

# GRADUATE RESEARCH SYMPOSIUM



## HYBRID EVENT

**In-Person:** Wednesday, March 20, 2024: 9:00 am to 5:00 pm  
Featuring Posters & Podium Presentations

**Online:** Monday, March 18 – Friday, March 22  
Virtual Posters & Videos via [Symposium](#) by Forager One

SPONSORED BY THE OFFICE  
OF RESEARCH AND INNOVATION

# TABLE OF CONTENTS



## Contents

ACKNOWLEDGEMENTS ..... 3

SCHEDULE OF EVENTS ..... 4

LIVE ORAL PRESENTATIONS ..... 6

AWARDS ..... 14

ABSTRACTS ..... 17

LIST OF PARTICIPANTS BY SCHOOL..... 72

# ACKNOWLEDGEMENTS

The organizers would like to **thank** all of the *faculty mentors* for their service and support of our graduate scholars.

Thank You!

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

- ❖ Bayer School of Natural & Environmental Sciences
- ❖ Center for African Studies
- ❖ Center for the Catholic Faith & Culture
- ❖ Center for Community-Engaged Teaching & Research
- ❖ Center for Global Health Ethics
- ❖ Center for Migration, Displacement & Community Studies
- ❖ Center for Teaching Excellence
- ❖ Center for Women's & Gender Studies
- ❖ Grefenstette Center for Ethics in Science, Technology & Law
- ❖ Gumberg Library
- ❖ Institute for Ethics & Integrity in Journalism
- ❖ Mary Pappert School of Music
- ❖ McNulty College and Graduate School of Liberal Arts
- ❖ School of Education
- ❖ School of Nursing
- ❖ Simon Silverman Phenomenology Center
- ❖ Office of the Provost
- ❖ Office of Research & Innovation
- ❖ Rangos School of Health Sciences
- ❖ Peer Selection Committee
- ❖ The GRS Graduate Student Committee

**Chair:** Catherine Bruno, *Biological Sciences*  
Anu Chitta, *Analytics and Information Management* | Ian Doherty, *Healthcare Ethics* | Sovi Herring, *Rhetoric and Philosophy* | Griffin Nordstrom, *Public History* | Anna Vietmeier, *Biological Sciences*

# SCHEDULE OF EVENTS

Monday, March 18	
All Day	<p><b>Welcome - Virtual <a href="#">Symposium</a> Site Launch!</b></p> <p><b>Virtual Symposium</b> via <a href="#">Symposium by Forager One</a> Browse through posters and videos. Comment and ask questions.</p>
Tuesday, March 19	
All Day	<p><b>Virtual Symposium</b> via <a href="#">Symposium by Forager One</a> Browse through posters and videos. Comment and ask questions.</p>
Wednesday, March 20	
9:00 am to 5:00 pm	<p><b>GRS In-Person Event – Location: Charles Dougherty Ballroom, Power Center</b></p> <p><b>Poster Session and Oral Podium Presentations</b></p> <p>Stop by to view posters in-person and ask students questions about their work!</p> <p><b>*Detailed schedule on the next page*</b></p>
Thursday, March 21	
All Day	<p><b>Virtual Symposium</b> via <a href="#">Symposium by Forager One</a> Browse through posters and videos. Comment and ask questions.</p>
Friday, March 22	
All Day	<p><b>Virtual Symposium</b> via <a href="#">Symposium by Forager One</a> Browse through posters and videos. Comment and ask questions.</p>

## SCHEDULE FOR IN-PERSON EVENT

### Wednesday, MARCH 20, 2024 | Power Center @ Duquesne University

<b>8:00 a.m. – 8:45 a.m.</b>	<b>Morning Poster Session Check-in and Breakfast</b> Continental Breakfast provided for participants. Morning Poster Session set up
<b>8:45 a.m. – 9:00 a.m.</b>	<b>Opening Remarks: Provost David Dausey (Ballroom A)</b>
<b>9:00 a.m. - 10:00 a.m.</b>	<b>ORAL SESSION 1 (Livestreamed on <a href="#">Symposium by Forager One</a>)</b> Students participating in the poster sessions <b>should attend</b> the formal presentations. <b>Poster Session is closed at this time. Please respect the formal presenters.</b>
<b>10:00 a.m. - 11:30 a.m.</b>	<b>MORNING POSTER SESSION</b> Guests are invited to walk around, peruse student projects, and engage with students.
<b>11:30 a.m. - 12:30 p.m.</b>	<b>ORAL SESSION 2 (Livestreamed on <a href="#">Symposium by Forager One</a>)</b> Students participating in the poster sessions <b>should attend</b> the formal presentations. <b>Poster Session is closed at this time. Please respect the formal presenters.</b>
<b>12:30 p.m. - 1:30 p.m.</b>	<b>LUNCH BREAK/POSTER SESSION CHANGE</b> Take down of Morning Session Posters/set up of Afternoon Session Posters Boxed lunches provided for participants. Take a break and get to know other presenters at the symposium!
<b>1:30 p.m. - 2:30 p.m.</b>	<b>ORAL SESSION 3 (Livestreamed on <a href="#">Symposium by Forager One</a>)</b> Students participating in the poster sessions <b>should attend</b> the formal presentations. <b>Poster Session is closed at this time. Please respect the formal presenters.</b>
<b>2:30 p.m. - 4:00 p.m.</b>	<b>AFTERNOON POSTER SESSION</b> Guests are invited to walk around, peruse student projects, and engage with students.
<b>4:00 p.m. to 5:00 p.m.</b>	<b>ORAL SESSION 4 (Livestreamed on <a href="#">Symposium by Forager One</a>)</b> Students participating in the poster sessions <b>should attend</b> the formal presentations. <b>Poster Session is closed at this time. Please respect the formal presenters.</b> Please take down Afternoon Session posters <b>no later than 5pm</b>
<b>ALL AWARD WINNERS WILL BE ANNOUNCED THE WEEK FOLLOWING THE EVENT VIA EMAIL &amp; ON OUR WEBSITE!</b>	

## ORAL PRESENTATIONS

### SESSION 1A: Charles Dougherty Ballroom A Moderator: Ashwini Gumireddy

9:00 - 9:15	<b>Cassandra Ziegler</b> Biology   School of Science and Engineering <b>Faculty Advisor/s:</b> Brady Porter, Ph.D. <i>Uncovering the diet of Wood Thrush and Veery in ecological forestry gaps using DNA metabarcoding</i>
9:15 - 9:30	<b>Rowan Terra</b> Biology   School of Science and Engineering <b>Faculty Advisor/s:</b> Nancy Trun, Ph.D.; Djuna Gulliver, Ph.D. <i>Spatiotemporal Stratification of Critical Minerals and Materials in an Acidic Abandoned Mine Drainage Passive Remediation System</i>
9:30 - 9:45	<b>Sarah Ostrowski</b> Pharmaceutics   School of Pharmacy <b>Faculty Advisor/s:</b> Wilson Meng, Ph.D.; Kerry Empey, PharmD, Ph.D. <i>A Biotin-Decorated Self-Adjuvanting Nanoparticle System for Delivery of a Respiratory Syncytial Virus Vaccine</i>
9:45 - 10:00	<b>Alexander Cocolas</b> Chemistry   School of Science and Engineering <b>Faculty Advisor/s:</b> Thomas Montgomery, Ph.D. <i>Diastereoselective [3+2] cycloaddition between tertiary amine N-oxides and substituted alkenes to access novel 7-azanorbornanes</i>

# SESSION 1B: Charles Dougherty Ballroom B

## Moderator: TBD

<p>9:00 - 9:15</p>	<p><b>Nicole DeCicco</b> School Psychology   School of Education <b>Additional Authors:</b> Stephanie Tran, MA, MEd   School Psychology   School of Education; Kiera Reilly   School Psychology   School of Education <b>Faculty Advisor/s:</b> Tammy Hughes, Ph.D., ABPP <i>Healthy Relationships for individuals on the Autism Spectrum</i></p>
<p>9:15 - 9:30</p>	<p><b>Paige Johnson</b> School Psychology   School of Education <b>Additional Authors:</b> Logan Bowser   PsyD School Psychology   School of Education <b>Faculty Advisor/s:</b> Bridget Green, Ed.D; Reva Mathieu-Sher, Ed.D <i>Are students with disabilities really career-ready? A scoping review.</i></p>
<p>9:30 - 9:45</p>	<p><b>Jennifer Dolecki</b> School Psychology   School of Education <b>Additional Authors:</b> Annie Haefs   School Psychology   Education; Annie Lao   School Psychology   Education; Ky-Asia Colter   School Psychology   Education <b>Faculty Advisor/s:</b> Tammy Hughes, Ph.D., ABPP <i>Trauma, Mindfulness, and Alternative Education</i></p>
<p>9:45 - 10:00</p>	<p><b>Kiera Reilly</b> School Psychology   School of Education <b>Additional Authors:</b> Nicole DeCicco, MEd   School Psychology   School of Education; Annie Haefs, MEd   School Psychology   School of Education; Elena Renze, MA, MEd   School Psychology   School of Education <b>Faculty Advisor/s:</b> Tammy Hughes, Ph.D., ABPP <i>Community Based Participatory Research: Youth Tackle Food Insecurity in Their Community</i></p>

## SESSION 2A: Charles Dougherty Ballroom A

### Moderator: Jesse Goodman

11:30 - 11:45	<b>Ricky Pazer</b> Healthcare Ethics   McNulty College and Graduate School of Liberal Arts <b>Faculty Advisor/s:</b> Joris Gielen, Ph.D. <i>Healthcare Access for Undocumented People in America</i>
11:45 - 12:00	<b>Lorenzo Selvaggi</b> Catholic Healthcare Ethics   McNulty College and Graduate School of Liberal Arts <b>Faculty Advisor/s:</b> Joris Gielen, Ph.D., MA <i>Catholic Ethics in the World of Clinical Research: A Study of Social Responsibility</i>
12:00 - 12:15	<b>Shantele Weaver</b> Healthcare Ethics   McNulty College and Graduate School of Liberal Arts <b>Faculty Advisor/s:</b> Joris Gielen, Ph.D. <i>The Use of Algorithmic Decision Making and Predictive Analytics in the Screening of Child Abuse Reports: An Analysis of Ethical Implications and Possible Solutions</i>
12:15 - 12:30	<b>Burton Carbino</b> Biomedical Engineering   School of Science and Engineering <b>Faculty Advisor/s:</b> Kimberly Forsten-Williams, Ph.D.; Sarah Breckenridge-Wright, Ph.D. <i>Cor Unum Gardens: The Validation and Upscale Development of Hydroponic Community Gardens</i>



## SESSION 2B: Charles Dougherty Ballroom B

### Moderator: Siyu Liu

<p>11:30 - 11:45</p>	<p><b>Kelly Bruzdewicz</b> MAT Secondary Education- Biology   School of Education <b>Faculty Advisor/s:</b> John Pollock, Ph.D.; Brinley Kantorski, Ph.D. <i>Developing a Framework for Educational Games: N.O.V.E.L.</i></p>
<p>11:45 - 12:00</p>	<p><b>Nur Masarwa</b> Educational Technology   School of Education <b>Faculty Advisor/s:</b> Joseph Kush, Ph.D. <i>The Process of Media Selection Among Arab English Language Teachers: Why Digital Inclusivity Matters</i></p>
<p>12:00 - 12:15</p>	<p><b>Scott Dyer</b> Healthcare Ethics   McAnulty College and Graduate School of Liberal Arts <b>Faculty Advisor/s:</b> Joris Gielen, Ph.D.; Gerard Magill, Ph.D. <i>From Policymaking to Legislation, The Need for a Secular Turn in Bioethics Discourse to Uphold, as a Function of the Greater Good, Policy for Legislation of Medically Aided Dying in the United States of America</i></p>
<p>12:15 - 12:30</p>	<p><b>Katie Willis</b> Applied and Public Sociology   McAnulty College and Graduate School of Liberal Arts <b>Faculty Advisor/s:</b> Anita Zuberi, Ph.D. <i>Assessing how the Humane Health Coalition connects Veterinary Services with Healthcare for People Experiencing Poverty and Housing Insecurity</i></p>

## SESSION 3A: Charles Dougherty Ballroom A

Moderator: Riddhi Vichare

1:30 - 1:45	<b>Rebekka Range</b> Forensic Science and Law   School of Science and Engineering <b>Faculty Advisor/s:</b> Pamela Marshall, Ph.D.; Lyndsie Ferrara, Ph.D.; Hannah Stokes Ph.D. <i>Conducting A Psychiatric Analysis using Collateral Materials: A Case Study of Theodore Kaczynski</i>
1:45 - 2:00	<b>Halle Saf</b> Forensic Science and Law   School of Science and Engineering <b>Faculty Advisor/s:</b> Pamela Marshall, Ph.D. <i>The Recovery of Human DNA from an Aqueous Environment Using Novel Technology</i>
2:00 - 2:15	<b>Kandarp Dave</b> Pharmaceutics   School of Pharmacy <b>Faculty Advisor/s:</b> Devika Soundara Manickam, Ph.D. <i>Mouse vs. human brain endothelial cell-derived mitochondria containing microvesicles for ischemic stroke therapy</i>
2:15 - 2:30	<b>Shawn Bliss</b> Biomedical Engineering   School of Science and Engineering <b>Faculty Advisor/s:</b> Melikhan Tanyeri, Ph.D. <i>Development of a Support Vector Machine for Digital CFU</i>

## SESSION 3B: Charles Dougherty Ballroom B

### Moderator: Sovi Herring

<p>1:30 - 1:45</p>	<p><b>April Morris</b> Nursing   School of Nursing <b>Faculty Advisor/s:</b> Pamela Spigelmyer, Ph.D., RN, CNS, CSN, SGAHN <i>Approaches for Addressing Behavioral and Psychological Symptoms of Dementia in Nursing Homes: A Scoping Review</i></p>
<p>1:45 - 2:00</p>	<p><b>Christina Pykett</b> Nursing   School of Nursing <b>Faculty Advisor/s:</b> Richard Zoucha, Ph.D.; Angela Karakachian, Ph.D. <i>Understanding African American Pediatric Nurses' Perceptions and Experience of Caring for Medically Complex Children Who Cannot Be Discharged Home from Transitional Care Facilities: A Mini-Ethnonursing Study</i></p>
<p>2:00 - 2:15</p>	<p><b>Thomas DeMauro III</b> Public History   McAnulty College and Graduate School of Liberal Arts <b>Faculty Advisor/s:</b> Jennifer Taylor, Ph.D. <i>Indigenous Iconography in Education's Athletics: Recognizing the Societal Repercussions of Mascot Culture</i></p>
<p>2:15 - 2:30</p>	<p><b>Dalena Collins</b> Public History   McAnulty College and Graduate School of Liberal Arts <b>Faculty Advisor/s:</b> Stephanie Gray, Ph.D. <i>Mobile Roots: the case for trailer park preservation</i></p>

## SESSION 4A: Charles Dougherty Ballroom A

### Moderator: Anna Vietmeier

4:00 - 4:15	<b>Siyu Liu</b> Physical Therapy   Rangos School of Health Sciences <b>Faculty Advisor/s:</b> Matthew Kostek, Ph.D. <i>Sex Differences in Muscle Regeneration: Female Mice Exhibit Faster Muscle Function Recovery After Injury</i>
4:15 - 4:30	<b>Joseph Heath</b> Biology   School of Science and Engineering <b>Faculty Advisor/s:</b> Jill Dembowski, Ph.D. <i>Topoisomerase I Contributes to Herpes Simplex Virus Type-1 Transcription and DNA Replication</i>
4:30 - 4:45	<b>Catherine Bruno</b> Biology   School of Science and Engineering <b>Faculty Advisor/s:</b> Joe McCormick, Ph.D. <i>Characterization of a small protein involved in development-associated genome segregation in a filamentous bacterium</i>
4:45 - 5:00	<b>Joseph Makowski</b> Chemistry   School of Science and Engineering <b>Faculty Advisor/s:</b> Jeffrey Evanseck, Ph.D. <i>RNA-RNA complexation for HIV-1 antiviral intervention: Thermodynamic and kinetic parameters characterizing HIV-1 DIS homodimerization</i>

## SESSION 4B: Charles Dougherty Ballroom B

### Moderator: Marisa Guido

4:00 -  
4:15

**Bethany Kaser**

English | McNulty College and Graduate School of Liberal Arts

**Faculty Advisor/s:** Laura Engel, Ph.D.

*Long Live the Queen: the Many Afterlives of Queen Victoria's Dolls and the Continued Influence of Dolls and Their Accessories on the Formation and Maintenance of Victorian Girlhood and Womanhood*

4:15 -  
4:30

**Emma Locarnini**

Performance | Mary Pappert School of Music

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

*The Analytical Performer: Marcel Tabuteau and American Clarinet Performance Practices*

4:30 -  
4:45

**Elisha Sidhu**

Corporate Communication | McNulty College and Graduate School of Liberal Arts

**Faculty Advisor/s:** Sarah Deiuliis, Ph.D.

*Case Study: Pittsburgh Post-Gazette's Intergenerational Community Relations in the Digital Age*

4:45 -  
5:00

**Casey Haas**

Public History | McNulty College and Graduate School of Liberal Arts

**Faculty Advisor/s:** Laura Engel, Ph.D.

*Beyond the Ballpark: Baseball Uniforms as City Symbols*

# AWARDS

## **CENTER FOR CATHOLIC FAITH & CULTURE**

### **Award for Graduate Student Research: \$500**

The Centers recognize and reward research from any discipline that aligns with Duquesne's Catholic, Spiritan mission, particularly our commitments to: the dignity and equality of all persons, working with vulnerable populations for systemic change, and preserving justice, peace, and integrity of creation.

## **CENTER FOR COMMUNITY-ENGAGED TEACHING & RESEARCH**

### **Award for Graduate Research: \$250**

The aim of this award is to recognize and celebrate research that contributes to authentic partnerships between scholars and community that generates knowledge that is relevant to disciplinary discovery as well as application to community concerns. The award will include a prize of \$250 as well as a gift to the researcher's community partner.

## **CENTER FOR GLOBAL HEALTH ETHICS**

### **Award for Graduate Research in Ethics, 2 awards, \$250 each**

This award aims to promote the interest of students for issues in healthcare ethics within contemporary society and culture. It also intends to encourage graduate research in the area of healthcare ethics. The HCE prize is for the presentation that best highlights ethical issues in healthcare and ethical dimensions of developments in science and technology for human health and wellbeing.

## **CENTER FOR MIGRATION, DISPLACEMENT & COMMUNITY STUDIES**

### **Outstanding Graduate Research: \$200**

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

## **CENTER FOR WOMEN'S & GENDER STUDIES**

### **Award for Graduate Research: \$150**

The aim of this award is to recognize and celebrate research that considers how the construct of gender identity shapes an individual's or community's experiences and/or how writers, artists, scholars, researchers and practitioners represent or respond to those gendered experiences.

## **GREFENSTETTE CENTER FOR ETHICS IN SCIENCE, TECHNOLOGY, & LAW**

### **Top Graduate Research Project: \$250, Honorable Mention: \$100**

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

## **GUMBERG LIBRARY**

### **Award for Graduate Research: \$500, Honorable Mention: \$100**

The Gumberg Library Award for Graduate Research recognizes excellence in application of research methods that demonstrate substantial use of library resources. Outstanding projects in any field of study that incorporate significant use of library expertise, resources, collections, and/or services are eligible.

## **INSTITUTE FOR ETHICS & INTEGRITY IN JOURNALISM**

### **Top Graduate Research Project: \$250**

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

## **MARY PAPPERT SCHOOL OF MUSIC**

### **Mary Pappert School of Music Graduate Award: \$250**

Students who are in the school of music are eligible for this award.

## **MCANULTY COLLEGE AND GRADUATE SCHOOL OF LIBERAL ARTS**

### **Outstanding Poster or Presentation: \$250**

The aim of this award is to recognize excellence in the liberal arts. Projects will be evaluated based upon organization, clarity, and content.

## **OFFICE OF THE PROVOST**

### **Provost's Award for Outstanding Scholarship, 3 awards, \$150 each**

Students from all disciplines who are participating in the GSRS are eligible for these awards. A committee of administrators and faculty will judge posters and oral presentations based on intellectual merits and demonstration that the research presented meets the standards for its field.

## **RANGOS SCHOOL OF HEALTH SCIENCES**

### **Award for Graduate Research: \$250**

Students who are in the school of Health Sciences are eligible for this award.

## **SCHOOL OF EDUCATION**

### **Outstanding Graduate Research: \$250, Runner-up: \$100**

The School of Education Award for Outstanding Graduate Student Research offers a prize and runner-up prize to graduate 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**

### **Award for Graduate Research: \$250**

Students from the School of Nursing are considered for this award.

## **SCHOOL OF SCIENCE AND ENGINEERING**

### **Excellence in Graduate Research, 2 awards, \$300 each**

Students whose projects fall within the realm of the basic sciences are considered for this award. Projects are evaluated based upon organization, creativity, clarity, and technical content.

**SIMON SILVERMAN PHENOMENOLOGY CENTER****Award for Graduate Research: \$250, Runner-up: \$100**

The Simon Silverman Phenomenology Center (SSPC) Award for Graduate Research recognizes excellence in phenomenological research. Outstanding projects in any field of study that employ a phenomenological approach—which can be realist, transcendental, existential, hermeneutic—either to articulate the essential structure of a specific lived experience or to interpret a concept or problem in a phenomenological figure or topic will be considered. Projects involving the intersection of phenomenology and pedagogy or phenomenology and clinical practice are also welcome. Some weight will be given to projects that show the use of SSPC’s special collection and/or archival materials.



# ABSTRACTS

\*Denotes Live Oral Presenter. Check the "Oral Presentations" section above for the schedule of live oral presentations (may be different from poster session time).

Presentations are available to view all week on [Symposium by ForagerOne!](#)

## VIRTUAL POSTERS AND ONLINE PRESENTATIONS

**NB: These presentations will only be available online.**

**Virtual: What pedagogical techniques are effective for teaching philosophical approaches to the mind-brain relationship? A quantitative and qualitative analysis of undergraduate student feedback data**

John Dall'Aglia | Clinical Psychology | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor/s: Derek Hook, Ph.D.

### ABSTRACT:

Human science (e.g., phenomenology, psychoanalysis) and natural science (e.g., quantitative psychology, neuroscience) approaches to the mind and brain take radically different epistemological stances. Human science prioritizes subjective experience - the mind as a subject with lived experience. Natural science approaches the mind as an object that can be quantified and reduced to its fundamental mechanisms. These "two psychologies" sit on opposite sides of the mind-body problem: how does the brain (objective natural substance) give rise to the mind (subjective human experience)?

However, there cannot be one "mind" for human science and a different "mind" for natural science. These are two perspectives of the same part of nature. This philosophical view is called "dual-aspect monism." Because of the traditional division between human and natural science, undergraduates typically encounter these fields in very different courses and learn them as somewhat opposed -as contrasting psychologies or as incompatible frameworks. As students progress in their careers, it can be more difficult to integrate these approaches, and disciplinary boundaries risk becoming internally (and externally) ossified. This unfortunately deepens disciplinary walls and impedes interdisciplinary progress. Therefore, teaching an approach to integrating natural and human science at the undergraduate level - when students are beginning their intellectual journeys - might substantially impact their academic trajectories and provide them with a framework for integrating these approaches in their research, clinical work, community engagement, scholarship, and so on.

This study reports quantitative and qualitative student feedback data on pedagogical techniques for teaching dual-aspect monism. Lesson plans were implemented as guest lectures in undergraduate courses (introductory- and intermediate-level) in the psychology department. After a first round of guest lectures and data collection, these lesson plans were modified based on student feedback data. These lesson plans were then implemented again in a second round of guest lectures and data collection. This allows a cross-sectional analysis of effective pedagogical techniques and a quasi-experimental design to see whether student feedback-driven changes to lesson plans improved learning outcomes.

## **Virtual: Psychometric Evaluation and Validation of the Multi-Dimensional Wellness Inventory in College Students**

Holly Buchanan | Nursing | School of Nursing

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

### **ABSTRACT:**

**Objective:** This study aimed to explore the factorial structure of the 45-item Multi-Dimensional Wellness Inventory (MDWI) and validate its structure through exploratory and confirmatory factor analysis (CFA) in a multi-year college student sample. The MDWI is a comprehensive instrument designed to assess various dimensions of wellness, including physical, emotional, social, intellectual, spiritual, and occupational wellness. A sample of college students from 2017 through 2023 (n = 4305) completed the MDWI, providing a rich dataset for psychometric analysis.

**Methods:** An exploratory factor analysis (EFA) was conducted to explore the underlying factor structure of the MDWI. Utilizing minimum residual factor extraction and employing oblique rotation techniques, the EFA sought to uncover the interrelatedness of the items and determine the factor structure that best fit the data. Subsequently, a CFA was performed to confirm the factor structure identified in the EFA and assess the model fit. The CFA aimed to provide empirical validation of the factor structure of the MDWI in the college student sample. The estimation method for this analysis was diagonally weighted least squares with robust standard errors to accommodate the ordinal item responses.

**Results:** The Kaiser criterion was chosen for electing how many factors to retain. As a result, a four-factor structure best fit the data. CFA with three different models (the originally proposed nine-factor, then a four-factor and five-factor model) was conducted. A Chi-square goodness of fit test was compared across models and found that the four-factor model best fit the data based on an alpha value of .05,  $\chi^2(990) = 73,263.04$ ,  $p < .001$ . Additional goodness-of-fit statistics showed good fit for the four-factor model, with an RMSEA of .061.

**Conclusion:** The findings of the EFA and CFA will contribute to a comprehensive understanding of the factorial structure of the MDWI in the context of college students' health and wellness, shedding light on the underlying dimensions of wellness as assessed by the inventory. The implications of this study extend to the refinement of the MDWI as a effective tool for assessing multidimensional wellness in college populations, thereby informing targeted interventions and wellness promotion initiatives within educational settings.

## **Virtual: Parents' perceptions and views of sending their children to public elementary schools amid rising incidences of school shootings in the United States**

Gretchen Goldman | Nursing | School of Nursing

Faculty Advisor/s: Alison Colbert, Ph.D., PHCNS-BC, FAAN; Rick Zoucha, Ph.D., PMHCNS-BC, CTN-A, FTNNS, FAAN

### **ABSTRACT:**

**Purpose:** The purpose of this study was to explore, describe, and understand the lived experiences of parents' of public elementary school children regarding sending their children to public school amid the rising incidences of school shootings in the United States.

**Research Question:** What are the lived experiences of parents regarding sending their children to public elementary schools amid rising incidences of school shootings in the United States?

**Background:** While ample evidence demonstrates school shootings negatively affect the overall well-being of children, little is known about parents' perceptions of sending their children to school amid the rise in school shootings.

**Methods:** A mini-qualitative descriptive phenomenological design utilizing Husserl's phenomenology approach was used. Giorgi's descriptive phenomenological model guided data analysis. Participants were recruited through community gatekeepers. Semi-structured interviews were conducted online via zoom.

**Results:** A total of five parents participated in the study. Six meaning units, four sub-themes, and two main themes were identified. The results from this study indicate that parents who send their children to public elementary school share feelings of anxiety and feel vulnerable, given the increase in the number of school shootings.

**Conclusions and Implications:** By understanding how parents perceive their children's safety at school, nurses can encourage better collaboration between parents and school personnel, and gain insight into parents' ideas regarding potential local, state, and national policy changes aimed at making schools safer.

### **Virtual: Disaster Preparedness in K-12 Schools: An Integrative Review**

Deborah Horton | Nursing | School of Nursing

Faculty Advisor/s: Pamela Spigelmyer, Ph.D., RN, CNS, CSN, SGAHN; Richard Zoucha, Ph.D., PMHCNS-BC, CTN-A, FTNSS, FAAN

#### **ABSTRACT:**

**BACKGROUND:** The threat of a disaster or potential for a disaster is something that may be experienced by individuals globally. Schools are places of daily mass gatherings which make them an ideal target for mass casualty, natural disasters, and biological incidents. The US Department of Education mandates that schools prepare for all types of disasters but has not provided specific guidance for the content of emergency operation plans. The American Academy of Pediatrics and National Association of School Nurses recommend that all schools have disaster and biological event preparedness plans. There is no standard instrument on which to measure compliance with these requirements and recommendations. A comprehensive review of the current state of school preparedness is essential to ensure adequate preparedness for disaster events in schools.

**METHODS:** An integrative review using Whitemore and Knaf'l's model was conducted to explore peer-reviewed publications about K-12 schools and natural disaster and pandemic preparedness and planning. An initial search was conducted in 2018 to identify relevant studies utilizing PubMed, CINAHL, and ERIC. Updated searches were conducted in 2019 and 2021 following the same procedure as the initial search. Twelve articles were included in this review.

**RESULTS:** Themes identified from the systematic review of 12 articles reflected determinants and level of school preparedness, disaster plan components, compliance with government requirements, emergency equipment, supplies, drills, and training, collaboration with outside agencies, and perceptions of school preparedness. Preparedness for disasters and biological events among schools varies and multiple factors contribute to the level of preparedness. Perceptions of school preparedness differ among school community members. Schools perceive themselves to be more prepared for disasters than their actual level of preparedness.

**IMPLICATIONS FOR SCHOOL HEALTH POLICY, PRACTICE, & EQUITY:** Although schools have some level of preparedness for disasters, multiple components are missing such as comprehensive disaster plans and

compliance with government requirements. Plans are less likely to address biological event preparedness and lack critical components of response.

CONCLUSIONS: Our nation's schools are not adequately prepared for disasters. There is a need for further research in schools to identify and understand preparedness for disasters and how best to prepare them.

**\*Virtual: Approaches for Addressing Behavioral and Psychological Symptoms of Dementia in Nursing Homes: A Scoping Review**

April Morris | Nursing | School of Nursing

Faculty Advisor/s: Pamela Spigelmyer, Ph.D., RN, CNS, CSN, SGAHN

**ABSTRACT:**

Background/Significance: In the United States, Alzheimer's Disease-Related Dementia (ADRD) affects approximately 1.45 million long-term care residents, highlighting the urgent need for effective management strategies for Behavioral and Psychological Symptoms of Dementia (BPSD) (Alzheimer's Association, 2020; Douglas et al., 2021; Leland et al., 2023). The global increase in dementia diagnoses underscores the significance of this issue (Shin, 2022).

Purpose: This review synthesizes current research on interventions for managing dementia behaviors in long-term care facilities to identify gaps and inform future research and practice improvements.

Method: Employing Arksey and O'Malley's scoping review framework, this review systematically searched multiple databases from 2018 to 2023, focusing on non-pharmacological interventions, staff training, and individualized care planning (Arksey & O'Malley, 2005).

Findings: Studies highlight the effectiveness of Multimodal nonpharmacological interventions (MNPis) and the importance of staff training and individualized care planning (Carrier et al., 2023; Pinazo-Clapés et al., 2020). However, gaps in standardization, assessment tools, and specifically in the continuous training and development of staff were identified. The need for ongoing, practical skills training and communication strategies for caregivers was emphasized to bridge implementation gaps in non-pharmacological interventions.

Discussion: The findings align with the literature emphasizing the importance of non-pharmacological interventions and education in BPSD management. They point to the need for standardized practices and underscore significant gaps in caregiver training that require further research (Yokozuya et al., 2019; Chalfont et al., 2019).

Limitations: The review's focus on English-language, peer-reviewed articles may omit relevant studies. Additionally, the scoping nature precludes a quality assessment of included studies.

Future Recommendations: Future research should focus on developing standardized MNPI protocols, creating sensitive cognitive function assessment tools, and evaluating the long-term impacts of staff training programs. Emphasis should be placed on continuous professional development and effective communication strategies to enhance care quality (Brazil et al., 2022; Stensvik et al., 2022).

**Virtual: Understanding the cultural beliefs, values, and perceptions of Sri Lankans regarding children in institutionalized care: A Mini- Focused Ethnography**

Monica Naumann | Nursing | School of Nursing

Faculty Advisor/s: Rick Zoucha, Ph.D., PMHCNS-BC, CTN-A, FAAN

**ABSTRACT:**

Purpose: The purpose of this mini-study was to explore the cultural beliefs, values, and perceptions of Sri Lankans regarding children in institutionalized care (i.e. orphanages, children's homes).

Research Question: What are the cultural beliefs, values, and perceptions of Sri Lankans regarding children in institutionalized care?

Background: There are approximately 21,000 institutionalized children in Sri Lanka. Yet little is known regarding Sri Lankans' perceptions of this form of child welfare.

Methods: The method used for this mini-study was a focused ethnography. English-speaking, Sri Lankan adults were recruited. All interviews were recorded and transcribed via Zoom. Data was analyzed for categories and patterns using Leininger's ethnography methodology. Themes were not assessed due to the scale of the study.

Results: Two (n=2) men and two (n=2) women were interviewed. Upon analysis of the data, fourteen categories were identified through open coding. Subsequently, two patterns emerged from further analysis—a pattern of Sri Lankans feeling ambivalent about institutionalized childcare, and a pattern of child welfare reform being viewed as not a public priority in Sri Lanka.

Conclusions and Implications: While national child welfare reform is at a standstill, this may be partially explained by Sri Lankans viewing institutionalized care both positively and negatively. Institutionalized childcare is seen as a solution, yet there is acknowledgment that the system is not ideal. The current national economic crisis has diverted attention away from the child welfare system. Education and additional studies regarding potential negative outcomes of children in institutionalized care may help to raise awareness and catalyze child welfare reforms in Sri Lanka.

**\*Virtual: Understanding African American Pediatric Nurses' Perceptions and Experience of Caring for Medically Complex Children Who Cannot Be Discharged Home from Transitional Care Facilities: A Mini-Ethnonursing Study**

Christina Pykett | Nursing | School of Nursing

Faculty Advisor/s: Richard Zoucha, Ph.D.; Angela Karakachian, Ph.D.

**ABSTRACT:**

Purpose: Understanding of perceptions and experiences of African American Pediatric Nurses caring for medically complex children who cannot be discharged home from a transitional care facility.

Background: Most research around medically complex pediatric patients focus on family, resources, or the transition to adult care. Nursing is becoming more diverse than ever. We must understand nurses' perspectives in specialty areas to support a healthier workforce.

Methods: This qualitative mini-study uses Leininger's Ethno-Nursing methods and the Culture Care Theory (Leininger, 2002) to guide the collection of new data and gain an understanding of African-American nurses' perspectives in this micro-population using Leininger's four phases of qualitative data analysis.

Results: The findings identified ten categories placed into codes, and two patterns emerged: sadness and frustration from the inability to discharge patients' homes and all African American Nurses who participated in this mini-ethno nursing study report feeling stronger connections with patients and families that look like them.

Conclusion: African American nurses feel more connected with families of similar cultures and backgrounds and with families and patients who look like them. They feel eager to put more effort into caring for those patients as if they are part of their larger family. Nurses report feeling frustration and sadness when patients are unable to discharge to home. African-American nurses feel that families are important in patient care for improved patient outcomes.

Implications: Frustration and sadness are experienced by African American nurses on a regular basis caring for medically complex patients. Their perceptions should be explored deeper to understand how to support the diversities in nursing. Examination of relationships between nurses and patients with similar cultures for improved outcomes and nursing satisfaction. A full study may be indicated to explore this phenomenon further. References available

### **Virtual: Family Caregivers and Breathlessness in Individuals with Chronic Obstructive Pulmonary Disease**

Kimberly Sloop | Nursing | School of Nursing

Faculty Advisor/s: Pamela Spigelmyer, Ph.D., RN, CNS, CSN, SGAHN; Melanie Turk, Ph.D., RN, FTNSS

#### **ABSTRACT:**

Objectives: The purpose of this review was to explore the literature on family caregivers and witnessed breathlessness in individuals with COPD.

Methods: An integrative review was performed using the Whittemore and Knafelz Integrative Review Model. Literature search results were reported using the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines.

Results: An overarching theme of constant care and burden resulted from the 16 studies on family caregivers and witnessed breathlessness in individuals with COPD. Three themes: psychosocial implications of caregivers, response ambiguity, and knowledge of interventions represented family caregivers and breathlessness in the care recipient.

Discussion: This review provides insight on family caregivers and witnessed breathlessness in individuals with COPD. An understanding of breathlessness can help healthcare professionals offer support specific to the needs of COPD family caregivers.

### **\*Virtual: Long Live the Queen: the Many Afterlives of Queen Victoria's Dolls and the Continued Influence of Dolls and Their Accessories on the Formation and Maintenance of Victorian Girlhood and Womanhood**

Bethany Kaser | English | McNulty College and Graduate School of Liberal Arts

Faculty Advisor/s: Laura Engel, Ph.D.

#### **ABSTRACT:**

Queen Victoria's extensive and influential reign has made all aspects of her life frequent topics for study and discussion. A centerpiece of her restrictive and carefully constructed childhood though is her collection of Dutch peg dolls and their accompanying accessories. My larger dissertation considers the impact of Queen Victoria's doll collection on the monarch's childhood, reign, and her legacy. This particular project focuses on Queen Mary, wife of George V and second cousin to Victoria, who continued the royal focus on dolls and miniatures and the

continued appearance and influence of Victoria, her dolls, and their accessories on British girlhood and womanhood. Queen Mary stands as an example of the lasting influence and impact of Victoria's childhood doll play and the Victorian girlhood and womanhood that that play helped to construct. Mary held a deep interest in dolls, but especially dollhouses and the world of miniatures. This project joins together analysis of Mary's dollhouse-the largest in the world, the miniature book written by Vita Sackville West that's included in the dollhouse's miniature library, the appearance of Victoria in other contemporary dolls, dollhouses, and doll accessories, and the continued allusions to Victoria's doll collection in popular culture. I argue that Victoria's Dutch peg doll collection and childhood doll play began a national use of doll play and culture to construct an idealized version of girlhood and womanhood that would both help to maintain British empire for years to come and fracture this idealization's foundation. I deconstruct the implications of Queen Mary's dollhouse and all of the various miniatures using material theory, with particular emphasis on the miniature and how the miniature models, parodies, criticizes, and deviates everyday life. I also utilize the work of Margaret Homans in *Royal Representations* to consider the public image and actual persona of Queen Victoria and how that image was constructed and fractured. I then use the binaries of the constructed and fractured representation, the private vs. public, and the real vs. the miniature to consider how dolls helped to build and crack the British empire's foundation via British girlhood and womanhood.

**\*Virtual: Mobile Roots: the case for trailer park preservation**

Dalena Collins | Public History | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor/s: Stephanie Gray, Ph.D.

**ABSTRACT:**

Today, over 20 million people in America call trailer parks home, yet they have not been properly recognized for their historic or architectural value. Not only have trailers and trailer parks existed since the early 20th century, but temporary and manufactured housing is an important style of architecture in American history. Despite this, a trailer park has never been listed on the National Register of Historic Places (NRHP) and only one, the Monterey Trailer Park, has received local designation. Because trailer parks and their residents have largely gone unnoticed by historians and historic preservationists, it is vital that we develop better methods of commemorating and preserving manufactured housing. This poster bases its argument on the NRHP criterion A and C, focusing on historic importance and architecture. With roots in the auto camp, the first trailer park was established in 1913. Since then, manufactured homes grew in popularity, gaining traction during the Great Depression and World War II. Later in the 20th century, trailers became closely linked with the American ideal of home ownership and white flight. Of similar importance, the technological advancements necessary for the creation of trailers are indicative of building trends and architectural creativity. While an integral part of the American zeitgeist, the deeply entrenched stigma is the largest hurdle that trailer parks must overcome when fighting for recognition as historic properties. The historic recognition of trailer parks is an urgent task. The view that mobile homes are disposable and temporary provide a level of justification socially, economically, and politically for people to marginalize entire communities. Additionally, trailer parks are inherently vulnerable to natural disasters and have been steadily decreasing in number as less are being built and more are being developed into permanent residential or commercial buildings. Trailer parks and mobile homes are an American cultural resource that will be lost if they are not recognized and preserved.

**\*Virtual: Catholic Ethics in the World of Clinical Research: A Study of Social Responsibility**

Lorenzo Selvaggi | Catholic Healthcare Ethics | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor/s: Joris Gielen, Ph.D., MA

**ABSTRACT:**

After the many global tragedies of the early 20th century, an emerging sense of social and moral urgency catalyzed the nations of the world to attempt to develop and promulgate ethical standards for clinical research. Seminal documents such as The Nuremberg Code, The Declaration of Helsinki, and The Belmont Report attempted to bridge the chasm that allowed such tragedies. The Belmont Report, specifically, pointed towards universal ethical principles that later evolved into what is widely known now as the four core bioethical tenets: beneficence, the duty to promote the welfare and good of others; nonmaleficence, the obligation to avoid causing harm; justice, the requirement of equal and fair treatment; and autonomy, the right of individuals to make independent, informed choices. More nuanced guidance would later be refined from the four principles for clinical research in the 21st century, such as those outlined in The Oxford Textbook of Clinical Research. However, despite the ubiquitous nature of these principles, they have disconnected instructions on the inherent social responsibilities of clinical research. To fill this void, Catholic Social Teachings founded on the three-fold cornerstone of human dignity, solidarity, and subsidiarity offer a basis for a new principle of social responsibility. Human dignity, the first of the three cornerstones, is the belief that all human life possesses intrinsic, inviolable value. Solidarity is the overarching interdependence among all humans on one another, and finally, subsidiarity is the coordination of society to support the lives of local communities. Therefore, this research assesses the essential components of clinical research while also exploring the foundational documents that led to the principle approach; by doing so, it highlights the deficiency in these principles' ability to address social stewardship. To address this apparent gap, it proposes a new principle of social responsibility built upon Catholic Social Teachings. Incorporating the new principle of social responsibility will enrich our current ethical framework for clinical research, and it is imperative to truly fulfill the goals set by humanity after World War II.

**\*Virtual: Characterization of a small protein involved in development-associated genome segregation in a filamentous bacterium**

Catherine Bruno | Biology | School of Science and Engineering  
Faculty Advisor/s: Joe McCormick, Ph.D.

**ABSTRACT:**

Streptomyces are a Gram-positive, filamentous, spore forming soil bacteria and the main producers of antibiotics. At a late stage in the life cycle, multigenomic aerial hypha cells segregate copies of the genome into unicellular pre-spore compartments. slzA, a novel gene expressed only in these bacteria, encodes a small leucine zipper protein, and contains an amino acid sequence that allows for dimerization. slzA is co-transcribed with an important and well-known gene encoding a protein involved in development-associated DNA condensation and chromosome segregation. Based on the location of slzA, we explored the possibility that SlzA is involved in developmentally-associated chromosome segregation for Streptomyces. Our genetic evidence suggests that slzA is involved in proper segregation because combining a slzA deletion with mutations in genes encoding key players in genome segregation displays significant sporulation-associated segregation defects. An assay to test protein-protein interactions suggests that SlzA interacts with both segregation and cell division proteins. Amino acid substitution experiments demonstrates that at least two amino acids are key for these SlzA protein-protein interactions in an E. coli assay. The altered gene with a two amino acid substitution are being tested in vivo to determine if they affect cell division and genome segregation in Streptomyces. The precise role of SlzA in orchestrating the cell division and segregation machineries is still not yet known. To gain more insight about the function, we used a proximity-based protein labeling strategy to identify additional components of the Streptomyces segregation machinery. Proximity labeling identified Kgd, which is normally involved in central



metabolism, but our results suggest it also has a surprising function in chromosome segregation. A *kgd* mutant has been isolated and is currently undergoing characterization.

**\*Virtual: Spatiotemporal Stratification of Critical Minerals and Materials in an Acidic Abandoned Mine Drainage Passive Remediation System**

Rowan Terra | Biology | School of Science and Engineering  
Faculty Advisor/s: Nancy Trun, Ph.D.; Djuna Gulliver, Ph.D.

**ABSTRACT:**

Critical minerals and materials (CMMs) are a group of 57 elements that are major components of modern manufacturing processes for renewable energy and technological sectors. Current acquisition of CMM by the US is largely non-domestic and extraction techniques have historically relied on the use of environmentally hazardous processes. High levels of CMM, including rare earth elements (REE), have been found within several acidic abandoned mine drainage (AMD) sites. Passive remediation systems (PRS) are an engineered method employed to reduce the impact of AMD pollutants by retaining heavy metal precipitants on site. Kentucky Hollow PRS in southwestern Pennsylvania has demonstrated accumulation of CMM, although the spatiotemporal stratification of these materials is unknown. Over four seasons, solid and fluid samples collected from ten sample sites were evaluated through geochemical procedures, including elemental composition. Materials were evaluated for 60 elements through ICP-MS and ICP-OES analysis, accounting for 82% of CMMs. Data analysis has revealed spatiotemporal differences in the chemical makeup of the physical space of the PRS and throughout the four seasons. Differential co-localization of specific CMMs also was observed, with REEs correlating strongly with aluminum. These findings will be used to determine the best locations in the PRS to sample for further CMM acquisition investigations. Through these future CMM capture studies, AMD will serve as the starting material, effectively turning an environmental pollutant into a sustainable resource.

**\*Virtual: Diastereoselective [3+2] cycloaddition between tertiary amine N-oxides and substituted alkenes to access novel 7-azanorbornanes**

Alexander Cocolas | Chemistry | School of Science and Engineering  
Faculty Advisor/s: Thomas Montgomery, Ph.D.

**ABSTRACT:**

Nitrogen-containing heterocycles are ubiquitous in bioactive molecules, pharmaceutical drugs, and natural products. For this reason, finding new and efficient ways to make such compounds remains a high priority for the organic and medicinal community. Our current endeavors build upon previously established work by our group where we generated 1,2-diamines by coupling commercially available aldehydes with trimethylamine N-oxide (TMAO) in two steps. Herein, we react various tertiary amine N-oxides with a library of dipolarophiles, to yield over 40 novel 7-azanorbornane compounds. Examples using pyrrolidine N-oxides with styrene derivatives generate novel azabicyclic products with diastereomeric ratios upwards of 94:6, and quantitative isolated yields. Our efficient 1-step [3+2] cycloaddition enables potential access towards non-narcotic analgesic drug targets such as epibatidine and epibatidine derivatives.

## MORNING POSTERS

These posters will be available to view during the in-person morning poster session in the Charles J. Dougherty Ballroom C, Power Center from 10:00am – 11:30am, March 20, and also online throughout the week of March 18 – 22 on [Symposium by Forager One](#).

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

### **1: Spectral analysis and DNA sequence comparison of chromoprotein pigments in darters**

Emily Bierer | Biology | School of Science and Engineering  
Faculty Advisor/s: Brady Porter, Ph.D.

#### **ABSTRACT:**

Fishes use coloration for important behaviors such as communication, sexual selection, and speciation. In vertebrates, blue coloration is typically produced by structures that incoherently scatter light, however true-blue pigment, termed Sandercyanin, was discovered in a Walleye (*Sander vitreus*). Sandercyanin is a 21 kDa homotetramer lipocalin chromoprotein that binds to the chromophore biliverdin IX- $\hat{\pm}$ . We predict the blue and green pigmentation in colorful species of darters are homologous chromoproteins to Sandercyanin. Here we focus on four species of darters, Rainbow (*Etheostoma caeruleum*), Greenside (*Etheostoma blennioides*), Banded (*Etheostoma zonale*) and Variegate (*Etheostoma variatum*) which are common to Western Pennsylvania. UV-Vis absorbance profiles in these darters is similar to Walleye but show subtle variation that results in various hues of blues and greens. Mass Spectral analysis of the Rainbow and Greenside Darter confirmed both use biliverdin IX- $\hat{\pm}$  as the chromophore. Fluorescence analysis showed that these species of darters fluorescence at a similar wavelength that is higher than the fluorescence of Sandercyanin. We hypothesize that the evolution of darter pigments involves variation in the protein structure of this biliverdin-binding lipocalin. We developed PCR primers to amplify and sequence an Apolipoprotein D gene from darter genomic DNA for further comparison to the published protein sequence of Sandercyanin. Sequence analysis indicates gene size ranges between species due to different intron lengths while the exon number, order, size and amino acid composition appears to be relatively conserved between species. Future Mass Spectral analysis of protein pigments isolated from darter integument is needed to fully support or reject our hypotheses that darter apolipoprotein D is homologous to Sandercyanin and that coloration differences result from protein sequence variation. Ultimately these data will contribute to understanding the evolution of pigments in one of the most colorful groups of freshwater fishes.

### **\*2: Topoisomerase I Contributes to Herpes Simplex Virus Type-1 Transcription and DNA Replication**

Joseph Heath | Biology | School of Science and Engineering  
Faculty Advisor/s: Jill Dembowski, Ph.D.

#### **ABSTRACT:**

Herpes Simplex Virus Type 1 (HSV-1) is a double-stranded DNA virus that infects the majority of the human population. We have previously characterized the host factors that associate with the viral genome throughout infection. One cellular protein that associates with HSV-1 DNA throughout infection is Topoisomerase 1 (Top1). Top1 relieves topological stress on DNA by generating a single-stranded nick at sites of supercoiling. This is followed by a controlled rotation and relegation, resulting in relaxed DNA that can be transcribed or replicated. Based on its association, and because HSV-1 does not encode its own topoisomerase, we hypothesize that Top1 contributes to key viral processes such as transcription and DNA replication. To study Top1 function in HSV-1 infection, we employed the use of the well-studied, commercially available Top1 inhibitor, camptothecin (CPT). We found that Top1 inhibition significantly reduces viral yield when compared to an uninhibited control. To

support this, we generated a cell line that expresses a doxycycline inducible Top1-targeting shRNA. Knockdown of Top1 resulted in a significant reduction in viral yield, similar to observations with CPT inhibition. We next conducted reverse transcription followed by quantitative PCR to determine how Top1 inhibition altered the expression of select viral genes. We found that Top1 inhibition resulted in a significant decrease in the expression of representative transcripts from each gene class including ICP4 (immediate early), ICP8 (early), ICP5 (leaky late), and gC (late). Additionally, we found that Top1 inhibition caused a dose-dependent defect in HSV-1 DNA replication, even if CPT is added to cells after the onset of DNA replication, indicating that the replication defect is not simply because prior steps in the infectious cycle are blocked. These results indicate that Top1 plays a role in HSV-1 transcription and DNA replication and that CPT is a potent inhibitor of viral infection.

### **3: A novel plasmid-based auxotrophic *Asaia bogorensis* strain that is stable without antibiotic reliance for paratransgenesis use**

Anna Manges | Biology | School of Science and Engineering  
Faculty Advisor/s: David Lampe, Ph.D.

#### **ABSTRACT:**

Malaria is one of the deadliest vector-borne diseases worldwide. Many preventative and treatment measures are currently in place, such as insecticide-treated bednets, indoor spraying of insecticides, artemisinin combination therapy, and imperfect vaccines. However, mosquito resistance to insecticides and *Plasmodium* resistance to antiparasitic drugs are increasing rapidly, reducing the effectiveness of these treatments and necessitating improved methods of malaria reduction and prevention. Paratransgenesis is one such technique. Characterized by the engineering of symbiotic vector microbiota to prevent parasite development within the mosquito, paratransgenesis has the potential to reduce *Plasmodium* in the mosquito prior to human infection. *Asaia bogorensis* is a prime candidate as it is transmitted horizontally and vertically through mosquito populations and does not commonly infect humans. It has also previously been manipulated successfully for paratransgenesis for malaria prevention. Here, we describe the first plasmid-based paratransgenic strain of *Asaia bogorensis* engineered without any antibiotic resistance genes that is stable and effective for reduction of *Plasmodium* oocysts in the mosquito midgut. Our strain, *Asaia* SF2.1pir<sup>+</sup>thyX, is auxotrophic for the essential gene *thyX* and has the Pir protein inserted into the chromosome. These gene modifications allow for conditional replication of its effector plasmid in this strain alone while also eliminating the need for selection based on antibiotic resistance.

### **4: Transcriptomic and proteomic profiling reveal a deadly function regulated by the post-transcriptional regulator RsmE in *Pseudomonas fluorescens***

Meghan Wells | Biology | School of Science and Engineering  
Faculty Advisor/s: Wook Kim, Ph.D.

#### **ABSTRACT:**

Bacteria naturally form densely structured populations where both space and nutrients become locally limiting, especially to the cells that get physically buried underneath rapidly dividing cells. In a colony model of the bacterium *Pseudomonas fluorescens*, numerous localized patches formed by spontaneously occurring *rsmE* mutants emerge naturally, as they breakthrough the upper layers of neighboring parental wildtype (WT) cells to reach and dominate the surface. RsmE is a posttranscriptional regulator that binds to specific mRNAs to repress the production of multiple extracellular secretions. Knocking out the *rsmE* gene ( $\Delta$ *rsmE*) consequently results in increased secretions that collectively function to reduce the local population density. We have previously identified and characterized two of the RsmE-regulated secretions: a mucoid polymer and a biosurfactant. The mucoid polymer pushes away the neighboring WT cells to create space and the biosurfactant appears to spatially localize the mucoid polymer to define the spatiogenetic structure. However, when both the mucoid

polymer and biosurfactant genes are knocked out, the respective  $\Delta$ rsmE mutant is still able to outcompete the WT, albeit at a significantly reduced level. These results imply that there are additional RsmE-regulated secretions that contribute to  $\Delta$ rsmE mutant's spatial advantage. We thus aimed to identify these additional secretions through a combination of RNA-sequencing, LC-MS/MS, and random transposon mutagenesis. Candidate genes were identified that encode secreted proteins. One striking discovery was a set of genes associated with the Type VI Secretion System (T6SS), known to form a syringe-like machinery which injects toxins directly into nearby cells. Confocal microscopy imaging of T6SS knockout mutants showed that the respective  $\Delta$ rsmE mutant selectively kills the neighboring WT cells, freeing up space and nutrients to promote growth within the dense population. The T6SS functions in concert with the mucoid polymer and biosurfactant, specifically by killing the WT cells that invade the newly created space and those that physically lie at the genotypic boundary of the expanding space. Furthermore, we are in the process of characterizing the remaining candidate genes toward comprehensively elucidating the functions of RsmE-regulated secretions, the homologs of which likely play similar ecological roles across clinically and environmentally significant bacterial species.

#### **\*5: Uncovering the diet of Wood Thrush and Veery in ecological forestry gaps using DNA metabarcoding**

Cassandra Ziegler | Biology | School of Science and Engineering

Faculty Advisor/s: Brady Porter, Ph.D.

#### **ABSTRACT:**

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

#### **6: Visualizing colocalization between cellular proteins and the HSV-1 genome**

Daniel Fromuth | Biotechnology | School of Science and Engineering

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

#### **ABSTRACT:**

Herpes simplex virus type 1 (HSV-1) is a double stranded DNA virus that can present various disease states. To better understand HSV-1 infection and replication, our lab studies the interactions between HSV-1 and the cellular host proteins, including members of the Integrator Complex and Topoisomerase 1 (Top1). We have previously identified that these proteins will associate with the viral genome throughout infection and hypothesize that they may contribute to the regulation of the transcription of viral genes. While we have identified interactions between these proteins and purified viral genomes, we have not previously visualized them within infected cells. Using confocal microscopy, we were able to visually verify these interactions. We

labeled the replicating viral genome with EdC and visualized the DNA by covalently attaching a fluorophore to EdC through a Click chemistry reaction. The Integrator complex is a fifteen-subunit complex that is responsible for the regulation of transcription by RNA Polymerase II (Pol II). In this study, we found that Integrator Complex subunits Ints3 and Ints4 colocalize with the viral genome during HSV-1 infection. Topoisomerase I is an enzyme that will relieve the topological stress caused by DNA supercoiling during DNA replication and transcription. To confirm Top1 association with the viral genome, we also verified Top1 colocalization to the ICP4 protein, an HSV-1 DNA binding protein, at both two and six hours post infection. We also visualized Top1 colocalization in the presence of Camptothecin (CPT), a known Top1 inhibitor that locks Top1 onto the DNA. We've found subtle visual differences between the groups treated with CPT and the groups that were not treated with CPT; however, further experiments are needed to validate these differences. Taken together, we demonstrate here that cellular proteins Ints3, Ints4, and Top1 colocalize with viral genomes in infected cells, confirming the lab's previous findings that the Integrator Complex and Top1 copurify with viral DNA.

### **7: Breaking the N-oxide paradigm: Stereoselectivity of [3+2] cycloaddition between an azomethine ylide (1,3-dipole) and styrene**

Eric Chartier | Chemistry | School of Science and Engineering  
Faculty Advisor/s: Jeffrey Evanseck, Ph.D.; Thomas Montgomery, Ph.D.

#### **ABSTRACT:**

Efficient production of nitrogen heterocycles, a privileged scaffold of significant pharmaceutical interest, continues to be a synthetic challenge. However, recent studies have reversed a long-standing paradigm, where it has been shown that readily available N-oxides allow for the practical and efficient formation of many nitrogen heterocycles through a [3+2] cycloaddition of azomethine ylides with various dipolarophiles. The key discovery is that during production of azomethine ylides from N-oxides the reaction pathway does not pass through a highly reactive iminium or a diradical intermediate as Roussi initially postulated, but rather through a stabilized multi-ion bridged pathway due to solvation and aggregation effects. To date, a systematic investigation into solvent and aggregation effects on the activation parameters of 1,3-dipole [3+2] cycloadditions has not been reported and is the focus of our current work. Specifically, experimental work by Montgomery and co-workers shows that the reaction of tert-butyl pyrrolidine N-oxide with styrene results in over a 9:1 diastereomeric ratio, favoring the pseudo-endo product. To determine the origin of this selectivity, our work uses second-order Møller-Plesset perturbation theory (MP2) and M06-2X density functional theory (DFT) with the jul-cc-pv(D,T)z basis sets to model the asynchronous [3+2] cycloadditions with an increasingly sophisticated solvation model. We started with vacuum computations, then added a continuum dielectric (polarized continuum model, PCM) to capture bulk phase effects, then added the effects of the conjugated lithium oxide. Despite representing a commonly employed approach, these levels of sophistication were still not sufficient to align with experiment and two conclusions were derived. First, vacuum and PCM DFT computations give fortuitous agreement with experimental selectivity, where a cancellation of electronic error occurs. Second, a slightly more sophisticated model including Li<sub>2</sub>O resulted in inconsistent activation parameters, underscoring the importance of explicit solvent and correct pattern of aggregation. Future work involves increasing the sophistication of the physical model to the point we have previously reported as optimal: this involves a unique aggregate that incorporates the N-oxide with THF and two LDAs. As such, we conclude that increasing the physical model to include these effects are necessary for our system to obtain results that are consistent with experiment.

## **8: An Injectable Self-Assembling Peptide Hydrogel for Three-Dimensional Cell Culture Using Metal-Ligand Coordination**

Benjamin Clegg | Chemistry | School of Science and Engineering  
Faculty Advisor/s: Ellen Gawalt, Ph.D.; Wilson Meng, Ph.D.

### **ABSTRACT:**

Cell therapies are potential cures for autoimmune disorders, cancer, neurodegenerative diseases, and other severe illnesses. These treatments depend on cultured cells presenting the phenotype of healthy cells before being re-injected, which is influenced by their spatial arrangement. Self-assembling peptide-based hydrogels are promising materials due to their biocompatibility and scaffold-like macromolecular structure that spontaneously assembles in the presence of biological ions at physiological concentrations. However, these transient charge-based interactions produce a weak macromolecular structure depending on local ion concentrations, leading to poor support. Using a modified self-assembling peptide with a six-histidine tag (EAKH6), histidine's strong binding affinity for zinc ions is used to enhance EAKH6's natural self-assembly with metal-ligand coordination. Zinc-histidine binding is observed using DRIFT spectroscopy through changes in characteristic histidine bond vibrations. Fibril formation behaviors with zinc are investigated using UV-Vis spectroscopy, immunofluorescence, and scanning electron microscopy (SEM) to visualize discernable fibril structures. Initial cell viability measurements with Jurkat cells were performed using a luminescent ATP assay. Ongoing work with this material includes further cell viability studies and mechanical characterization.

## **9: 3D Predictive Modeling and Validation of RNA Kissing Complexes: Application to HIV-1 and Coronaviruses**

Adam Kensinger | Chemistry | School of Science and Engineering  
Faculty Advisor/s: Jeffrey Evanseck, Ph.D.

### **ABSTRACT:**

RNA, a flexible and highly charged molecule, depends on various factors such as its nucleotide sequence, environmental ions, and protein chaperones to adopt conformations crucial for its functional roles in biological systems. Thus, despite recent advancements in structure determination techniques, obtaining atomistic-resolution 3D experimental structures remains challenging, particularly for transient meta-stable structures implicated in large conformational transitions. Computational RNA structure prediction rapidly generates structural models based on experimental structural databases, ultimately aiding in understanding RNA structure-function relationships, designing RNA-targeted therapeutics, and investigating RNA-related diseases. In this work, the Iterative Simulated Reference State (IsRNA) approach was used to fold tertiary structures of HIV-1 RNA kissing complexes (KC) and extended duplexes (ED) with given secondary structure constraints for both blind and referenced prediction. A wide range of structure-based measures was used to quantify agreement between the prediction models and reported experimental crystal structures. Secondly, IsRNA was used to predict KC and ED structures for a set of viruses for which there are no experimentally determined structures (SARS-CoV, SARS-CoV-2, and SARS-CoV-2 delta variant s2m). Each structure from a pool of candidate conformations was evaluated by an empirical scoring function without prior knowledge of the native structure. All the top predictions for the HIV-1 KC and ED structures were successful (P-score of  $< 0.01$ ) in both the blind and referenced screening with an average RMSD of 3.61 angstroms compared to the respective crystal structures. While the global structures were nearly identical to experimental structures, highly local interactions (e.g. base stack orientations, non-canonical base pair geometries) were the largest contributor to RMSD. For the s2m predictions, 90% of the models were good predictions according to the scoring function, indicating reliable prediction in the absence of reported experimental structures. In the future, our top ranked structural ensembles will be used in unbiased molecular dynamics simulations and transition path-finding methods to better understand the dynamics of each structure and the thermodynamics and kinetics of the transitions between the KC and ED in viral systems.

## **10: Local immunomodulating AT1R-pathway blocker loaded reversibly thermoresponsive hydrogel for the treatment of peripheral neuropathy**

Amit Chandra Das | Pharmaceuticals | School of Pharmacy  
Faculty Advisor/s: Jelena Janjic, Ph.D.

### **ABSTRACT:**

Peripheral neuropathy refers to peripheral nervous system disorders with heterogeneous etiology, diverse pathology, and clinical manifestations like pain coming from inflammation and nerve degeneration. The impaired transition of pro-inflammatory M1 macrophages to anti-inflammatory M2 macrophages leads to chronic inflammation and lasting pain. The need for etiological therapy aimed at modifying the pathophysiological mechanisms engaging key cellular entities in inflammation and fibrosis is still unmet. Signaling pathways involving both macrophage and fibroblast are compelling targets for analgesia and type 1 angiotensin II (Ang II) receptor (AT1R) pathway involves Ang II, a pro-inflammatory peptide hormone that has a role in fibrosis and inflammation.

Our lab has previously shown that captopril-loaded hydrogel is effective in elevating mechanical sensitivity in a diabetic mouse model rapidly but for a short duration due to the faster release of drug. We propose a novel formulation of AT1-receptor antagonists (losartan) and ACE inhibitors (captopril) loaded into reversibly thermoresponsive hydrogel injected locally that can block AT1R pathway inhibiting macrophage and fibroblast pro-inflammatory activity and provide effective rapid and long-lasting analgesic activity. Optimized hydrogel with losartan which acts upstream and captopril which acts downstream of the AT1R pathway, will be complementary in suppressing inflammatory markers associated with peripheral nerve injury.

Mixed pluronic-based hydrogel formulation was optimized by implementing a 2-level 2-factor central composite design (CCD). Losartan and captopril were loaded into micelles first and then the micelles were dispersed into hydrogel.

The design of experiment (DoE) results showed a correlation between viscosity and the concentration of pluronics in the hydrogel. The colloidal tests confirm stability, while the rheological tests demonstrate the viscoelastic and thermoresponsive properties of an injectable hydrogel. Both drug-free and drug-loaded hydrogels were found sterile and viable in macrophage cell lines, which were mandatory for the intended in-vivo and cell culture experiments. Losartan showed a very controlled slower release from the hydrogel compared to the captopril.

We have shown that AT1-receptor antagonists and ACE inhibitors can be loaded into reversibly thermoresponsive injectable hydrogel optimized implementing statistical experimental modeling with robust quality control.

## **11: A Reversibly Thermoresponsive, Theranostic Nanoemulgel for Tacrolimus Delivery to Activated Macrophages.**

Riddhi Vichare | Pharmaceuticals | School of Pharmacy  
Faculty Advisor/s: Jelena Janjic, Ph.D.; Vijay S. Gorantla, Ph.D.

### **ABSTRACT:**

Despite the continual administration of broad immunosuppressants, one in three organ transplant recipients encounters organ rejection. Tacrolimus (TAC, FK506, Prograf®) is an FDA-approved keystone immunosuppressant for preventing transplant rejection. The oral bioavailability of TAC ranges from 7.3% to 19.7%. However, 95% of the bioavailable TAC binds to the red blood cells (RBCs), where it exerts no immunomodulatory effects. This necessitates repeated, high doses of TAC. This can lead to off-target effects like nephrotoxicity. To obviate this, we present a locally injectable drug delivery platform for macrophages, where

TAC is incorporated into a colloiddally stable nanoemulsion (NE) and then formulated as a reversibly thermoresponsive, Pluronic-based NEG for immunomodulation of macrophages. Macrophages are promising therapeutic targets as they are the dominant infiltrated cell type (~60%) at the site of the transplant during severe rejection episodes, and their increased levels correlate with a poor prognosis post-transplantation. Importantly, macrophages are skewed towards the proinflammatory phenotype (M1), which primarily causes neuroinflammation and delays nerve regeneration, a critical outcome for a successful transplant. Macrophages contribute to transplant rejection through pathways like increased pro-inflammatory cytokine release (e.g., TNF- $\alpha$ , IL-6, and IL-1 $\beta$ ), nitric oxide production, and antigen presentation, which ultimately activate recipient T cells in the transplant. The TAC NEG undergoes a sol-to-gel transition at physiological temperature for the release of TAC in situ at the site of local application, which contrasts with the current non-specific delivery of immunosuppressants. The goal was to first develop a colloiddally stable and non-toxic TAC nanoemulsion (NE) and conduct in vitro assessments in activated macrophages. The second, was to successfully incorporate NE into a gel to form TAC NEG, with the ability to gel at the application site due to body temperature to provide sustained release of TAC. The third was to study the decrease in pro-inflammatory cytokine release due to TAC NEG from lipopolysaccharide (LPS)-activated macrophages. To the best of our knowledge, this is the first TAC-loaded nanoemulgel with demonstrated anti-inflammatory effects on macrophages in vitro.

## **12: Analysis of Drug Content Distribution on Paper using both Soak and Spray Methods by Gas Chromatography-Mass Spectrometry (GC-MS)**

Aizlynn Michel | Forensic Science and Law | School of Science and Engineering  
Faculty Advisor/s: Stephanie Wetzel, Ph.D.

### **ABSTRACT:**

In recent years, illicit substances have been clandestinely introduced into the prison system via the mail. The presence of these drugs can be a hazard to any individuals within correctional facilities including inmates, guards, and mailroom staff. In order to obtain these illicit drugs, inmates require the assistance of an individual outside the prison. This outside connection will acquire the drug of choice and dissolve it in acetone to create a solution. Any paper type can be either soaked in or sprayed with the solution, then disguised as a regular letter when dried. Despite this being an emergent issue heavily impacting jails and prisons, little to no research on this topic has been completed. This study aims to investigate the distribution of drugs on different paper types while observing both soak and spray methods. For this research, a 3.33 mg/mL solution of the desired surrogate drug type was created by dissolving the drug in acetone. The solutions were used to evaluate both soak and spray methods on different paper types. Thirteen one-by-one-centimeter squares were marked on the paper type according to a template to ensure consistency for later in the experiment. To properly observe distribution factors, each paper was either dipped in or sprayed with solution two, four, or six times depending on their respective trial. Between each dip or spray, the paper dried completely. The paper squares were then soaked in methanol to extract the drug from the paper matrix. After extraction, the solution was transferred into a gas chromatography-mass spectrometry (GC-MS) vial using a nylon syringe filter. The samples were run in the instrument utilizing a developed GC-MS method for the detection and quantification of the target analyte. The chromatographic data provided by the GC-MS were used to observe how the surrogate drugs were distributed throughout different paper types. By understanding how drugs are distributed on the paper, further research can be conducted to help identify when a piece of mail has been tampered with and avoid these illicit substances making their way into prisons while protecting those who may unknowingly come into contact with these illicit drugs.



### **13: The use of Leaf Spray Ionization Mass Spectrometry for the Detection of Kratom (*Mitragyna speciosa*) Leaf**

Macenzie Powell | Forensic Science and Law | School of Science and Engineering

Faculty Advisor/s: Michael Van Stipdonk, Ph.D.

#### **ABSTRACT:**

*Mitragyna speciosa* is a plant that produces a metabolite called mitragynine. This substance has been used for centuries as a traditional pain remedy, primarily in Southeast Asia. Recently it has become available in the United States and is commonly known as kratom. Kratom has become a widespread substance for relieving pain, fatigue, and opioid withdrawal. Kratom is currently not considered an illegal substance in the United States; however, the Drug Enforcement Administration has deemed it a drug of concern. There is much unknown about kratom including a standardized detection method of the substance. The purpose of this study is to detect mitragynine using Leaf spray Ionization Mass Spectroscopy (LSI-MS), this was proven to be successful. Kratom was detected in all three strains tested, meng da, white meng da, and red meng da. All initial scans contained a parent ion peak at 399 m/z. This is indicative of the [M+H] peak of kratom as it has a molecular weight of 398.5 g/mol. The fragment ion peaks that were present in the CID scans of 399 were 364m/z, 238m/z, 226m/z, and 174m/z. All peaks observed are specific to kratom. From these results, the hypothesis stands that kratom can be detected using LSI-MS.

### **14: Analysis of Sampling Techniques and Sampling Time for the Detection of Organic Gunshot Residue (OGSR)**

Matthew Lasker | Forensic Science and Law | School of Science and Engineering

Faculty Advisor/s: Stephanie Wetzel, Ph.D.; Jackson Dimalanta

#### **ABSTRACT:**

Organic gunshot residue (OGSR) is a collection of organic molecules that result from the firing of guns. A transition towards heavy metal free ammunition, which was traditionally analyzed for determination of a recent firing event, brings OGSR to the forefront of forensic importance. Various collection methods of OGSR will be tested and compared to the current standard of gunshot residue collection, scanning electron microscope (SEM) stubs with carbon adhesive tape. The collected OGSR will then be analyzed and quantified by Liquid Chromatography Tandem Triple Quadrupole Mass Spectrometry (LC-QqQ-MS). Volunteers will fire (5 or 6) shots then their hands will be swabbed with the various collection methods. Seven(?) replicates of each method will be collected and statistics will be performed using analysis of variance (ANOVA). The study hopes to determine the most effective method of collection of OGSR for analysis by LC-QqQ-MS. This advances the knowledge of the collection and detection of OGSR and allows for a future path of determination of a firing event if heavy metal free ammunition becomes the norm.

### **15: Determination of Naloxone Levels When Administered in Drug Overdose Cases By LC-QqQ-MS**

Chloe Bermejo | Forensic Science and Law | School of Science and Engineering

Faculty Advisor/s: Stephanie Wetzel, Ph.D.

#### **ABSTRACT:**

The opioid epidemic in the United States is a product of the increase of opioid use outside of its intended or prescribed use. Opioids are typically prescribed by healthcare officials to combat chronic or acute pain. Some of the most common opioids prescribed include fentanyl or oxycodone, with fentanyl becoming more prevalent in underground illicit drug sales. With the increase of opioid-related deaths, the most effective counteragent against an ongoing overdose is naloxone hydrochloride, more commonly known as naloxone or Narcan. Naloxone can be administered intravenously, intranasally, or subcutaneously; in previous research studies it has been found the best uptake for naloxone is when it was administered intravenously. In post-mortem toxicology tests, naloxone is either not tested for or if it was tested for, it doesn't appear in the post-mortem reports. In

this study the opioids that were studied were fentanyl, oxycodone, morphine, and 6-monoacetylmorphine (6-MAM) along with their deuterated forms. The purpose of using heroin's two major metabolites, morphine and 6-MAM, as opposed to heroin is due to heroin's rapidly degrading nature and in toxicology labs morphine and 6-MAM are tested for to indicate the presence of heroin. The analytes were extracted from spiked whole human blood samples through the use of solid phase extraction (SPE). The extracted blood samples will then be tested with the Agilent 6460 liquid chromatography-triple quadrupole-mass spectrometer (LC-QqQ-MS) to determine a method of separation and quantification of naloxone. Due to the polarity of each drug, they eluted from the Raptor Biphenyl column in the order of morphine, naloxone, 6-MAM, oxycodone, and finally fentanyl. A method for naloxone quantification is essential to gain further insight into how naloxone interacts with opioids and blood cells, as well as to understand the effectiveness and intricacies of naloxone.

#### **16: Methods of Application for Internal Standards in Solid-Phase Extraction, in Preparation for Drug Quantitation on LC-QQQ-MS**

Amy Cook | Forensic Science and Law | School of Science and Engineering  
Faculty Advisor/s: Stephanie Wetzel, Ph.D.; Pamela Marshall, Ph.D.

##### **ABSTRACT:**

Toxicological analysis requires high precision and accuracy during sample preparation, which involves the extraction of analytes of interest from an often complex biological matrix. One possible technique to increase efficiency is pre-loading deuterated internal standards to later integrate into Solid-Phase Extraction (SPE), cutting out time-consuming steps and possible human error in sample preparation. In this study, SPE was performed on drug-spiked synthetic urine samples using pre-loaded frit materials and SPE cartridges, then Liquid Chromatography–Triple Quadrupole–Mass Spectrometry (LC–QQQ–MS) was used to analyze the extracts and determine percent recovery for each drug in all samples and controls. In addition, a time study was conducted in which the pre-loaded materials were stored to determine if recovery decreased over time. These experiments provide useful evidence about the reliability of pre-loaded internal standards, as well as the potential of creating pre-loaded frits and cartridges to eventually market to laboratories.

#### **17: Analysis of the Transfer of Drugs to the Envelope in Mail Over Time and Varying Conditions**

Madison Eidemueller | Forensic Science and Law | School of Science and Engineering  
Faculty Advisor/s: Stephanie Wetzel, Ph.D.

##### **ABSTRACT:**

According to the National Institute on Drug Abuse, 85% of the prison population has an active substance abuse disorder or was incarcerated for a crime including drugs/drug use. This high percentage contributes to the large amount of drugs that are smuggled into prisons and jails, which continues to be a problem for prison staff. One method smugglers use is sending substance-soaked papers through the mail. In this method, the smugglers soak a piece of paper in a liquid mixture that contains the illicit substance of interest. This piece of paper is then placed in an envelope and mailed into the prison or jail. These pieces of mail are received by the prison staff, and in several cases, the correctional officers who came in contact with these pieces of mail fell ill as a result of the substances soaked onto the paper mail. Because of this, correctional facilities have been faced with the difficult challenge of regulating the mail without breaching the inmates' First Amendment rights. Several prisons have turned to only allowing mail to be sent on white printer paper or using electronic services to deliver mail. The purpose of this research is to investigate the transfer of substances from substance-soaked paper mail onto the envelope, and how different conditions affect this transfer. Thus far, minimal research has been done investigating substance-soaked papers, especially when sent through the mail. This research attempts to address this gap in the field by first dipping pieces of paper into a mixture of rubbing alcohol and caffeine made to a concentration of 3.33 mg/mL. These substance-soaked papers were then placed in manila or white paper

envelopes and allowed to sit for different periods of time or were sent in the mail. The samples were then extracted and analyzed using Gas Chromatography-Mass Spectrometry. Testing has shown that certain sample preparations result in transfer from the paper to the envelope. The amount of transferred substance was calculated and comparisons were made. Future research will include the use of different substances.

#### **18: The Extraction and Subsequent Analysis of Gel Pen Ink**

Elizabeth Knittle | Forensic Science and Law | School of Science and Engineering  
Faculty Advisor/s: Stephanie Wetzel, Ph.D.; Lyndsie Ferrara, Ph.D.

##### **ABSTRACT:**

Document examination, an important subdivision of Forensic Science, has many kinds of evidence that yield important results. One such type of evidence is ink analysis. Ballpoint ink has been analyzed multiple ways. Due to the simple nature of its composition, ballpoint ink can be separated and identified to be analyzed as evidence. One method for ballpoint ink analysis involves Thin-Layer Chromatography, TLC, which employs the use of a stationary and mobile phase to separate the components of a sample. Due to the differences in polarity of ink components, TLC works well to separate the ink sample fully. Another ink, gel, has a complex composition which makes it difficult to analyze. Therefore, the ability to extract gel pen ink using similar methods to ballpoint ink extraction was studied. There have been past attempts to extract gel ink, with little to no success due to the complexity of the ink composition. A new extraction technique has been developed to produce better results. Three different manufacturers of gel ink were subjected to the modified extraction technique using TLC. The existing method for gel ink extraction using common ballpoint ink extraction methods has not successfully extracted all evidence of the gel ink. The most successful extraction method identified so far involved an extended extraction period of 2 days using methanol before application to a plastic-backed TLC plate with a mobile phase consisting of acetone, n-butanol, and deionized water. The three manufacturers could be individually identified from each other under both natural and UV lighting via the banding on the TLC plate; however, minute differences between the pens have yet to be visualized. If these differences can be identified, the impact of evidence gained from gel ink analysis would have greater significance. Using more conclusive testing methods such as Gel Permeation Chromatography, GPC, or Liquid Chromatography Mass Spectrometry, LC-MS, could highlight these minute differences where TLC cannot. Once a method of analysis is developed the extracted ink can be used to analyze questioned documents such as counterfeit notes, ransom notes, and forged currency.

#### **19: Identifying the Presence of Semen Through the Detection of Fructose**

Taylor McClure | Forensic Science and Law | School of Science and Engineering  
Faculty Advisor/s: Michael Jensen-Seaman, Ph.D.; Pamela Marshall, Ph.D.

##### **ABSTRACT:**

Seminal fluid is among the most valuable sources of biological evidence which can be recovered from a crime scene. Current testing methods for seminal fluid, such as the prostate-specific antigen (PSA) test and microscopic examination for spermatozoa, are non-comprehensive and have a high potential for false positive or false negative results. Microscopic examination and identification of spermatozoa is often utilized as a confirmatory testing method, but relies on the presence of spermatozoa in the sample. PSA testing is an attractive alternative that should return positive results for seminal fluid even in the absence of spermatozoa, such as in cases where a male subject is vasectomized. However, this test is known to produce false positives in response to urine, breast milk, and condom lubricants.

Fructose is a naturally occurring sugar which serves as the main energy source for sperm in semen. Fructose is present in all seminal fluid at varying levels depending on the presence or absence of spermatozoa. There is currently no testing method for seminal fluid which utilizes fructose as the target molecule. However, it is

possible that quantification of fructose in semen under different conditions, and compared to other bodily fluids, may aid in identification of crime scene samples, forming an alternative method to PSA testing. To explore this potential, two different methods were utilized to quantify fructose levels in semen samples: a fluorometric enzyme assay kit and the colorimetric resorcinol method. Initial results of these methods indicated greater success with the resorcinol method; therefore, efforts of this research turned to scaling down this method to a format more accessible for a forensic biology laboratory. Preliminary results of this research indicated that fructose levels in seminal fluid were lower than expected based on literature values from a medical context, providing an important indication of the potential impact of testing forensically relevant, non-fresh seminal fluid samples. The feasibility of this newly optimized method, as well as potential implications for the discriminatory power of fructose-based identification of body fluids in a forensic context, will be discussed.

## **20: Cognitive Bias Mitigation Techniques: Overcoming Barriers and Finding Solutions**

Taylor Hopkins | Forensic Science and Law | School of Science and Engineering  
Faculty Advisor/s: Lyndsie Ferrara, Ph.D.

### **ABSTRACT:**

Bias has become a buzzword within society over the last few years. More specifically, it has become a topic of discussion for professional fields connected to the criminal justice system, including the field of forensic science. Forensic science practitioners are tasked with giving a voice to evidence within the court of law while maintaining a stance of neutrality as it relates to the outcome of a given case. Although a natural phenomenon, cognitive bias can undermine this stance of neutrality by unintentionally impacting an examiner's means of collection, analysis, and/or final conclusions. Because of this, one of the challenges in the modern forensic science world is acknowledging and mitigating cognitive bias. An important document released in 2009, referred to as the National Academy of Sciences (NAS) report, gave multiple recommendations to strengthen the forensic science field including a call for more research on bias, its impact on practitioners, and solutions to help remedy its effects. Since this report, some literature has provided potential solutions to reduce the risk of bias in the laboratory. However, these proposed methods are not widely implemented in laboratories. This project investigated the specific barriers forensic laboratories across the United States face when looking to potentially implement bias mitigation strategies. Although most participants answered affirmatively to the need for bias mitigation methods, barriers such as lack of knowledge, support, and resources make implementation difficult. These and other barriers provided by participants, along with proposed solutions, gave insight into possible organizational changes to implement when attempting to reduce the effects of cognitive bias. Overall, input from over 50 professionals ranging in position and experience revealed relevant information that can help the field better understand current stances and future steps regarding the discussion of bias in forensic science.

## **21: Using An Indirect Personality Assessment of Timothy McVeigh to Determine Psychopathy**

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

### **ABSTRACT:**

On April 19 of 1995, the Alfred P. Murrah building in Oklahoma City was bombed by Gulf War veteran Timothy McVeigh using a deadly cocktail of fertilizer, diesel, and other chemicals. McVeigh had an extreme hatred and disgust for the government after the events at Waco, Texas. The Waco incident was a 51-day siege between the United States government and the Branch Davidians which resulted in the deaths of four federal agents and 82 Branch Davidians. Additionally, he feared that the government would take away his right to bear arms. This research aimed to analyze the life of Timothy McVeigh to determine if he exhibited psychopathic behaviors using an indirect personality assessment and a series of interview tapes. In order to complete the indirect personality assessment many factors were examined including details of McVeigh's family dynamic and personal

relationships throughout his life, the environmental conditions of his childhood, and his physical characteristics/health. The details of McVeigh's behavior, the most important factor, are discussed in the biography "American Terrorist: Timothy McVeigh and the Oklahoma City Bombing" by Dan Herbeck and Lou Michel. The biography discusses thoughts and feelings of McVeigh throughout his life, childhood up to his execution. Additionally, the interview tapes, conducted by Herbeck and Michel during his prison stay (1997-2001), were utilized to gain further information and listen for emotional inflection in the voice. The combined information mentioned above was used to complete the indirect personality assessment. To conclude or disprove psychopathy, McVeigh's behaviors were rated on a scale from one to five. On the scale, behaviors under the one category are considered to be psychopathic behaviors while five are towards the social norm. Based on the assessment, a presentation of Timothy McVeigh's psychopathic behaviors was determined. Through this research, the method of using an indirect personality assessment was furthered validated. In the future, the indirect personality assessment will allow us to determine if someone is a psychopath, whether alive or dead, based on interview and other materials rather than a conductive interview with the individual.

## **22: A Landscape Study: Examining Trends in Serial Killers Raised by Non-biological Parents**

Amanda Piccirilli | Forensic Science and Law | School of Science and Engineering  
Faculty Advisor/s: Pamela Marshall, Ph.D.

### **ABSTRACT:**

While serial killers can be found everywhere in the world, they became increasingly prevalent in the United States throughout the 1960s to present day. The cases of Ted Bundy and Jeffrey Dahmer sparked a public fascination with serial killers. According to the FBI, a serial killer is someone who kills two or more people at various times. Example motives include anger, pleasure, money, and attention seeking. Using the Radford / Florida Gulf Coast University Serial Killer Database, this study examined trends in serial killers who were adopted, placed in foster care, or raised by family members other than their biological parents. Out of 500 serial killers active between 1965 to present day, 10% were raised by their non-biological parents. Factors such as demographic, childhood, and criminal background information were examined. The study aimed to address two questions: (1) why is it critical to add information about adoption status for the U.S. serial killer database? and (2) how does this advance our knowledge of serial killers? This study advanced knowledge in the field of forensic science and psychology by showing the trends and numerical data within the population of serial killers raised by non-biological parents. This information will be useful to further research on a subset of American serial killers and to provide resources to law enforcement and researchers using the Radford / Florida Gulf Coast University Serial Killer Database.

## **23: Examining the Relevance and Admissibility of Neuroimaging Evidence in Psychopathy and Insanity Defense Cases**

Kaitlyn Svencer | Forensic Science and Law | School of Science and Engineering  
Faculty Advisor/s: Lyndsie Ferrara, Ph.D.

### **ABSTRACT:**

Neuroimaging, the visual aspect of neuroscience, refers to various forms of technology that are used to image the brain structurally and functionally. Sometimes termed "brain scans", neuroimaging can depict distinctive features in the brain. With increased utilization in court, this evidence type has been examined in various applications of the law in terms of relevance and admissibility of brain scans for physical brain trauma. The goal of this research was to expand on that work to assess how brain scans are introduced and applied in various insanity defense and psychopathy cases. The study was conducted in two phases to examine application and admissibility of the evidence. Phase one compared mental health assessment evidence and neuroimaging evidence specifically involved in insanity defense cases. This revealed that a variety of neuroimaging evidence

has been admitted as supplemental evidence with mental health assessments. Phase two analyzed the role of neuroimaging, specifically an fMRI, in psychopathy cases to understand the application of this evidence type. Overall, the research investigated the relevance and admissibility of neuroimaging evidence to further understand its use in court.

#### **24: Identity and Systems of Care: Supporting Transgender Migrants in Pittsburgh**

Cameron Moore | Rhetoric and Philosophy Communication | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor/s: Eric Garrett, Ph.D.

##### **ABSTRACT:**

In 2021, Pittsburgh became a certified Welcoming Place for immigrant, refugee and new Americans. Last fall, the Pittsburgh City Council passed legislature to protect gender-affirming healthcare and designate Pittsburgh as a sanctuary city. In response, this research explores the intersectional identities of 'migrant' and 'trans': in what ways do these identities complicate, mutually inform, and expand upon each other? Then, this research assesses Pittsburgh's existing and developing systems that support transgender immigrants across several axes, including social, political, and medical: in what ways is Pittsburgh prepared to support transgender immigrants and refugees? Finally, this research provides the greater Pittsburgh community with praxis-informed calls to actions: what support systems are needed to deliver on the City of Pittsburgh's Welcoming Place and Sanctuary City designatory promises?

#### **\*25: The Process of Media Selection Among Arab English Language Teachers: Why Digital Inclusivity Matters**

Nur Masarwa | Educational Technology | School of Education

Faculty Advisor/s: Joseph Kush, Ph.D.

##### **ABSTRACT:**

This qualitative, phenomenological study investigates the impact of culture on media choices in English as a Foreign Language (EFL) classrooms within an Arab region in Israel. In addition to traditional grammar-focused instruction, EFL instructors in Israel integrate technology and media to expose students to authentic English pronunciation and cultural communication. However, this technological integration not only facilitates global material transfer but also triggers shifts in different life dynamics. The EFL curriculum, shaped by Western and Jewish ideologies and overseen by the Ministry of Education, faces a critical gap: the lack of representation of Palestinian Arabs. This absence results in conflicts related to teaching methods and identity formation within the Arab sector. Guided by the frameworks of technological and cultural determinism, this research poses a pivotal question: How do Arab EFL teachers in Israel teach authentic English using media and navigate the potential cultural differences that may arise from this exposure? Through semi-structured interviews, data from seven Arab EFL teachers reveal that culture significantly influences their pedagogical choices regarding media integration. Despite recognizing the potential of technology, teachers encounter challenges due to cultural and religious sensitivities. They employ strategies such as avoiding certain media or editing content for cultural appropriateness, which may inadvertently impact implicit language acquisition. Furthermore, the absence of Arab representation in media and textbooks perpetuates Western cultural superiority and impacts Arab students' perceptions of their own culture. Consequently, this study advocates for a comprehensive curriculum design and inclusive digital educational environment, emphasizing diverse cultural perspectives

## **26: Non-Financial Sustainability Reporting: Promoting Transparency and Accountability in Corporate Governance**

Tori Cikins | Accountancy | A.J. Palumbo School of Business Administration  
Faculty Advisor/s: Congcong Li, Ph.D.

### **ABSTRACT:**

Non-financial sustainability reporting has become a cornerstone of corporate governance, facilitating transparent communication of environmental, social, and governance (ESG) performance to stakeholders. This project explores the evolving landscape of non-financial sustainability reporting, emphasizing its role in fostering transparency, accountability, and stakeholder engagement. Drawing from scholarly literature and industry practices, the project discusses motivations behind non-financial reporting, including regulatory demands, investor expectations, and societal pressures for sustainable practices. It examines prominent reporting frameworks like the Global Reporting Initiative (GRI), Sustainability Accounting Standards Board (SASB), International Integrated Reporting Council (IIRC), and the Climate Disclosure Standards Board (CDSB), highlighting their role in shaping reporting practices. The project also addresses the emerging involvement of the International Financial Reporting Standards (IFRS) Foundation in the development of sustainability disclosure standards, signaling a significant shift towards standardized reporting. Challenges such as data reliability and comparability, alongside trends like integrated reporting and technology-driven solutions, are also discussed. The project underscores the importance of stakeholder engagement in the reporting process, advocating transparent communication to build trust and accountability. Furthermore, this project highlights non-financial reporting's transformative potential in driving sustainable business practices. In conclusion, non-financial sustainability reporting is recognized as pivotal for organizational change, promoting long-term value creation and contributing to a sustainable economy. The project calls for continued research and collaboration, acknowledging the growing influence of reporting frameworks like the Group of Five and the IFRS Foundation's role in shaping the future of sustainability reporting standards.

## **27: Gender in Video Game Music: Rewriting the Gender Narratives of Western Tonal Music**

Ian Young | Performance | Mary Pappert School of Music  
Faculty Advisor/s: Nicole Vilkner, Ph.D.

### **ABSTRACT:**

In her 1991 book *Feminine Endings*, musicologist Susan McClary argued that musical structures were inherently gendered, noting how Western tonal music often uses semiotic codes to signify masculinity and femininity in certain elements of music. When listeners understand the dominant, first theme in sonata form to be masculine and interpret the subservient, second theme to be feminine, a narrative is created where the masculine elements will return for an inevitable victory over the feminine elements, which are treated as an obstacle to this musical transcendence. Recent studies of video games have shown how gendered hierarchies can be reinforced in video game music. For instance, culturally-understood "masculine" orchestration accompanies hypermasculine fantasies of dominance (Austin, 2018). Other research suggests that video game music can subvert traditional gender codes. For instance, video game music often relies on loops which complicate and/or prevent a given theme from being heard as the "main" or "dominant" element (Thompson, 2020). My project offers an alternative argument. I propose that video game music can change and reimagine traditional gendered narratives. In a close analysis of *Final Fantasy XIV*, I show how music corresponds to the gameplay structure. The gameplay structure alternates between long, dialogue-driven, narrative segments, in which the player will hear music that is coded feminine (soft, reflective, peaceful), and shorter, combat-driven action segments, in which the player will hear music that is coded masculine (loud, driving, tense). In the gameplay, the combat scenes featuring masculine music are treated as obstacles to be overcome, whereas the balanced, serene scenes featuring feminine music are treated as the end goal of the game, as the player restores

harmony and peace. I argue that the music of Final Fantasy XIV flips the traditional narrative found in music, and I posit that video game music, and video games themselves, have the potential to question and change traditional narratives of masculine dominance, rather than serving only to reinforce them.

### **28: How to Cook and Eat in Chinese: Cookbooks & Culinary Encounter, 1910-1950**

Lily Berry | Public History | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor/s: Laura Engel, Ph.D.

#### **ABSTRACT:**

Community cookbooks deal in familiarity--a familiarity built upon sharing language, sharing culinary experience, and, often, the literal act of sharing food. Community cookbook authors know their audiences, and they share a foundational culinary familiarity. The Chinese cookbooks published in the U.S. between 1910 and 1950, however, were consciously created in the absence of underlying familiarity. To make the foreign familiar required an expansion of the cookbook's norms as a medium, as well as an expansion of American foodways. In the shadow of the Chinese Exclusion Act and the cultural marginalization of Chinese people in America, Chinese cookbooks emerged as a means of culinary instruction, cultural exchange, and communal representation. This project centers Jessie Louise Norton's *Chinese Cookery in the Home Kitchen* (1911) and Buwei Yang Chao's *How to Cook and Eat in Chinese* (1945), which were groundbreaking contributions to the Chinese cookbook phenomenon, introducing white Americans to authentic Chinese foodways and locating Chinese food in the American kitchen for the first time. These cookbooks were shaped by their audience's unfamiliarity and their diplomatic aim to represent Chinese culture, positioning the cookbook as educational rather than merely instructional. In addition to outlining ingredients and instructions for recipes, these cookbook authors take care to explain the culinary history, necessary tools and techniques, and cultural norms for the unfamiliar audience to bridge the gap between the foreign and the familiar in American foodways and society. Combining recipes and instructional entries from Norton and Chao's cookbooks with photographs and ephemera connecting to food as a medium of cultural negotiation in Chicago, this project visually depicts the presentation and self-representation of Chinese identity through food in the early 20th century.

### **\*29: Indigenous Iconography in Education's Athletics: Recognizing the Societal Repercussions of Mascot Culture**

Thomas DeMauro III | Public History | McAnulty College and Graduate School of Liberal Arts

Faculty Advisor/s: Jennifer Taylor, Ph.D.

#### **ABSTRACT:**

The utilization of Native American iconography for athletic mascots has been debated and examined for over a century. Scholars have analyzed these stereotypical misinterpretations and the prejudice, racism, and psychological effects they propagate primarily through the lens of collegiate and professional sporting organizations. While valuable towards Indigenous equality efforts, the evident deficiency of scholarship on pre-collegiate education--both primary and secondary schooling--and their usage of Native American mascots makes the field rather incomplete. At the most impressionable of ages, children attend school districts with racist iconography and are confronted with the imagery every day. This project, functioning as a quasi-compendium, aims to present a vast assortment of material, statistics, and first-hand testimonials relating to Native American mascots, offering those who are unaware of the adverse effects such iconography produces to comprehend its impact on not just Indigenous cultures, but society overall. Additionally, I aim to encourage others to pursue future studies regarding the impact school districts and school boards have on localized educational institutions by demonstrating the insufficiency of published scholarship considering both school districts and pre-collegiate mascot usage altogether. Scholarship regarding professional athletic organizations and the NCAA are utilized heavily throughout, as most provide excellent facts and statistics useful to Indigenous mascot studies overall.



The limited studies that examine children and Indigenous mascots will also be incorporated. Additionally, primary sources--such as newspaper articles, online editorials, and interviews--will be integrated to ground discussions in relevant everyday life. Throughout, I will explore the history of Native American mascots and mascot culture, investigate how Indigenous iconography triggers harmful psychological effects, examine the debates between eliminating and preserving Indigenous mascots, evaluate the possible solutions raised by scholars, and, lastly, present potentially beneficial research questions which could spark constructive developments regarding pre-collegiate education and Indigenous iconography. Primary and secondary schooling's use of Indigenous mascots must be examined and reconsidered utilizing the wealth of studies and statistics available to the public. This project aims to make light of such sources.

### **\*30: Beyond the Ballpark: Baseball Uniforms as City Symbols**

Casey Haas | Public History | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor/s: Laura Engel, Ph.D.

#### **ABSTRACT:**

The prestige of the baseball uniform generates an aura that penetrates its team's surrounding city and region. Each team's colors, stripes, and logo become a symbol of its locale and a representation of its people. *Beyond the Ballpark* is a digital exhibit that focuses on the uniforms of 5 baseball teams significant to its city's residents and beyond. The uniforms are divided into 4 categories: "Symbols of Adversity"; "Growth Behind the Uniform"; "Cultural Influencers"; and "Finding Agency." "Symbols of Adversity" includes the 1979 Pittsburgh Pirates and 1986 New York Mets representing uniforms worn in times of economic upheaval for their respective cities. "Growth Behind the Uniform" includes the 1970s through the mid-80s Houston Astros uniforms, worn alongside the growth of Houston, Texas, into one of America's most populated cities. "Cultural Influencers" focuses on the 1990s Chicago White Sox uniforms that had a huge cultural impact beyond the limits of Chicago's south side in the hip hop industry. Finally, "Finding Agency" highlights Pittsburgh's Negro League team, the Homestead Grays, focusing on the Grays' uniform as a symbol of African American agency in a racially divided America. Each uniform is presented through artifacts such as music, logos, magazine covers, and photography demonstrating the connection between each baseball team and its city. This exhibit argues that baseball and sports overall do not exist in a vacuum. Rather, sports are affected by economic, social, and cultural issues while also acting as a mediator to help individuals cope through community changes. As a result, fans and city residents manage to build their own personal connections with their baseball team and their team's uniform.

### **31: A Metaphysics of the Moral Imagination: John Ruskin's Realism, Revisited**

Jesse Goodman | Philosophy | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor/s: Michael Harrington, Ph.D.

#### **ABSTRACT:**

The Victorian philosopher John Ruskin is primarily remembered for his political writing, as a forerunner of what we would today call Christian Socialist and Green politics. In aesthetic circles, he is also often considered something of a punchline: a stuffy conservative who represents the worst and most trite vagaries of his day, an enemy of abstraction and a man who let his own gossipy opinions of individual artists impede his view of the art they produced. Ruskin thus has a double-being in cultural memory: both an admired social reformer and a laughingstock art critic.

These views of Ruskin can be challenged and potentially reconciled by showing how his critics have misunderstood his aesthetic philosophy. Ruskin is often described as an aesthetic realist, the view on which art must represent the world— i.e. a painted tree must closely resemble its real-life counterpart. But Ruskin is not an aesthetic realist. He is a moral realist, who argues good art will be of service to its society by representing a

rightly ordered ethical view of reality. In this way, art for Ruskin serves a reformist purpose just like his environmental and labor advocacy. Art is the wing of his social project which is manifested by the imagination, and requires rightly-ordered artists to perform it properly.

This presentation will work through Ruskin's account of the moral imagination in his three-volume work from the 1850's, *The Stones of Venice*. Ruskin argues inspiration comes from a transcendent moral outside of the artist, which is then refracted through the artist's own ethical temperament to create a work of varying moral quality. The presentation will then conclude by citing Ruskin's famous extracted chapter of *The Stones of Venice*, "The Nature of Gothic" to argue that because Ruskin's moral realism is not an aesthetic realism, it leaves open new possibilities of understanding the relationship of social class to artistic production.

### **32: Building Action-Oriented Compassionate Care Skills Through Receiving Feedback: A Qualitative Exploration of Students Learning, Perceptions and Values**

Elizabeth Straub | School Psychology | School of Education

Paige Johnson | School Psychology | School of Education

Faculty Advisor/s: Reva Mathieu-Sher, Ed.D.

#### **ABSTRACT:**

Applied Behavior Analysis (ABA) based-treatments have received criticism from the autistic community in recent years (Autisticscienceperson, n.d.; McGill et al., 2020) claiming that ABA can prevent individuality, be dehumanizing, and could potentially cause psychological harm. As a result, some BCBA's have advocated for prioritizing compassionate care-based techniques to be required content for ABA students. Although no definition has been adopted by all ABA practitioners, compassionate care is about putting empathy into action (Taylor, 2019) and includes developing behaviors and skills which allow development of technical skills required to deliver quality behavior analytic treatment while simultaneously understanding the importance and fundamental nature of developing strong bi-directional relationships with clients, caregivers and colleagues. Empathy, mutual trust and respect become core components of their practice. There has been limited research exploring how to teach compassionate care-based skills in ABA (Rohrer et al., 2022, G et al., 2023). To date, there has been no research that explores the experience of the learning during this process. This research qualitatively explored student learning progressions, perceptions and values as they learned about compassionate care from a behavioral analytic lens.

The study aimed to answer the following research questions:

1. How do students' progress in their understanding of compassion throughout the learning progression?
  2. How do students value learning about compassionate-care in ABA?
  3. What are students' perceptions of learning compassionate care-based skills?
  4. What are students' beliefs about the future potential for compassionate care-based skills?
- Results were analyzed as well as future directions for continued teaching, policy and research implications are discussed.

### **\*33: Healthy Relationships for individuals on the Autism Spectrum**

Nicole DeCicco | School Psychology | School of Education  
Stephanie Tran, MA, MEd | School Psychology | School of Education  
Kiera Reilly | School Psychology | School of Education  
Faculty Advisor/s: Tammy Hughes, Ph.D., ABPP

#### **ABSTRACT:**

The CDC reports the prevalence of children diagnosed with an Autism Spectrum Disorder (ASD) is 1 in 36 children. ASD is reported to occur four times more often in boys than girls (Center of Disease Control, 2023); it is a developmental disability (neurodevelopmental disorder) that impacts an individual's social-pragmatic and communication skills. Although those with ASD evidence social impairments, many also still seek social connections. One major barrier to obtaining healthy (acquaintance, friendships or dating) relationships is a lack of attention to personal hygiene (Sharma & Gupta, 2020). As such, interventions addressing personal hygiene are a critical first step for helping those with ASD to ready for relationship obtainment and development. The first module of the Healthy Relationships Curriculum addresses dental care, toileting, dressing and eating, and distinguishes between private personal actions and public presentations in order to master skills of daily living. Using a single-subject design, this poster shows the learning/ basic knowledge acquisition using a pre-post comparison. The independent use of skills, and frequency of prompts required to use daily living skills, are monitored by both teacher and parent reports. Levels of ASD impairment, rates of learning and skill acquisition are described.

### **\*34: Trauma, Mindfulness, and Alternative Education**

Jennifer Dolecki | School Psychology | School of Education  
Annie Haefs | School Psychology | School of Education  
Annie Lao | School Psychology | School of Education  
Ky-Asia Colter | School Psychology | School of Education  
Faculty Advisor/s: Tammy Hughes, Ph.D., ABPP

#### **ABSTRACT:**

Adverse childhood experiences (ACEs) are so prevalent that they have been identified as a public health epidemic. According to the Centers for Disease Control and Prevention, about 64% of adults in the United States reported they had experienced at least one ACE as a child and about 17% reported they had experienced four or more types of ACEs. Students placed in alternative education high schools are disproportionately impacted by social and individual level risk factors, including ACEs and trauma resulting from ACEs (Johnson & Taliaferro, 2011).

Growing evidence supports the effectiveness of mindfulness-based interventions, demonstrating a wide range of outcomes including reducing chronic pain, symptoms of depression, symptoms of anxiety, drug use and cravings, rumination, symptoms of PTSD, as well as improving attention and prosocial behaviors (Creswell, 2017; Hopwood & Schutte, 2017). When trauma is present, it is important to adapt mindfulness interventions so that participants do not experience a resurfacing of traumatic memories during mindfulness exercises (Creswell, 2017). In school settings, mindfulness interventions have become increasingly popular and show potential for improving cognitive performance and resilience to stress (Zenner et al., 2014).

In one alternative school that serves high school youth who have experienced trauma, the principal and school counselors sought guidance on incorporating a trauma-informed approach into their mindfulness counseling program. The counselors and a Duquesne school psychology graduate student cofacilitated weekly trauma-informed mindfulness sessions, using the guidelines from Sam Himelstein's Trauma-Informed Mindfulness with

Teens: A Guide for Mental Health Professionals (2019) and David Treleaven's Trauma Sensitive Mindfulness: Practices for Safe and Transformative Healing (2018). Using a pre-post design, students' self-reports of mindfulness were measured using the Mindful Attention Awareness Scale (Brown & Ryan, 2003).

### **35: Amplifying Youth Voice: Youth-led Community Based Participatory Research**

Annie Haefs | School Psychology | School of Education

Anna Marie Paolicelli | School Psychology | School of Education

Nicole DeCicco | School Psychology | School of Education

Faculty Advisor/s: Tammy Hughes, Ph.D., ABPP

#### **ABSTRACT:**

Community Based Participatory Research (CBPR) aims to engage and collaborate with communities, recognizing them as active and central partners in the research process. CBPR seeks to address health and social issues by involving community members, researchers, and other stakeholders in the research design, implementation, and dissemination of findings. Duquesne University's Youth Advocacy Clinic (YAC) has engaged youth during summer camp over a three year period. During this experience youth identify priorities they would like to understand better and also discover how to use research methodologies to ask and answer questions so that they can disseminate findings to audiences of their choice. The training emphasized understanding the research process including ethical considerations, proper sampling procedures, and instrument selection or development. To date youth identified a) how COVID-19 impacted their peers and their own education during the 2020-2021 school year, b) how mental health needs and social injustices affected them and their peers during the 2021-2022 school year and c) how food insecurities are impacting the communities in which they live during the 2022-2023 school year. During this same period the CBPR team sought feedback from youth and made changes to how we engaged with them during summer learning sessions. This project describes what the CBPR team learned and how to approach youth that may be new to providing input to adults. The purpose of this poster presentation is to inform the audience on CBPR and highlight youth voice and learning.

### **\*36: Are students with disabilities really career-ready? A scoping review.**

Paige Johnson | School Psychology | School of Education

Logan Bowser | PsyD School Psychology | School of Education

Faculty Advisor/s: Bridget Green, Ed.D; Reva Mathieu-Sher, Ed.D

#### **ABSTRACT:**

Students with disabilities with IEPs create postsecondary goals to support their college and career development based on their career interests, preferences, and needs. Unfortunately, there is a push to have college readiness, which overlooks potential opportunities students with disabilities can access in high school that focus on career skills. While legislation focuses on the goal of career readiness for students with disabilities (i.e., The Individuals with Disabilities Act (IDEA), The Every Student Succeeds Act (ESSA), and Perkins VI), research demonstrates that Career and Technical Education (CTE) is underutilized as a pathway to support students with disabilities identifying and accessing credentials and career pathways. CTE programs offer individualized hands-on learning experiences that teach technical skills for specific career pathways and vocations, including culinary, cosmetology, construction, welding, and other STEM-related fields. Previous research has found that involvement in CTE programs benefits students with disabilities. This study aimed to conduct a scoping literature review to understand how CTE supports students with disabilities toward achieving postsecondary success and the barriers experienced by students with disabilities as they progress through K-12 education in CTE. Literature for this review was collected through university-based databases, including ProQuest and ERIC. Additionally, researchers targeted specific journals related to CTE and vocational programs and manually reviewed articles

that met inclusion criteria. The presentation will discuss the results from the scoping review and discuss implications for practitioners and research.

### **37: Cyberbullying, Suicide, and Emotional Intelligence: A Portentous Combination**

Amelia Klass | School Psychology | School of Education  
Kayla Perfetto | School Psychology | School of Education  
Jessica Cowley | School Psychology | School of Education  
Athena Vafiadis | School Psychology | School of Education  
Faculty Advisor/s: Laura Crothers, Ed.D.; Laura Crothers, Ed.D.

#### **ABSTRACT:**

In this study, the researcher examined whether a history of cyberbullying predicted suicidal behavior and whether higher levels of emotional intelligence was predictive of suicidal behavior in college students who identified as victims of cyberbullying, when controlling for depressive symptoms. In a sample of 891 college students, regression results indicated that a history of cyberbullying victimization accounted for 14.2% of the variance of suicidal behaviors. The second research question focused upon only victims of cyberbullying; thus, any non-victims were excluded from the second analysis. Consequently, the total number of respondents included in the second analysis was 276. Regression results in this analysis also indicated that when combined, both depression and higher levels of emotional intelligence accounted for 14% of the variance in suicidal behavior. In order to parse the contribution of each of the variables, depression was entered into the analysis independent of emotional intelligence and accounted for 11.7% of suicidal behavior. Therefore, emotional intelligence was found to account for 2.3% of the variance of suicidal behavior. The low amount of variance predicted by emotional intelligence suggests that this may not be an avenue for meaningful intervention in addressing the propensity for suicide among cyber bullied college students.

### **38: Public School Readiness Assessment**

Travyon Lovely | School Psychology | School of Education  
Annie Lao | School Psychology | School of Education  
Ky-Asia Colter | School Psychology | School of Education  
Faculty Advisor/s: Tammy Hughes, Ph.D., ABPP

#### **ABSTRACT:**

Students who face barriers in their education can be removed from their home school and placed in other schools until they are ready to return. For example, some students may require temporary removal for disruptive behaviors (alternative education), some students require stabilization services after experiencing a crisis (partial hospitalization) and other students need specialized academic or social emotional services to benefit from the educational environment (approved private schools). The goal for all of these students is to return to their home school.

Wesley Family Services is a school and treatment facility that provides specialized programs for students in grades K-12 who require general, alternative, or special education interim placements. These schools serve students who are removed from their home school to access individualized educational and behavioral health services.

Wesley Family Service schools have developed a standardized approach for gathering information to determine when and whether students are ready to return to public schools, known as the Public School Readiness Assessment (PSRA). The stated goal of this assessment is for students to transition back to their public school while maintaining gains in support of their continued academic progress. The PSRA is completed for every

student four times per school year. All of the school staff working with the student provides input. The results are summarized and used to provide one piece of information toward determining a student's readiness to return to public schools.

While there are students who smoothly transition back to public schools, others are consistently redirected back to these alternative settings. As such, the process was put into place to determine who, when and how students were not successful in staying in their public school settings. In this project, we reviewed results from 130 students and used factor analysis to evaluate the efficacy of the PSRA.

### **\*39: Community Based Participatory Research: Youth Tackle Food Insecurity in Their Community**

Kiera Reilly | School Psychology | School of Education

Nicole DeCicco, MEd | School Psychology | School of Education

Annie Haefs, MEd | School Psychology | School of Education

Elena Renze, MA, MEd | School Psychology | School of Education

Faculty Advisor/s: Tammy Hughes, Ph.D., ABPP

#### **ABSTRACT:**

Community-Based Participatory Research (CBPR) is a methodology that focuses on uncovering the social, structural, and physical environmental inequities by engaging relevant community members, organizational representatives, and researchers in all aspects of the research process. In a youth-led inquiry, students seek to understand and make meaningful change in their communities and schools. During the summer of 2023, high-school-aged youth enrolled in a research fellowship summer program. They learned ethical research methods for determining the current state of research, developing a survey to understand community needs, collecting information from a representative sample relevant to the information they sought to understand, and, in the end, how to present what they found to the audiences of their choice. When given the opportunity to identify a topic of high priority to them these students selected food insecurity within their local community. After documenting the needs and potential solutions, these youth then partnered with a local food bank to directly address this issue. Results highlight youth perceptions of the experience, if they found the information collected to be useful in their approach to community needs, how they experienced the socialization and collaboration processes with peers, and their ability and understanding of how advocacy can be an outcome of research. Specifically, findings examine participants' engagement with research before, during, and after the project.

### **40: EXAMINING THE EFFECTIVENESS OF THE PARENT IMPLEMENTED FUNCTIONAL COMMUNICATION TRAINING THROUGH THE USE OF ZOOM IN CHILDREN WITH DEVELOPMENTAL DISABILITIES AT HOME SETTING IN KSA**

Abdulrhman Ashgar | Special Education | School of Education

Faculty Advisor/s: Bridget Green, Ed.D; Reva Mathieu-Sher, Ed.D

#### **ABSTRACT:**

Studies showed that children with Developmental Disabilities (DD) have communication and social difficulties; consequently, they are more likely to display challenging behaviors. During daily interactions, challenging behaviors can pose difficulties for individuals such as siblings, peers, parents, and educators. In KSA, parental involvement in school-related activities is overall insufficient. Also, parents were dissatisfied with their children's progress in academic and life skills. Those factors evoked the importance of having parents implement evidence-based practice to increase their competence, knowledge, and independence. Furthermore, teaching children meaningful communication ways through FCT may benefit school readiness and the development of social relationships and overall daily living skills. This research used an effective approach to increase communication skills and decrease disruptive behaviors in students with DD. Functional Communication Training (FCT) involves

learners using appropriate functional communicative forms that replace nonfunctional commutative forms. Therefore, this study aimed to examine the effectiveness of parent implemented FCT intervention through the use of Zoom in children with DD in Saudi Arabia. Three parents and their children diagnosed with DD participated in this research in their home settings using a single-subject design and multiple baselines across participants to determine the efficiency of FCT in enhancing functional communication skills and decreasing disruptive behaviors. The results of this research were significant in improving the functional alternative communicative forms and decreasing the disruptive behaviors in children with DD that aligned with previous studies. Also, parents showed high fidelity in implementing FCT procedures for their children, which was needed to promote long-term effects and sustainability. The FCT effectiveness of FCT was maintained over time and generalized to other parents.

**\*41: Cor Unum Gardens: The Validation and Upscale Development of Hydroponic Community Gardens**

Burton Carbino | Biomedical Engineering | School of Science and Engineering

Faculty Advisor/s: Kimberly Forsten-Williams, Ph.D.; Sarah Breckenridge-Wright, Ph.D.

**ABSTRACT:**

The goal of this work is to formalize a stakeholder network, validate previous/current projects, and propose a development pipeline for the Cor Unum Gardens. To this end, stakeholders will be surveyed, design criteria will be updated, and a business plan will be organized. The hope is to optimize the current state of CUG initiatives while also plotting a path for upscaling the gardens into a 501(c) NPO.

Food insecurity is a complex social issue with interwoven causes and effects. Perhaps the most important aspect of food insecurity is its link to nourishment and health. In the US alone, an estimated 44 million people face hunger daily, and 92% of the country's population is suffering from at least one mineral/vitamin deficiency. Since nutrition contributes to the development and exacerbation of many chronic conditions (like cardiovascular disease), it is considered an effective form of preventative healthcare. While monitoring dietary habits may be cheaper than a hospital bill in the long term, ensuring consistent access to healthy foods for underserved/marginalized communities is no simple task.

Plenty of Non-Profit Organizations (NPOs) exist to make healthy food options available, accessible, desirable, and convenient for local communities. One of the most viable ways to improve the food environment in a holistic manner is through community gardening. Most gardens succeed in yielding healthy food options, but programs such as winter harvests, cooking classes, and nutritional education seminars are yet to fully integrated. Moreover, garden facilitators face challenges related to space constraints, funding, deciding what to grow, assessing community interest in initiatives/programs, etc.

The Cor Unum Garden (CUG) initiative was started in 2022 to help address food insecurity in Pittsburgh with budget-friendly, indoor, hydroponic, community gardens. Inspired by the core values of the Spiritan model of service, the project uses gardening to gather people and promote wellness "In One Heart." Previous work has centered around the designing and building of two space-friendly vertical gardens at Duquesne University. As these efforts progress through undergraduate student research, special attention must be given to re-evaluating assumptions, garnering feedback, and planning for future community-engaged initiatives.

#### **42: Quilting & Conversation; Oral History Methodology and Engaging Craft**

Griffin Nordstrom | Public History | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor/s: Jennifer Taylor, Ph.D.

##### **ABSTRACT:**

Developing rapport with interviewees is a critical skill for oral historians to develop in order to engage with the broader story and perspectives of the narrator. This is traditionally established through multiple interview sessions or choosing an environment that feels most natural to the narrator. I am investigating the role that craft and hands-on activity can further this atmosphere of openness and comfort, and how oral history practice can expand past the formal seated interview format, which may inadvertently produce a sensation of being scrutinized or judgement.

At the Graduate Research Symposium, I would like to share an exploration of oral history methodology by engaging craftspeople in their work while interviewing, and the potential implementation of artsmaking in expressing and mobilizing their storytelling. By engaging with culturally recognizable traditions, like quilting bees, can rapport and comfort with narrators be established for more successful interviews, and can approaching experiences from this lens aid perceptions of an 'Ivory Tower' in academic oral history practice? An interview has been conducted testing this practice and be available for assessing successes and problem-points to be improved on, and an example point to workshop interpretation opportunities. The interviewee, Katherine Prentice, is a lifelong sewist who recently managed the construction of the 2023 U.S. Capitol Christmas Tree tree skirt; the interview followed a life history, but focused often on the changing nature of her sewing work. By actively engaging in hand-quilting with the interviewee, a relaxed atmosphere was quickly established where responses felt non-rigid or rehearsed, though also led to occasional distractions due to crafting hiccups. From the session, a physical artifact from the interview was also produced in the handiwork and choices of the maker and interview, extending the shared ownership of the experience into the visual realm. How can this practice influence engagement and connection both in the production of the archive and its mobilization?

#### **43: The Fascism Effect: Consequences of a Biunivocal Model of Death**

Andrew Stanford | Philosophy | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor/s: Jay Lampert, Ph.D.

##### **ABSTRACT:**

This presentation aims to provide a novel understanding of the "fascism effect," drawing on Gilles Deleuze's libidinal analysis of fascism and Baruch Spinoza's examination of nationalist hatred and violence in the "Theological-Political Treatise." The fascism effect is a circulation of affects like hatred and fear which decrease the "capacity to act" across a social body like the nation-state. It is accompanied by the attempt to repel or destroy the imagined cause of this circulation, mediated by a series of reductive, biunivocal relations between divisions on the social body. The fascism effect can take place on any social body and becomes actual depending upon the historical context and social conditions in which it emerges.

Two distinct elements play a role in this analysis. First, the role Spinoza's concept of superstition plays in creating cuts and segregations in the social field, establishing what Deleuze calls a field of "biunivocity." Biunivocalization is the substitution of indeterminate social forms of relation with symbolic derivatives and equivalences. This makes possible and inevitable the reduction of social relations to racial, national, or religious symbols. A 20th century example of biunivocalization can be seen in how the "Protocols of the Elders of Zion" reduces the effects of capitalism and communism on the social field to derivatives of a secret Jewish conspiracy. Everything is made to begin with Judaism, by means of explanation, which produces a further confirmation of the conspiracy.



The second element, found in Spinoza, is the circulation of those affects, particularly hatred, which the nation-state is compelled to cultivate in its citizens in response to external threats of violence. The fascist effect emerges when the nation-state deploys a biunivocal model of death or of the threat of external violence, becoming dependent upon racial, national, or religious symbolic derivatives to explain the effects that its own circulation of hatred caused.

This presentation will use examples drawn from several works by Spinoza to demonstrate what a particular instance of the fascism effect looks like when it emerges in a social body and how these two elements interact with one another.

#### **44: 'The Red Flag Waved': Labor Radicalism in Gilded Age Pittsburgh, 1877-1892**

Zach Bauerle | History | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor/s: Philipp Stelzel, Ph.D.; Andrew Simpson, Ph.D.

#### **ABSTRACT:**

This paper examines the radicalization of the labor movement in Pittsburgh following the Great Railroad Strike of 1877 to the Homestead Strike of 1892 and the attempted assassination of Henry Clay Frick by an anarchist. I engage with several historiographical traditions, including labor history, the history of anarchism, and the history of Pittsburgh and the region. I argue that the labor movement in Pittsburgh was forged through the battles between moderate reformers and radical groups, especially anarchists during this period. It challenges previous notions about the nature of the labor movement in Pittsburgh by making the case that the extreme Left and anarchist elements played a greater role in the development of labor activism in Pittsburgh than previous histories give credit. It also contends that Pittsburgh was part of a larger radical movement in the United States during these years and was an important center for revolutionary activity, putting the city on a similar level to other bastions of labor radicalism such as Chicago and New York. These points are highlighted through a narrative analysis of this pivotal period in American labor history that features the stories of leaders like the moderate reformer, Thomas Armstrong, the forgotten anarchist Joseph Frick, and other labor activists. This research draws on a diverse array of contemporary sources including, newspapers, memoirs, and government records, and asks important questions about who is included and excluded from the story of American labor, as well as what is considered legitimate protest and activism in American society.

## AFTERNOON POSTERS

These posters will be available to view during the afternoon poster session in the Charles J. Dougherty Ballroom C, Power Center from 2:30pm – 4:00pm, March 20, and also online throughout the week of March 18 – 22 on [Symposium by Forager One](#).

**Note:** The number in front of each title corresponds with the physical place the student's poster will be located at the in-person event on March 20.

### **2: Elucidating the molecular connections between the two primary drivers of competition and cooperation in a crowded bacterial population**

Sadhana Srinivasa | Biology | School of Science and Engineering  
Faculty Advisor/s: Wook Kim, Ph.D.

#### **ABSTRACT:**

Bacteria form densely populated surface-attached communities, known as biofilms, that are responsible for the vast majority of chronic infections in humans. Individual cells secrete diverse biochemical compounds that collectively form the extracellular matrix (ECM), which defines the overall structure and integrity of a biofilm. Although it is widely accepted that the ECM, as a whole, is largely responsible for the recalcitrant nature of biofilms against both physical and chemical interventions, the regulation and physicochemical interactions of individual ECM components and their spatial organization remain poorly understood. In the bacterium *Pseudomonas fluorescens*, we have recently demonstrated that the post-transcriptional regulator RsmE and a second messenger cyclic di-GMP (CdG) converge on ECM production to drive competitive and cooperative behaviors within crowded colonies. Although we have shown that RsmE exclusively regulates ECM production from its two paralogs, the molecular links among and between the Rsm-paralogs and CdG remain unclear. We thus conducted quantitative PCR to determine CdG's influence on the expression of the three rsm-paralogs. Under basal intracellular level of CdG, the rsmA transcript was most abundant while rsmI was least abundant. In addition, the expression of all three genes was elevated in a genetically engineered isolate with a defective RsmE, suggesting that RsmE negatively regulates the transcription of all three paralogs. In contrast, only rsmE expression was dramatically increased at a high CdG level, indicating a unique molecular connection between RsmE and CdG. Furthermore, we provide evidence that the cooperative behavior driven by CdG requires inhibition of RsmE activity, likely through maximizing CdG production. Future research will aim to tease apart the underlying molecular mechanisms to establish the RsmE-CdG connectivity as a promising path toward developing biofilm eradication strategies that do not depend on antibiotics.

### **3: Microbial Acidification of AMD Solids Can be Used for the Biomining of Rare Earth Elements and Critical Materials Co-solubilized with Manganese Oxides**

Anna Vietmeier | Biology | School of Science and Engineering  
Faculty Advisor/s: Nancy Trun, Ph.D.; Djuna Gulliver, Ph.D.

#### **ABSTRACT:**

Abandoned Coal-Mine Drainage (AMD) is a domestic source of rare earth elements (REEs) and critical minerals (CMs) that can be biomined to decrease foreign import and mitigate current AMD hazardous waste. Pennsylvania has ~11,000 abandoned mines, ~500 of which are currently being treated with passive remediation systems that are designed precipitate AMD waste high in manganese and REEs/CMs onsite. Bacterial metabolism that acidifies the environment can lead to the co-solubilization of manganese and REEs/CMs. Currently, microbial biomining mechanisms are poorly understood. We have isolated bacteria that acidify their environment leading to the solubilization of MnO<sub>2</sub>. Three isolates identified via their 16S rrrn gene, are related to

Bacillus sp. and two are related to Corynebacterium sp. All isolates produce organic acids from glucose fermentation. Whole genome sequencing of isolate AV21 encode genes to ferment glucose to both lactic and acetic acid. Isolates co-resolubilized manganese and REEs/CMs from AMD system solids, including Y, Zr, Sb, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, and Lu. Determining the microbial metabolism and genes involved in the resolubilization of manganese is of interest for optimizing the biomining of REEs/CMs from AMD solid precipitants.

#### **4: Evaluation of Changes in Evaporative Losses from Lake Powell Reservoir Contributions in the Colorado River Basin**

Maria Mlinarcik | Environmental Science and Management | School of Science and Engineering  
Faculty Advisor/s: David Kahler, Ph.D.

##### **ABSTRACT:**

The Colorado River Basin covers more than 246,000 square miles and the River is one of the most critical water sources for the western United States and Mexico. For over a century, numerous policies and regulations have been implemented in attempts to manage the Colorado River Basin to address the concern of overuse, collectively referred to as the "Law of the River." However, drought and exacerbation of global climate change have increased challenges between the available supply of resources and current demand. Evaporation is a key component of the hydrological cycle and needs to be evaluated for water resources management, particularly for consumptive use. This study evaluated limnology data from Lake Powell, the largest reservoir in the Upper Colorado River Basin, and how changes in heat storage affect evaporative loss. Through utilization of remote sensing techniques, other potential sources of evaporation were determined.

#### **5: Tadpole gut microbiota acquired from natural environmental sources are responsive to dietary tannins**

Rosemary Westcott | Biology | School of Science and Engineering  
Faculty Advisor/s: Sarah Woodley, Ph.D.

##### **ABSTRACT:**

Tannins are plant-secondary compounds that, when consumed, can have toxic effects on animals, including herbivorous amphibian larvae. Tannins can also interact with the gut microbiota, as these compounds are antimicrobial and can induce changes to the gut microbial community structure. Previous studies on the effects of tannins on tadpoles have been performed in laboratory water, which is largely devoid of natural microbes. Given that tadpoles acquire much of their gut microbial diversity from the aquatic environment, we sought to understand the effects of tannins on tadpole development and gut microbiota when animals were exposed to natural pond water, supplying a repertoire of microbes that are not present in laboratory water. Specifically, we raised green frog (*Lithobates clamitans*) tadpoles under two water treatments for 4 weeks: either natural (microbially-rich) or autoclaved (microbially-depleted) pond water. Animals in these treatments were fed either control diets or diets containing 2% tannic acid. Gut microbial diversity was profiled using 16S rRNA sequencing. The gut microbial community from tadpoles raised in natural pond water was considerably more diverse than that of tadpoles raised in autoclaved pond water. Tannin treatment had a greater effect on gut microbial diversity in the natural compared to the autoclaved pond water group. However, there was no effect of tannins on tadpole body size in either pond water condition. These results indicate that the gut microbiota acquired from natural environmental sources are relatively responsive to dietary tannins, perhaps due to greater opportunities for biotic interactions between tannins and the gut microbiota.

**6: The Identification of Gammarid Amphipod Species By Scanning Electron Microscopy and DNA Barcoding**  
Mikayla Bayto | Center for Environmental Research and Education (CERE) | School of Science and Engineering  
Faculty Advisor/s: John Stolz, Ph.D.; Brady Porter, Ph.D.

**ABSTRACT:**

Amphipods - also known as scuds or freshwater shrimp - are aquatic, bottom-dwelling members of subphylum Crustacea that inhabit various freshwater, brackish, and saline communities globally. Gammarid amphipods exhibit collector-gather feeding behaviors and are moderately-tolerant to aquatic pollution. The identification of amphipod species is difficult due to small specimen size, little morphological variance, varying environmental phenotypes (ecophenotypes), and lack of study at the species level. We were interested in examining the morphological diversity of Gammarid amphipod specimens from the Mingo Creek watershed of Washington County, Pennsylvania, United States of America. Specimens were collected in compliance with the "Rapid Bioassessment Protocols For Use in Streams and Wadeable Rivers" established by the Environmental Protection Agency of the United States of America (US EPA). Specimens from the Gammaridae family - Gammarus and Crangonyx genera, specifically - were previously analyzed using scanning electron microscopy (SEM) and low power light microscopy. Specimen identification determined with microscopy was verified by DNA barcoding. Primers for DNA barcoding were designed from published universal sequences of the mtDNA cytochrome oxidase subunit 1 (COX1) gene. DNA was extracted from fresh amphipod specimens from field collections, amplified for a 700 base pair fragment of the COX1 gene by polymerase-chain reaction (PCR), and subjected to Sanger sequencing. DNA barcoding of freshwater amphipods with COX1 reveals extensive genetic variation between individuals of what is considered Gammarus minus species.

**\*7: Development of a Support Vector Machine for Digital CFU**

Shawn Bliss | Biomedical Engineering | School of Science and Engineering  
Faculty Advisor/s: Melikhan Tanyeri, Ph.D.

**ABSTRACT:**

The capacity to identify bacteria quickly and accurately is critical for applications such as medical diagnosis, environmental monitoring, and food safety assurance. For instance, sepsis detection requires blood cultures that take as long as 1-5 days, preventing timely intervention and increasing mortality rate. Here, we propose the joint use of microfluidics and a machine learning algorithm for rapid bacterial cell capture and quantification. The combination of high-throughput droplet microfluidics and a support vector machine (SVM) enables analysis and quantification of bacterial samples within as short as 4 hours. We have performed successful encapsulation of pathogenic bacteria such as *E. coli*, *S. enterica*, and *P. aeruginosa*, yielding an average detection accuracy of 98% using our trained SVM model. These results were benchmarked with traditional plating techniques and Petroff-Hausser chamber counts, demonstrating comparable growth curves and validating the promise of digital CFU methods.

**8: [3+2] Cycloadditions of Tertiary Amine N-Oxides and Azobenzene Derivatives as a Route to Variously Substituted 1,2,4-Triazolidines**

Nick Frankos | Chemistry | School of Science and Engineering  
Faculty Advisor/s: Thomas Montgomery, Ph.D.

**ABSTRACT:**

Nitrogen containing heterocycles are a common motif found throughout nature. These molecules are generally bioactive and thus are attractive synthetic targets in the development of potential medications. While the syntheses of one and two nitrogen containing heterocycles are comparably well explored, the literature lacks robust methods of producing diverse three nitrogen containing heterocycles. Saturated five membered

heterocycles containing three nitrogens and only one N-N bond comprise the 1,2,4-triazolidine family of molecules. Existing literature suggests that 1,2,4-triazolidines may be of medicinal and industrial interest, however the scarcity of synthetic routes impedes further research. Using our group's [3+2] cycloadditions of tertiary amine N-oxides and azobenzene derivatives, this project aims to contribute an efficient and effective method of accessing these unexplored heterocycles. All compounds synthesized using this method will be fully characterized to publication standards using  $^1\text{H}$  and  $^{13}\text{C}$  NMR to establish purity, FT-IR, and HRMS to establish identity.

### **9: Development of a Palladium Catalyzed Tsuji-Trost Reaction for Generating Complex Piperazine Alkaloids**

Aiden Lane | Chemistry | School of Science and Engineering

Faculty Advisor/s: Thomas Montgomery, Ph.D.

#### **ABSTRACT:**

Chrysosporazine D, a member of the chrysosporazine family of marine alkaloids, is a piperazine-containing natural product with a demonstrated ability to reverse cytotoxic resistance in carcinoma cells to chemotherapeutic drugs. Given the widespread impact of cancer, the investigation of novel approaches to treat it and improve patient outcomes is a high priority for the medical and chemical communities. Towards this end we propose an efficient total synthesis of chrysosporazine D utilizing a key palladium catalyzed Tsuji-Trost cyclization, forming the central piperazine moiety in a single step. This palladium cyclization, however, unselectively generates the E+Z isomers of which the Z cannot be utilized further. This hinderance leads to poor yields and a challenging characterization process of our final natural product. In this report we detail our investigations towards both finishing our synthesis of chrysosporazine D while also optimizing the selectivity of the palladium cross-coupling reaction.

### **\*10: RNA-RNA complexation for HIV-1 antiviral intervention: Thermodynamic and kinetic parameters characterizing HIV-1 DIS homodimerization**

Joseph Makowski | Chemistry | School of Science and Engineering

Faculty Advisor/s: Jeffrey Evanseck, Ph.D.

#### **ABSTRACT:**

Despite the success of current protease-based antiviral strategies against HIV-1, the threat of increasing antiviral resistance demands the identification of alternative targets for antiviral therapies. The HIV-1 dimerization initiation site (DIS) plays a crucial role in the regulation of HIV-1 genome replication through forming RNA-RNA complexes, and the DIS is a conserved element that rarely mutates. Consequentially, understanding the structure and dynamics of HIV-1 DIS along possible dimerization transition pathways could reveal new targets to disrupt the viral lifecycle. In this work, we computed minimum energy paths for one possible DIS transition pathway proceeding through a kissing complex intermediate to establish a baseline and set of computational best-practices for future comparisons with experimental data. Our transition pathway was found between experimentally determined endpoint structures, a kissing complex (KC) and extended duplex (ED), using the partial nudged elastic band method in explicit solvent and ions, and free energies along the pathway were computed using umbrella sampling and the weighted histogram analysis method. Our computational findings suggest qualitative similarities with prior experimental insights. Umbrella sampling along our computed pathway demonstrate an enthalpic penalty to break KC or ED base pairs to initiate the transition, reflective of experimental data suggesting that the KC to ED transition is slow. However, our current results conflict with quantitative estimates of barrier heights and thermodynamic stability of either end point, suggesting that future umbrella sampling calculations may require more sampling to reach a better-converged free energy landscape. Ultimately, this study advances our understanding of HIV-1 DIS, offering insights into the structure and dynamics of potential targets for antiviral therapies. The elucidation of structural features and energetic characteristics of

HIV-1 DIS contributes to the broader knowledge of HIV-1 replication, offering new avenues for therapeutic interventions.

### **11: Hammick decarboxylation of pyrazinoic acid: First step for improved tuberculosis drugs**

Unnikrishnan Puthumana | Chemistry | School of Science and Engineering

Faculty Advisor/s: Jeffrey Evanseck, Ph.D.; Jeffrey Rohde, Ph.D.

#### **ABSTRACT:**

Pyrazinoic acid (POA) is the active form of the prodrug pyrazinamide (PZA) shown to target aspartate decarboxylase enzyme (PanD) in mycobacterium tuberculosis (Mtb) and is widely used in the treatment of tuberculosis. However, the exact mechanism of action for POA has not been described so far, preventing the development of drugs to counter PZA-resistance in Mtb. We proposed that POA undergoes decarboxylation through the Hammick pathway in non-enzymatic systems, as a referenced to enzymatic decarboxylation. A systematic conformational search was carried out to identify the ground and the transition structures using scans along reaction dihedral angle coordinates. The solvent was modelled first using an implicit solvent model using polarizable continuum (PCM) and then using a discrete continuum model with explicit waters along with PCM to increase model sophistication for accuracy. The waters were chosen and placed to satisfy the hydrogen-bond acceptor and donor positions on the Lewis structure of POA. Quantum mechanical methods with the M06-2X density functional and MP2 paired with Dunning's correlation-consistent basis sets X-cc-pV[D,T]Z where X=maug- and jul- diffuse modifications were used for geometry optimizations. The preliminary results yield the first-time description of the conformational landscape of POA in the aqueous solution with the planar conformer as the most stable. The decarboxylation of POA described using the M06-2X/maug-cc-pVTZ level of theory with PCM yield  $\Delta H^\ddagger = 25.9$  kcal/mol. These results, for the first time, divulge the aqueous decarboxylation mechanism of POA and provide reference point for the future extension to the enzymatic system for developing efficient tuberculosis drugs.

### **\*12: Mouse vs. human brain endothelial cell-derived mitochondria containing microvesicles for ischemic stroke therapy**

Kandarp Dave | Pharmaceutics | School of Pharmacy

Faculty Advisor/s: Devika Soundara Manickam, Ph.D.

#### **ABSTRACT:**

Ischemic stroke-induced oxygen-glucose deprivation leads to mitochondrial dysfunction in the brain endothelial cells (BECs) lining the blood-brain barrier (BBB). Mitochondrial damage results in BEC death and BBB breakdown, leading to long-term disabilities in stroke patients. Delivery of exogenous mitochondria to ischemic BECs is a promising approach to restore mitochondrial functions in recipient BECs and improving post-stroke outcomes. Cell-derived extracellular vesicles (EVs), including exosomes (EXOs) and microvesicles (MVs), contain innate mitochondrial components. We have previously demonstrated that human BEC (hBEC)-derived MVs transfer their innate mitochondria to recipient healthy hBECs and improve cellular adenosine triphosphate levels and mitochondrial functions in normal and hypoxic human BECs. hBEC-derived MVs injected in a mouse model of stroke showed a lower brain infarct volume compared to vehicle-injected controls. Since EV harvested from donor species (e.g., human) other than the recipient species (e.g., mouse) may compromise therapeutic efficacy, in this work, we hypothesized that intravenous administration of mouse BEC (mBEC)-derived MV may reduce brain infarct volume and improve behavioral outcomes in a mouse model of ischemic stroke.

We investigated whether EVs derived from the same species as the recipient cells (homotypic EV donor cell-recipient cell pair) may have higher MV mitochondria delivery efficiency than cross-species EVs and recipient cells (heterotypic EV donor cell-recipient cell pair). We evaluated the therapeutic efficacy of mBEC-derived MVs

on mouse brain infarct volume and neurological deficits score in a mouse stroke model. Our results showed that mBEC-derived MVs outperformed hBEC-derived MVs in transferring MV mitochondria to recipient ischemic BECs, increasing cellular adenosine triphosphate levels and mitochondrial respiration. Intravenously injected mBEC-derived MVs significantly reduced brain infarct volume and improved behavioral recovery compared to vehicle-treated stroke mice. Our data suggests that EV derived from the same species as the host species could show better efficacy profiles than the cross-species donor-recipient pair. The superior therapeutic efficacy of mBEC-EVs in a mouse MCAo stroke supports the continued use of mBEC-EVs to optimize the therapeutic potential of mitochondria-containing EVs in preclinical mouse models.

### **13: Re-engineering of lipid nanoparticles using ionic liquids for brain drug delivery**

Purva Khare | Pharmaceuticals | School of Pharmacy

Faculty Advisor/s: Devika Manickam, Ph.D.

#### **ABSTRACT:**

Drug delivery to the brain is often ineffective due to low amounts of drugs that reach the brain. Most of the injected nanoparticle dose is directed to the liver and spleen because nanocarriers adsorb large amounts of plasma proteins. Lipid nanoparticles (LNPs) are FDA-approved carriers for delivery of siRNA to the liver and are mRNA carriers in the Pfizer and Moderna COVID-19 vaccines. The high drug-loading capacity and superior safety profile of LNPs can be harnessed for brain delivery. Ionic liquids (ILs) hitchhike on red blood cells and increase the accumulation of IL-coated nanocarriers in well-vascularized tissues. We hypothesize that IL coating can increase LNP accumulation in the blood-brain barrier as the brain receives ~15 to 20% of the body's blood supply. siRNA-LNPs were coated with different volumes of 1:1 or 1:2 choline:trans-2-hexenoate ILs using bath sonication. A significant reduction in particle size and shifts in zeta potential were considered as determinants of IL coating. We noted a significant reduction in the sizes of LNPs coated with 12.5  $\mu\text{L}$  and 25  $\mu\text{L}$  of 1:1 ILs post-one hour of sonication compared to uncoated LNPs. Colloidal stability studies demonstrated non-significant changes in the colloidal properties of LNPs coated with 1:1 ILs compared to the standard LNPs. Upon incubation with mouse plasma, IL-coated LNPs adsorbed significantly lower amounts of plasma proteins than uncoated LNP— suggesting improved surface properties that may allow redistribution of LNPs to the brain. Additionally, higher levels of cellular uptake were detected for LNPs coated with 12.5  $\mu\text{L}$  of 1:1 ILs in brain endothelial cells and neurons. Overall, IL-coated LNPs showed colloidal stability, lower plasma protein adsorption, and increased uptake into mouse brain endothelial cells and neurons— traditionally hard-to-deliver cellular targets. Our future studies will determine the biodistribution and brain uptake of IL-coated LNPs in vivo in a mouse.

### **\*14: A Biotin-Decorated Self-Adjuvanting Nanoparticle System for Delivery of a Respiratory Syncytial Virus Vaccine**

Sarah Ostrowski | Pharmaceuticals | School of Pharmacy

Faculty Advisor/s: Wilson Meng, Ph.D.; Kerry Empey, PharmD, Ph.D.

#### **ABSTRACT:**

Respiratory syncytial virus (RSV) is the number one cause of viral bronchiolitis in young children, causing approximately 33 million new cases of lower respiratory disease annually. Unlike other viruses, RSV elicits a CD4 Th2-mediated allergic-type immune response resulting in excess mucus production and airway inflammation. Maternal immunization and monoclonal antibody strategies aim to reduce RSV disease severity in newborn children, but do not provide long-term protection. To address this gap, we have developed a self-adjuvanted RSV vaccine designed to promote a Th1-dominant anti-viral response. The vaccine, referred hereafter as preF-bNP, consists of a biotinylated polymeric nanoparticle with a conformationally stabilized RSV prefusion protein (preF) anchored on its surface. preF is the most antigenic component of RSV and is used in the FDA-approved RSV vaccine for elderly patients. We hypothesize that when given intranasally, preF-bNP will prolong the

residence time of the viral antigen in the lungs and draining lymph nodes to induce a robust RSV-specific antibody response and expand resident memory T cells against RSV. Whole body imaging of intranasally inoculated mice showed that the particles reside within the lung space for at least seven days. Flow cytometric analysis further showed that the preF-bNP administration increased IL-12 (Th1 cytokine) positive total dendritic cells (DCs) in the lungs and lymph nodes compared to preF antigen alone. Future studies will test the safety and efficacy in our neonatal RSV mouse model and continue to optimize the formulation to improve DC activation and residence time. Overall, this vaccine design has the potential to become a clinical product that could considerably reduce the long-term incidence of RSV-related severe disease in children.

### **15: Partial Demyelination Worsens a-Synucleinopathy in the Preformed Fibril Model**

Rachel Clark | Pharmacology | School of Pharmacy

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

#### **ABSTRACT:**

Lewy body disorders are characterized by aggregated alpha-synuclein protein into insoluble inclusions. In Parkinson's disease, long, unmyelinated axons are more likely to harbor alpha-synuclein+ inclusions, compared to sturdier, myelinated fibers, but it is not known if this relationship is causal. To address this question in an experimental model of Lewy body disease, we infused preformed fibrils into the anterior olfactory nucleus of the olfactory bulb (OB/AON) in 9 to 11-month-old mice of both sexes. Dietary administration of cuprizone (0.3%), an established copper chelating agent, for 8 weeks elicited partial demyelination. Compared to control diet mice, cuprizone-fed animals displayed the expected decrease in two major proteins of the myelin sheath, myelin basic protein (MBP) and proteolipid protein (PLP) in the OB/AON. However, no additional loss of MBP and PLP was observed in fibril-treated mice, suggesting that cuprizone and fibril exposure act neither additively nor synergistically on myelin-associated proteins, perhaps because they impinge on the same physiological processes in white matter. However, cuprizone exposure increased the fraction of Triton-insoluble alpha-synuclein that was phosphorylated at Serine 129 (pSer129) in the amygdala and piriform cortex, revealing an exacerbation of insoluble Lewy-like pathology with forced demyelination. Insoluble pSer129 levels were negatively correlated with PLP levels in fibril-infused mice under control diet conditions, and this negative correlation was abolished by cuprizone exposure. Thus, higher levels of PLP are associated with lower Lewy-like pathology as expected, but forced demyelination uncouples this link. Similarly, we discovered a negative correlation between PLP and Triton-insoluble pSer129 alpha-synuclein levels in amygdala tissues from men (but not women) with Lewy body disease, and a trend towards a negative correlation between MBP and insoluble pSer129 in the human amygdala. Further investigations into oligodendrocyte precursor cells and pre- and post-myelinating oligodendrocytes are now warranted, to understand the impact of myelination status on Lewy body disease.

### **16: The Effects of Thermal Stress on the Structure and Downstream DNA Analysis of Human Teeth**

Michael Brivchik | Forensic Science and Law | School of Science and Engineering

Faculty Advisor/s: Pamela Marshall, Ph.D.; Rhonda Roby, Ph.D.

#### **ABSTRACT:**

Teeth are often recovered from events and are a viable source of DNA for identification purposes. Examples of these events include human identification cases stemming from natural disasters, terrorist attacks, fires, and car accidents. However, sufficient DNA from a tooth may be a challenge to obtain if they are exposed to extreme heat, especially for an extended time period. This study demonstrates that the DNA quality is compromised under thermal stress. It was hypothesized that a heat transfer occurs within human teeth, causing the teeth to explode into fragment. To test this hypothesis, forty-four human wisdom teeth were collected following extraction by oral surgeon between 2019 – 2020. Each tooth was received without any cleaning process and



contained small amounts of blood and tissue related to the extraction. DNA profiles of the remaining blood or tissue on each tooth were created as a reference. This study used two male and two female individual wisdom teeth at each extreme temperature. The extreme temperatures used were 500°C, 700°C, and 900°C. A heat resistant firefighter body camera was placed inside the kiln with the teeth to observe the changes that occurred during the time that they were exposed to heat. After the heat exposure, the DNA content from each wisdom tooth was quantified using qPCR (quantitative polymerase chain reaction). Degraded DNA was analyzed by measuring the allele dropouts. Overall, this study advances the knowledge on the heat transfer and ability to extract DNA from human teeth that explode under thermal stress.

### **17: Detection of Low Concentration Ignitable Liquid Residues from Fire Debris using Gas Chromatography-Mass Spectrometry and an Ignitable Liquid Detection Canine**

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

#### **ABSTRACT:**

Fire crimes are difficult to investigate because physical evidence tends to be destroyed by fire; however, ignitable liquid residue (ILR) is one type of physical evidence that can be left behind in fire debris. The presence of ILRs at a fire scene can indicate criminal activity and aid investigators in the classification of the fire. A fire can be classified into four distinct categories based on the results of the investigation: accidental, natural, incendiary, and undetermined. Ignitable liquid detection canines (ILDCs) are commonly used in fire investigations to assist in detecting potential remains of an ILR and direct investigators to notable locations for sample collection. After collection, the fire debris samples are sent to forensic laboratories where gas chromatography-mass spectrometry (GC-MS) analysis is performed to determine the presence and nature of the ILRs. There have been instances where GC-MS analysis has been unable to confirm the presence of ILRs after an ILDC has alerted. This leaves a gap in the field of fire debris analysis as to the difference between the detection limit of ILDCs and GC-MS instrumentation for ILRs. This research assessed the difference in detection limit by conducting test burns on twenty-seven samples of wood and carpet. Control samples (n=9) were spiked with either 0 µL, 25 µL, or 50 µL of gasoline and remained unburned. Test samples (n=18) were spiked with either 0 mL, 125 mL, or 250 mL of gasoline and burned for either 0 min, 1 min, or 5 mins. All samples were created and burned in triplicate for statistical analysis. An ILDC was then used to analyze the samples. Each sample was collected in a metal paint can and brought to a forensic laboratory for GC-MS analysis. The heated passive headspace concentration technique with activated charcoal strips was utilized to pre-concentrate the samples, which were then analyzed using GC-MS instrumentation. The detection limits of both methods were noted and compared using statistical analysis. By understanding this gap in fire investigation, future research can be done to enhance the collection and analysis methods of fire debris.

### **18: Assessing fentanyl concentrations in forensically relevant blow fly (Diptera: Calliphoridae) larvae to improve minimum postmortem interval estimations**

Shelby Hale | Forensic Science and Law | School of Science and Engineering  
Faculty Advisor/s: Stephanie Wetzel, Ph.D.

#### **ABSTRACT:**

Forensic entomotoxicology is a subfield of forensic investigation involving the study of illicit substances in entomological specimens. The presence of illicit drug compounds can alter the growth patterns of carrion insects, which could decrease the accuracy of entomological evidence in minimum postmortem interval (mPMI) estimation. The development of this field has identified various effects on growth of larvae resulting from drug compounds frequently found in human remains. Over two thirds of all overdose deaths reported in 2022 in the United States involved synthetic opioids such as fentanyl. Despite the increasing presence of fentanyl in the

United States, few studies reflect the drug's effects on the larval growth of carrion insects. Therefore, this study aimed to identify how varying concentrations of fentanyl in human tissues affected the growth of forensically relevant blow fly (Diptera: Calliphoridae) larvae. Fentanyl was distributed within cadaveric tissue samples and offered to blow fly larvae, and in vivo measurements of these larvae were taken to measure growth. After reaching the third instar stage of development, the larvae were euthanized, homogenized, and subjected to solid-phase extraction. The remaining eluent was analyzed using liquid chromatography triple quadrupole mass spectrometry, or LC-QqQ-MS, to determine the percentage of fentanyl consumed at the latest larval stage of growth. By assessing the effects of fentanyl on the growth of blow fly larvae, the accuracy of mPMI estimations can be improved, resulting in more effective forensic investigations.

### **19: The Extraction Efficiency of DNA from Cotton and Nylon Swabs in Contrived Sexual Assault Samples**

Sylvia Hamilton | Forensic Science and Law | School of Science and Engineering  
Faculty Advisor/s: Pamela Marshall, Ph.D.; Betsy Wisbon

#### **ABSTRACT:**

Sexual Assault Kit (SAK) collection is the process of collecting biological evidence from victims for use for the prosecution of a sexual assault. Since SAKs were developed in the 1970s, the primary collection device utilized is the cotton swab which is known to embed DNA within the fiber matrix. In this study, two swabs were evaluated for their efficiency in DNA collection and release: a cotton swab, and the Copan® 4N6FLOQSwabs which have nylon fibers that purportedly absorb and release DNA. A differential extraction was performed on contrived samples of donated vaginal swabs treated with diluted semen using the Promega Differe™ and DNA IQ™ and quantified with the Quantifiler™ Trio kit. Results in this study show that DNA concentration retrieved from nylon is statistically higher than that from cotton swabs.

### **20: Impacts of Desiccants on DNA Quantity and Quality in Sexual Assault Kits Over One Year**

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

#### **ABSTRACT:**

The collection of sexual assault samples in hospitals requires a drying process before storage. This drying process could allow for cross-contamination with other samples or contamination from personnel walking by. Additionally, air-drying also creates the potential for DNA degradation as the swab might not dry fully before storage, leaving it vulnerable to bacteria and other enzymatic breakdown. Degradation could result in poor DNA quantity and quality and inconclusive results. If a desiccant were to be used, the drying process could be eliminated to reduce degradation, limit mistakes, and reduce storage space. The desiccant is a substance that absorbs water to allow for dry conditions in storage. Finding the ideal collection and storage process is crucial to maintaining the quality and quantity of DNA. A desiccant-based collection kit, manufactured by Gentueri, and a non-desiccant-based collection kit, used by the Pennsylvania State Police, were used to make contrived sexual assault samples. The sexual assault samples were stored for up to 12 months to determine which kit better preserved the quantity and quality of DNA in the sample. While previous research has shown that both sexual assault kits perform fairly equally over 30, 60, and 90 days, it also showed that the Gentueri kit offered a more robust, standardized process. This allows for a controlled design, reducing the number of variables such as temperature, weather, and state of collection. The results show which collection kit would be ideal for sexual assault samples. The results can be applied to forensic crime labs across Pennsylvania to preserve DNA quantity and quality in sexual assault kit collection. The study could then be expanded to different states with different climates to achieve a more standardized procedure for collecting sexual assault kits across the United States.

### **\*21: The Recovery of Human DNA from an Aqueous Environment Using Novel Technology**

Halle Saf | Forensic Science and Law | School of Science and Engineering

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

#### **ABSTRACT:**

This research project intends to implement a novel method of human detection in bodies of water to assist in missing persons cases. Through this study, it was anticipated that a trendline based on the migration of DNA may be generated to allow for the area in which a missing individual is likely present within a water source to be discovered by studying the natural degradation of human tissue in a body of water. In an attempt to generate this trendline, a tissue sample was studied in a spring fed pond located in Kane, PA. The tissue was placed within a mesh-lined suet feeder and submerged within the pond approximately 3 feet deep. Water samples were collected at 0 ft, 3 ft, 6 ft, 9 ft, and 12 ft from the tissue source each week for three months (June-August). A control chamber was also set up indoors at a location where outside environmental conditions would not affect the tissue sample within the chamber. Sampling of the control occurred at the same measured increments as the pond collection, to further account for the impact of the pond's current on DNA migration. A novel microbubble technology from Akadeum Life Sciences was used to extract the human DNA from the collected water samples. Extractions were performed in triplicate. Any recoverable DNA within the collected samples was analyzed using the Quantifiler Human Plus quantification kit via quantitative polymerase chain reaction (qPCR). Downstream, the highest quality and least degraded samples were amplified and genotyped. The trial also attempted to understand the impacts of temperature, pH, oxygenation, wildlife activity, depth, and water current on the rate of DNA degradation and migration. Through this study, it is intended that the location, presence, and identity of a potential missing person may be discovered. By using DNA extraction techniques on water samples, the recovery of missing individuals may become more efficient in the future. In conclusion, the Microbubble extraction kit was able to recover partial DNA profiles. The DNA was recovered in low quantities as was expected due to the decomposition of the tissue throughout the collection period.

### **22: The Impact of Age on Strength and Fracture Patterns of the Human Hyoid Bone**

Olivia DePergola | Forensic Science and Law | School of Science and Engineering

Faculty Advisor/s: Pamela Marshall, Ph.D.; John Viator, Ph.D.

#### **ABSTRACT:**

The human hyoid bone has been studied in conjunction with suicide and homicide since the nineteenth century. Suicide and homicide are two leading causes of death in the United States, with hanging being a frequent method of suicide worldwide. Fractures of the hyoid bone are significant indicators of hanging, strangulation, or blunt force trauma to the neck, causing them to garner great importance and relevance in the forensic science community. Several studies have elucidated that fracture is most common in manual strangulation events and least common in hanging events. Furthermore, numerous studies have examined the relationship between age, sex, and the morphology of the bone with the occurrence of hyoid bone fracture, but there is no existing data on the amount of force required to fracture hyoid bones of different ages in simulations of manual strangulation. The differences in shape, size, and rigidity of this bone throughout the human lifespan suggest that different amounts of force are required to fracture hyoid bones in the various stages of life. In this study, digital imaging files (.stl) of hyoid bones were collected from living patients of the University of Pittsburgh School of Dental Medicine. Four female bones were collected for each age group of 18-30, 30-45, and 45-80 years old. The digital imaging files were sent to a Bambu Lab X1-Carbon 3D printer to create four copies of each hyoid bone for a total of forty-eight bones. Several morphological measurements were made before encasing the 3D-printed hyoid bones in gelatin and chamois. The gelatin and chamois casing served to mimic the structure and skin of the human neck to better simulate manual strangulation. The gelatin-encased hyoid bones were subjected to a Torbal FT Odyssey force gauge to determine the amount of force necessary to produce fractures. The locations

of fractures were noted as well. The data collected will better define the relationship between age and strength of the hyoid bone, manual strangulation fracture patterns, and will aid in manner of death conclusions.

### **23: Identification of Biomarkers Associated with Prolonged Starvation in Cat (*Felis catus*) Bones**

Annagrace Radocaj | Forensic Science and Law | School of Science and Engineering

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

#### **ABSTRACT:**

According to the Animal Legal Defense Fund, around 250,000 animals each year are victims of hoarding, with the number of cases steadily increasing. Hoarding can be defined as the human desire that is satisfied through the collection or control of animals that supersedes the animals' needs. In many incidents of hoarding animals, starvation or emaciation of the animal is not uncommon. In the late stages of decomposition, little to no tissue is present, and only depleted bone samples can be collected from the victim. During starvation, bone turnover biological markers, or BTMs, are expressed due to increased bone resorption. BTMs are degradation products of type I collagen and include the C and N-terminal cross-linking telopeptides of type I collagen that reside at the ends of collagen chains and are cleaved off into the bloodstream during the metabolic breakdown of bone. Collagen proteins found within the bone will be analyzed to determine if a BTM can be identified to determine starvation for that individual.

Immunoassay testing for N-terminal telopeptides of type I collagen was performed prior to protein extraction with the BioTang N-telopeptide Feline specific immunoassay kit to confirm that these selected biomarkers can be identified in both well-nourished and malnourished felines. Three trials have been completed with both well-nourished and malnourished feline serum samples. A calibration curve was created to quantify the concentrations of BTMs in the serum samples. It was concluded that based on the calibration curve, malnourished feline samples displayed significantly larger concentrations of N-telopeptides compared to those quantified for nourished samples.

Bone samples, both well-nourished and malnourished, were ground to a fine powder in a freezer mill, and proteins from the collected bone samples were extracted using the Minute™ Total Protein Extraction Kit. More confirmatory testing will be completed with an immunoassay using a respective antibody to determine the identity of said biomarkers. Once data has been collected, the amounts and concentrations of the identified BTMs will be measured and compared to those found in the control sample from a feline who has not undergone starvation.

### **24: Can the Use of Sharpies in Forensic Analysis be a Source of DNA Transfer and Contamination When Examining Different Fabric Types?**

Haley Murphy | Forensic Science and Law | School of Science and Engineering

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

#### **ABSTRACT:**

Body fluids on fabric items are a commonly encountered type of evidence at crime scenes. During evidence processing, the fluid is outlined using a Sharpie marker to assist DNA analysts to sample the correct area. The tip of the Sharpie, which has direct contact with the fabric, is not decontaminated between uses. Additionally, the felt fibers of a Sharpie tip are similar to the natural fibers of a cotton swab, which are utilized in crime labs to collect sources of DNA. The similarities between swab and Sharpie fibers as well as repeated direct contact with body fluid-stained evidence increase the potential for DNA transfer. The ability of a Sharpie to collect DNA was compared using an accidental sampling scenario and pre-existing DNA scenario. Furthermore, the amount of DNA transferred was analyzed based on fluid type, fabric type, and number of uses.

The process began with each Sharpie being swabbed using a cotton swab moistened with sterile water. The extraction method involved the QIAGEN QIAamp™ quantifier kit with the cotton swab extraction protocol. Then, Quantifiler™ HP was used to quantify the amount of DNA extracted from each sharpie. Afterward, the Globalfiler™ amplification kit in tandem with capillary electrophoresis on the SeqStudio genetic analyzer was utilized to generate DNA profiles on selected optimal samples.

Preliminary testing completed by Danielle Guckin confirmed the possibility of DNA transfer from Sharpie tips, therefore, the testing in this study is expected to produce similar results. It is hypothesized that Sharpie markers have the ability to collect DNA and that the concentration of DNA in the Sharpie tip increases with more uses. The importance of this research is to prevent future contamination of DNA samples through the continuous use of Sharpie markers.

### **25: The Significance of 3D Printed Firearms with Regards to Lethal Capacities and Traceable Elements**

Caitlin Baker | Forensic Science and Law | School of Science and Engineering  
Faculty Advisor/s: Pamela Marshall, Ph.D.

#### **ABSTRACT:**

3D printed firearms, commonly known as ghost guns, are problematic in the forensic field due to their untraceable and undetectable elements. Metal detectors, gun-shot residue (GSR), serial numbers, and other commonly used forensic firearm analysis methods have been proven to be no match for these weapons in preliminary results. This research shows the comparison of three ghost guns utilizing forensic firearm methods. With the use of a 3D printer, three total guns were produced for this testing, all of which were Liberator models. Previous results suggest that the Liberator can only withstand one firing. This experiment utilized two polymers in the printing process: acrylonitrile butadiene styrene (ABS) and polylactic acid (PLA). By printing with alternating polymers, the structural integrity of each can be analyzed. Due to their explosive nature, once the firearms are printed and assembled, a remote trigger-device was used to fire the weapons. The guns were fired directly into a contained system to allow for the comparison and identification of lethality in humans. Any remnants of the gun present after the firing process is complete were collected for analysis utilizing scanning electron microscopy (SEM). This research advances knowledge and understanding of 3D printed firearm analysis.

### **26: The Effects of Fingerprint Development Techniques on Forensic Cartridge Case Identification**

Sasha Valentino | Forensic Science and Law | School of Science and Engineering  
Faculty Advisor/s: Lyndsie Ferrara, Ph.D.

#### **ABSTRACT:**

When a fired cartridge case comes into a forensic science laboratory there are various pathways it can go through to be analyzed. The more frequent process of analysis is done by the fingerprint section followed by the firearm section, but some laboratories will analyze them in the opposite way or will not attempt to develop fingerprints. There is no standard that exists among all forensic science laboratories as to which section should analyze the evidence first, if at all. The purpose of this study is to determine what effects certain fingerprint development techniques may have on cartridge cases and if these techniques impact cartridge case comparisons. Brass, steel and aluminum cartridges in a 9mm and .45 caliber were fired using a Taurus 708 and Remington 1911 respectively. The cartridges were processed using cyanoacrylate fuming, gun bluing, basic yellow 40, black powder and a sequence of these techniques. Microscopic markings left on the breech face of the cartridge cases from the firing process were compared using the comparison microscope both before and after processing with each development method and a sequence of them. Markings on the cartridge cases were identified following development with cyanoacrylate fuming, basic yellow 40 and black powder while some

markings on the cartridge cases did not contain enough detail for an identification to be made, yielding an inconclusive result. Cartridge cases that came in contact with gun blue were not able to be identified prior to cleaning. Cartridges that underwent gun bluing were cleaned using acetone, an alcohol wipe and soapy water to remove the gun blue that accumulated on the headstamp. All of the cleaning methods aided in comparisons. Some of the markings were not of enough detail for an identification to be made and others were unable to be cleaned enough for an identification to be made.

### **27: The Makings of a High-Profile Case: How Media Bias Impacts Forensic Investigations in Missing Person Cases**

Jennifer Fertel | Forensic Science and Law | School of Science and Engineering  
Faculty Advisor/s: Pamela Marshall, Ph.D.

#### **ABSTRACT:**

As the consumption of true crime cases continues to capture the attention of viewers, listeners, and readers, issues arise when adequate media coverage is lacking for those deemed socially excluded. Bias can present itself as an issue when the media focuses on whom they value the most in society. This dilemma has been described as "Missing White Woman Syndrome," in which the media prioritizes white women who are missing or murdered rather than underrepresented individuals concerning race, sexuality, ethnicity, or gender. Those who do not fit the "ideal image," are not necessarily prevalent in the media. The implications that this lack of media attention has on socially excluded individuals in forensic investigations have yet to be fully explored. This led to the question: How does media bias impact forensic investigations? A case study comparison has been conducted to examine the impact that these high-profile cases have on investigative work. The outcomes of both observed cases were supplemented by a series of interviews involving forensic investigators and media representatives to diversify the information being obtained. The information obtained through both the case comparison study and interviews may assist in ensuring media representatives make conscious choices in adequately representing missing persons in the media. While results have not shown a definitive result of positive or negative impacts, there are influences from media bias on forensic investigations. This can stem from various factors such as community involvement, finances, and a support system. Ultimately the biggest result is the understanding of the relationship dynamic between society, media, and missing persons. Using these relationships positively can increase advocacy and generate discussions about the missing person crisis needed to promote justice for all, regardless of media attention.

### **\*28: Conducting A Psychiatric Analysis using Collateral Materials: A Case Study of Theodore Kaczynski**

Rebekka Range | Forensic Science and Law | School of Science and Engineering  
Faculty Advisor/s: Pamela Marshall, Ph.D.; Lyndsie Ferrara, Ph.D.; Hannah Stokes Ph.D.

#### **ABSTRACT:**

Competency to stand trial and sentencing are both factors impacted by the results of a mental health evaluation. Currently, these evaluations utilize interviews with the defendant to answer the question of their mental state. In cases of Fifth Amendment invocations, these individuals do not have to speak with the mental health expert and a method of analysis that does not require the interview becomes necessary. A case study of Theodore Kaczynski has been used to develop such a method, specifically with the documents collected by the Federal Bureau of Investigation (FBI) during his arrest, which were made available by Pennsylvania Western University. Additional documents housed in the Labadie Collection at the University of Michigan were also analyzed. Kaczynski came to be known as the Unabomber because the first several bombs targeted universities and airlines. After his capture, Kaczynski was held by authorities until his death in June of 2023, at the age of 81. Previous research proposed diagnoses of paranoid schizophrenia and Asperger's disorder, which now falls under autism spectrum disorder (ASD). The diagnosis of paranoid schizophrenia was reached in a court-ordered

psychiatric evaluation, completed by Dr Sally Johnson in 1998, during the pre-trial phase. This differs from the Asperger's disorder diagnosis, which was reached through a more holistic approach, completed in 2003. The documents are being compared to the diagnostic criteria found in the DSM-5 (2013) as well as the PDM-2 (2008) to determine if a potential diagnosis can be reached. This research will impact the forensic science and legal community by presenting a method to assess mental health disorders when an individual invokes their Fifth Amendment rights and refuses to participate in psychological evaluations.

**\*29: Assessing how the Humane Health Coalition connects Veterinary Services with Healthcare for People Experiencing Poverty and Housing Insecurity**

Katie Willis | Applied and Public Sociology | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor/s: Anita Zuberi, Ph.D.

**ABSTRACT:**

Many people experiencing housing insecurity and financial hardship often prioritize their pets before themselves. They may choose to access veterinary care for their dogs or cats rather than address their own healthcare needs. In addition to financial concerns, some are hesitant or unable to obtain medical treatment because they lack transportation or have had negative experiences with medical professionals. Research has found concerning trends of medical professionals ascribing stigma to their less affluent patients. Due to these factors, people in these at-risk populations may not receive the preventive care they need.

The Humane Health Coalition (HHC) is a collaborative initiative between Humane Animal Rescue of Pittsburgh (HARP) and Allegheny Health Network (AHN) that aims to address this challenge by connecting healthcare and veterinary services. The Coalition launched in September 2023 and seeks to help people who are living below the poverty line, experiencing homelessness and housing insecurity, or receiving governmental assistance. HHC clinics are held twice a month and allow individuals experiencing housing and financial instability to receive veterinary care for their pets and medical and social services for themselves.

My research examines the implementation of this new program. I conducted observations and semi-structured interviews at eight HHC clinics over four months. I interviewed twenty-seven participants and thirteen staff members from HARP, AHN, and other staff associated with the HHC. In addition, I was able to analyze administrative data from the program. My findings describe the services offered, assess how effectively the initiative is reaching its target population, and explore the experiences of HHC participants in accessing services. These results will be shared with the Coalition and can be used to inform future HHC events, such as where clinics should be held, changes to the intake paperwork, and additional staff training.

**\*30: Case Study: Pittsburgh Post-Gazette's Intergenerational Community Relations in the Digital Age**

Elisha Sidhu | Corporate Communication | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor/s: Sarah Deiuliis, Ph.D.

**ABSTRACT:**

On October 18th, 2022, the Newsroom employees at the Pittsburgh Post-Gazette (PG) went on strike, the first newspaper strike in over twenty years in the United States. Over a year later, the strike between the Newspaper Guild of Pittsburgh and Block Communications, Inc. is ongoing. As the strike continues, the PG risks losing half of its intergenerational readership, as 80% of newspaper readers are over the age of 50. Importantly, Post-gazette.com has an even split between readership above and below 50. This reflects today's news environment that has shifted to prioritize production of digital content more readily consumed by younger generations. Older generations are key publics that are reluctant to trust what is, to them, this new medium.

Philosopher Marshall McLuhan said media are the "extensions of man[kind]," and as the generation of the print newspaper begins to retire, this calls into question print consumer value to key stakeholders (McLuhan, 8). This research addresses the communication value of community relations applied to this important and timely case study. Today, on the lawns of Pittsburgh homes, signs read "I stand in solidarity with Post-Gazette workers on strike." Author Edmund Burke informs his readers about the psychological contract between communities and companies, asserting that both interested parties have key values at stake in the marketplace. Applied here, these signs signal to Block Communications, Inc. that if they do not cooperate with the Newspaper Guild of Pittsburgh, then their 237-year-old "license to operate" in the Pittsburgh area will cease to exist. Considering the shifting media that shape this industry, direct consideration of the practice of community relations is necessary to meet these challenges.

Community relations encompass psychological, economic, and social insights to provide companies with the framework to thrive in their geographic and digital regions. As a practice, community relations is rooted in the relationship between a company and its communities. Informed by McLuhan's ideology, this research focuses on strategies in community relations that the PG must take to repair their communicative relationships with the Pittsburgh region, providing a thorough overview of the PG's positioning with the intergenerational demographics of the Pittsburgh community.

### **31: Not So Fast: Sitting Velocities and Motor Control in Late Preterm Infants and Full Term Infants**

Katrina Bucher | Physical Therapy | Rangos School of Health Sciences  
Faculty Advisor/s: Regina Harbourne, Ph.D., FAPTA

#### **ABSTRACT:**

Background and Objective:

Infants developing control of their body in sitting learn to adjust their body when perturbations occur. These perturbations occur when they are placed in sitting, or when they are reaching. Infants make adjustments upon release of support in sitting, and also demonstrate body mechanics strategies such as leaning on their arms, falling over, and using an elevated arm position. These early postural strategies have not been examined with late preterm infants (LPT; born at 34-37 weeks), who are assumed normally developing. The purpose of this study was to compare full term and LPT infant's postural control using sitting velocity and body mechanics.

Study Participants and Setting:

20 independently sitting infants (10 LPT and 10 full-term) between 6 and 8 months old were recruited. Infants were typically developing based on the Bayley III motor screening. Data collection occurred in the participants home, using video for later analysis.

Materials/Methods:

Infants were lifted slightly and then placed down with support removed quickly. The angle of the infant's trunk at release and of their furthest point forward within one second was used to calculate velocity. Infants were then asked to reach for 6 toys. Datavyu software was used to code the following variables: falls, high guard and leaning. T-tests were used for comparisons between groups (term and LPT infants) using SPSS statistics 29 (IBM). Pearson correlations examined the relationships between variables.

Results:

LPT infants had significantly more falls during reaching than full term infants ( $p=0.05$ ). Highguard position and lean were significantly negatively correlated ( $r=-0.47$ ;  $p=0.02$ ), such that infants who used highguard more leaned less. Leans and falls were significantly correlated ( $r=.39$ ;  $p=0.04$ ), such that infants who fell more leaned



more; this relationship was stronger for LPT infants. LPT infants had higher velocity in sitting than full term infants.

#### Conclusions/Significance:

Although Bayley screening indicated normal scores, we found differences between LPT infants and full-term infants. LPT infants demonstrated immature postural control compared to full term infants shown by increased falls and increased velocity. Examination of early postural strategies could be a marker for later motor control difficulties in LPT infants.

### **\*32: Sex Differences in Muscle Regeneration: Female Mice Exhibit Faster Muscle Function Recovery After Injury**

Siyu Liu | Physical Therapy | Rangos School of Health Sciences

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

#### **ABSTRACT:**

**Background/Purpose:** Musculoskeletal injuries affect 65.8 million people annually in the U.S. and cost more than 176 billion dollars. After significant injury, muscle function rarely recovers to 100%. The lack of full muscle function restoration is affected by several factors including biological sex. Furthermore, the various measures of recovery are not well characterized between the sexes, including force, velocity, and fatigue. Further complicating repair is the interaction of the immune system with muscle in producing fibrosis. A major limitation of current lab-based models is that they produce minimal fibrosis. Our laboratory has recently conducted experiments using a newer injury model (glycerol injection) that amplifies inflammation and generates significant fibrosis. We hypothesized that inflammation/fibrosis is playing a sex-based role in measures of muscle function recovery.

**Methods:** Male and female mice were split into two groups. Mouse gastrocnemius muscle was injected with glycerol (experimental) or saline (control) on day 0. Muscle force production, contraction velocity, and muscle fatigue testing was performed 3 days (n=14) and 12 days (n=26) after injection, followed by hind-limb muscle collection and preservation for histological analysis.

**Results:** Male groups had significantly higher muscle force production than the female groups at 3 days post injury ( $p < 0.05$ ). The improvement of maximal force production ( $p < 0.05$ ) and contraction velocity ( $p < 0.05$ ) was significant in females only. Histological analysis (necrosis, regeneration, and fibrosis) is ongoing, but preliminary observations concur with the muscle physiology testing that females are recovering faster than males with less fibrosis.

**Conclusion:** The timeline of the muscle function repair is different between the male and female groups and repair and regeneration continue at 12 days, which suggests interventions can be applied and studied during this time period. Female muscle is recovering faster with less fibrosis. This is likely due to sex-based differences in the interaction of injury severity and inflammation. We are currently examining these mechanistic differences. These results suggest that muscle rehabilitation could benefit from interventions that are sex specific.

### **33: Counseling Treatment Considerations for Clerical Abuse of Children**

Sydney Adams | Clinical Mental Health Counseling | School of Education  
Addie Alderson | Clinical Mental Health Counseling | School of Education  
Faculty Advisor/s: Yih-Hsing Liu, Ph.D.

#### **ABSTRACT:**

Clergy sexual abuse in the Catholic Church has been documented as far back as the eleventh century. The U.S. Conference of Catholic Bishops (USCCB) reported 4,228 child sexual abuse allegations between 2019 and 2020 (Catholic Church Sex Abuse, 2022). Such high numbers in clergy sexual abuse cases within the Catholic community results in countless survivors, and, as a result, countless mental health manifestations, such as depression, suicidal ideation or attempts, substance use disorders, difficulty forming adult relationships, and trust problems. Although the high prevalence of abuse scandals within the church is over a century old phenomenon, there is lack of research in prevention and postvention strategies as well as community counseling implications. This review of research addresses community-level interventions for how to best prevent future abuse as well as support current survivors in their healing journeys. Engaging the community, through the use of community-based interventions, has repeatedly been shown to offer a higher level of positive outcomes for clients with trauma (Werner & Tyler, 1993). The goal of this research is to identify prevention, intervention, and postvention strategies for interfacing with individuals who have been affected by clerical abuse within the Catholic Church. Proposed treatment strategies for these individuals include TF-CBT, EMDR, community support groups, psychoeducational prevention programs, and greater community involvement. As mental health practitioners, it is vital to address the full extent of the trauma endured by those affected by clerical abuse through the utilization of interprofessional collaboration and community counseling interventions to address this massive-scale abuse. The proposed research addresses interventions within the community, education, and church sectors in order to address this widespread issue through a multifaceted lens. Implications and future research directions will also be discussed.

### **\*34: Healthcare Access for Undocumented People in America**

Ricky Pazer | Healthcare Ethics | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor/s: Joris Gielen, Ph.D.

#### **ABSTRACT:**

Millions of undocumented people live in America and roughly a million have entered every year since 2021. This is a hot-button issue in mainstream politics for a variety of reasons. However, there is an issue that tends to get overlooked which is their health care. In most states, undocumented people do not qualify for healthcare coverage of any kind. This leaves them reliant on EMTALA and emergency departments (ED). Through an examination of the various state and federal policies that pertain to undocumented people's healthcare coverage, we can see that these people are in desperate need of assistance. It becomes clear that having millions of people reliant on EDs as their primary care leads to major issues with resource allocation, budgeting, and physician fatigue for hospitals around the country. New York and California both have programs that extend Medicaid eligibility to undocumented people. This model is quick and effective. However, it can be quite controversial since there are still nearly a dozen states that have yet to sign on to the Medicaid expansion for low-income Americans put in place by the ACA. Another possible model is one represented in Massachusetts that helps fund more free clinics and city or charitable hospitals around the state. This is a model that may be less controversial since it helps everyone, Americans and undocumented people alike. Also, a case study of a patient named Mrs. Gomez who was an undocumented person with kidney failure receiving care regularly through an ED can show the tension that can arise between the beneficence-focused physician and the justice-focused director of the ED. All of this suggests that America must find effective ways to provide affordable and

accessible health care for all people in America, Americans and undocumented people alike. This is a matter of justice for all.

**\*35: The Use of Algorithmic Decision Making and Predictive Analytics in the Screening of Child Abuse Reports: An Analysis of Ethical Implications and Possible Solutions**

Shantele Weaver | Healthcare Ethics | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor/s: Joris Gielen, Ph.D.

**ABSTRACT:**

Technology has been a standing interest for humankind due to its promising potential for the advancement of our livelihood. Today, it is embedded into the daily functions of many civilizations and cultures, but for some individuals, it has become a necessity for survival. But, how much should the use of technology, and more importantly artificial intelligence be involved in the critical decision-making processes that can affect the daily lives of humanity? The present analysis aims to examine the core aspects of artificial intelligence, its relation to algorithmic decision making, how the two are currently utilized in the realm of social services, and more specifically child abuse reporting. This analysis will begin with examining the historical motivation behind the development of such technologies, and the desire to replicate human capabilities within said technological systems. Through the brief examination of algorithmic decision-making processes and their design, this analysis will bring awareness to the reasons why such forms of technology have been heavily promoted for use when making decisions regarding the welfare of others. A review of the current processes for reporting child abuse, and the common screening processes that have been identified in the research will be done to provide a premise for the identification of some of the common algorithmic decision-making tools or technologies that are currently utilized within social service and child welfare systems. Specific attention will be given to the topic of predictive analytic technologies that have been utilized within policing and court cases as well, in an effort to bring further insight to the ways in which these systems are currently being relied upon within the decision-making processes of several areas of societal livelihood. This analysis will identify and elaborate on several commonly cited ethical concerns found within the research, including that of transparency and informed consent, bias and responsibility. Here, this analysis will also focus on several moral concerns including the risk that the use of such technologies can pose towards human judgement and societal functioning if they are to be depended upon. This analysis will close with suggestions for future use of identified technologies for prospective social service workers, organizations and other professionals, well as proposed solutions or practices for researchers and developers of said systems or technologies.

**\*36: From Policymaking to Legislation, The Need for a Secular Turn in Bioethics Discourse to Uphold, as a Function of the Greater Good, Policy for Legislation of Medically Aided Dying in the United States of America**

Scott Dyer | Healthcare Ethics | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor/s: Joris Gielen, Ph.D.; Gerard Magill, Ph.D.

**ABSTRACT:**

The United States was founded on lofty aspirations of religious freedom. On the surface, this was a valiant effort at escaping religious persecution in their home countries. In reality, however, many of the early European settlers attempted to use their given religious beliefs to justify restrictive laws and proselytize other citizens, their communities, states, and the governing bodies of the time.

To combat this, the Founding Fathers wrote the Bill of Rights - amendments into the U.S. Constitution - which sought to give individual rights to citizens while establishing limits on governmental power. The first of these amendments worked to contend with and overcome the issue of religious influence on government by

forbidding the establishment of an official religion and attempting to prevent the government from favoring any given religion, while further guaranteeing citizen's rights to practice any religion of their choosing.

Nonetheless, history and modernity have shown an overt governmental favoring of Christianity in the U.S. The ignoring of the first amendment has allowed religion to unjustifiably influence law and policy in the U.S., especially in the realm of healthcare. Thus, that influence has resulted in modern politics surrounding healthcare initiatives in the United States being problematically quite heavily laden with religion.

To overcome these issues, I challenge the validity of religious influence on law while pointing to larger sociopolitical repercussions that stem from pious discourse and lawmaking. By establishing and maintaining a turn towards secularity in bioethical discourse, the resulting policy and legislation can remain free of undue religious influence and work towards the greater good while also upholding Constitutional parameters.

Ultimately, I argue that pursuits of legalizing medically aided dying have been hampered by unconstitutional religious legislation, although this can be reversed by recognizing and upholding secular discourse in the realm of policymaking and legislative pursuits. Various philosophical approaches, such as Rawlsian political theory, secular humanism, global ethics, utilitarianism, autonomy, personhood, and quality of life will be used to assist my arguments and justifications.

**37: Student Withdrew**

**38: Student Withdrew**

**39: Applications of Phenomenology: Retrospective Analysis of Lived Experience of Eye Disease**

Kimberly Tucker | Philosophy | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor/s: Lanei Rodemeyer, Ph.D.; Jay Chhablani, MD

**ABSTRACT:**

Visual acuity tests, while valuable in assessing ocular function, fall short in capturing the nuanced experiences of individuals coping with vision impairment. These tests do not provide a comprehensive understanding of how vision loss intricately influences perception, embodiment, and the routine activities and social engagements of everyday life. Even individuals with ostensibly "low" or "moderate" levels of vision loss, commonly observed in Central Serous Chorioretinopathy (CSCR) patients, may encounter multifaceted impacts on their lifeworld. The lifeworld, a concept rooted in philosophical phenomenology, encompasses an individual's entire existence, spanning from first-hand perceptions to embodied behaviors and habits, as well as intersubjective relationships. Within the scope of our project, we explored the diverse ways in which vision loss disrupts perception and the general lifeworld of patients with CSCR. The method used is grounded in phenomenological concepts and methods that ultimately allowed us to interpret and analyze patient descriptions, unveiling new facets of the impacts of low vision. We found that individual experiences of CSCR differed greatly given that different areas of the lifeworld were impacted by low vision (work, life, family, body awareness), but there were some general features of perception that were common across participants that are best interpreted through the theoretical framework of Edmund Husserl's notion of "perceptual optimality." According to Husserl, individuals strive for optimal perception even (and especially) in the presence of a sensory disability. They adapt and move the body in various ways to achieve a "new" perceptual optimum. We found that the new visual optimal (post-onset of eye disease) is largely dependent on an individual's primary desires and motivations to carry out theoretical or practical projects and goals. We were able to analyze participant's altered lifeworlds (decisions, behaviors, and changed habits) disrupted by vision loss by examining their primary motivations and desires. Motivations ultimately dictated how participants moved their body in new ways to adapt to low vision and achieve the "visual optimum" that was necessary in order to carry out specific projects and goals.

#### **40: Johnny Got His Gun: A Trauma Novel as Cultural Trauma Fiction and the Importance of Ethical Communication**

Noah Madden | English | McAnulty College and Graduate School of Liberal Arts  
Faculty Advisor/s: Rebecca Maatta, Ph.D.; Sarah Wright, Ph.D.

##### **ABSTRACT:**

This research will explore how the medical staff's communication with Joe Bonham in Dalton Trumbo's trauma novel *Johnny Got His Gun* has failed due to the care team not interpreting Joe's mode of communication: morse code. Upon being hospitalized after enduring a shell explosion in World War I, it is relevant that ethical communication in doctor-patient care was not relevant in the early 20th century. Ethical communication serves "the expressed, known and genuine needs of patients, customers, clients, and [aims to] bring about the best possible health and quality-of-life outcomes for them and society through negotiation and partnership" (Hugman 37). Joe's care team does not meet these standards for ethical communication, to the extent that Joe's day nurse sexually assaulted him. In exploring these discontinuities, I will examine different texts on healthcare communication and studies on healthcare in war veterans in the early 20th century to defend my argument. I will also explore how communication in this novel extends beyond characters in the book to its readership, specifically when we read the novel as Cultural Trauma Fiction, which can resonate with fellow war veterans, doctors and nurses, people who have endured loss, and victims of sexual assault

#### **\*41: Developing a Framework for Educational Games: N.O.V.E.L.**

Kelly Bruzdewicz | MAT Secondary Education- Biology | School of Education  
Faculty Advisor/s: John Pollock, Ph.D.; Brinley Kantorski, Ph.D.

##### **ABSTRACT:**

Games have proven to be an effective teaching tool in science education, yet research on the intricate process of designing such games remains limited. In response to the profound shifts in public attitudes toward vaccines during the COVID-19 pandemic, The Partnership in Education (PIE) embarked on a project to address vaccine hesitancy by improving students' understanding of the vaccine development process. Our solution was to develop a tabletop board game that would immerse students in the complexities of scientific collaboration and model the process of vaccine development. This game, entitled, N.O.V.E.L.- Newly Observed Variant of Extreme Lethality, leverages cooperative and modular gameplay, and fulfills essential educational standards, making it adaptable for classroom use and accessible to diverse learners. Our quasi-experimental study design has demonstrated N.O.V.E.L.'s effectiveness in reducing vaccine hesitancy among students. Given the success of N.O.V.E.L., we aim to disseminate the framework we developed for its creation, offering it as a blueprint for designing similar educational games. By doing so, we seek to leverage the potential of educational games to enhance student learning outcomes and promote health literacy. Our work underscores the importance of innovative approaches in addressing critical social issues within educational contexts. By expanding research into educational game design processes and utilizing them effectively, we can bridge gaps in understanding and promote informed decision-making among students, contributing to a healthier and more informed society. Funding: NIH NIGMS SEPA R25 5R25GM13291

#### **\*42: The Analytical Performer: Marcel Tabuteau and American Clarinet Performance Practices**

Emma Locarnini | Performance | Mary Pappert School of Music  
Faculty Advisor/s: Benjamin Binder, Ph.D.

## ABSTRACT:

In the traditional conception of Western classical music, a performer is dutifully bound to execute what the composer has written in their score without additions or alterations, and their performance is supposed to be a pure and unadulterated realization of the composer's musical intentions. But the legitimacy of this belief is called into question when we realize how vague and indeterminate Western classical notation really is. Musicologists such as Nicholas Cook, in his essay "Music Minus One" (2007), point out how performers must make creative decisions about articulation, phrasing, dynamics, and style to turn the score into a performance, thus making them creative equals with the composer. Similarly, in "The Performer as Analyst" (2007), Daniel Barolsky demonstrates how recordings of performances are equal in authority to the written score, and performers' creative interpretations are integral to how we understand any given piece of music. During routine practice and preparation of a piece of music, performers develop a distinctive analytical understanding of the structure of the piece, that acts as a foundation for the creative decisions heard during performance. In this project I apply Cook and Barolsky's model of the analytical performer to French oboist Marcel Tabuteau (1887-1966), whose teachings significantly impacted American clarinet playing. Tabuteau carefully devised a system for organizing musical phrases through subtle modifications of volume and rhythmic groupings. He also set a new standard for woodwind timbre based on sound projection and overtones. Tabuteau's systematic approach to performance provides tangible evidence of how musicians address indeterminacies in music. Through an investigation of the writings and recorded performances of his students, colleagues, and pedagogical descendants, I will demonstrate the application of his theories during his lifetime, and how they were deliberately shared across generations of professional woodwind players and are still influencing the work of important orchestral musicians today. While not all performers have a system so richly documented as Tabuteau's, his work and its traceable lineage proves that performers share unique analytical ideas through public performance, and teaching, revealing an intellectual involvement with music that surpasses the execution of written notations.

### **43: Effect of face masks on voice quality associated with young and older Chinese adult speakers**

Feiyun Jiang | Speech Language Pathology | Rangos School of Health Sciences

Jiarui Tian | Speech Language Pathology | Rangos School of Health Sciences

Yuting Song | Speech Language Pathology | Rangos School of Health Sciences

Faculty Advisor/s: Manwa Ng, Ph.D.; Yang Chen, Ph.D.

## ABSTRACT:

**Objectives.** Face masks have become important after the pandemic, but the change in voice when wearing a face mask is still not very clear. The study investigated the effect of face masks on the acoustic and perceptual characteristics of voice quality associated with young and older Chinese adults. **Method.** Voice samples of the sustained vowel /a/ and continuous speech produced by 44 older and 61 young adults with and without an ASTM level-3 surgical face mask were recorded and analyzed. Perceptual and acoustic parameters including mean fundamental frequency (F0) and intensity, perturbation measures (jitter and shimmer), harmonic-to-noise ratio (HNR), smoothed cepstral peak prominence (CPPs), and long-term average spectral (LTAS) measures were obtained and compared. **Results.** When comparing masked to unmasked voices, for both male and female speakers, F0 and intensity showed no significant changes, except for F0 of continuous speech, which increased significantly. Meanwhile, perturbation measures were reduced, HNR and CPPs were increased, and LTAS measures were different. For perceptual measures, the overall grade and roughness were reduced, but the other vocal qualities. Between young and older adults, significant differences in shimmer, CPPs and perceived breathiness among males, and low-frequency MSE among females were found. **Conclusion.** Wearing a surgical mask appeared to improve the perceived voice quality. This is supported by the change in perturbation and LTAS measures, and HNR and CPPs values. In addition, some differences between young and older male adults were observed.

## LIST OF PARTICIPANTS BY SCHOOL

\*Denotes Live Oral Presenter

Name | Poster Session | Abstract #

### **A.J. Palumbo School of Business Administration**

Tori Cikins | Morning | 26

### **Mary Pappert School of Music**

\*Emma Locarnini | Afternoon | 42

Ian Young | Morning | 27

### **McAnulty College and Graduate School of Liberal Arts**

Zach Bauerle | Morning | 44

Lily Berry | Morning | 28

\*Dalena Collins | Oral only | Virtual

John Dall'Aglio | Virtual Only | Virtual

\*Thomas DeMauro III | Morning | 29

\*Scott Dyer | Afternoon | 36

Jesse Goodman | Morning | 31

\*Casey Haas | Morning | 30

\*Bethany Kaser | Virtual Only | Virtual

Noah Madden | Afternoon | 40

Cameron Moore | Morning | 24

Griffin Nordstrom | Morning | 42

\*Ricky Pazer | Afternoon | 34

Nicole Powell | Afternoon | 37

\*Lorenzo Selvaggi | Oral only | Virtual

\*Elisha Sidhu | Afternoon | 30

Andrew Stanford | Morning | 43

Kimberly Tucker | Afternoon | 39

\*Shantele Weaver | Afternoon | 35

\*Katie Willis | Afternoon | 29

### **Rangos School of Health Sciences**

Katrina Bucher | Afternoon | 31

Feiyun Jiang | Afternoon | 43

\*Siyu Liu | Afternoon | 32

### **School of Education**

Sydney Adams | Afternoon | 33

Abdulrhman Ashgar | Morning | 40

\*Kelly Bruzdewicz | Afternoon | 41

\*Nicole DeCicco | Morning | 33

\*Jennifer Dolecki | Morning | 34

Annie Haefs | Morning | 35



\*Paige Johnson | Morning | 36

Amelia Klass | Morning | 37

Travyon Lovely | Morning | 38

\*Nur Masarwa | Morning | 25

\*Kiera Reilly | Morning | 39

Elizabeth Straub | Morning | 32

### **School of Nursing**

Holly Buchanan | Virtual Only | Virtual

Gretchen Goldman | Virtual Only | Virtual

Deborah Horton | Virtual Only | Virtual

\*April Morris | Virtual Only | Virtual

Monica Naumann | Virtual Only | Virtual

\*Christina Pykett | Virtual Only | Virtual

Kimberly Sloop | Virtual Only | Virtual

### **School of Pharmacy**

Rachel Clark | Afternoon | 15

Amit Chandra Das | Morning | 10

\*Kandarp Dave | Afternoon | 12

Purva Khare | Afternoon | 13

\*Sarah Ostrowski | Afternoon | 14

Riddhi Vichare | Morning | 11

### **School of Science and Engineering**

Caitlin Baker | Afternoon | 25

Mikayla Bayto | Afternoon | 6

Chloe Bermejo | Morning | 15

Emily Bierer | Morning | 1

\*Shawn Bliss | Afternoon | 7  
Michael Brivchik | Afternoon | 16  
\*Catherine Bruno | Oral only | Virtual  
Abigail Burke | Afternoon | 17  
\*Burton Carbino | Morning | 41  
Eric Chartier | Morning | 7  
Benjamin Clegg | Morning | 8  
\*Alexander Cocolas | Oral Only | Virtual  
Amy Cook | Morning | 16  
Olivia DePergola | Afternoon | 22  
Madison Eidemueller | Morning | 17  
Jennifer Fertel | Afternoon | 27  
Nick Frankos | Afternoon | 8  
Daniel Fromuth | Morning | 6  
Shelby Hale | Afternoon | 18  
Sylvia Hamilton | Afternoon | 19  
\*Joseph Heath | Morning | 2  
Taylor Hopkins | Morning | 20  
Catherine Hull | Afternoon | 20  
Adam Kensinger | Morning | 9  
Elizabeth Knittle | Morning | 18  
Aiden Lane | Afternoon | 9  
Matthew Lasker | Morning | 14  
\*Joseph Makowski | Afternoon | 10  
Anna Manges | Morning | 3  
Taylor McClure | Morning | 19  
Aizlynn Michel | Morning | 12  
Mackenzie Miller | Morning | 21  
Maria Mlinarcik | Afternoon | 4

Haley Murphy | Afternoon | 24  
Amanda Piccirilli | Morning | 22  
Macenzie Powell | Morning | 13  
Unnikrishnan Puthumana | Afternoon | 11  
Annagrace Radocaj | Afternoon | 23  
\*Rebekka Range | Afternoon | 28  
\*Halle Saf | Afternoon | 21  
Sadhana Srinivasa | Afternoon | 2  
Kaitlyn Svencer | Morning | 23  
\*Rowan Terra | Oral only | Virtual  
Sasha Valentino | Afternoon | 26  
Anna Vietmeier | Afternoon | 3  
Meghan Wells | Morning | 4  
Rosemary Westcott | Afternoon | 5  
\*Cassandra Ziegler | Morning | 5