEPT8, and SEPT11. Understanding how unc-61 works in C. elegans could provide us with more information about human diseases involving SEPT6, SEPT8, and/or SEPT11 such as Parkinson's disease.

148: Comparative Wound Ballistics of 3D-Printed and Commercial Firearms: A Postmortem Analysis of Penetration Potential and Tissue Damage Using Pigs

Brooke Sanders | Biochemistry | School of Science and Engineering
Faculty Advisor(s): Matthew Regentin, M.S., Pamela Marshall, Ph.D.

ABSTRACT: A privately made firearm (PMF) is a firearm that an unlicensed individual assembles or manufactures outside of a commercial setting. PMFs lack a serial number or other identifying marks required of licensed manufacturers, and 3D-printed firearms are a subset of PMFs. A 3D-printed firearm is a gun that is partially or entirely manufactured using a 3D printer, typically from plastic or polymers. This study evaluates the wound-ballistic performance of .22 LR ammunition fired from a fully 3D-printed, single-shot, ABS polymer Songbird model firearm compared with a commercially manufactured semi-automatic pistol. Each firearm will discharge a round into three pig thigh samples to assess penetration depth and the extent of tissue damage across scientific replicates. Postmortem examinations will document the entrance/exit characteristics, wound-channel morphology, and penetration measurements. By comparing these findings, the study aims to determine whether 3D-printed firearms generate wound patterns similar to those produced by commercially manufactured firearms. Future research will incorporate additional 3D-printed models, polymer types, and firing distances. Insights into the terminal performance of 3D-printed firearms will support forensic evaluations of PMF lethality and inform investigative and legal considerations surrounding these untraceable weapons.

149: Post-Concussion Symptom Severity and Exercise Tolerance on the Buffalo Concussion Treadmill Test

Cameron Crivelli | Finance | A.J. Palumbo School of Business Administration
Mia Grisafi | Health Sciences | Rangos School of Health Sciences
Faculty Advisor(s): Erica Beidler, Ph.D.

ABSTRACT: Prior to recent updates to concussion management guidelines, athletes were typically advised to rest and avoid physical activity following a concussion. The Buffalo Concussion Treadmill Test (BCTT) deliberately provokes mild symptom exacerbation in a controlled setting to identify a safe, sub-symptom aerobic exercise threshold, which is then used to guide individualized exercise prescription and recovery. To examine the relationship between concussion symptom burden (i.e., number, severity) and BCTT performance outcomes [i.e., time to test termination, heart rate at termination, Rate of Perceived exertion (RPE) at termination]. We hypothesize that greater symptom burdens are associated with shorter time to test termination and higher heart rate and RPE at the time of BCTT termination. We conducted a retrospective chart review of medical records from a single NCAA Division I institution beginning with the initial implementation of the BCTT in August 2022 and including all subsequent cases (starting n=127). Records included all concussions diagnosed and management by the institution's sports medicine team. The independent variables were post-concussion symptom number and severity captured using the 22-item Post-Concussion Symptom Scale just prior to BCTT completion. The dependent variables were BCTT performance outcomes, including time to test termination, heart rate at termination, and rating of perceived exertion at termination. Data were extracted from paper and electronic medical records by two trained research assistants, and each case was assigned a unique identifier to ensure patient confidentiality. After correcting errors and excluding incomplete or missing records, Pearson correlation analyses will be conducted.

150: Cutaneous Biomimicry for Stage II Sacral Decubitus Ulcer Modeling: A Tri-Composite Biomaterial Platform to Investigate Pressure-Induced Tissue Deformation and Necrosis

Skyler Wrubleski | Biomedical Engineering and Nursing | School of Science and Engineering and School of Nursing
Faculty Advisor(s): John Viator, Ph.D., Kimberly Williams, Ph.D.

ABSTRACT: This study developed a three-dimensional tissue-engineered biomaterial scaffold to mimic human sacral skin for modeling Stage II pressure injuries. A tri-composite hydrogel consisting of sodium alginate, gelatin, and elastin was formulated to replicate the structural and mechanical properties of native cutaneous tissue. Alginate provided compressive stability through ionic crosslinking with calcium chloride, while gelatin and elastin were crosslinked using tannic acid under alkaline conditions to promote protein network formation and elasticity. Scaffold thickness was engineered to approximate the depth of human sacral dermal tissue (~2.5 mm). A custom 3D-printed wound-mimetic indenter was developed and integrated with a

mechanical testing system to apply clinically relevant compressive pressure (32 mmHg; ~0.62 psi) to a localized region of the scaffold. Mechanical integrity, elastic behavior, and hydration capacity were assessed through compression testing and swelling analysis to evaluate scaffold suitability for sustained pressure loading.

This platform aims to address limitations of animal models and two-dimensional in vitro systems by providing a reproducible, physiologically relevant model of pressure-induced tissue deformation. Future work will incorporate a bilayer configuration with fibroblasts embedded within the dermal layer, and keratinocytes seeded on the surface to investigate pressure-induced cellular necrosis and viability under controlled mechanical loading.

151: A Comparative Analysis of Killing Methods Between Male and Female Serial Killers

Alexandra Carrillo | Biochemistry | School of Science and Engineering
Faculty Advisor(s): Pamela Marshall, Ph.D.

ABSTRACT: Serial homicide has long been a subject of forensic and criminological study, with males historically comprising the majority of identified offenders. Serial homicide is the killing of at least two people by the same person usually in events separated by a “cooling off” period. Males comprise the majority of identified serial killers in existing datasets. A curated serial homicide database was analyzed to compare killing methods between male and female offenders. Cases were verified using appropriate external sources and classified by validated definitions of serial homicide. The dataset included 626 females and 5,257 males. However, not every individual was included due to parameters of the definition of serial homicide. Within the analyzed dataset, female-identified offenders most frequently employed poisoning, whereas male-identified offenders most frequently employed firearms and strangulations. These patterns may reflect social, situational, or opportunity-based factors rather than intrinsic behavioral differences. Gender as recorded in archival case data was used for classification in this study. Female serial killers in the dataset most frequently employed poisoning as a killing method. This research has the ability to strengthen the public’s perception of gender considerations for serial killers.
Keywords: serial killers, female, male

***152: *TrussWorthy* – A Lunar Module Truss System**

Anthony Wehrli | Biomedical Engineering | School of Science and Engineering
Connor McDonaugh | Environmental Science | School of Science and Engineering
Tyler Williams | Mechanical Engineering & Physics | School of Science and Engineering
Sofia Lopez-Linares Perez | Mechanical Engineering | School of Science and Engineering
Elif Sebnem Kalayci | Mechanical Engineering | Swanson School of Engineering
Faculty Advisor(s): Melikhan Tanyeri, Ph.D.

ABSTRACT: TrussWorthy is a modular truss-based construction platform designed to support the gradual development of sustainable infrastructure on the lunar surface. Aligned with NASA's Moon to Mars objectives, the system emphasizes in-situ resource utilization (ISRU) by transforming lunar regolith into structural components through sintering and additive manufacturing. By reducing dependence on Earth-supplied materials, TrussWorthy aims to lower launch costs while enabling scalable, long-term construction capabilities. The design integrates autonomous excavation, 3D printing, and robotic assembly, building on technologies expected from upcoming Artemis and Commercial Lunar Payload Services missions. Engineered to withstand extreme thermal cycling, vacuum conditions, and reduced lunar gravity, the modular architecture allows for flexible expansion and reconfiguration over time. Applications include structural platforms for solar arrays and modular launch pads capable of supporting future landing and ascent operations. Through its adaptable, autonomous, and resource-efficient approach, TrussWorthy presents a practical pathway toward resilient lunar infrastructure and the advancement of a sustainable cislunar economy.

153: Forensic Science Competency in Legal Training: Addressing Gaps Exposed by Wrongful Conviction Cases

Nevaeh Lindemuth | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Pamela Marshall, Ph.D.

ABSTRACT: Wrongful convictions occur when post-conviction evidence establishes that a defendant is legally entitled to an acquittal. Analyses from the National Registry of Exonerations indicate that approximately 61% of wrongful conviction cases involve official misconduct. This project examines a subset of such cases in which ineffective assistance of counsel occurred due to the misinterpretation of forensic evidence by a legal professional as a result of a lack of scientific knowledge. During phase one of this project, cases were compiled using the National Registry of Exonerations and the Innocence Project to review and identify patterns involving the misuse, miscommunication, or improper interpretation of forensic evidence. Contributing factors such as ineffective assistance of counsel, failure to consult forensic experts, or inaccurate courtroom presentations were documented. Phase two consults existing literature to assess law school curricula and continuing legal education requirements across the United States to evaluate the level of forensic evidence training legal professionals obtain. By comparing case-

based findings with these curricular gaps, this study aims to identify opportunities to strengthen forensic science literacy in legal education to reduce the risk of future wrongful convictions.

154: Fish diversity and community structure of four stream deltas in the Pittsburgh Region
Haleigh Newell | Biology | School of Science and Engineering
Faculty Advisor(s): Brady Porter, Ph.D.

ABSTRACT: Where streams confluence with large rivers, they form deltas with complex habitats involving variable depths, flow, structure, and sediment types. These delta habitats are expected to have high biodiversity compared to the adjacent large rivers but are poorly characterized in the Pittsburgh region. Four sites were examined in this project: Girty's Run, Pine Creek, and Seitz Run, all which confluence with the Allegheny River, and Nine Mile Run, which confluences with the Monongahela River. Following ORSANCO's protocol for detecting the effects of an outfall, we utilized traveling zones (T-zones) upstream, downstream, and at each delta. Fish collected via electrofishing were enumerated by species, measured, and weighed separately for each T-zone. The population data was used to calculate an index of biotic integrity (IBI) using the Ohio surface waters criteria to assess the health of the fish community. All deltas displayed higher IBI scores in the fish community compared to upstream and downstream. Shannon's H index was conducted to evaluate species diversity. The deltas scored higher in comparison to their upstream and downstream counterparts, except for the Pine Creek site. T-zone sampling displayed increased diversity of fish deltas communities, indicating the importance of preserving delta habitats to conserve fish biodiversity.

155: Withdrawn

156: Ethical Governance in AI-Driven Supply Chains
Benjamin Irwin | Supply Chain Management | A.J. Palumbo School of Business Administration
Faculty Advisor(s): Rachel Neilan, Ph.D, Mia Briceno, Ph.D

ABSTRACT: Artificial intelligence (AI) adoption in supply chain management (SCM) is accelerating, offering substantial gains in efficiency, cost reduction, and operational productivity. However, the rapid deployment of AI across supply chain functions is outpacing efforts to understand and govern its ethical risks. In this poster, I explore three central ethical concerns raised by AI adoption in SCM: job displacement and polarization, transparency and accountability gaps created by opaque "black box" systems, and power asymmetries that emerge as large organizations dominate AI vendor markets.

To investigate these concerns, I reviewed empirical literature on SCM AI applications and conducted a systematic analysis of research priorities across 50 highly cited SCM AI studies, examining the proportion of work focused primarily on benefits versus ethical risks versus a balanced treatment of both.

This analysis reveals that over 70% of current SCM AI research focuses primarily on benefits and applications, while only 2% focuses primarily on ethical risks, with the remainder taking a more balanced view, demonstrating a significant governance lag. I identified two promising frameworks for addressing these issues: Human-Centered AI, which prioritizes human decision-making over automation, and Explainable AI, which increases transparency for stakeholders. These findings point to an urgent need for ethics-by-design approaches and further investigation into AI procurement dynamics before governance mechanisms fall dangerously behind technological deployment.

157: Evolution in Public Schools: A Battle in the Wars of Science & Theology and Church & State

Paul Horne | Biology | School of Science and Engineering
Faculty Advisor(s): Anna Scheid, Ph.D.

ABSTRACT: The long American decline in religious affiliation has recently leveled off, and more Americans perceive religion to be gaining influence, which some attribute to Generation Z. Many social factors could be influencing this trend, such as gender, politics, and current events. Generation Z is similarly religious to Millennials, unlike the previous trend of successive generational decreases. This unexpected statistical plateau could have important implications for politics in the United States. How has religion influenced political history, and why?
To gain a greater understanding of how politics and religion relate, this project explores theological and cultural reasons behind the historic "Monkey" Scopes Trial and its influence on teaching evolution in public schools. This project also analyzes perspectives of church-state relations through Supreme Court cases and denominational theologies. Methodologically, this research project is based on academic sources: statistics, legal documents, secondary historical sources, and theological publications.

This project highlights three main findings. First, religious conflicts with science and its teaching in school curricula were much more dependent on cultural moments and theological distinctives of certain denominations than Christianity or religion broadly. So, as religion shifts in society, its theological emphasis should be studied (e.g., evangelicalism). Second, the US divide between church and state is nuanced and changing. The Supreme Court has influenced and interpreted religion in public life differently over time. Third, the demographic shift around religion, while small, warrants further examination to better understand the direction of the US politically.

158: A State Within A State: The Rise of the CIA and the Transformation of American Foreign Policy in the Early Cold War

Noah Kalpich | History | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Andrew Simpson, Ph.D.

ABSTRACT: From the dying embers of the Second World War, President Harry S. Truman inherited the immense responsibility of lifting Europe from ruin. Despite victory parades and newspaper titles declaring Allied victory, Soviet aggression in the months preceding the Potsdam Conference threatened to reignite tensions. To combat the international threat of Communism, President Truman signed the National Security Act into law on July 26, 1947. This act gave US intelligence a legal basis, guaranteed the president access to a civilian intelligence stream with a dedicated budget, and, most importantly, created the Central Intelligence Agency. Tasked with coordinating the collection of national intelligence outside of the United States through sources authorized by the president and the National Security Council, the CIA became the premier foreign intelligence agency within the federal government. While strict language within the National Security Act reflected President Truman's concern that intelligence collection threatened democracy, Soviet advancement in Europe prompted the National Security Council to bolster the CIA. On June 18, 1948, the council issued NSC 10/2 - an energetic directive that permitted the CIA to conduct espionage and counterespionage in foreign nations. For the next two decades, the CIA utilized its discretionary powers to exert influence upon the foreign affairs of nations ensnared by Communist leanings. Unrestrained by rules and regulations and outside of the grasp of congressional scrutiny, the foreign intelligence community became a powerful agent within the executive branch and federal government.

159: Families of matrices associated with degree-\(n\) Blaschke products which generalize the bicentric polygon conditions, satisfy Poncelet's closure theorem, admit decompositions of Blaschke products, and adhere to Crouzeix's conjecture

Michael Gambardella | Mathematics | School of Science and Engineering
Faculty Advisor(s): Samantha Allen, Ph.D.

ABSTRACT: In this research, we determine the conditions for the numerical range, otherwise known as the field of values, of a Blaschke curve associated with a degree-n Blaschke product to be an ellipse. We do so by considering the Kippenhahn curve of the compression of the shift operator's matrix representation. In proving the numerical range is an elliptical disk, we satisfy the bicentric polygon conditions, which determine when an n-gon that circumscribes a conic is itself inscribed in a conic, for any n-gon. As such, the conditions also satisfy Poncelet's porism, which states we may then find an infinite number of polygons that circumscribe and inscribe our two conics, respectively. The conditions for the numerical range to be an ellipse allow us to show a decomposition in the form of rational monomials. We then extend to multiple ellipses and consider when the numerical range consists of nested ellipses, each with circumscribed and inscribed n-gons. We prove a non-subspace topology on the numerical range in the multi-ellipse

case that tracks the branching of ellipses. The families of matrices studied also are found to adhere to Crouzeix's conjecture, a current open problem in complex analysis and linear algebra. The conditions found may be appreciably realized in the applied space. For example, these conditions can be utilized in non-Hermitian quantum mechanics, where the usual requirement of Dirac Hermiticity is replaced with unbroken PT symmetry. Other applications include the study of non-Hermitian Hamiltonians utilized in coupled cluster theory electronic structure calculations, unidirectional dissipative processes such as radioactive decay, gravitational lensing problems, and relevant matrices used in machine learning.

160: Dual Inhibitors of PI3K and ERK5 in Breast and Glioblastoma cancers

Joseph DiPaolo | Pharmaceutical Sciences | School of Pharmacy
Faculty Advisor(s): Jane Cavanaugh, Ph.D.

ABSTRACT: Cancer development is driven by a complex intracellular cascade, hijacked to disrupt the normal cellular functions to promote uncontrolled proliferation, metastasis and survival. Two critical pathways allowing malignant growth are the ERK/MAPK and PI3K/AKT/mTOR signaling cascades which play crucial roles in maintaining cell homeostatic functions of replication and proliferation. ERK 1/2 and PI3K pathways are well established as potential proto-oncogenic mutation sites as they have been shown to be aberrantly activated in many forms of cancer. With experimentation upon these pathways, we have found that there is cross talk among these proliferative pathways that may be a pro-cancer mechanism of resistance. We have also discovered that there is activation of ERK5, a MAPK found in breast and glioblastoma cancers, following inhibition of the ERK1/2 and/or PI3K pathways which suggests a role for the ERK5 pathway in cancer cell survival. We tested our novel dual small molecule inhibitors that regulate cross talk among the ERK5 and PI3K pathways to potentially downregulate chemo resistance and potentiation of cancerous cells. Using western blot analysis, Bradford assays, and scratch assay tests we can observe ERK5 levels in cells treated with our novel dual inhibitors and cellular migration to determine their role in tumorigenesis, apoptotic signaling, cell differentiation and metastasis. These findings will indicate the effects of ERK5 inhibition on the cellular signaling cascade in combination with another proliferative pathway inhibitor to advance the treatment for TNBC and glioblastoma cancers. These tests were performed determine the efficacy of the agents and testing is still ongoing.

161: Emotional Responses to Social Media Discourse

Rylee Garrigan | Psychology | McAnulty College and Graduate School of Liberal Arts
Ian McCurdy | Psychology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Alex Kranjec, Ph.D.

ABSTRACT: The rise of manosphere-related social media content has increased the visibility of online communities that promote misogynistic beliefs, traditional gender hierarchies, and hostile attitudes toward women. Little is known about how individuals emotionally respond to

this type of content or whether prior exposure influences those responses. The study examines how individuals emotionally react to manosphere-related social media content compared to neutral social media content, and whether emotional responses differ based on prior exposure to similar media. Participants will complete an online survey administered through Qualtrics. After reporting prior exposure to manosphere-related content, participants will view 20 short video clips (10 manosphere-related and 10 neutral clips) presented in randomized order. Participants will rate their emotional reactions, including emotional intensity, agreement, and valence. Analyses will examine the mean differences in emotional responses between content types and assess correlations between prior exposure and emotional response patterns. Findings from this study will provide insight into how exposure to manosphere-related social media content may shape emotional processing and social perceptions related to gender. Understanding these emotional responses may contribute to broader discussions about the psychological and social impact of online gender-based discourse.

162: Molecular mechanisms underlying the natural emergence of the super mucoid variants within a population of Pseudomonas fluorescens

Sarah Cole | Biology | School of Science and Engineering
Faculty Advisor(s): Wook Kim, Ph.D.

ABSTRACT: Biofilms are densely populated assemblages of microbial cells that are encased within a self-produced extracellular matrix. The reproductive success of individual cells can vary dramatically depending on their spatial positioning within the crowded population. Previous studies of Pseudomonas fluorescens identified mucoid (M) variants that naturally emerge from the wild type (WT) population by solving the problem of overcrowding. M cells produce multiple extracellular secretions that collectively push away the neighboring WT cells to create and maintain space that is significantly less crowded. All M variants possess a mutated RsmE protein, which natively represses the production of diverse extracellular secretions. We have recently identified a new class of mutants, termed “super mucoid” (SM), that also naturally emerge from the WT population. Here, we test the hypothesis that SM forms a unique spatial structure compared to M, since they are phenotypically distinct by their hyper-mucoid appearance and their RsmE protein remains unaltered from WT. Random and directed mutagenesis revealed that M and SM produce similar extracellular secretions, and they also exhibit similar relative fitness and spatial structure patterning against WT. Genome analysis revealed that SM arises through a mutation in the GacS/GacA system, which is known to regulate RsmE. Despite the phenotypic and genetic differences between SM and M, our study shows that the two mutant classes converge on altered regulation/function of RsmE. Disentangling the mechanisms of individual extracellular secretions is crucial, as they are expected to be functionally conserved across clinically relevant microbes and biofilm formation.

163: Detection of GHB and Rohypnol in Blow fly Larvae: Evaluating Forensic Toxicological Potential in Decomposition Contexts

Jessica Turner | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Stephanie Wetzel, Ph.D.

ABSTRACT: "Date rape" is a form of sexual assault often committed by potential partners. These crimes are often dismissed due to a lack of physical evidence, such as alcohol or drugs. “Date rape drugs” are commonly used in cases of sexual homicide, which is a combination of murder and sexual assault. If GHB (Gamma-hydroxybutyrate) or flunitrazepam, commonly known as Rohypnol, were more easily detected, their presence may serve as evidence in these forensic investigations. This research aimed to determine whether GHB and flunitrazepam could be detected at measurable concentrations in blow fly larvae, and if larvae could be used as toxicological indicators in death investigations involving these substances. Forensic entomotoxicology utilizes both forensic entomology and forensic toxicology to detect illicit substances within forensically relevant entomological species. Previous studies have been successful in identifying central nervous system depressants, amongst other illicit substances present in forensically relevant larvae, even when undetectable in the respective remains. Drugs of forensic interest can be successfully detected with liquid chromatography and triple quadrupole spectrometry (LC-QqQ-MS). GHB and flunitrazepam have shorter detection windows, making detection at measurable levels improbable. However, observations made on the changes in behavior and development cycle of the forensically relevant blow fly larvae under influence of GHB and flunitrazepam could potentially be used as toxicological indicators. The use of forensically relevant blow fly larvae as toxicological indicators would be critical in examining homicide cases involving drugs like GHB and flunitrazepam.

164: Red State, Blue Hair? Aesthetic Bias in Political Perception

Rebeca Galván Chapa | Psychology | McAnulty College and Graduate School of Liberal Arts
Ella Jones | Psychology | McAnulty College and Graduate School of Liberal Arts
Emmy Scullion | Psychology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Alexander Kranjec, Ph.D.

ABSTRACT: Certain features and aesthetics have been stereotypically associated with different political affiliations, and an individual’s face can communicate a lot about them. Previous research has shown that political orientation can be identified based just on someone’s face (Ambady & Rule, 2010). The present study explores the specific aesthetic characteristics associated with political ideologies or affiliations. The study consists of two parts. In Part One, 18 faces will be generated using AI image software. Prompts will specify gender and incorporate distinct visual aesthetic features, such as hair color, makeup style, and facial piercings. Participants will evaluate each face using a visual analog scale to indicate whether they believe the individual is politically left- or right-leaning. This phase examines how explicit aesthetic cues shape political categorization. In Part Two, a separate set of 18 faces will be collected from photographs of local government politicians outside of Pennsylvania, obtained from official government websites. Images will be edited to display only isolated facial features, removing

external aesthetic cues. Participants will again judge political affiliation. This phase assesses accuracy when stylistic indicators are absent. We hypothesize that features such as dyed hair, piercings, and specific grooming styles will systematically bias political judgments. Additionally, we will explore whether individuals who rely more heavily on aesthetic stereotypes are more or less accurate when judging political orientation from facial structure alone.

165: Bicultural Upbringing: Exploring Culture and Identity

Rebeca Galván Chapa | Psychology | McAnulty College and Graduate School of Liberal Arts
Faculty Advisor(s): Elizabeth Nickrenz, Ph.D.

ABSTRACT: Latinidad and who is "Latino enough" have been up for discussion lately in the media, but what and who determines whether anyone is enough to carry their culture with pride? Using personal narratives from participants of diverse backgrounds and cultural upbringings within the Latino community, including Latinos raised in the United States and Latinos raised in Latino America. This study explores how individuals have navigated within this discussion and how they have defined (and continue to define) their own identities. The research explores how participants describe moments of affirmation, exclusion, learning, and pride. The only person to determine how to feel about one's culture is oneself. Identity is not a stagnant thing, but rather something that shifts and changes the more an individual learns and grows.

166: Targeted gene knockouts and RsmE missense mutations reveal extracellular secretion networks governing biofilm spatial structure formation in Pseudomonas fluorescens

Cole Garland | Biology | School of Science and Engineering
Faculty Advisor(s): Wook Kim, Ph.D.

ABSTRACT: The spatial organization of individual cells within densely structured bacterial populations profoundly impacts their survival and adaptation. RsmE is a post-transcriptional regulatory protein in Pseudomonas fluorescens that represses the secretion of multiple extracellular products. Spontaneous mutations in the rsmE gene are naturally selected in P. fluorescens colonies as they de-repress extracellular secretions that provide spatial advantages in crowded populations, specifically biofilms. To understand RsmE attenuation and identify other regulated secretions, this study had two complementary aims. First, we previously competed 16 naturally occurring RsmE missense mutants against wildtype (WT) and quantified a spectrum of relative fitness advantages, suggesting that certain mutations differentially impact RsmE's repressor function. To test this hypothesis, select GFP-tagged RsmE missense mutants were competed against RFP-tagged WT and visualized by epifluorescence and confocal microscopy. We observed unique spatial phenotypes among the tested mutants, indicating that specific mutations differentially impact distinct extracellular secretion components. Second, we validated 14 candidate genes previously identified through random transposon mutagenesis by constructing targeted deletions in WT P. fluorescens Pf0-1 and ΔrsmE backgrounds. Individual knockout isolates were competed against WT to assess their relative fitness and effects on

spatial structure formation. Candidate genes are bioinformatically predicted to encode extracellular secretions, signal transduction components, and proteins of unknown function. Molecular insights could provide potential therapeutic strategies against chronic bacterial infections.

167: Identification of Novel Azole Compounds to Treat Shigella Infections

Trista Newman | Biochemistry | School of Science and Engineering
Faculty Advisor(s): David Heisler, Ph.D.

ABSTRACT: The rise in drug-resistant pathogens is one of the leading global health crises, with antibiotic-resistant pathogens (ARPs) causing ~48 million infections and $75 billion in costs annually. Thus, identifying new antimicrobial agents has become crucial to improving public health. Recent works suggest that N-heterocyclic azole-containing compounds can be functionalized to bind to various enzymes, proteins, and receptors. As a result, they possess the potential to serve as scaffolds for developing new antibiotics. Here, we screened a library of azole-containing compounds to assess their antibacterial potential against common foodborne pathogens (Salmonella, E. coli, Shigella, and Listeria). We identified three compounds that exhibited a strong anti-Shigella phenotype. Furthermore, these compounds had minimal cytotoxicity against mammalian cell lines and could reduce Shigella growth in infected cells. We are currently analyzing whether these compounds are bactericidal or bacteriostatic. Identifying new potential antibiotics that can target emerging ARPs is essential, and this work can provide a new approach for tackling the antibiotic crisis.

168: Development of a platform for applying uniaxial strain and torsion to flexible substrates

Lena Smith | Biomedical Engineering | School of Science and Engineering
Teresa Steffens | Biomedical Engineering | School of Science and Engineering
Faculty Advisor(s): Melikhan Tanyeri, Ph.D., Leda Kloudas, Ph.D.

ABSTRACT: This project aims to develop a mechanical testing platform capable of simultaneously applying uniaxial strain and torsional deformation to flexible materials, such as a thin silicone or PDMS sheet. The system integrates a linear actuator to impose controlled tensile loading and a rotational actuator to induce torsional stress from the opposite end. By altering the displacement of the linear actuator and the angular rotation of the torsional actuator, a range of mechanical loading conditions can be explored. To experimentally quantify the strain and torsion, time-lapse imaging is performed by stamping a pattern of microscopic fiduciary markers onto a silicone membrane and tracking their displacement under a microscope. Images acquired before and during actuation enable quantitative analysis of both strain and torsion experienced by the membrane. Future work will extend testing on a range of flexible substrates and refine actuator parameters for integration with cell culture systems or other biointerface applications.

169: Representations of cellular algebras

Miles Bertrand | Mathematics | School of Science and Engineering
Faculty Advisor(s): Robert Muth, Ph.D.

ABSTRACT: Diagramatic algebras are very useful ways both of conceiving of problems already laid out numerically, as well as formulating theories for concepts which have not yet been examined mathematically. One of the very useful tools we have for making sense of diagramatic algebras is the ability to create matrix subalgebras which represent these diagrams in an algorithmic manner. One of the types of algebras which readily shows the general principle of diagramatic algebras and their uses is cellular algebras. Cellularity is an important feature with connections to various other fields of mathematics, and illustrates the ways representation theory can be used to make sense of problems. For example, the Temperley-Lieb algebra, a prototypical cellular algebra was originally defined in the context of statistical mechanics, and applied to knot theory. A certain variant of the Temperley-Lieb algebra, the oriented Temperley-Lieb algebra, also has interesting uses in combinatorics. Currently, I am researching the generalia around their representations, including concepts like cellularity etc. I hope to present my findings on cellular algebras and note their applications, with a tentative focus on combinatorics.

170: Analyzing Participation Patterns in the "Brashear CARES Food Pantry" Program

Benjamin Colli | Applied Mathematics | School of Science and Engineering
Lona Adams | Applied Mathematics | School of Science and Engineering
Jacob Schaner | Data Science | School of Science and Engineering
Faculty Advisor(s): Josef DiPietrantonio, Ph.D.

ABSTRACT: The Brashear Association is a nonprofit organization providing South Pittsburgh residents access to programs addressing economic challenges. The Brashear CARES Food Pantry offers immediate assistance to individuals and families experiencing food insecurity.
We examine the duration of client participation and demographic characteristics of pantry users using survival analysis techniques, specifically Kaplan-Meier estimation. Duration is defined as the number of days between a client's first and last recorded pantry visit. Because the dataset begins in 2025, it is impossible to determine whether clients had visited the pantry prior to the observation period. Additionally, the absence of later visits does not necessarily represent permanent exit from the program and should be interpreted cautiously.

Results indicate 70% of clients appear as one-time visitors, while 30% return at least once. Despite representing fewer clients, returning users account for 57% of total visits. The survival curve shows a steep early decline, suggesting repeat visits often occur shortly after the initial visit. Demographic patterns suggest higher return tendencies among senior clients (60+) and lower rates among young adults (18-34), while family size shows minimal predictive influence. Income analysis is limited by missing data, as 88% of clients did not report income. Among

reported categories, medium-income clients appear to return more frequently than low-income clients, while the non-reported income group demonstrates the highest observed return rate. These findings highlight engagement patterns and the importance of accounting for incomplete demographic information. Understanding these trends may help the Brashear Association improve outreach efforts and service accessibility for underrepresented populations.

171: Assessing the Potential for CODIS-Eligible DNA Profiles from Smokeless Powder IED Fragments

Casey Sullivan | Forensic Science and Law | School of Science and Engineering
Faculty Advisor(s): Lyndsie Ferrara, Ph.D.

ABSTRACT: Low explosive improvised explosive devices (IEDs) pose a danger to the general public due to the shrapnel that is often placed within the device, aimed to harm as many people as possible when deflagrated. In 2013, the Boston Marathon Bombings claimed five lives and injured 500 people using IEDs containing shrapnel. Identifying the creator of the IED is a priority. Potential DNA deposited on the components may be from touch or blood when an actor is constructing an IED. This study will utilize smokeless powder, a low explosive that burns at a steady rate, subjecting the deposited DNA to high temperatures. It is imperative to determine a suitable setup to simulate DNA deposited on IEDs and recovery post-burn. Materials commonly used in IED construction will be spiked with known amounts of whole blood and then burned using smokeless powder as the explosive filler. Pipe end caps, made of PVC, steel, and copper, will be used. Blood will be placed on the outside of the caps and hung upside down on a wooden stand to be burned using smokeless powder. Afterwards, swabs of the IED fragments will be processed for DNA analysis. These findings will help determine the survivability of DNA on detonated IED fragments and aid further research in optimizing a recovery and analysis method.

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