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Graduate Student Research Symposium

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GRS 2023 Program Booklet

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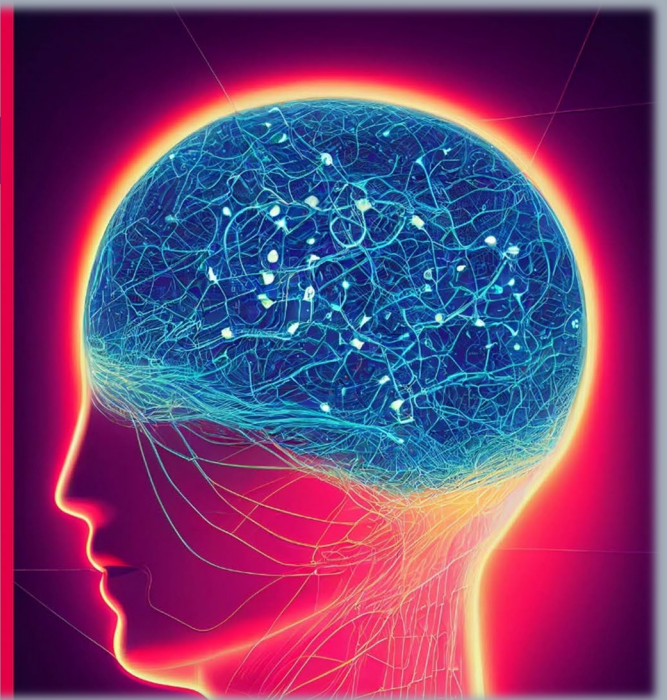
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9th Annual

Graduate Research Symposium

A Virtual Event: March 13 - 17



A VIRTUAL EVENT

Hosted via [SYMPOSIUM BY FORAGERONE](#)

March 13 to 17, 2023

Sponsored by the Office of Research and Innovation



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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 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 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
- ❖ McAnulty 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

Chair: Zachary Dehm, *Theology*

Sovi Herring, *Communication & Rhetorical Studies* | Erica Glaneman, *Occupational Therapy* | April Morris, *Nursing* | Rahima Khatun, *Pharmacy* |

Pooja Patel, *Center for Global Health Care Ethics* | Victoria Hrach, *Biological Sciences* | Adam Rish, *Pharmacy* | Chris Phillips, *Communication & Rhetorical Studies* | Yesha Shah, *Pharmacy* | Fayla Junior, *Center for Global Health Care Ethics*

SCHEDULE OF EVENTS

| | |
|--|---|
| March 13 to March 17 All Week Long! | Interactive Poster Session via Symposium by Forager One Browse through posters and videos. Comment and ask questions. |
| Monday, March 13 | Welcome - Symposium Site Launch! Interactive Poster Session via Symposium by Forager One Browse through posters and videos. Comment and ask questions. |
| Tuesday, March 14 | Interactive Poster Session via Symposium by Forager One Browse through posters and videos. Comment and ask questions. |
| Wednesday, March 15 | Interactive Poster Session via Symposium by Forager One Browse through posters and videos. Comment and ask questions. |
| Thursday, March 16 | Live Student Oral Presentations (online) via Symposium by Forager One 10:00 am to 11:00 am - Session 1 1:00 pm to 2:00 pm - Session 2 2:30 pm to 3:30 pm - Session 3 |
| Friday, March 17 | Live Student Oral Presentations (online) via Symposium by Forager One 10:00 am to 11:00 am - Session 1 1:00 pm to 2:00 pm - Session 2 2:30 pm to 3:30 pm - Session 3 |

LIVE ORAL PRESENTATIONS (ONLINE)

SESSION 1: Thursday, March 16

Moderator: Ashwini Gumireddy

| | |
|------------------|--|
| 10:00 - 10:15 | <p>Samuel Henson School of Pharmacy Pharmaceutics, Graduate School of Pharmaceutical Sciences Additional authors: Jacob Guess, Nahid Hasan, Mustafa Bookwala, James K. Drennen III, Carl A. Anderson Faculty Advisor: Carl Anderson Ph.D. <i>Continuous Granulation Screening Study Results via Principal Component Analysis of Granule Size Distributions</i></p> |
| 10:15 - 10:30 | <p>Kandarp Dave School of Pharmacy Pharmaceutics, Graduate School of Pharmaceutical Sciences Additional authors: Donna B. Stolz, Venugopal R. Venna, Victoria A. Quaicoe, Michael E. Maniskas, Michael John Reynolds, Younsoo Bae, Rehana K. Leak, Sruti S. Shiva, Louise D. McCullough, Devika S. Manickam Faculty Advisor: Devika S Manickam, Ph.D. <i>Co-delivery of Heat Shock Protein (HSP27) and Extracellular Vesicles Protect Ischemic Brain Endothelial Integrity in vitro for Stroke Therapy</i></p> |
| 10:30 - 10:45 | <p>Alexander Cocolas Bayer School of Natural and Environmental Sciences Chemistry Additional authors: Aiden Lane, Derek Bedillion Faculty Advisor: Thomas Montgomery, Ph.D. <i>Access Towards Substituted Piperazines using Mismatched N,N-Protected Diamides</i></p> |
| 10:45 - 11:00 | <p>Kiley Miller Bayer School of Natural and Environmental Sciences Center for Environmental Research and Education Additional authors: Frederick Gilbert, Tetiana Cantlay, David Kahler, Daniel Bain, John Stolz Faculty Advisor: John Stolz, Ph.D. <i>Investigating the Impact on Private Water Supply of Hydraulic Fracturing Communication with an Abandoned Gas Well in New Freeport, PA</i></p> |

LIVE ORAL PRESENTATIONS (ONLINE)

SESSION 2: Thursday, March 16

Moderator: TBA

| | |
|----------------|--|
| 1:00 - 1:15 | <p>Giulia Adele Dinicola McAnulty College and Graduate School of Liberal Arts Center for Global Healthcare Ethics Faculty Advisor: Gerard Magill, Ph.D. <i>Do Adolescent Patients Have a Right to be Informed about Fertility Preservation Options by Virtue of the Convention on the Rights of the Child?</i></p> |
| 1:15 - 1:30 | <p>Ferdinand Okafor McAnulty College and Graduate School of Liberal Arts Center for Global Healthcare Ethics Faculty Advisor: Gerard Magill, Ph.D. <i>Ethical Conscience in the Care of Patients with Autism Spectrum Disorder within Healthcare Organizations</i></p> |
| 1:30 - 1:45 | <p>John Henry Reilly McAnulty College and Graduate School of Liberal Arts Philosophy Faculty Advisor: Lanei Rodemeyer, Ph.D. <i>Peripheral Minds: A Phenomenological Analysis of Dyslexia</i></p> |
| 1:45 - 2:00 | <p>Maria Picado Sandi Mary Pappert School of Music Music Faculty Advisor: Benjamin Binder, Ph.D. <i>Theological Perspectives of the Mass in B minor</i></p> |

LIVE ORAL PRESENTATIONS (ONLINE)

SESSION 3: Thursday, March 16

Moderator: TBA

| | |
|-------------|--|
| 2:30 - 2:45 | <p>Duaa Alzahrani School of Education Special Education Additional author: Reva Mathieu-Sher Faculty Advisor: Reva Mathieu-Sher, Ed.D. <i>Using ASD Critiques of Applied Behavior Analysis to Inform Person-Centered Compassionate Care</i></p> |
| 2:45 - 3:00 | <p>Unnikrishnan Puthumana Bayer School of Natural and Environmental Sciences Chemistry Additional authors: Angel Tamez, Kezia Jemison, Douglas J. Fox, Jeffrey D. Evanseck Faculty Advisor: Jeffery Evanseck, Ph.D. <i>Malonate Hijacks Solvent into its Auantum System for Uncatalyzed Decarboxylation Reaction</i></p> |
| 3:00 - 3:15 | <p>Jessica Packard Bayer School of Natural and Environmental Sciences Biological Sciences Additional authors: Maya Williams, Daniel Fromuth Faculty Advisor: Jill Dembowski, Ph.D. <i>PCNA Inhibition Results in Stalled HSV-1 Replication Forks</i></p> |
| 3:15 - 3:30 | <p>Joseph Heath Bayer School of Natural and Environmental Sciences Biological Sciences Additional author: Jill Dembowski Faculty Advisor: Jill Dembowski, Ph.D. <i>Investigating the Role of the Integrator Complex During HSV-1 Gene Expression</i></p> |

LIVE ORAL PRESENTATIONS (ONLINE)

SESSION 1: Friday, March 17

Moderator: Marisa Guido

| | |
|------------------|---|
| 10:00 - 10:15 | Tori Kocsis Rangos School of Health Sciences Biomedical Engineering Faculty Advisor: John Viator, Ph.D. <i>Labeling Melanoma Cells With Black Microspheres For Improved Sensitivity In Detection Via Photoacoustic Flow Cytometry</i> |
| 10:15 - 10:30 | Gabriela Sanchez McAnulty College and Graduate School of Liberal Arts Philosophy Faculty Advisor: Lanei Rodemeyer, Ph.D. <i>A Peculiar Home: A Phenomenology of Place</i> |
| 10:30 - 10:45 | Bethany Kaser McAnulty College and Graduate School of Liberal Arts English Faculty Advisor: Sarah Wright, Ph.D. <i>The Original Toy Story: Frances Hodgson Burnett's "Racketty Packetty House," a Playful Critique of Victorian Society through a Playroom Drama</i> |
| 10:45 - 11:00 | Kathleen Burch McAnulty College and Graduate School of Liberal Arts History Faculty Advisor: Jennifer Taylor, Ph.D. <i>Jean Witter and Betty Friedan: Grassroots Activism in Pennsylvania and the Federal Fight for the Equal Rights Amendment</i> |

LIVE ORAL PRESENTATIONS (ONLINE)

SESSION 2: Friday, March 17

Moderator: Siyu Liu

1:00 - 1:15

Eman Alaslani

McAnulty College and Graduate School of Liberal Arts | Rhetoric

Faculty Advisor: Anthony Wachs, Ph.D.

Thurman's View Toward Racism as Crisis Communication

1:15 - 1:30

Haibin Shi

Rangos School of Health Sciences | Duquesne China Health Institute

Faculty Advisor: Faina Linkov, Ph.D.

Long-term Care Current Development in China Urban Area: A Literature Review

1:30 - 1:45

Sherlenne Francisco

School of Education | School Psychology

Faculty Advisor: Tammy Hughes, Ph.D.

Counselor Self-Efficacy Utilizing a Trauma-Informed Approach

1:45 - 2:00

Emma Locarnini

Mary Pappert School of Music | Music

Faculty Advisor: Benjamin Binder, Ph.D.

J.S. Bach as a Religious Storyteller – The Second Brandenburg Concerto

LIVE ORAL PRESENTATIONS (ONLINE)

SESSION 3: Friday, March 17

Moderator: Yesha Shah

| | |
|----------------|--|
| 2:30 - 2:45 | Chloe Warham Rangos School of Health Sciences Physcial Therapy Additional author: Katrina Bucher, Emma Costello, Aleena Purewal, Melanie Tommer, Melanie Schultz, Regina Harbourne Faculty Advisor: Regina Harbourne, PT, Ph.D., FAPTA, PCS <i>The LEARN Scale: Use of Toys in Early Intervention</i> |
| 2:45 - 3:00 | Siyu Liu, Kailey Omstead, Olivia Price, Shaelyn Walker, Matthew Kostek Rangos School of Health Sciences Physcial Therapy Faculty Advisor: Matthew Kostek, Ph.D. <i>Sex Based Differences in Muscle Regeneration</i> |
| 3:00 - 3:15 | Brooke Foundas Rangos School of Health Sciences Occupational Therapy Additional authors: Elena V. Donoso Brown, Dr. Sarah E. Wallace, Seth Tichenor, Jacquelyn Stochel Faculty Advisor: Elena V. Donoso Brown, Ph.D., OTR/L <i>Understanding Self-reported Patterns of Home Program Adherence in People with Acquired Brain Injury</i> |
| 3:15 - 3:30 | Marisa Ricciardi, Kelsey O'Connor, Michelle Catao Rangos School of Health Sciences Speech-Language Pathology Faculty Advisor: Abigail Delehanty, Ph.D. <i>Student Family Navigators Promoting Social Communication Outcomes for Infants and Toddlers from Lower-Income Families</i> |

AWARDS

BAYER SCHOOL FOR NATURAL AND ENVIRONMENTAL SCIENCES

Excellence in Graduate Research: Two 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.

CENTER FOR AFRICAN STUDIES

Award for Graduate Student Research in African Studies: \$400

This award is intended to encourage and reward graduate research in African Studies and related areas that engage Duquesne's ongoing commitment to Africa. Evaluations are based upon visual presentation, organization, creativity, and clarity.

Award for Graduate Student Research in Global Health: \$400

This award is intended to encourage and reward graduate research in Global Studies. Evaluations are based upon visual presentation, organization, creativity, and clarity.

CENTER FOR CATHOLIC FAITH & CULTURE

Common Good Research Award: \$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

CETR 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: \$250

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.

Oral History Initiative Award for Graduate Research: \$250

The Oral History Initiative Award for Graduate Research rewards research methods that demonstrate excellence in the application of oral history resources and methodology. Exceptional projects in any field of study that incorporate significant use of original or archival oral history resources or collections 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.

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

The Development of A Central Mammalian Fur Database

Hailey Adamik

Bayer School of Natural and Environmental Sciences

Faculty Advisor: Lisa Ludvico, Ph.D.

ABSTRACT:

Wildlife forensics is a branch of forensic science commonly utilized in the widespread issue of poaching and trafficking of endangered animals – predominantly mammals. Knowledge of animal hair morphology can not only aid in these issues, but domestic animal abuse, meat adulteration cases, and crime scene investigations.¹ Mammalian species may vary morphologically in fur characteristics regarding age, region, and interspecific variation. Subsequently, many existing atlases describing mammalian pelage are limited in that they are non-inclusive, non-digital, and/or not freely available in most cases. As a result, the development of a single, digitalized database of mammalian hair would greatly benefit the realm of wildlife forensics, as well as other fields of study. The macroscopic and microscopic analysis of guard hairs using Scanning Electron Microscopy (SEM) and Compound Light Microscopy (CLM) can distinguish morphological variations to assist in species identification. These techniques can provide documentation and visual references regarding cuticle scale pattern, medullary type, pigmentation, and basic form/size of individual mammalian hairs. Overall, the implications of a singular, widely accessible fur database include providing forensic hair examiners with consistent references across the globe, as well as continuing future research to aid in wildlife investigations.

Balancing the Ethical Principles of Autonomy and Beneficence to Develop Cohesive Plans of Care for Geriatric Patients with Psychiatric Conditions

Gabriella Agostaro

McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Joris Gielen, Ph.D.

ABSTRACT:

As a result of advancements in medical technology, our ability to reason and decipher harm from benefits has become essential for ethical treatment and decision-making in medicine. Geriatric patients with psychiatric conditions have the potential to experience inadequacies in care when the principles of autonomy and beneficence are not mutually respected. Balancing the ethical principles of autonomy and beneficence in geriatric psychiatry is the most beneficial way to enhance patient care and support further respect for the patient. These methods can be practiced by facilitating alternative methods to coercion and implementing psychiatric advance directives.

Examining the Effectiveness of Using Video Modeling on Increasing Positive Social Interaction in Academic Settings in Students With Learning Disabilities in Saudi Arabia

Ayman Alamri

School of Education

Faculty Advisor: Ann Huang, Ph.D.

ABSTRACT:

Video Modeling (VM) is a widely used intervention strategy to promote academic learning and positive social interactions in children with disabilities by watching a video clip modeled by a peer (peers) demonstrating the desired behavior. Limited research has been conducted on this topic to examine its effectiveness on promoting positive social

interactions in academic settings involving children with learning disabilities (LD) using VM. This study employed a single subject research design, specifically, a multiple baseline across participant design, to fill the void in the literature. The researcher invited three elementary students between 4th to 6th grade who met the inclusion criteria to participate in this study. The results of the study determined VM is effective in promoting positive social interaction in academic settings in individuals with LD, in the context of Saudi Arabia.

Thurman's View Toward Racism as Crisis Communication

Eman Alaslani

McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Anthony Wachs, Ph.D.

ABSTRACT:

On May 25, 2020, George Floyd, an unarmed Black man, was killed under the knee of a white Minneapolis police officer, sparking protests across the United States. The incident created fear and hatred among Black people. Racism was an issue discussed in the 2020 election as a serious problem that should be solved and equality for all individuals secured. Several organizations have dealt with racism, such as New Orleans the Katrina catastrophe issue, Dove ads showed a black woman turning herself white, and H&M Monkey hoodie ads. As a result of the Katrina catastrophe in New Orleans, the city has become a source of "a powerful number of social movements seeking racial and economic justice." According to Darwin BondGraham, "Katrina "exposed" or "brought to the surface" much of the structural racism operating in our society, the future of New Orleans and the Gulf Coast is by no means determined " (2007). Also, both Dove and H&M ads offended millions of people and created negative feelings. These ads were discussed on social media for weeks, and people called for a boycott, which had a serious impact.

This paper will use Jesus and the Disinherited, written in 1996 by Howard Thurman, the African American minister, theologian, and civil rights leader. The book's central question is, what does Jesus offer to a people who live with their backs against the wall? The book deals with the negative feelings rising among the disinherited and how they impact their spirit. Thurman showed the best way to deal with the negative feelings is Love.

Racism has become more noticeable, and organizations that did not pay enough attention to mistakes that make people feel offended can hinder the organization. Thus, finding link between Thurman's idea and crisis communication is interesting and it will help us to understand the question for this paper is: How does Thurman help us understand crisis communication in the context of racism? Thurman's ideas provide a new way for organizations to deal with racism crisis types.

Effects of Intracellular Conditions on the Pyruvate Substrate Inhibition of Lactobacillus Casei L-Lactate Dehydrogenase

Kelsey Aldrich

Bayer School of Natural and Environmental Sciences

Faculty Advisor: David Seybert, Ph.D.

ABSTRACT:

Although up to 25% of all enzymes show substrate inhibition, this kinetic mechanism is often disregarded as an artifact of in vitro reaction conditions. This assumption is often made, however, without any investigation into the factors that may enhance or diminish substrate inhibition. Here, the steady-state kinetics of Lactobacillus casei L-lactate dehydrogenase (Lc-LDH) are investigated under a variety of conditions to better understand whether substrate inhibition with respect to pyruvate persists using reaction conditions that more closely mirror those found within bacterial cells. Literature has identified that the Lc-LDH activator fructose 1,6-bisphosphate (FBP) causes the stabilization of a specific enzyme conformation with higher pyruvate affinity. This is consistent with our results when increasing FBP from micromolar to more physiologically relevant millimolar concentrations. This increase in FBP results in changes in kinetics that suggest an enhanced binding of a first, catalytic pyruvate alongside a simultaneous decrease in the inhibitory second pyruvate binding. When the highly crowded interior of a cell was mimicked through the addition of the

sugar polymer Ficoll 70, similar changes in pyruvate kinetics were observed as with increased concentrations of FBP. As minimal changes in FBP kinetics occur with increased crowding, the observed effects on pyruvate kinetics can be attributed to a crowding-induced conformation change rather than a change in activator binding. To further probe a potential shift in the enzyme conformations in solution, Lc-LDH was assayed in the presence of ATP, as recent literature has suggested that ATP confers a stabilizing effect on specific protein conformations. Addition of ATP at concentrations comparable to those found in bacterial cells resulted in complete abolishment of substrate inhibition for Lc-LDH. Overall, these results suggest a dynamic equilibrium of Lc-LDH conformations that is highly sensitive to assay conditions, resulting in enzyme conformation(s) that are less sensitive to substrate inhibition becoming favored under more physiologically relevant conditions. As such, Lc-LDH substrate inhibition may not be operative in vivo. This an additional unexplored difference in LDH regulation between mammalian and bacterial systems, as literature surrounding mammalian lactate dehydrogenases speculates that substrate inhibition is operative in vivo.

***Using ASD Critiques of Applied Behavior Analysis to Inform Person-Centered Compassionate Care**

Duaa Alzahrani

School of Education

Faculty Advisor: Duaa Alzahrani, MA, MEd

ABSTRACT:

Despite the recent advances in the field of ABA toward compassionate care, the primary efforts have focused on family engagement and have minimally taken into account the first-hand accounts of autistic individuals in the development of compassionate care. Since the criticism of ABA has come from the very population it is meant to serve, compassionate care should originate and evolve from the feedback gained from the Autistic Community. This paper discusses the ABA critiques that the autistic community and compassionate care researchers have raised, the barriers to the development of compassionate care in ABA, and attempts to use the patterns identified in the autistic community critiques to create a person-centered compassionate care (PCCC) framework. Examples are provided on how to implement PCCC values in behavior-analytic interventions, and future direction for the field in using compassionate care is discussed.

Using Behavioral Interventions to Increase Menstrual Hygiene Independency in Young Women with Developmental Disabilities

Sarah Alzahrani

School of Education

Faculty Advisor: Bridget Green, Ph.D.

ABSTRACT:

Menstrual hygiene is an essential aspect of self-care that young women with developmental disabilities(DD) should learn. For young women with DD, achieving maximum self-care independence, including managing as many aspects of menstrual hygiene as possible, improves their quality of life and opportunities for social engagement. This literature review aims to shed light on single-subject studies that solely focused on teaching menstrual hygiene to women with DD to identify effective behavioral interventions, how the interventions were delivered, and whether or not young women with DD provided social validity input. For this review, seven studies met the inclusion criteria. The findings show that while all participants in the included studies improved their overall menstrual hygiene, not all achieved complete independence. The behavioral interventions that were commonly used were a chaining procedure; however, all included studies relied on multicomponent interventions to improve the full acquisition of menstrual hygiene skills. The significant finding is that only one study included input from young women with DD on the study's social validity data. Implications for practice and future research are also discussed.

Understanding the Cultural Values, Beliefs, and Experiences of Widowhood in Nigerian American Women: A Mini Ethnographic Study

Prisca Anuforo

School of Nursing

Faculty Advisor: Rick Zoucha, Ph.D

ABSTRACT:

Purpose: The purpose of the study is to understand the cultural values, beliefs, and experiences of widowhood in Nigerian American women, and how it affects health and well-being.

Research Questions: a). What are the cultural values, beliefs, and experiences of widowed Nigerian American women in the United States? b). How does these experiences affect health and well-being of the widowed?

Background: There are 461,695 Nigerians residing in the United States and 3.1 percent of the population are widowed. The rate of morbidity and mortality is higher in widowhood than in married and single people with the highest incidence occurring in the first six months.

Method: The study used a qualitative ethnonursing method. Analysis is based on Leininger's four phases of data analysis.

Results: The results are from five participants aged between 50 and 62 years of age with average of 12 widowhood years. Eleven categories and three patterns emerged from the data. The patterns are, pattern of describing mental health concerns but not acknowledging it as a health problem, pattern of unfavorable cultural treatment of widows, and pattern of reliance on God for survival.

Conclusion and Implications: Widowhood cultural practices impacts health. Healthcare practitioners need to understand the meaning of health in this population to provide culturally congruent care. Knowledge gained from this study has the potential to inform nursing care decisions directed at early intervention that can improve healthcare outcomes.

Stress, Anxiety, and Depression Among School Psychology Graduate Students

Jeremy Armann

School of Education

Faculty Advisor: Cydney Quinn, Ph.D., NCSP

ABSTRACT:

The empirical literature on stress among graduate students in psychology is sparse and varied. El-Ghoroury et al. (2012) noted that psychology graduate students face several challenges that include academic, financial, and personal stressors in the pursuit of a higher degree. These factors can lead to increased levels of stress, anxiety, and depression, which places graduate students at risk of burnout (El-Ghoroury et al., 2012). A number of studies have observed significant associations between stress and burnout and reduced academic performance among undergraduates in different disciplines (Danoff-Burg et al., 2004; Gold et al., 1989; Hackett et al., 1992; Schaufeli, et al., 2002; Shields, 2001; Yang & Farn, 2005). However, little empirical evidence exists to support this same association between stress and burnout for graduate students in psychology. The purpose of our study is to identify self-reported levels of stress, anxiety, and depression that school psychology graduate students experience throughout their graduate studies. This was accomplished by utilizing a self-designed survey to reflect general trends regarding school psychologist's; a) current stress levels amongst school psychology graduate students b) student perceptions about their stress level in relation to graduate education training specifically and c) the specific causes of stress in school psychology programs.

Accuracy of DNA Phenotyping Using Next Generation Sequencing Technology

Paige Aymar

Bayer School of Natural and Environmental Sciences

Faculty Advisor: Pamela Marshall, Ph.D.

ABSTRACT:

DNA phenotyping is the science of predicting externally visible characteristics of a person from their DNA sample. By using next-generation sequencing (NGS) technology, predictions of the physical characteristics of a person are made. NGS, also known as massive parallel sequencing, has the capability to sequence millions of DNA fragments at a time. Although NGS and DNA phenotyping are quickly advancing in the field of forensic science, there is little research that can be found on how precisely the instrumentation performs. The question this study aims to resolve is how accurate this technology is at predicting these phenotypic traits. Verogen, a forensic science company, has created an NGS instrument, MiSeqFGx, that predicts hair color, eye color, and biogeographical ancestry (skin color) from a DNA sample. The MiSeqFGx gives exact predictions for hair and eye color based on the HirisPlex model, but it is to be noted that skin color prediction is based on biogeographical ancestry from 1000 genome data. Before the predictions are examined, the methodology for this research includes the following three main steps: library preparation, cluster generation and sequencing, and data analysis. Library preparation is lab-based and includes the extraction, quantification, and amplification of a DNA sample to prepare it for the MiSeq. Cluster generation and sequencing are performed by the instrument by setting up a run using the MiSeqFGX Control Software. The final step, data analysis, examines the sample summary which includes the samples STRs, SNPs, and phenotypic estimation using the ForenSeq Universal Analysis Software (UAS). A total of 12 samples were analyzed using the described NGS system to evaluate its accuracy and precision in predicting hair color, eye color, and skin color. The research is crucial in aiding in the advancement of DNA phenotyping for criminal investigations.

Keywords: DNA Phenotyping, Next Generation Sequencing, Forensic Genetics

Remembering and Forgetting Farm Labor in California: Public Art and Collective Memory of the United Farm Workers

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Faculty Advisor: Jay Dwyer, Ph.D.

ABSTRACT:

Memorials abound in American cities, but few memorialize laborers and labor movements. However, in California and the American southwest, the farmworker movement of the 1960s and 1970s is often memorialized in public art. This paper will evaluate these memorial artworks to understand how California communities collectively remember the United Farm Workers (UFW).

At a UFW board meeting at La Paz on February 25th, 1977, the fundamental divisions inside the United Farm Workers were laid bare. The meeting took place at the new UFW headquarters, Nuestra Senora de La Paz, which sat in the Tehachapi mountains, and geographically distanced Chavez from the UFW leadership working in the Salinas and Coachella valleys. At this meeting, a common argument resurfaced. This division is articulated by Chavez, who prompts his colleagues by stating, "The crossroads right now is, is it a movement or a union?" This striking quote foreshadows the divisions within the UFW that would eventually lead to the resignations or purges of almost all union leadership. These divisions and weaknesses are absent from farmworker memorial artwork and have only recently become the focus of historical study.

This paper aims to understand why so many memorials exist that heroicize Cesar Chavez and dignify farmworkers, even though many workers in California fields labor in only slightly better conditions than they did in the 1960s. In California's farmworker memorial landscape, Cesar Chavez is overrepresented and often misrepresented. He is implicitly credited with the union's successes, but no attempt is made to reckon with his complicated legacy. As a result of this focus on

Chavez, rank and file farmworkers, especially Filipino farmworkers, are drastically unrepresented. The failure to recognize the contributions of Filipino farmworkers represents a failure of both the original movement and a shortcoming in the historical study of the movement, which has overwhelmingly focused on Chavez and the social movement he created.

Synthesis of 1,2- Diamines as Versatile Building Blocks for Imidazolidines: A Potential Antibiotic Scaffold

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Faculty Advisor: Thomas Montgomery, Ph.D.

ABSTRACT:

Bacterial strains are becoming more and more resistant to commonly used antibiotics with medical professional increasingly relying on firebreak treatments for common infections. This drives the investigation and discovery of new antibiotic families regarding antimicrobial resistance. Imidazolidines are nitrogen-containing heterocycles that exhibit a wide range of bioactive properties, and have shown promising initial results as novel antimicrobials, making them attractive targets for additional study. Here we report that substituted silyl protected imines and tertiary N-oxides can undergo a [3+2] cycloaddition to efficiently synthesize imidazolidines in a three step one-pot reaction. A range of aldehydes have been converted into silyl imines and shown to be compatible with this chemistry. Moreover, imidazolidines are unstable to strongly nucleophilic conditions, allowing for their conversion into diamines which can then be recycled into a wide variety of highly substituted imidazolidines.

Characterization of blue and green chromoproteins in percid fishes

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Faculty Advisor: Brady Porter, Ph.D.

ABSTRACT:

Coloration plays an important role in communication, sexual selection, and speciation of fishes. Blue coloration in vertebrates is typically produced by structures that incoherently scatter light, however a true blue pigment has been discovered in a blue color mutant of walleye (*Sander vitreus*) found in Canada. Researchers named the walleye pigment Sandercyanin, a 21 kDa lipocalin chromoprotein that functions as a homotetramer, binding to the chromophore biliverdin IX- α . A similar pigment is found in other fishes in the family Percidae, in particular darters (*Etheostominae*). We predict the chromoproteins found in colorful species of darters are homologous to Sandercyanin. Here we focus on two species of darter, *Etheostoma caeruleum* (rainbow darter) and *Etheostoma blennioides* (greenside darter) which are common to Western Pennsylvania. Absorbance patterns measured in these darters showed an overall similar absorption profile to walleye but all three species showed variation in light absorbance associated with various hues of blue and green. Mass Spectral analysis confirmed that both darter chromoproteins bind biliverdin IX- α , just like Sandercyanin. We hypothesize that the evolution of darter pigments involves variation in the protein structure of this biliverdin-binding lipocalin. We attempt to amplify and sequence the gene coding for darter proteins to examine potential differences in the protein primary structure. Using BLAST searches and sequence alignment of Sandercyanin to darter genomes, we have developed PCR primers to amplify the DNA gene for the lipocalin apolipoprotein D. Sequence analysis indicates the gene size is around 1158 bp for *E. caeruleum* and 1173 bp for *E. blennioides*. Due to the size limitations of Sanger sequencing, additional internal primers were designed to sequence across the amplicon and build a contiguous sequence for the entire gene. Further analysis of these sequences will be needed to support or reject our hypotheses that darter apolipoprotein D is homologous to Sandercyanin and that coloration differences result from protein variation. Ultimately these data will contribute to our understanding of the evolution of pigments in one of the most colorful groups of freshwater fishes.

***Jean Witter and Betty Friedan: Grassroots Activism in Pennsylvania and the Federal Fight for the Equal Rights Amendment**

Kathleen Burch

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Faculty Advisor: Jennifer Taylor, Ph.D.

ABSTRACT:

Women's equality and what defines womanhood are two battles at the center of the fight for the Equal Rights Amendment (ERA). Despite the passage of individual state ERAs and the inclusion of the federal ERA in a majority of states, as a country, the United States has not ratified the ERA as a federal amendment. However, at the state level, Pennsylvania owes the state ERA to the local grassroots activism of Jean Witter and the Pittsburgh National Organization for Women (NOW) chapters. As an amendment, the ERA is associated with NOW members like Betty Friedan. However, local Pittsburgh activist Jean Witter was instrumental in getting the ERA passed in Pennsylvania among other states. My paper analyzes the relationship between local grassroots activism for women's rights compared to the more well-known women for and against the ERA. A comparison between Witter's success in getting the Pennsylvania ERA passed and Friedan's failure to get the federal ERA added as an amendment to the United States Constitution examines the differences in grassroots activism versus a top-down approach to leadership. Even though Witter and Friedan were acquainted, their strategies for the ERA proved different and resulted in outcomes impacting women depending on where they lived. In fact, Friedan's unsuccessful efforts resulted in Phyllis Schlafly's success. Like Witter, Schlafly was a lawyer and worked as a grassroots activist. The grassroots activism of Witter and Schlafly proved successful even though their goals were the opposite.

My research highlights the need to understand the effects of grassroots activism on women's rights. When analyzing organizations, such as NOW, it is crucial to understand Witter, Friedan, and Schlafly's successes and failures as a way to move forward with women's equality. Witter demonstrated how to rally women to fight for a cause. Friedan proved the exclusion of specific groups of women to be a hindrance to her struggle for the federal ERA. Schlafly exemplified how rallying women around her own morals and ethics helped her to win against Friedan. This research is vital to understanding how grassroots activism can help causes that we value as a society.

Black Girlhood in Pittsburgh's Gilded Age and Progressive Era

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ABSTRACT:

In 2019, The City of Pittsburgh Commission on Gender Equity released a report entitled "Pittsburgh's Inequality Across Gender and Race," which examined disparities between African American men, women, and children in Pittsburgh versus other racial groups. The findings in the report could be summarized by one line: "Black women and men in other cities have better health, income, employment, and educational outcomes, than Pittsburgh's Black residents." This statement included Black girls.

Previous reports yielded similar messages that Black girls in Pittsburgh faced multiple factors that endangered their health and welfare. In 2017 Gwen's Girls, an organization that "empowers young women to lead holistic lives", commissioned a report entitled: "Advocating for Equity for Black Girls: The Formation of the Black Girls Equity Alliance." The report found that fifty-five percent of Black girls lived in poverty in Pittsburgh compared to just fifteen percent of White girls.

The aforementioned information is bleak but is not new. While there is a renewed focus on Black girlhood and its outcomes for girls in the city, in the 19th and early twentieth centuries, African American girls faced these same struggles. That nothing has changed much in over 150 years in Pittsburgh, is a huge problem. Considering the

persistence of these issues, the lack of information in the historical record regarding Black girls lives in Pittsburgh prior to the millennium, and the absence of scholarship on Black history in the Progressive Era and Gilded Age period (1870-1910) in Pittsburgh, this paper will discuss Black girlhood in during that period examine how the issues Black girls faced were characterized in Pittsburgh media.

Cadaver Dogs and Handlers: Detection of Ancient Bones

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Faculty Advisor: Lisa Ludvico, Ph.D.

ABSTRACT:

Cadaver dogs are working dogs, often brought on search and rescue missions or to the scenes of potential crimes to help locate missing and deceased persons. They have also been used in an archaeological setting to locate ancient burials. This is because they possess a powerful olfactory, that can detect and recognize traces of scent that people cannot. In this research, five cadaver dogs were assessed by their ability to locate 3 human bones (femur, humerus, ulna) from Greece, dated around 580 A.D. This was done through a series of 5 trials, and it was predicted that they would be able to successfully detect the ancient bones in each one. As a control, 3 modern human metacarpals were used. To date, no research has been conducted and published to assess the precision, accuracy, and reproducibility of cadaver dog detections on ancient bones. This research has the potential to demonstrate those capabilities. It may also indicate if previously reported success at locating burial sites (where remains are in situ) was heavily influenced by the scents potentially trapped in the soil, or if human bones themselves still give off detectable scent after over 1,000 years.

Myelination and Lewy Body Pathologies: One Way Street or Reciprocal Link?

Rachel Clark

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Faculty Advisor: Rehana Leak, Ph.D.

ABSTRACT:

Lewy body diseases are a group of neurodegenerative disorders characterized by inclusions filled partly with aggregated forms of the protein alpha-synuclein. The two most common Lewy body disorders are Parkinson's disease (PD) and dementia with Lewy bodies (DLB). In patients living with PD, diffusion tensor imaging of white matter tracts suggests that Lewy body disease leads to loss of myelin integrity. Conversely, the degree of myelination may also determine neuronal vulnerability to Lewy body formation according to postmortem tissue analyses. Myelin is speculated to provide a physical barrier against the invasion of alpha-synucleinopathic aggregates, lower energy expenditure, and temper oxidative stress. In order to test for a reciprocal link between myelination and Lewy pathologies, we leveraged our mouse model of limbic Lewy body disease and postmortem tissues of the human olfactory bulb and amygdala. Male mice injected with preformed alpha-synuclein fibrils in the olfactory bulb displayed denser Lewy-like inclusions in the limbic system than females, and also performed worse in the buried food test for olfaction. We elicited partial demyelination of the olfactory bulb with dietary administration of the copper chelating agent cuprizone in male versus female mice infused with preformed alpha-synuclein fibrils or vehicle. Cuprizone reduced bodyweight in all groups as expected and lowered two myelin markers (myelin basic protein and proteolipid protein) in control mice of both sexes. Fibril-infused mice did not respond to cuprizone with additional loss of myelin basic protein or proteolipid protein, but experiments are underway to test the hypothesis that Lewy-related pathology is amplified by the cuprizone diet. In human postmortem tissues, the olfactory bulbs of men showed greater loss of myelin basic protein in response to Lewy body disease than the olfactory bulbs of women. Similar patterns were noted in male mice with experimental Lewy body disease in pilot work. These preliminary findings suggest that alpha-synucleinopathy may slightly suppress myelination in the olfactory bulb, perhaps contributing to loss of smell in Lewy body disease. Ongoing work will determine if demyelination worsens limbic alpha-synucleinopathy, revealing a possibly reciprocal loop between the degree of myelination and neuronal resilience against Lewy body pathologies.

***Access Towards Substituted Piperazines Using Mismatched N,N-Protected Diamides**

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Faculty Advisor: Thomas Montgomery, Ph.D.

ABSTRACT:

Nitrogen 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 community. Piperazines are an important class of nitrogen heterocycles, constituting the key structure of various high value compounds. Specifically, synthetic derivatives containing a piperazine core have been found to combat the elusive *A. baumannii*, a multidrug resistant (MDR) bacterium that causes a high number of nosocomial infections in hospitalized patients. Given the importance of the piperazine core, current methods for its formation are surprisingly limited. These methods typically require symmetric substitutions, high temperatures, and multiple steps to form the desired products. Herein, we present a palladium-catalyzed cyclization between substituted propargyl carbonates and functionalized diamides with two different N-protecting groups. The use of separate N-protecting groups enables selective, late-stage cleavage, advantageous for total synthetic routes of complex molecular targets. To complement our experimental findings, single crystal X-ray diffraction was implemented to aid in elucidating complex products. Given the aforementioned prevalence of piperazines as important synthetic targets, this work is relevant to both organic and medicinal chemists.

The Place for Architecture within Psychoanalytic Notions of Progress

Austin Cottrell

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Faculty Advisor: James Swindal, Ph.D.

ABSTRACT:

Melanie Klein's notion of progress as a forward-looking imperative requires a foundation from which to begin both the actualization and recognition of genuine social change. I argue that a symbolic interpretation of architecture can provide this ground. To accomplish this, I work through Amy Allen's article *Progress and the Death Drive* in order to establish Klein's notion of progress as distinct from Herbert Marcuse's regressive conception of progress. This distinction rests in an ambiguous reading of Freud's *Civilization and Its Discontents*, provided by Allen. After establishing key Freudian insights into social and historical progress and how Klein takes these up, I move to define architecture in a way that conceives of it as a tool with which a fundamental change in the psychical drive-structure can take place. From this, I utilize Leland Roth's *Understanding Architecture* to develop the notion of symbolic interpretation with reference to architecture. I conclude by asserting the transformative potential of architecture and, should this be dismissed, the latent function within architecture that allows for historical changes in the drive-structure to be observed in society's material edifices. The purpose of this investigation is to outline a theoretical foundation from which to actualize Klein's notion of progress. As such, the practical employment/impact of this method of interpreting architecture was not broached.

Teaching (Neuro)Psychoanalysis in Undergraduate Education: A Preliminary Analysis of Pilot Data on Teaching Dual-Aspect Monism and Mixed Methods Research

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Faculty Advisor: Derek Hook, Ph.D.

ABSTRACT:

Neuropsychanalysis is an interdisciplinary field that combines findings from the neurosciences with those of psychoanalysis. These are two disciplines that have traditionally not spoken to each other, with neuroscience prioritizing objective study of the brain and psychoanalysis privileging a subjective approach to the mind. However, there cannot be

one “mind” for psychoanalysis and a different “mind” for neuroscience. Neuroscience and psychoanalysis are two perspectives of the same part of nature.

Because of the traditional division between these schools, undergraduates typically encounter psychoanalysis and neuroscience in very different courses or learn about them as contrasting or incompatible approaches. As individuals advance in their careers, it can become more and more difficult to integrate these perspectives. Therefore, teaching neuropsychanalysis at an undergraduate level – when students are just encountering ideas in neuroscience and psychoanalysis – might have significant downstream effects on bridging these two fields and shaping the next generation of researchers, clinicians, and scholars.

An ongoing initiative has been the development of lesson plans for teaching neuropsychanalysis in undergraduate education. Qualitative and quantitative student feedback data allow an assessment of which pedagogical techniques are effective for teaching neuropsychanalysis and can improve lesson plans. Some of these lesson plans have been piloted in existing undergraduate courses in the psychology department. This poster reports preliminary analyses of these pilot data for teaching two concepts in neuropsychanalysis: dual-aspect monism and integrating qualitative and quantitative data. Specific pedagogical techniques that were significantly associated with inspiring interest and convincing students of these perspectives are discussed.

The Impact of Earthworm Activity on the Movement of Human DNA into Soil

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ABSTRACT:

After death, decomposition of the human body releases cellular contents into its surroundings. DNA has been shown to be influenced and ingested by other living things such as insects in the environment. Despite the advances in extracting and developing DNA profiles from insects, there has been no research on earthworms, an annelid that lives in soil and decomposes organic matter. This study determined the impact of the activity of the earthworm *Lumbricus terrestris* on the movement of human DNA into a soil burial environment as human tissue undergoes decomposition. Donated cadaveric flesh was placed into a loamy soil environment containing earthworms and allowed to decompose for one month indoors and five months outdoors. Samples of soil and earthworms were collected throughout these study periods. The Qiagen DNAeasy® Powersoil Pro and Qiagen Blood and Tissue Kits® were used to extract any DNA contained within the soil and earthworm matrices. The quality and quantity of the extracted human DNA was assessed using quantitative PCR. Samples of high enough quality and quantity were genotyped and compared to the profile of the flesh. It is anticipated that the presence of earthworms will impact the rate of DNA transfer into the soil. Through the earthworm’s interactions with the soil environment, it is predicted that they will retain and redistribute the DNA by passing it through their digestive tract. The earthworms were found to retain a quantifiable amount of human DNA, but the quantity and quality of this DNA was not suitable for downstream DNA processing. By understanding this interaction, this research can later be useful in identifying cadavers and associating cadavers with burial sites or be a proposal for an eco-friendly way to dispose of human remains.

***Co-delivery of Heat Shock Protein (HSP27) and Extracellular Vesicles Protect Ischemic Brain Endothelial Integrity in vitro for Stroke Therapy**

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Faculty Advisor: Devika Soundara Manickam, Ph.D

ABSTRACT:

Oxygen-glucose deprivation (OGD) during ischemic stroke leads to mitochondrial damage and disruption of tight junctions in brain endothelial cells (BECs) lining the BBB. The restoration of blood flow, and ischemia/reperfusion, further damage the BBB integrity leading to the infiltration of inflammatory mediators from blood to the brain

parenchyma. Therefore, protecting the BBB integrity is a promising approach to alleviate ischemia/reperfusion (stroke)-induced long-term neurovascular unit damage. Preclinical studies have demonstrated that the overexpression of 27 kDa heat shock protein (HSP27) in BEC elicits long-lasting protection against stroke-induced BBB disruption. Cell-derived extracellular vesicles (EVs) are intriguing carriers due to the presence of innate mitochondrial components and due to their lower immunogenicity. Our lab characterized two subpopulations of EVs. i.e. small EVs (sEV, particle diameter <200 nm) and medium-to-large EVs (m/IEVs, diameter >200 nm). In our previous studies, we determined that human brain endothelial cells-derived m/IEVs contain mitochondria and m/IEV-mitochondria transferred into recipient BECs. m/IEV-mediated mitochondria transfer increased recipient BEC ATP levels and mitochondrial respiration. Importantly, m/IEV-injected mice showed a reduction in brain infarct volume compared to vehicle-treated mice models of stroke.

In this research, we harnessed mitochondria-containing EVs and utilized mixtures of EV/exogenous HSP27 to preserve their tight junction integrity via HSP27 effects. We formulated binary mixtures of human recombinant HSP27 protein with EVs: EV/HSP27 and ternary mixtures of HSP27 and EV with cationic polymer poly (ethylene glycol)-b-poly (diethyltriamine): (PEG-DET/HSP27)/EV. We characterized HSP27 interactions with EVs using native polyacrylamide gel electrophoresis and determined their particle diameters and surface charges using dynamic light scattering. The cytocompatibility of EV/HSP27 mixtures was determined using a cell Titer glo-based ATP assay. We measured the paracellular permeability of 4.4 and 65-85 kD TRITC-Dextran to evaluate the effect of (PEG-DET/HSP27)/EV and EV/HSP27 pre-treatment on the diffusion of a small molecule-mimic across primary HBMECs during ischemia/reperfusion conditions. EV/HSP27 binary mixtures showed a prolonged decrease in the paracellular permeability of small and large molecular mass fluorescent tracers during OGD and OGD/reperfusion conditions compared to OGD control and native HSP27 alone.

In conclusion, EV/HSP27 mixtures were cytocompatible and protected tight junction integrity in ischemic BECs.

Knowledge and Self Efficacy Regarding School Based Services for Children with RYR-1

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ABSTRACT:

Research has indicated that there is an increased prevalence of children who have chronic and complex health care needs attending public schools (Singer, 2012). Not only is there an increase in children with disabilities, there are also advances in medical technology and health care that are integrated into school systems without appropriate training for teachers and practitioners (Singer, 2012). The Individuals with Disabilities Education Act (IDEA) indicates that children with disabilities and complex health care needs must be educated with their nondisabled peers in the least restrictive environment. IDEA was designed to ensure that children with disabilities are provided with free and appropriate public education services in the school setting (U.S. Department of Education, 2010). However, many school staff, particularly school nurses and teachers, report a lack of preparation and training to support children with complex health care needs (Singer, 2012; West et al., 2013). School system personnel also indicated limited experience communicating effectively with parents, other medical professionals, and working students with complex medical conditions. In order to best serve children with disabilities, schools provide Individualized Education Programs (IEP). Parents are required to be a part of the planning process to best implement a plan that will provide the child with appropriate services in school. Research supports that increased parent participation leads to positive outcomes for children with complex needs, including higher levels of parental satisfaction, more effective strategies for resolving problems, and positive outcomes for intervention programs (Underwood, 2010). This study looked to identify the level of training needed for conference participants to support their self-efficacy when advocating for their children within schools. Additionally, this study looked to examine how to increase parental involvement in Individualized Education Programming in hopes of contributing to the literature regarding the best ways to educate this parent population.

An Ottoman Muslim in Queen Elizabeth's Court: How Royal Court Language Enforced English Identity

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Faculty Advisor: Jotham Parsons, Ph.D.

ABSTRACT:

The Tudor Period of British History has often been characterized as one of redefinition for the people of England. The destructive War of the Roses had ended, yet the social and religious challenges had just begun. The Reformation prompted battles and internal strife over religion and identity, dividing the country more than the political alliances of the War before it. The 16th and 17th centuries also saw major reshuffling of the European political map, leading to new alliances and new relationships with the Muslim world. How the royal court presented itself to the world thus became an even greater challenge for the Tudor monarchs.

In looking through the foreign correspondence, sovereign papers, petitions, decrees, and calendars of state foreign papers of these English monarchs found in the British National Archives and British History Online, a duality presents itself concerning the treatment of Muslim, specifically those from Africa and the Middle East. While religion can cross many national and ethnic boundaries, the efforts of the Tudors to suppress and expel Muslims had a particular racial element to it. At the same time, monarchs like Elizabeth I continued to court favor and seek trade relations with the Ottomans and Persians. By continuing to dig deeper into these sources, I seek to explore the relationship between the political realities of the world the Tudors lived in and the identity the monarchy sought to impose upon their country. In doing so I will be answering questions of how the English royal court related and interacted with Muslim courts and those living in England, what their language reveals about their motivations, and how those reveal an ideological basis for their actions devoted to creating an identity distinct from both mainland Europe and the Muslim world.

Revisiting the CSI Effect: Has the Popularity of Crime Media Changed Anything?

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Faculty Advisor: Lyndsie Ferrara, Ph.D.

ABSTRACT:

CSI: Crime Scene Investigation, NCIS, Forensic Files, 48 Hours, these are all television programs with a focus on forensic science and crime investigation. While two of these shows (Forensic Files and 48 Hours) focus on real crime stories, CSI and NCIS are dramatizations of the world of forensic investigations that have led to the idea of a phenomenon known as the "CSI Effect." This phenomenon is commonly defined as jurors being influenced by shows like CSI and the portrayal of forensics leading to more acquittals when evidence is lacking. Prior research has shown no existence of a CSI Effect, but this research aims to see if crime media sub-genre watching (true crime versus crime dramas) has an impact in juror verdict decision making or evidence expectations. Additionally, this research investigated the impact of the CSI effect on criminal justice practitioners as prior research has not been thoroughly investigated in this aspect.

A House Divided: The Challenge of a Catholic Morality in a Pluralistic Society through the Lens of the Art of Dying

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Faculty Advisor: Joris Gielen, Ph.D.

ABSTRACT:

The Catholic Church of today is a far different entity compared to the early organized Church of the early Medieval Ages with strong development of unique interpretations of the Catholic faith. One arena this phenomenon is becoming slowly more apparent in is with the case of End-of-Life medicine. Over recent decades, communities around the world have legalized and normalized physician assisted death in multiple forms. Notable inclusions of these are Canada and Belgium. Canada is of significant mention as it has recently pushed forward in trying to get all of its practitioners to be

some form of cooperative in assisted death through effective referrals. Belgium is of note as there was a Catholic healthcare system that determined it was morally permissible to participate in assisted death under the Belgian law. These two cases will be the backdrop for this essay as they will be repeatedly utilized to illustrate the case of a diverse Catholic society around the world. Furthermore, these cases will be useful in illustrating this essay's goal of developing a more organized model of the Catholic moral principle of cooperation. This essay aims to detail how Catholicism faces challenges in the current pluralistic society at-large, especially when compared to the medical institution that has a rather specific understanding of medicine compared to Catholic medicine. This essay will also detail the concept of humble cooperation as part of a novel application principle of cooperation and its implied spectrum of cooperation.

***Do Adolescent Patients Have a Right To Be Informed About Fertility Preservation Options By Virtue Of the Convention on the Rights of the Child?**

Giulia Adele Dinicola

McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Gerard Magill, Ph.D.

ABSTRACT:

The 1989 United Nations Convention on the Rights of the Child not only states that children should be heard in matters of their concern according to their age and maturity, but also that children should have a right to have access to information. However, when it comes to medical indications, a consensus has not been reached whether parents should disclose healthcare complications to their adolescent child. The American Academy of Pediatrics encourages discussions with children and adolescents about their diagnosis and treatment. They also justify parents who decide not to involve their child either in the discussions, or in the decision-making process. Adolescent disclosure becomes even more controversial when related to non-lifesaving procedures. In the United States, one child in 285 children is diagnosed with cancer every year, but thanks to improvement in medicine, the likelihood of survival has dramatically improved. However, cancer treatments, such as chemotherapy and radiation, are likely to affect their fertility later in their lives, diminishing their ability to become genetic parents. To circumvent this risk, preventive medicine offers procedures, such as fertility preservation through ovarian tissue cryopreservation, that allows female adolescents to retrieve and cryopreserve their ovarian tissue. Once reimplanted into the abdomen, this procedure has the potential to restore fertility. However, in order to provide this option, parents of female patients should give consent for a non-lifesaving procedure that carries minimal risk to obtain their ovarian tissue. Nevertheless, if parents decline either disclosure, or discussions, these patients will have this possibility denied. As demonstrated by articles that have shown the impact of infertility on sexual well-being and happiness in adults, these patients may experience depression, anxiety, and lower self-esteem at a higher rate. By virtue of Article 17 of the Convention on the Rights of the Child, this paper aims to investigate if adolescents have a right to obtain information, not only through mass media, but also from their parents when disclosure "aims at the promotion of his or her social, [...] well-being and physical and mental health" and if being informed is within their best interest taking into consideration their age and maturity.

The Hermeneutics of Nudging: The Reciprocity Between Transhumanism and Nudging

Ian Doherty

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Faculty Advisor: Gerard Magill, Ph.D.

ABSTRACT:

This paper investigates and evaluates the implications of nudging someone toward transhumanism. Transhumanism offers a path to alleviate suffering and transcend our physical and mental limitations. Transhumanist technologies consist of alterations like genetic modification, neural implants, and molecular nanotechnology. These technologies are meant to give people full morphological freedom over their bodies. Although transhumanism remains a largely unknown movement, this is where nudge theory can help raise its prominence. Nudge theory aims to help people make better choices, and aid them in making better decisions related to their health and lifestyle. If paired correctly, transhumanism seems to be a perfect option to live a life free of suffering and physical ailments. However, we should be cautious about

this union. This partnership would nudge people toward an ideal body that further condemns conditions like physical and mental disabilities. Further, epistemological concerns arise from the perspective of whether a proposed nudge will actually address an individual's true need. Instead, the individual may need psychological counseling or a behavioral change. Transhumanism and nudging raise questions about our obligations to one another. Each of them challenges our deep-seated interdependent nature, in favor of elevating the individual above the community. The direction we want to nudge them is loaded with presuppositions and faulty assumptions about how we perceive health and well-being. We ought to consider what nudging someone toward transhumanism says about what we, as a society, value. Nudging someone toward a particular option extends beyond the clinical encounter and signals that certain choices and lifestyles are suboptimal. The nudge itself may rob an individual of the opportunity to undergo self-interpretation to understand what they value and need in life.

Impacts of the Environmental Microbial Species Pool on the Microbiota-Gut-Brain Axis in Larval Amphibians.

Kyle Emerson

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Faculty Advisor: Sarah Woodley, Ph.D.

ABSTRACT:

Microbes present in the immediate local environment at birth/hatching are the first to colonize the vertebrate gastrointestinal tract and form the gut microbiota. The gut microbiota participates in a symbiotic relationship with the host that influences many aspects of physiological development, including neurodevelopment through the microbiota-gut-brain (MGB) axis. Investigations of the MGB axis have found that manipulations of the host's gut microbiota, particularly in early stages of development, can impact neural signaling pathways associated with cognitive and behavioral impairments. Here, I investigated whether manipulating the environmental microbial species pool impacted relative brain size, relative brain shape and behavior in newly hatched Northern Leopard Frog tadpoles (*Lithobates pipiens*). Amphibians are an excellent model to study the impacts of environmental factors on the gut microbiota because they develop completely in the external environment. Further, investigations into the MGB axis in ectothermic vertebrates remains a pertinent knowledge gap. I hypothesized that microbes present in the local environment during early development will impact brain development and behavior in tadpoles. I raised tadpoles in sterilized lab water seeded with 25% natural pond water, or 25% autoclaved natural pond water to reduce the abundance and diversity of microbes present in the local environment. Tadpoles raised in autoclaved natural pond water had relatively larger brains, relatively narrower medullas, and decreased locomotory activity in response to novel stimuli. These results support my hypothesis that the microbes present in the local environment impact neurodevelopment and behavior in a larval amphibian model.

Educational Delinquency and Curriculum Reform in SouthWest Nigeria

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Faculty Advisor: Nandini Bhowmick, Ed.D.

ABSTRACT:

The establishment of a standard education system in Nigeria would be a dream come true and a way to give back to the community and ensure the future growth of students and education practitioners. The reform aimed at redefining and restructuring the system of education in Southwest Nigeria to make education effective and efficient in the life of the people, the region, and the country. The vision is of an educational system that puts the students, the graduates, the region, and the country on the developed map of the world. The focus of this reform is on the southwest region of Nigeria. A significant percentage of Nigerian youths in this region are educated and yet unemployed. In the education sector in general, the southwest region is doing better than the national average as regards access, retention, and learning according to the Nigerian population commission. The southwest region of Nigeria is mainly dominated by Yoruba (Tribe) people. The states in the southwest are Oyo, Osun, Ogun, Lagos, Ekiti, and Ondo states. These states

take up about 22% of the national population and a large portion of dependency on the education system. These states contain the highest population of learners within the education system of the country. However, most especially in southwestern Nigeria, the percentage of educated but unemployed Nigerian youths is alarming. It is a problem of the Nigerian education sector that graduates, after fulfilling the requirements stipulated by certain academic or technical training institutes are unable to find relevant, developmental, and befitting employment in their country. Beyond the general observation that the government refuses to employ the youths while older and less productive people take the mantle of control and effects, many of the southwestern Nigeria youths are not employable due to the kind of education they received.

Drug Detection in Surgical Masks Using Paper Spray Ionization: Mass Spectrometry with a Simulated Breathing Apparatus

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Faculty Advisor: Michael Van Stipdonk, Ph.D.

ABSTRACT:

Controlled substance and toxicology cases make up an alarmingly large portion of backlogged requests in the United States. This issue proclaims the need for a time-efficient method in drug testing and illicit substance detection. Testing breath excretion through breath condensate analysis in surgical masks provides a non-invasive, inexpensive, and quick testing method to accurately determine drug presence. Breath condensate analysis, an underdeveloped area of research in forensic science, has the potential to quicken the controlled substance analysis processes while exposing the field to a novel type of evidence for investigations. A Simulated Breathing Apparatus (SBA) was constructed to deposit drug solution aliquots onto surgical masks. These samples were tested through Paper Spray Ionization – Mass Spectrometry (PSI-MS) to determine a drug identity from simulated breath condensate. Illicit substances (cocaine, methamphetamine, alprazolam, cannabinoids and MDMA) were detected through PSI-MS by comparing experimentally collected spectra to collision-induced dissociation (CID) reference fragmentation pathways to determine substance identity. Multiple mask types (standard disposable face masks, N95 respirators and homemade cloth masks) were tested and displayed accurate results despite changes in mask material. After determining drug identity through PSI-MS, quantitative results of the experiment were collected via Liquid Chromatography – Triple Quadrupole – Mass Spectrometry (LC-QQQ-MS). After the extraction of deposited drug material into a liquid analyte, LC-QQQ-MS results signified that drug species can be quantified accurately and precisely in physiological amounts. This experiment, which involved minimal sample preparation, portrayed both targeted and non-targeted capabilities in mass spectral testing of controlled substance and toxicological evidence in artificial breath condensate samples. Ultimately, surgical masks hold value in forensic investigations due to the breath condensate in which they contain for drug-related criminal investigations.

America's Court System through the Lens of a Pandemic: The Past, Present, and Future Adaptations

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Faculty Advisor: Lyndsie Ferrara, Ph.D.

ABSTRACT:

In March of 2020, the courts shut down, along with the rest of the world. During this unprecedented time, figuring out a way to continue with legal proceedings was a difficult feat that each court did independently, without universal guidelines. Prior to the pandemic, the court was extremely slow to make changes, but the pandemic forced many quick changes along with significant investment into new courtroom technology. These significant changes are important to document and analyze. The goal of this research was to collect firsthand accounts of court adaptations and operations throughout the pandemic. Interviews were conducted with various professionals within the court system - at the state criminal courts - to gather information on their experiences during the pandemic. Documenting how the courts adapted

is important for future events that may also require virtual court as well as for analyzing if what was changed was effective and fair.

***Understanding Self-Reported Patterns of Home Program Adherence in People With Acquired Brain Injury**

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

ABSTRACT:

In rehabilitation after acquired brain injury (ABI), it is common clinical practice to provide patients with a home program of exercises or activities to be completed independently after discharge from inpatient services or during outpatient treatment. The intended purpose of these rehabilitation home programs is to extend therapy to support enough practice to achieve neurological change and improve outcomes. However, individuals post-ABI have reported low adherence to their assigned rehabilitation home programs. Therefore, the research objective is to determine factors that predict adherence to rehabilitation home programs by persons with ABI once discharged from an inpatient rehabilitation facility. The findings from this study aim to assist rehabilitation therapists in providing additional support for adherence to rehabilitation home programs. Participants were recruited through an inpatient rehabilitation facility, Encompass Health. After completing informed consent and HIPAA forms, participants were screened for study eligibility. To be included in the study participants had a diagnosis of an ABI, be between the ages of 18-85 years, speak English, be their own medical power of attorney, be assigned an individualized home exercise program, and have a planned community discharge. Exclusion criteria include a diagnosis of a progressive condition, or impaired cognition determined by chart review or clinical assessment. If eligible, prior to discharge we completed a short interview to determine the participant's understanding of the assigned program and complete a modified Self-Efficacy for Exercise Scale. We gathered information on the medical history and assigned program from the chart. After discharge we followed participants for six months. Once a week, participants were contacted via phone, text, or email to complete a ten-question survey. As data collection is still being collected, we will present a preliminary descriptive analysis of the participants who have completed the protocol. This analysis will explore the perceived self-efficacy regarding home program completion at discharge, self-reported practice adherence across time, and reported barriers to the use of home practice programs. Understanding these descriptive patterns will support future research and clinical practice around the implementation of rehabilitation home program support.

***Counselor Self-Efficacy Utilizing a Trauma-Informed Approach**

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Faculty Advisor: Tammy Hughes, Ph.D.

ABSTRACT:

Children exposed to adverse childhood experiences (ACEs) is so pervasive that it has been identified as a public health epidemic in the US. Given that most children receive mental health care in schools, schools have been identified as a place for delivering needed support to children. However, school personnel, and counselors in specific, indicate that they are not prepared to address ACEs, especially the five categories that are considered a trauma. To help schools serving high rates of ACEs exposure, consultation is necessary to allow for the professional competencies required for trauma-informed care and skills. In one alternative school that serves high school youth who have experienced trauma and are at risk of entering the juvenile justice system, the principal sought guidance on incorporating a trauma-informed approach into their counseling program. Using a consolation model aimed at improving the counselors' skill set, three counselors received bi-monthly support in advancing their professional skills in trauma intervention. These counselors used The National Child Traumatic Stress Network – 'Complex Trauma: A Guide for Youth and Those Who Care About with 20 students. Using a pre-post design, a) counselors' knowledge of addressing and treating trauma in the school setting was measured via a Trauma quiz; counselor's feelings of self-efficacy were also measured to determine their beliefs in being successful in this task, b) student's knowledge of trauma and its impact on their physical and mental

health was tested using a Trauma quiz. Counselor knowledge and self-efficacy and student progress are presented in this poster. Recommendations based on stakeholder feedback are provided.

Keywords: trauma, complex trauma, trauma-informed care in schools, counselor self-efficacy, consultation

Development of a Conserved Semenogelin I and II Epitope for Semen Identification with Respect to Allelic Variation

William Gibbs

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

ABSTRACT:

Seminal fluid is a source of biological evidence used for DNA analysis. Semen identification may be difficult in many instances, such as sexual assault cases. Accurate identification of semen is crucial for proper evidence storage and preservation, a necessity for DNA analysis techniques. The highly abundant semenogelin proteins are used as a marker in the Rapid Stain Identification Series (RSID) semen assays. There are currently no readily available studies analyzing the effects of allelic variation on semen detection assays. Therefore, semenogelin I (SEMG1) and semenogelin II (SEMG2) known allelic variants were computationally analyzed. Analysis was performed using publicly available databases of human genome allelic variants. The data were used to identify an optimal peptide fragment (LJG fragment) that was conserved in both SEMG1 and SEMG2, with little known variation. LJG was assessed with the currently used epitope, the SPMI fragment. The analyses determined that LJG was a more effective epitope to minimize false negative results due to allelic variation. The LJG fragment was cloned and expressed in an E. coli system by fusing the desired fragment with maltose-binding protein on the amino terminus and a hexahistidine tag on the carboxy terminus. Affinity chromatography was used to purify the expressed LJG fragment. The fragment was then prepared for antibody production of the ideal epitope for SEMG1 and SEMG2. This study showed a more reliable epitope can be produced for the monoclonal antibody-based semen assays and recommends new antigens be produced for SEMG1 and SEMG2 detection. Application of this epitope may increase the accuracy and detection of monoclonal antibody-based semen assays, improving semen identification techniques.

Understanding Registered Nurses' Values, Beliefs, and Experiences of Ethical Practice: A Mini-Ethnonursing Study

Katherine Goodman

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Faculty Advisor: Rick Zoucha, Ph.D.

ABSTRACT:

Purpose: The purpose of this mini study is to understand registered nurses' values, beliefs, and experiences of ethical practice.

Research Question: What are registered nurses' values, beliefs, and experiences of ethical practice?

Background: Ethics have been understood as important to nursing practice from the inception of the profession. Today's nursing professionals continue to face ethical decisions as they navigate changing technology and increasingly complex relationships with patients, families, and members of the health care team.

Method: This mini study was guided by the ethnonursing research method and utilized a semi-structured interview for data collection. Data was analyzed using Leininger's four phases of data analysis.

Results: Three informants (ages 34 to 65), currently working as registered nurses participated in one 45–60-minute Zoom™ interview. Interview data was analyzed, coded, and classified into 10 categories. Further scrutiny of the data elicited a pattern of persistently attempting to overcome barriers in collaborative care. The pattern was shown in the experiences of the nurses, demonstrating by the value they placed providing the care they believed they ought to

provide. However, the care was sometimes, only attempted, due to difficulties related to inadequate staffing and dysfunction in professional collaboration and communication. No themes were explicated due to the small sample size. Conclusion and Implications: The data revealed the value the informants placed on providing care. Further study with a larger sample size is needed to better understand nurses' values, beliefs, and experiences of ethical care. Additionally, research is needed to understand the barriers and into how to support nurses' development and provision of ethical care.

Characterization of Type I secretion in *A. bogorensis* for paratransgenesis

Marisa Guido

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Faculty Advisor: David Lampe, Ph.D.

ABSTRACT:

Malaria is a global health burden and deadly vector-borne disease. In 2021, approximately 247 million cases and over 600,000 deaths were reported due to malaria[1]. Plasmodium parasites are transmitted through the bite of infected female Anopheles mosquitoes, and are the causative agent of malaria. Despite widespread usage of insecticide-treated bed nets, indoor insecticide spraying, and artemisinin combination therapy, malaria cases continue to rise. New preventative measures are needed to combat Plasmodium infection. One such strategy, called paratransgenesis, uses the native mosquito microbial symbionts to secrete antiparasite molecules, therefore killing the parasite within the mosquito and preventing the mosquito from becoming infective. *Asaia bogorensis* is a Gram-negative bacterium, and common symbiont within Anopheles mosquitoes with several characteristics that are beneficial for paratransgenesis[2, 3]. Paratransgenic strains of *A. bogorensis* have been successful at reducing Plasmodium oocyst burden when secreting the antimicrobial scorpine, using Type II bacterial secretion[4, 5]. However, these transgenic strains also exhibited fitness costs such as higher cell death and slower growth rates when compared to wildtype *A. bogorensis*[6]. We believe these fitness costs can be alleviated by using Type I bacterial secretion signals, as Type I secretion bypasses the periplasmic space in Gram-negative bacterial to directly export the substrate outside of the cell. Type I secretion in *A. bogorensis* is not well characterized, but through the use of an online tool called BastionHub, we were able to identify potential Type I secretion signals[7]. We have generated transgenic strains of *A. bogorensis* capable of secreting scorpine with Type I signals. These constructs can be used to continue designing paratransgenic systems that do not negatively impact the fitness of *A. bogorensis*

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Engaging the Community: Commemorating Pittsburgh Sports History

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ABSTRACT:

In the latter half of the twentieth century, the Pittsburgh community formed an identity around the success of the championship Pirates, Steelers, and Penguins teams. As a result, Pittsburghers sought to commemorate the greatness of their sports teams. Two of Pittsburgh's most significant commemoration projects involve the preservation of the Forbes Field Wall at the site of Bill Mazeroski's 1960 World Series walk off homerun and the Immaculate Reception Monument's commemoration of Franco Harris's Immaculate Reception that led the Steelers to their first ever playoff win in 1972. This presentation will analyze the commemorations of both these events including the process, the level of community involvement, and why the commemoration mattered to the Pittsburgh community. After examining these projects, I explore how they can influence a contemporary commemoration of Pittsburgh sports in a theoretical project dedicated to the late Steelers color commentator, Myron Cope, and his creation of the "Terrible Towel." By proposing a contemporary commemoration of Pittsburgh sports, I will demonstrate the significance of allowing the community to decide who or what should be commemorated and how the project should be implemented.

This presentation is based on a research base of local Pittsburgh newspapers, the Society of American Baseball Research's annual journal, and national sports media reports about Pittsburgh's sports commemorations. These sources analyzed through the lens of Dolores Hayden's *The Power of Place* (1997) that argued for the necessity of community involvement in preserving the urban built environment. This research was completed three weeks before the passing of the Steelers' Franco Harris. Therefore, I will expand upon commemorations of his famous "Immaculate Reception" play by examining the play's meaning following his death.

The Comparative Extraction and Identification of Illicit Compounds from Baked Edibles Using Paper Spray Ionization – Tandem Mass Spectrometry (PSI-MS) and Liquid Chromatography – Triple Quadrupole – Mass Spectrometry (LC-QQQ-MS)

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ABSTRACT:

Complex baked edible matrices have become more common methods of consumption for illicit substances like MDMA and methamphetamine, but there is a lack of research regarding the rapid detection of drugs contained in baked edibles. The existing research for extracting substances from edibles focuses on cannabis, and the developed extraction methods for this application are complex and require multiple extractions to obtain a prepared sample.

To fill this gap, cookie dough was spiked with varying amounts of phenethylamine, which is a structural precursor to MDMA and methamphetamine. The cookies were baked, and the phenethylamine in each cookie was extracted using the QuEChERS (Quick Easy Cheap Effective Rugged Safe) solid phase extraction method and detected using both paper spray ionization-tandem mass spectrometry (PSI-MS) and liquid chromatography-triple quadrupole-mass spectrometry (LC-QQQ-MS). The QuEChERS method, although not typically used for baked edibles, isolated the illicit compound from a complex matrix to allow for accurate detection of the compound. PSI-MS is a recent ambient ionization method that has produced accurate quantitative and qualitative data for drug detection studies, and it was compared to LC-QQQ-MS, which is the gold standard for drug detection studies. For PSI-MS analysis, the QuEChERS supernatants were analyzed using the Thermo Scientific LTQ-XL Linear Ion Trap Mass Spectrometer for the presence of phenethylamine, which was confirmed through collision induced dissociation. The same optimized QuEChERS method with an additional filtration step was used to obtain supernatants for LC-QQQ-MS analysis. The Agilent 1200 Series LC Stack and Agilent 6460 Triple

Quadrupole Mass Spectrometer were used to detect phenethylamine in each sample using an optimized LC-QQQ-MS method. The detection methods were compared in their sensitivity of detection and time-effectiveness.

Foregrounding Youth Voice: Youth Led Research

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ABSTRACT:

The Duquesne Youth Advocacy Fellowship supports teens in learning about their communities through research and disseminating findings to impact audiences of their choice. During summer 2021, seven high school-aged youth enrolled in the Fellowship during a summer camp for girls. They were trained in ethical research methods, sampling, and survey development. They proceeded to create and recruit for their survey on youth educational experiences during COVID-19. In summer 2022, five campers returned and participated in the Fellowship as leaders. Returning youth provided feedback to improve processes for this year's campers and received training on encouraging others to speak and guiding conversations. With assistance from the leaders, the campers decided to build upon the previous year's COVID-19 research. They developed a survey regarding the transition from virtual to in-person school aiming to capture disruptions in relationships, academics, and wellness.

This project explores the effectiveness of methods used in the Fellowship to increase student voice. While the output of the research is of primary importance to the youth, our purpose is to evaluate the training experience: engagement, learning, and agency of campers to create measures meaningful to them. Results suggest youth reported growth in their learning and confidence in research methods as demonstrated by statistically significant survey results. Qualitative data show youth valued the Fellowship as it provided an opportunity to expand knowledge on research, engage with and benefit their community, socialize and collaborate with peers, and build college applications. Implications for community-engaged participatory research projects for youth-led research are further discussed.

DNA Analysis of Human Tissue Leaching from Different Soil Depths

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Faculty Advisor: Pamela Marshall, Ph.D.

ABSTRACT:

Decomposition occurs in every living thing after death. It can be a great determiner in the forensic sciences as it helps in determining the time a person or living thing had died, based on factors such as soil composition changes and environmental factors.¹ Decomposition can become more complex when an individual is buried underground.² Environmental factors such as weather, temperature, and location, may have different impacts depending on the depth of soil. When a body is buried, the DNA will leach into the surrounding soil at a rate determined by the depth and these outside factors.

This rate of DNA leaching at various depths is relatively unknown due to the lack of research. In the forensic science community, analyzing the DNA leaching from the soil at various depths can be beneficial in a multitude of ways. DNA leaching can help specify the post-mortem interval (PMI), determine the location of a body, or identify if a body was buried in an area and moved to another location. Given there are methods to find a body buried underground, such as ground-penetrating radars and cadaver dogs, there are not many ways to determine the length of time or confirm if a body was buried and moved. Determining the rate of DNA leaching from different depths in northwest Pennsylvania over a year can be beneficial in understanding how fast DNA can spread at different depths.

In this study, human tissue was obtained from a forearm belonging to a 55-year-old man that was freeze-thawed once. The amount of DNA leached into the surrounding soil will be analyzed by burying the tissue samples at 4 feet, 2 feet, and

1 foot, using loam soil and grow pots. The soil will be collected 4 times (1 month, 3 months, 6 months, and 9 months) using a 4-foot coring device and placed in individually labeled manila envelopes. The DNA will be extracted using the DNeasy Power Soil Pro-Kit and quantitated using qPCR. The soil microbe will also be analyzed using the Model EM Soil Test Kit.

***Investigating the Role of the Integrator Complex During HSV-1 Gene Expression**

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Faculty Advisor: Jill Dembowski, Ph.D.

ABSTRACT:

Herpes simplex virus type-1 (HSV-1) is a ubiquitous pathogen that infects the majority of the human population. We previously identified cellular proteins that associate with the HSV-1 genome during infection and predict that these contribute to key viral processes. One protein group of interest is the Integrator complex, which associates with the HSV-1 genome throughout productive infection. In uninfected cells, this complex regulates the transcription elongation of protein-coding genes and termination of coding and non-coding RNAs produced by RNA polymerase II (Pol II). Certain Integrator subunits can also act outside of the complex, performing independent, essential cellular functions. We hypothesize that the Integrator complex plays a key role in Pol II mediated transcription of HSV-1 genes. To study the function of the Integrator complex during HSV-1 infection, we have generated a human fibroblast cell line that can be induced to express shRNAs targeting Ints3. Ints3 is an Integrator complex subunit that contributes to transcription regulation of eukaryotic genes, as well as moonlights to facilitate the repair of damaged DNA. We found that when cells are subject to Ints3 knockdown, viral yield is significantly reduced when compared to the yield from a non-targeting shRNA control. Additionally, we examined the expression of key viral genes in the presence of knockdown through western blotting. This revealed that the expression of the HSV-1 transcription factor, ICP4, and the single stranded DNA binding protein, ICP8, were reduced at 2 and 4 hours post infection. These data support our hypothesis that the Integrator complex contributes to HSV-1 infection and begins to characterize the role that it plays during the infection process. Currently, we are conducting direct RNA sequencing experiments using Nanopore technology to specifically understand how Ints3 knockdown alters HSV-1 transcription of coding and non-coding viral RNAs.

Innovative Route to Potential Antibiotic Cores via 1,2-Diamines

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Faculty Advisor: Thomas Montgomery, Ph.D.

ABSTRACT:

In 2020, the World Health Organization listed antibiotic resistance as one of the biggest threats to global health today. As a result the need for rapid access to new drug targets has become more apparent. Nitrogen containing heterocycles are privileged structures known to exhibit an array of bioactivities including antimicrobial properties. We have developed a method that provides access to these compounds from simple building blocks via a [3+2] cycloaddition between silyl imines and tertiary amine N-oxides to form imidazolidines. These can then be hydrolyzed to form 1,2-diamines, which are valuable synthetic building blocks. New functional groups can then be installed by cyclizing these 1,2-diamines into 2,4-dihydro imidazoles, a common core found in various drugs.

***Continuous Granulation Screening Study Results via Principal Component Analysis of Granule Size Distributions**

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ABSTRACT:

As the pharmaceutical industry pursues continuous manufacturing (CM), unit operations which are not inherently continuous require novel equipment. Wet granulation is a desirable CM unit operation due to the inability of direct compression to overcome specific formulation challenges (e.g. poor flow, low tabletability). Novel continuous wet granulators require intense development efforts to provide an appropriate level of process understanding, which is necessary before implementation. While many granule size metrics are important for thorough characterization, granule size is a direct indicator of success in granulation processes. Size measurements provide granule diameters, which are typically compiled to build a granule size distribution (GSD). Additionally, percentile values referred to as d-values are used to describe the general trends in granule size change. For well-characterized processes, d-values are appropriate and have been applied in the context of process control. In the development stage, however, d-values do not capture the entirety of the information surrounding granule size change. Analysis of the GSDs has the potential to provide an increased level of process understanding. Traditional GSD analysis is performed by visual comparison, which is helpful when there is a drastic change in the GSD shape but does not provide the intricate information required for process development. Quantitative analyses, such as principal component analysis, treat the GSDs as multivariate data. In this investigation, PCA is used to analyze GSDs from multiple parameter settings calculated with a screening study. The d-values are analyzed alongside PCA to highlight the differences in the analyses as well as the potential for differing results. The principal component (PC) loadings help to visualize the variance captured by each PC. The PC scores are plotted, highlighting the transformation of GSD shape as process parameters are changed. Finally, screening results based on PC scores and d-values are compared. Overall, PCA is demonstrated as a reliable data analysis approach for GSDs, providing more information than d-values and increasing the level of process understanding gained through development efforts.

Assessing the Role of Exogenous Melatonin in Modulating the SIRT1, LMO3 & SMAD4 Protein in Transgenic Mice Model To Understand Its Role in Musculoskeletal Disorders

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Faculty Advisor: Paula Witt-Enderby, Ph.D.

ABSTRACT:

A decline in bone and muscle health during musculoskeletal disorders is primarily related to fat accumulation in muscle (myosteatorsis) & bone marrow cavity. Melatonin has been investigated as a potential therapeutic intervention to improve musculoskeletal health in adults due to its ability to regulate multipotent stem cells and antioxidant properties. Melatonin is well studied for its systemic and cellular action endogenously and exogenously in osteoporosis. The underlying mechanism of melatonin is still under investigation though it appears to involve MEK1/2 & MEK5 signaling pathways for osteogenesis. In our lab, we performed long noncoding RNA (lncRNA) analysis to identify the downstream marker modulated by exogenous melatonin in a HER2/Neu mice model that was melatonin replete were treated with a nightly oral dose of melatonin for one year. It is a comparatively novel approach for investigating the regulatory function of melatonin at a genomic level. We analyzed lncRNA to examine melatonin-treated animals' cellular and molecular levels to identify bone and muscle tissue changes. More than 1000 unique up- & downregulated lncRNAs and mRNAs were in the melatonin-treated group compared to the vehicle-treated group. Among those, we initially chose Sirtuin 1 (SIRT1), LIM domain only 3 (LMO3) & SMAD family member 4 (SMAD4) to identify their transcription via western blots in the muscle and bone tissue extracted from the melatonin-depleted AA-NATKO transgenic mouse model to see whether the regulation of the genes was translated into the protein. SIRT1 is a positive regulator of the liver X receptor (LXR) protein that functions as a cholesterol sensor and controls the body's lipid homeostasis. SMAD4, a transcription factor, is a crucial component of the bone morphogenetic protein signaling pathway. Lastly, the LMO3 protein regulates

osteogenic differentiation in adipose-derived stem cells through the PI3K/Akt signaling pathway. The western blot analysis showed a difference in the protein expression in the melatonin vs. the control group. The sex-specific difference, although not statistically significant, was also observed. Using small molecular inhibitors with melatonin in the future will further help us identify the signaling pathway and aid us in understanding the effect of melatonin, in treating this degenerative disease in adults.

How Do Extracellular Vesicles Enter Recipient Brain Endothelial Cells?

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Faculty Advisor: Devika Manickam , Ph.D.

ABSTRACT:

Purpose: Extracellular vesicles (EVs) are nano-sized bilayered membrane sacs that transfer cellular cargo in between cells. EVs are of two key types: the 100-1000 nm medium-to-large EVs (m/IEVs), also referred to as microvesicles and the 50-200 nm small EVs (sEVs), commonly referred to as exosomes. Their role in intercellular communication propelled the development of EVs as carriers for drug delivery. In this work, we seek to understand the mechanism by which m/IEVs vs. sEVs enter the recipient BECs.

While endocytosis is reported to be key mechanism via which cells internalize EVs, the entry pathway of EVs into recipient BECs is currently unknown. We individually blocked different routes of endocytosis using the respective pharmacological inhibitors and determined its effect on EV uptake into recipient BECs.

Methods: m/IEVs and sEVs were isolated from EV-conditioned medium of BECs using a differential ultracentrifugation method. We measured total EV protein content using MicroBCA assay. We used DLS and NTA to characterize the isolated EVs. We used western blotting to detect the presence of characteristic EV markers. Calcein-AM dye labelled EVs were studied for its intracellular uptake recipient BECs using fluorescence microscopy. Sucrose, genistein and 5-(N-Ethyl-N-isopropyl) amiloride (EIPA) were used as the endocytosis inhibitors. Flow cytometry was used to study the effect of different inhibitors on uptake of EVs into recipient BECs.

Results: sEVs and m/IEVs showed particle diameters of 126.3 ± 7.8 nm and 251.4 ± 3.2 nm, respectively and a dispersity index of 0.3. Both EV subpopulations showed intracellular uptake within recipient BECs as seen using z-stack fluorescence images. We noted that blocking macropinocytosis using EIPA showed a significant reduction in m/IEV and sEV uptake into recipient BECs.

Conclusion: We confirmed intracellular uptake of EVs using the z-stack fluorescence microscopy and ruled out the possibility that EVs merely stick to cell surfaces. Our results seem to suggest that both EV subpopulations use multiple endocytosis pathways to enter the recipient BECs. We speculate that BEC-derived EVs are internalized by the recipient BECs via a combination of cell fusion and energy-dependent processes such as endocytosis, however—our future experiments will shed more light on this speculation.

Contestant Theology: Toward a Play Theology of Religions

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Faculty Advisor: Radu Bordeianu, Ph.D.

ABSTRACT:

How can a Christian theology of religions navigate the interreligious dialogical problems of 1) the inability to fully articulate faith, 2) the lack of persuasive religious language, 3) the reality of violence among religions, and 4) the liquescent “truth” of modern times? This dissertation answers this question with a theology of religions considered through the lens of play theology. Contestant theology navigates these problems as 1) a space of cooperation and

contest which 2) incorporates assertiveness (exclusivism), compassion (inclusivism), openness (pluralism) and free participation (Trinitarianism) to 3) hold together enriching and diminishing relationalities among diverse religious peoples with a view toward 4) affirming God's glory and humanity's goodness in traditional and surprising contexts. The methodology of contestant theology is a mixture of biblio-theological, religious, and popular culture studies that is grounded in the five movements of Paul's speech to the Athenians in Acts 17:28. The first movement ("in God") considers the "serious" theologies of religion, whose "dead" seriousness encounters dialogical problems. The second movement ("we live") grounds play theology's "revival" of the Christian thought-world, spirituality, relationality, and epistemology from the "dead" seriousness that hinders the Christian response to the interreligious encounter. The third movement ("and move") grounds the vision of "breathing with" other religions; the fourth movement ("and have our being") grounds the practices in which this "conspiring" occurs. The fifth movement ("For we too are his offspring") grounds the relationality of simultaneously pulling at and moving with other religions according to the wind of the Spirit, who "breathes where [God] will" (John 3:8). These movements of contestant theology prevent any religion from dominating the earthly sphere of faith, by situating the interreligious encounter in the game that one wants to play forever – discovering one's God-given self with the other, who is also discovering their God-given self.

Differences in Exonerations across the United States

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ABSTRACT:

Since the National Registry of Exonerations (NRE) began methodically tracking exonerations in 1989, there have been 3,249 recorded exonerations (1). Previous literature regarding exonerations focuses primarily on the causes or contributing factors to wrongful convictions. These factors, as recognized by the NRE, include false or misleading forensic science, inadequate legal defense, perjury/false accusation, official misconduct, false confession, and mistaken witness identification. A prior study by Dr. Gerald LaPorte examined the role of forensic science in DNA exonerations (2). The main analyses included the relationship between false or misleading forensic science and the other five factors, as well as the commonly associated forensic methods with wrongful convictions. The first part of my study replicated this work using an updated list of exonerations by the NRE. Analyses were replicated with both DNA and non-DNA exonerations. Results from the replication of DNA exonerations show that the trends continue with the newer set of data, in that false or misleading forensic science is most often associated with mistaken witness identification. In non-DNA exonerations, results showed that false or misleading forensic science is most often seen alongside perjury/false accusation. The second part of my study examined the role of innocence groups and the trends associated with their involvement in correcting erroneous convictions. Innocence groups, such as the Innocence Project, Centurion, and conviction integrity units (CIUs) are becoming more prominent across the United States. These groups are credited with a portion of those 3,249 exonerations due to legal and/or investigative support provided to wrongfully convicted individuals. Despite their success, there is limited research regarding the effect of innocence groups on exonerations. Specifically, part two of this research investigated how factors such as crime type, location, race, the availability of DNA evidence, etc. influence the involvement of innocence groups. Initial results show that innocence groups are involved in both DNA and non-DNA exonerations, with the majority of success in homicide and sexual assault crimes. The results of this research will provide a representation of exoneration trends and allow a better understanding of how innocence groups can aid in correcting wrongful convictions.

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The Original Toy Story: Frances Hodgson Burnett's "Racketty Packetty House," a Playful Critique of Victorian Society through a Playroom Drama

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ABSTRACT:

Over a hundred years ago, Frances Hodgson Burnett preceded the much-loved Disney Toy Story series with her own playroom drama—Racketty Packetty House. Much like these Disney classics, the tale follows a family of dolls, the Racketty Packettys, and their misadventures as they age and get replaced by new toys in their human Cynthia's playroom. Although intended primarily for children, Racketty Packetty House, like Toy Story, offers a biting and playful critique of society with insights that are still applicable today. As the Racketty Packetty dolls encounter the well-to-do Tidy Castle dolls and fight for their very lives, readers experience all of the drama of love, class, illness, social mores, and impending death—but through the eyes of toys. As Burnett shares the toys' stories, she provides both implicit and explicit judgments on both the playroom society the dolls live in and the larger British society that the playroom is housed within. This project is an excerpt from a dissertation chapter also focusing on Burnett's doll story and read through the framework of Queen Victoria's childhood doll collection and the continued resonance of Victoria's dolls on the creation of Victorian girlhood. This excerpt however focuses specifically on Burnett's text and the critique it offers on love, class, and social rules. Through examination of Burnett's children's story and the roles of the dolls, this project argues that children's cultural items—such as toys and children's literature—both train children in social rules and structure and permit space for critiquing, adjusting, and rebelling against these same rules and structures. Although Burnett's critiques consider historical Britain, the way in which she uses children's culture, the playroom, and toy narratives is useful in considering contemporary children's culture, playrooms, and toys and their narratives.

Medication Shortages: An Analysis of Hospital Medication Shortages in the United States

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ABSTRACT:

Hospital medication shortages have not yet seen a decline in many years and have been contributing to the increased cost to the US healthcare system. The increased cost of medication and an aging population that requires more services is facing a lack of medication. Currently, there is no adequate monitoring or resolution, and hospitals are creating their own strategies to cope with the medication shortage problem. A systematic literature review was conducted through PubMed, Medline [E-Journals], and Medline. Database searches for articles from 2010 to 2023 finding relevant peer-reviewed articles and appropriate government legislation regarding medication shortages. Review of thirty-three of relevant articles shows that current efforts by hospitals only focus on themselves and just getting through a medication shortage. Government policies are only warnings without any punitive action that have not offered any relief. Going forward, additional efforts are needed, including Congress making the Federal Drug Association (FDA) a regulatory agency that can enforce its policies and require medication manufacturers to create strategies to prevent and resolve medication shortages in a timely manner. Additionally, hospitals and medical professionals need to advocate for their patients by raising awareness and asking for solutions for the entire system. The government has forced temporary resolutions in times of need and has been successful; this review aimed at examining the current issue and recommending a more sustainable solution for the United States.

Keywords: Medication, Shortage, United States

Streamlining the Extraction and Quantification of Synthetic Cathinone in Oral Fluid by Means of Solid-Phase Extraction (SPE) and LC-MS/MS Analysis

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ABSTRACT:

Synthetic cathinone, often referred to as “bath salts,” is characterized as the beta-ketone isomer of amphetamine in a more potent formulation while avoiding several legislative roadblocks with constant structural modifications (i.e. addition of a methyl substituent). Prior studies into the intoxicating effects of cathinone usage point to similar behaviors exhibited by amphetamine users such as exemplified feelings of euphoria. It is of forensic interest to develop a streamlined methodology for the analysis of substances as there is a major lack in quantification standards and to benefit public health.

The research focused in on five substances: 3',4'-Methylenedioxy- α -pyrrolidinobutiophenone (3,4-MDPBP), 2'-Methyl- α -pyrrolidinopropiophenone (2-MePPP), 3-Chlorocathinone (3-CC), 2-fluoroisocathinone (2-FIC), and 5-Chloro-2-thiothione (5-Cl-bk-MPA). Methods were developed using an Agilent 1200 Rapid Resolution LC with 6460 Triple Quadrupole in the positive ESI mode. Such transitions were developed through the usage of scan and product ion scan modes. Next, specimens were extracted from synthetic oral fluid using a previously validated method for 729 different NPS including bath salts using Clean Screen DAU (200mg; 10mL) cartridges. Samples were pre-treated with 2ml of borate buffer (pH 9.0) to 0.5mL synthetic oral fluid. The goal was to minimize the steps and solvents while not affecting the integrity of oral fluid samples.

Preliminary results from the development of mass transitions yielded feasible data for the downstream progression of all substances with exception to 5-Cl-bk-MPA, as there still exist ambiguities between sample and blank acetonitrile. Pre-treatment of oral fluid with the borate buffer yielded feasible results, however, limiting reagent volumes in the SPE is still in development. With this, it is proposed to minimize the pre-treatment steps down to a simple centrifugation with buffer prior to loading to cartridge. Future considerations for analysis closely correspond with the minimization of oral fluid needed to acquire clear, reproductive results in a roadside collection scenario.

Structural and Dynamical Consequences of Individual G31U and U5C S2m Mutations Between SARS-Cov and SARS-Cov-2

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ABSTRACT:

Within the 3'-untranslated region of the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) genome, the stem-loop II motif (s2m) RNA element harbors two mutations (U5C and G31U) that alter the secondary structure and suspected roles in the viral life cycle compared to the SARS-CoV s2m sequence. From previously reported NMR and homodimerization experiments, the G31U mutation alone gives rise to a secondary structure and dimerization properties similar to SARS-CoV-2 s2m, while the U5C mutation was found to be more characteristic of SARS-CoV s2m. The individual effects of each mutation on the structure, dynamics, and thermodynamics have not been reported and could guide the discovery of potential functional differences of s2m in distinct viral genomes. Unbiased 3.5 microsecond molecular dynamics simulations were performed using previously reported three-dimensional atomistic coordinates based on NMR NOE assignments and the SARS-CoV s2m 1XJR crystallographic coordinates for each U5C and G31U mutation independently. Tertiary structural dependence on temperature was investigated by running simulations at 283 and 310 K to represent NMR and physiological temperatures, respectively. Principal component analysis was used to identify s2m conformational substates, and a quasiharmonic partition function was used to estimate the absolute entropy associated with each model to quantitate the structural and dynamical impact of each individual mutation.

Starting from the SARS-CoV s2m structure, the G31U simulation reveals dynamic base pair reshuffling, weakened base pair hydrogen bonding, and higher entropy than the wild-type (WT) SARS-CoV s2m. In contrast, the U5C model remains structurally rigid from strong stem hydrogen bonding and is calculated to be less entropic than the WT SARS-CoV s2m, both of which align with the secondary structures from our 1H NMR spectrum. Our work addresses the structural and terminal loop entropy differences as interpretations for previously reported NMR and homodimerization experiments. Overall, a quantitative structural and dynamical insight with atomistic resolution for each U5C and G31U mutation contribution is provided for the experimentally observed deviations between SARS-CoV and SARS-CoV-2 s2m.

Lipidoid Nanoparticles (Lnps) Increase ATP Uptake Into Hypoxic Brain Endothelial Cells

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ABSTRACT:

LNPs have revolutionized the field of non-viral delivery systems and are mRNA carriers in the Pfizer-BioNTech and Moderna COVID-19 mRNA vaccines. LNPs have been extensively studied for the delivery of large molecules like polypeptides and nucleic acids, however, their delivery potential for small molecule actives remains unexplored. We propose that the delivery of adenosine triphosphate (ATP) to the brain endothelial cells (BECs) lining the blood-brain barrier (BBB) is an effective strategy to increase the metabolic function and viability of BECs post-cerebral ischemia/reperfusion injury (stroke). In the present work, we formulated ATP-LNPs using C12-200 ionizable cationic lipid for the delivery of ATP to hypoxic BECs. We studied the physicochemical characteristics of ATP-LNPs and determined their cellular uptake in two different models of BECs subjected to hypoxia: a human brain microvascular endothelial cell line (hCMEC/D3) and primary human brain microvascular endothelial cells (HBMECs). ATP-LNPs (+PEG-DMG) had an initial particle diameter of ~83 nm that increased to ~162 nm whereas ATP-LNPs (-PEG-DMG) showed a particle diameter of ~995 nm post-preparation that increased to ~2 μ m after seven days—these results confirm the stabilizing effects of the PEG-DMG helper lipid. ATP-LNPs (+PEG-DMG) remained stable in the presence of 10% FBS whereas serum proteins destabilized LNPs (-PEG-DMG). To conclude, PEG-DMG played a crucial role in maintaining the colloidal stability of LNPs over time and in the presence of serum proteins. ATP-LNPs formulated with PEG-DMG resulted in a 7.7- and 6.6- fold increased uptake of ATP into normoxic and hypoxic BECs, respectively. Fluorescence microscopy studies showed the cytosolic presence of ATP-LNPs. In contrast to ATP delivered via LNPs, free ATP showed minimal uptake into BECs which demonstrates the need to utilize LNPs as a delivery system. Altogether, our results demonstrate the potential of LNPs as a novel carrier for the delivery of small molecular mass actives to BECs—an extra-hepatic, CNS target.

An Exploratory Study of a Brief Measure of Job Satisfaction in Pennsylvania School Psychologists

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ABSTRACT:

This exploratory study utilized items from a previously-developed measure of job satisfaction, the Measure of Job Satisfaction (MJS), which was originally developed to be used with nurses in the United Kingdom. These items were adapted into a 15-item instrument (Job Satisfaction-Brief) that is applicable to school psychologists in the state of Pennsylvania (N=94). An exploratory factor analysis (EFA) was run in order to examine the underlying factors of the items adapted from the MJS. The exploratory factor analysis was applied in the JAMOVI Version 2.3.19.0, with maximum likelihood estimation to be implemented for the ordered categorical scale. Two factors were extracted from the data: Factor One: Satisfaction with Intrapersonal Development and Clinical Accomplishment and Factor Two: Satisfaction with Advancement, Financial Compensation, and Rank. The uses for the measure and recommended future directions are discussed.

Improving Forensic Science Education within a Law School Curriculum

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ABSTRACT:

Many, if not most, criminal lawyers and judges do not have a background in the forensic sciences¹⁻². Because of this, judges may struggle to determine what type of forensic evidence can be admissible in court and base their admissions on past cases. Lawyers struggle to clearly communicate forensic evidence to juries during the course of a trial. Many studies have already assessed where lawyers then gain their forensic science knowledge, most commonly through Continuing Legal Education courses or through trial experience³⁻⁴. Very rarely does their knowledge come from the implementation of forensic science courses within a law school curriculum. To address this issue, an online module program on forensic science, which contained several different topics such as: DNA and toxicology, was developed via Canvas to determine if the modules increased criminal law students' knowledge on different forensic sciences. To gauge the students' knowledge before and after the educational material, a pre and post test was utilized to determine if any knowledge was gained throughout the course of the module. Both the tests were the same set of questions to better statistically analyze the scores. In order to prevent participants from using their pre-test to complete the post-test, they were unable to see their responses as well as the correct answers to the questions. The participants were also required to complete knowledge checks about halfway through the module to ensure they were grasping the forensic concepts confidently. The pre and post test scores should show the importance of teaching basic forensic science techniques to criminal law students. If forensic science is incorporated into law school curriculums, the law students will be better equipped to handle forensic evidence in court quickly upon becoming a licensed and practicing attorney rather than gaining this knowledge throughout their career.

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***Labeling Melanoma Cells With Black Microspheres for Improved Sensitivity in Detection Via Photoacoustic Flow Cytometry**

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ABSTRACT:

Melanoma is an aggressive form of skin cancer known for developing into metastatic disease. Current clinical diagnostics, including medical imaging and tissue biopsy, lack strong predictive value since the cancer is in the late stages of disease progression. In recent years, photoacoustic flow cytometry has allowed for the detection of circulating melanoma cells within patient blood samples, in vitro. Therefore, this detection system quantifies metastatic disease independent of secondary tumor formation and medical radiation. Although this method exploits the naturally-produced melanin within the cells, it has only successfully detected highly-pigmented melanoma cells. Since various

forms of melanoma exist, each with varying melanin concentrations, this research aims to provide a novel method for detecting lightly pigmented circulating melanoma cells in a patient's blood sample. This was achieved by coating black dyed microspheres via passive adsorption with monoclonal Anti-Melan-A antibodies, a melanocyte differentiation antigen-specific to melanoma cells. Labeling the surface of the melanoma cells with these darkly-pigmented microspheres primes them for detection using the same photoacoustic flowmetry principles as highly-pigmented cells. Upon completing a two-sample t-test with equal variance, there was a significant difference in these average above-threshold peak-to-peak signals produced between unlabeled SK-MEL-24 cells ($M = 1.44 \times 10^{-1} \text{ V}$, $SD = 2.51 \times 10^{-3}$) and microsphere-labeled SK-MEL-24 cells ($M = 2.54 \times 10^{-1} \text{ V}$, $SD = 4.77 \times 10^{-2} \text{ V}$) of $t(8) = 6.40$, $p = 1.04 \times 10^{-4}$. The more robust peak-to-peak signals produced by the microsphere-labeled cells allow researchers to confidently identify lightly-pigmented cells in flow, especially when presented in small concentrations, typically less than 103 melanoma cells per milliliter. Ultimately, enhancing the detection of lightly-pigmented melanoma cell lines will provide a gateway towards applying this technique to circulating tumor cells with a range of pigmentation within patient blood samples, such as breast cancer and colon cancer. The ability to detect circulating tumor cells in blood samples will allow clinicians to identify metastasis in early, more-manageable stages of disease progression as well as monitor the effectiveness of therapeutic regimens in patients battling metastatic diseases.

Who Is the Subject of Freedom?

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ABSTRACT:

As one of the leading figures in political existentialism, Hannah Arendt's understanding of freedom is based on the concept of action, instead of the concept of will. For her, freedom is not about being capable of deciding but beginning, e.g., doing something unexpected or starting something new. That is, freedom for her concerns the capability of doing actions. In this paper, I argue that Arendt's answer to the question "what is freedom?" is responded more substantially by introducing Paul Ricoeur's concepts of ideology and utopia. To do that, I relate the question "what is freedom?" to the question "who is the subject of freedom?" The latter question brings forth another question: "What are the fundamental characteristics of the subject that make it capable of existing as a subject of freedom?" In other words, "what are the capabilities of the subject of freedom for its existence?"

In the paper, I claim that the capabilities of Arendt's subject of freedom are its actions. Nonetheless, as claimed, I state that Arendt's concept of action must be supported by Ricoeur's concepts of ideology and utopia for constituting a more substantial concept of action. Accordingly, by making use of Arendt's concept of action and Ricoeur's concepts of ideology and utopia, I maintain that the capabilities of the subject of freedom are the actions that are shaped by ideology and utopia. As such, I will show that along with the spontaneous and discursive nature of Arendt's concept of action, action is shaped by i) a utopia, and ii) an already existing ideology. In this respect, action as the capability of the subject of freedom is characterized through the relationship between two moments: i) discursive spontaneity and ii) utopian ideology. While the former moment represents the engagement of the subject of freedom with the world, the latter explicates the way through which the engagement itself is formed. Accordingly, in this paper, I argue that the capabilities of the subject of freedom are identified with its actions which are constituted by the mutual constitution between the spontaneous discourse and utopian ideology.

Ph Influence on Sulfate-Reducing Bacteria Growth in Passive Remediation Systems Treating Abandoned Mine Drainage

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ABSTRACT:

Pollution resulting from abandoned mine drainage (AMD) is widespread across the nation and impacts several thousand miles of watersheds in Pennsylvania. AMD contaminants pose hazards to ecosystems and to human health by lowering the pH and by suspending heavy metals in water. Microorganisms play a role in the formation of AMD contaminants and ultimately determine their fate and removal. Specifically, sulfate reducing bacteria (SRB) are known to remove metals and sulfate from mine drainage through the formation of metal sulfide precipitates and have been documented to raise the alkalinity of water in systems treating AMD. Due to their remediating capacity, it is necessary to understand the conditions in which these microorganisms survive. It was hypothesized that SRB growth would be optimized in neutral pH, with decreased growth in acidic water. Slurry samples were collected from circumneutral and acidic AMD passive remediation systems. Samples were diluted and plated onto a sulfide indole motility (SIM) medium, which consists of thiosulfate to serve as the electron acceptor, ferrous iron to facilitate metal-sulfide precipitate formation, and an overlaying top agar to promote anaerobic conditions for growth of facultative anaerobes. The SIM medium was modified to account for lower pH values and other sulfur intermediates used in sulfur reduction pathways. Results indicate that facultative SRB are present in the circumneutral remediation system, with sulfur reducers consisting of nearly 1% of the plated community in some samples. Negligible growth was documented from the acidic system. Current work utilizes primers to determine the relative abundance of desirable sulfur reducing enzymes in environmental samples collected at the passive remediation systems.

Total Synthesis of Chrysosporazine D

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ABSTRACT:

Chrysosporazine D, a member of the recently discovered chrysosporazine family of marine alkaloids, is a piperazine-containing natural product with a demonstrated ability to reverse resistance of carcinoma cells to chemotherapeutic drugs. We propose an efficient total synthesis of chrysosporazine D utilizing a key palladium catalyzed cycloaddition, forming the central piperazine moiety in a single step. Moreover, this route makes minimal use of protecting groups, pre-optimizing our sequence for future scale-up and biomedical structure activity relationship (SAR) studies. In this report we detail our investigations towards a rhodium coupling pathway in addition to a previously investigated palladium cross-coupling reaction pathway.

Green Teens and Magazines: Environmentalism, Consumerism, and Girl Power in Girls' Magazines at the Turn of the Twenty-First Century

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Faculty Advisor: Robin Chapdelaine, Ph.D.

ABSTRACT:

Five days before the 2020 election, seventeen-year-old Naina Agrawal-Hardin urged the readers of Seventeen Magazine to throw their support behind Democratic candidates Joe Biden and Kamala Harris for president and vice president of the United States. Agrawal-Hardin cited climate change as the principal reason she chose to support the Democratic party in the election: "I've seen flooding collapse dams in my home state of Michigan, and unprecedented fires rip through my maternal grandparents' community in Eastern Tennessee.... I'm supporting Joe Biden and Kamala Harris for

President and Vice President. When it comes to saving our planet, there is no other option.” Girls around the United States have been cultivating political identities around climate-related environmentalism since at least the 1990s in response to Earth’s rising temperatures.

Youth activists represent some of the loudest voices speaking out for climate action both in the United States and around the world. Because of compounding factors like age, race, voting power, wealth, and gender, these activists are often not taken seriously by politicians and mainstream news media. Studying print media directed at girls and teens at the turn of the twenty-first century on a global scale can help further historicize and contextualize the contemporary youth climate movement.

This study of girls’ magazines at the turn of the twenty-first century reveals how girls and teens in the United States shaped their identities as both activists and consumers around the issues of environmentalism and global warming. In doing so, they retained characteristics of “Girl Power,” a movement that sought to empower young girls while retaining traditional white, middle-class, notions of morality and respectability.

Understanding the Beliefs, Perceptions, and Experiences of Disaster Preparedness in Nurses: A Focused Mini-Ethnography

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School of Nursing

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

ABSTRACT:

Purpose: To explore the beliefs, perceptions, and experiences of disaster preparedness of nurses

Research Questions: What are the beliefs, perceptions, and experiences of disaster preparedness for nurses?

Background: Disasters have been occurring more frequently. Nurses fulfil important roles in disasters. Previous studies found many nurses considered themselves unprepared for their roles in disasters. To identify potential learning gaps, a clearer understanding of what nurses believe is necessary for disaster preparation.

Methods: A focused mini-ethnography was used to conduct this study. Registered nurses from the greater New York City area were recruited to complete a demographic survey and participate in interviews. Analysis of interview data was conducted utilizing Leininger’s Four Phases of Data Analysis.

Results: Of the participants (n=3; male = 2, female = 1), two had > 20 years of experience working in emergency departments, while one participant had < 2 years in a telemetry unit. Two participants had previous disaster experience and training from their workplaces. In the initial phase of analysis 9 categories were identified. Further analysis resulted in two patterns: (1) Pattern of feeling competent as sign of successful preparedness (2) Pattern of knowledge of nurse role expectations as important to disaster preparedness.

Conclusions and Implications: Nurses perceptions of being prepared for disasters emanates from knowing what their role expectations are during disasters and feeling competent in their roles. Disaster preparedness training/education curriculum should consider these factors in their design to facilitate better future nursing disaster preparedness.

Understanding the Decision-Making Process of People with Chronic Illness Using the Emergency Department as a Primary Source of Care: A Mini Study

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Faculty Advisor: Grace Campbell, Ph.D.

ABSTRACT:

Purpose: The purpose of this mini study was to understand the process in which a person with chronic illness makes the decision to utilize the Emergency Department (ED).

Research Question: What is the decision-making process of people with chronic illness using the Emergency Department as a primary source of care?

Background: Patients utilizing the ED as a primary source of care risk a disruption in continuity, as specialized care plans may not be properly implemented and/or followed. Unnecessary diagnostic testing is often used to fill in historical gaps, which proliferates and creates extended wait times for all patients, as those utilizing the ED for primary care are deprioritized over more critical patients.

Methods: A modified grounded theory qualitative analysis was performed using interviews, observations, and field notes. The transcripts were coded and grouped in NVivo, allowing for themes to surface.

Results: Self-identifying participants (n=5) included four female and one male. The sample included four persons of color (African American=3, multiracial = 1) and one White. All participants report having a primary care provider. Coding revealed four categories relating to the process of seeking care: location, coping mechanisms, frequency of care seeking, and impact on behaviors. Further analysis led to emergence of Perception of Urgency as the key driver of the decision-making process. Participants voiced a feeling of uncertainty about what would happen if they delayed care.

Conclusions and Implications: The coding of categories led to a greater understanding of patient and provider relationships. An increased perception of urgency drives patients to first seek care in the ED, often on referral. The limited sample size and associated lack of thematic saturation suggests that a full-scale study is warranted to provide further insight into decision making processes and patterns related to seeking care at an ED.

***Sex Based Differences in Muscle Regeneration**

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ABSTRACT:

Background: Normal skeletal muscle healing can be affected by various factors including biological sex. Males and females differ in the healing process such as the time course of the inflammation, recovery of muscle force, and period of regeneration. How exactly these processes differ is not well understood. Glycerol injections are a novel chemical model of skeletal muscle injury that mimic aspects of muscular dystrophy but currently there are no sex comparisons for this model. Therefore, the purpose of this study is to compare the difference in skeletal muscle healing between males and females, in a time course study, using this new method.

Method: Male and female mice were split into two groups. Mouse gastrocnemius muscle was injected with glycerol (experimental) or saline (control) on day 0. Muscle physiology testing was performed 3 days (n=14) and 12 days (n=14) after injection, followed by hind-limb muscle collection and preservation for H&E, F480, necrosis, and eMyHC histological analysis.

Result: Male groups had significantly higher muscle force production than the female groups ($p < 0.001$). The improvement of muscle force production in the female group from 3 days to 12 days is significant ($p < 0.05$), but the recovery of males did not reach statistical significance during this time period ($p = 0.659$). There was greater pathology in the female group than the male group at 12 days after glycerol injection. Muscle regeneration occurred more at 12 days in females based on eMyHC analysis ($p < 0.05$). Histological analysis is ongoing, but preliminary observations concur with the muscle physiology testing.

Conclusion: The timeline of the muscle repair is different between the male and female groups. Muscle repair and regeneration are still ongoing at 12 days, which means interventions can be applied and studied during this time period. The difference in muscle regeneration between male and female groups is possibly due to hormone effects such as estrogen. Our laboratory is currently planning therapeutic trials based on levels of estrogen and exercise.

***J.S. Bach as a Religious Storyteller – The Second Brandenburg Concerto**

Emma Locarnini

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Faculty Advisor: Benjamin Binder, Ph.D.

ABSTRACT:

The sacred music of Johann Sebastian Bach, written during the composer's employments at churches in Weimar (1708-17) and Leipzig (1724-50), clearly demonstrates his strong Lutheran faith. However, until relatively recently, Bach's instrumental works have been considered devoid of religious inspiration, especially those published during his time at the Calvinist court of Prince Leopold in Cöthen (1717-23). With the discovery of Bach's personal Bible and other Lutheran theological texts that contained annotations underscoring the role of music in bringing glory and praise to God, some contemporary scholars have pushed against the notion of Bach's instrumental works being purely secular. For example, Michael Marissen, in his groundbreaking 1995 book *The Social and Religious Designs of J.S. Bach's Brandenburg Concertos*, demonstrates how the First Concerto represents a Lutheran perspective on social hierarchies. The unusual inclusion of a hunting horn signals the presence of the aristocracy, and Bach's musical treatment of the hunting horn suggests that the aristocracy is in some ways superfluous to the ensemble but is ultimately necessary to maintain social and musical order.

In this project, I argue that the same analytical principles can be productively applied to the Second Brandenburg Concerto, a piece which has not been yet considered in a theological context, and its unique use of the trumpet. Given the instrument's strong Biblical resonances and its direct association with the Second Coming in Revelations, I show how the trumpet can be considered Bach's musical embodiment of Christ. The concerto begins with all parts in unison as Christ was born in the same humble manner as man. The trumpet is absent in the somber second movement, symbolizing Christ's death, but returns triumphantly in the third movement, announcing a melody that is then repeated by the other instruments, as the teachings of Christ are shared through his followers. The Second Brandenburg Concerto was never intended for performance in church, but by applying Marissen's method of analyzing Bach's instrumental compositions, we discover that the piece may nonetheless have been heard as a musical retelling of the Easter Story.

The Power of the Love Affair: A Lacanian-Kristevan Reflection on Cheating

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Faculty Advisor: Lanei Rodemeyer, Ph.D.

ABSTRACT:

Cheating in romantic relationships is a common source of misery and pain for many people. However, if it happens so frequently and at the same time there is typically such a strong societal disapproval of it; what is happening? In this paper, we attempt to challenge receptions of cheating through a Lacanian-Kristevan analysis of love. We begin the paper by defining love, outlining its forms and the course of its development. Via this psychoanalytic lens we will demonstrate

that there are sustainable aspects about cheating, and that challenging this triangulated structure could potentially lead to destabilization.

Love, for Kristeva is to speak of a bodily upheaval, an emotion, the “never dwells in us without burning”, and one can only speak of it after they have been burnt. Lacan stated something similar in his analogy about love when he described it as an attempt to reach a flower or fruit, but at the moment one tries to grab it, it “bursts into flames”. For Kristeva, this burning arises from the incommunicability of love which can be overcome through a third party; the latter can be an ideal, God, or another subject. This triangulation we also find in Lacanian thinking in fears of intrusion in dialectical relationships. The secretive inclusion of an Other could in these cases contribute to sustaining a healthy balance for the subject.

Romantic relationships are personal and complex experiences; therefore, it is not recommended to disqualify cheating on the basis of societal norms, but it is vital for clinicians to remain critical about what one gains and loses on the basis of their symptoms.

Identifying Structural Motifs in Biological Macromolecules by Topological Data Analysis: A Preliminary Study

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Faculty Advisor: Jeffrey Evanseck, Ph.D

ABSTRACT:

Proteins and RNA serve diverse functional roles within biological systems, often regulated by changes in conformation or three-dimensional shape. While differences in structure are studied for use in predictive models or to analyze molecular dynamics (MD) simulations, it remains challenging to convey quantitatively notions of “shape” from raw atomic position data. Historically, graph-based topological descriptors of molecular shape have been studied but lack detail for computations requiring high-resolution structural information. In this work, we investigate the viability of an alternative topological approach, persistent homology, at discriminating between distinct structural motifs and quantifying structural change over MD simulations. We obtained a data set of pre-labeled RNA structural fragments by exhaustive search of the RNA CoSMMos database and proteins from the Protein Data Bank, providing the basis for comparative studies between known structural motifs, such as alpha helices, beta sheets, loops, or bulges. MD data was sourced from simulations of the stem-loop II motif, a genomic RNA element in SARS-CoV and SARS-CoV-2, which we analyzed previously for sources of major structural variation. Each point cloud of atomic coordinates was used to form a Rips filtration, which ultimately yielded topological data in the form of “persistence images” (PIs). Principal component analysis (PCA) was employed to determine large sources of variance between PIs and project the data to a lower-dimensional subspace. Our preliminary findings show that the persistence images of proteins and RNA form distinct clusters in PC space, suggesting that the inherent geometries of each class of biomolecule results in a characteristic topological signature. Further results focused on specific motifs, such as alpha helices and beta sheets, and analysis of dynamics simulations will also be reported. Ultimately, our preliminary data establishes confidence in the use of persistent homology as a modern descriptor for macromolecules, setting the stage for useful applications in enhanced sampling.

Melatonin’s Effects on Osteoblastogenesis and Adipogenesis through PPAR γ in Mesenchymal Stem Cells

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ABSTRACT:

Melatonin-mediated induction of new bone is the result of its effects on osteoblasts. Melatonin, through MT2 melatonin receptors (MT2) coupled to both MEK1/2 and MEK5 induces osteoblastogenesis and new bone formation by increasing the osteogenic proteins (i.e., RUNX2, FRA-1, BMP-2, Type 1 collagen). Melatonin has also demonstrated modulatory

effects on metabolic proteins, PPAR γ , C/EBP, adiponectin, Acrp30, and Ucp-1). How melatonin induces osteoblastogenesis may involve PPAR γ —the important metabolic switch that regulates MSC differentiation into adipocytes or osteoblasts. The role of melatonin in directing metabolic actions in MSCs to govern their movement away from adipogenesis and towards osteoblastogenesis is unclear. Using activators (rosiglitazone) and inhibitors (G3335) of PPAR γ and antagonists (luzindole, 4P-P-DOT) of MT2s, we demonstrate concentration-dependent increases in adipogenesis by rosiglitazone (1pM-1mM) that is inhibited by G3335 (30 μ M) in mMSCs. Melatonin (1pM-1mM) inhibits adipogenesis in mMSCs with a potency of 1.12 μ M that is blocked in the presence of 4P-P-DOT (10 μ M), suggesting the involvement of MT2s. In human MSCs grown in osteogenic medium, rosiglitazone (10 μ M) inhibits osteoblastogenesis. The addition of melatonin (50nM) reverses these actions. These findings suggest that melatonin at low micromolar concentration plays a critical role in governing MSC lineage towards osteoblastogenesis and away from adipogenesis by controlling the metabolic switch, PPAR γ . Perhaps, in bone marrow, melatonin-mediated actions on MSCs facilitate new bone formation by directing metabolic function, adipogenesis, and osteoblastogenesis setting up novel uses for melatonin in maintaining bone health.

Engineering a Transgenic *Asaia bogorensis* Strain To Control an Effector Plasmid With a Conditional Origin of Replication for Paratransgenesis Use

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Faculty Advisor: David Lampe, Ph.D.

ABSTRACT:

Malaria is a dangerous vector-borne disease caused by parasitic protists of the genus *Plasmodium* and transmitted through the bite of infected female *Anopheles* mosquitoes. In 2020, over 600,000 deaths from malaria were reported. Due to its severity, many strategies to mitigate and combat the spread of malaria are currently in place. However, the emergence of resistance to insecticides and anti-plasmodium treatments calls for additional methods for reduction of malaria infection. Paratransgenesis is the genetic engineering of symbiotic bacteria that live in the mosquito midgut to secrete anti-plasmodium effector peptides. Paratransgenesis has the potential to kill *Plasmodium* parasites prior to human infection. The *pi* protein, *Pir*, is necessary for the replication of *oriR6K* plasmids. By inserting *pir* into the *Asaia bogorensis* chromosome, an *oriR6K* effector plasmid will be able to replicate in the engineered bacterial strain only, preventing its horizontal transfer to unintended hosts. To this end, *pir* has been inserted into a neutral phage site within the *Asaia* chromosome. By supplementing *Pir* in trans, the plasmid is unable to replicate in unintended hosts, preventing its transfer to other bacteria in the mosquito midgut environment. In addition, varying the *pir* ribosome binding site will allow for replication of the plasmid at varying copy numbers, allowing for maintenance at optimal levels for survival and competitiveness of the transgenic strains. Thus, this provides the first step towards a plasmid-based paratransgenesis system that will not be transferred to other bacteria within the mosquito midgut.

Source Attribution for Lighter Fluids from Fire Debris

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ABSTRACT:

Identifying the specific brand of lighter fluid after burning can be incredibly impactful to the forensic investigation of arson cases. Arson is a criminal act that can destroy millions of dollars in any type of property or even human life. With this in mind, little progress has been made in regard to methods of evidence examination and determining what type of accelerant was used at a scene. Lighter fluid is a common type of accelerant found at arson scenes and can be easily purchased. It is imperative to determine if the variety of brands available to consumers can be individualized to reduce the risk of wrongful convictions as well as bring forth suspects of the crime. A charcoal extraction method and gas chromatography-mass spectrometry (GC-MS) analysis were used to compare five different brands of lighter fluid (Kingsford, Embers, Zippo, Ronseal, EcoGreen) after burning on three different source materials (100% cotton t-shirt,

wood chips, and cut out carpet squares) to determine if they can be classified as statistically different by use of differential analysis. These were chosen because they are often found in arson scenes. It is expected that each of the brands of lighter fluid will be able to be distinguished from one another, although brands that are owned by the same company may not be found to be statistically different. The results from this research experiment will help provide references for each lighter fluid. In theory, an outside researcher will be able to burn a lighter fluid on a substrate, run the sample using GC-MS, and compare to the known chromatograms to determine the brand used. In turn, forensic investigators can determine what brand of lighter fluid was used to burn property in arson cases, and potentially find the person who bought the accelerant for further questioning.

The Values, Beliefs, and Perceptions of Nurses Caring for Patients Who Are Living With Obesity and Have COVID-19 in the Critical Care Unit: A Mini-Ethnonursing Study

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Faculty Advisor: Richard Zoucha, Ph.D.

ABSTRACT:

Purpose: To investigate the values, beliefs, and perceptions of nurses caring for patients living with obesity (PLWO) and have COVID-19.

Research question: What are the values, beliefs, and perceptions of nurses caring for PLWO and have COVID-19 in the critical care unit?

Background: Obesity is associated with multiple physiological and adverse psychological disorders. Nurses' attitudes toward PLWO have profound implications and compromise trusting relationships with patients. Working with patients who have COVID-19 elicits nurses' anxiety, stress, fear, helplessness, worry, and empathy. These same feelings are unclear when examined from an obesity perspective. Investigating nurses' experiences when caring for PLWO and have been diagnosed with COVID-19 is essential to understanding the clinical care of this patient population, especially those patients who require extended care in the critical care environment.

Method: The Ethnonursing method, directed by Leininger's Cultural Care Theory, guided semi-structured interviews for this study.

Results: Using Leininger's four phases of data analysis, eleven categories and three patterns emerged from interviews with three white female and three white male participants. Those patterns include nurses' caregiver burden when caring for patients, collaboration within healthcare teams, and self-care practices among nurses.

Conclusions and Implications: Nurses faced extraordinary burdens when caring for COVID-19 patients but often found ways to collaborate with team members and believed that self-care practices were crucial. Obesity added to the complexity of caring for patients. Further research is needed to fully comprehend nurses' work environments and responses during the COVID-19 pandemic from diverse points of view and potential effects on care.

Detection of Organic Peroxides Used in Improvised Explosive Devices Using Electrospray Ionization – Tandem Mass Spectrometry and Liquid Chromatography – Triple Quadrupole – Mass Spectrometry

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Bayer School of Natural and Environmental Sciences

Faculty Advisor: Michael Van Stipdonk, Ph.D.

ABSTRACT:

The goal of this project is to develop electrospray ionization-tandem mass spectrometry (ESI-MS) coupled with collision induced dissociation (CID) for the detection and identification of peroxide-based explosives. Benzoyl peroxide and

dicumyl peroxide were used as model compounds in this study because they are prone to exothermic reactions and are more accessible in a laboratory setting. In previous studies done within the Van Stipdonk laboratory, a variety of metal cations with a +1 charge, including lithium, sodium, potassium, rubidium, and silver, were complexed with the organic peroxide species to achieve reliable detection of these compounds. From these studies, it was concluded that the silver cation was the most effective at creating metal-peroxide complexes with characteristic CID fragmentation patterns for the organic peroxide species.

In this study, benzoyl peroxide and dicumyl peroxide samples were collected using a swipe sampling method, which involves swiping the organic peroxide from a surface using filter paper. The rapidity and ease of the swipe sampling technique would make it favorable for use in the field for forensic technicians investigating a scene with suspected residue from an improvised explosive device. Because silver cations readily complexed with the peroxide species in previous studies, silver-impregnated filter paper was used as the swiping substrate to create a positively charged silver-peroxide complex for detection. The swiped samples were then analyzed utilizing the ThermoFisher LTQ-XL Linear Ion Trap Mass Spectrometer for ESI-MS experimentation. To complement these experimental studies, liquid chromatography-triple quadrupole-mass spectrometry was used to validate experimental findings with ESI-MS and to provide an alternative method of detection. The same swiped samples were analyzed using the Agilent 1200 LC Stack and the Agilent 6460 Triple Quadrupole Mass Spectrometer, and these results were directly compared to results obtained using ESI-MS.

Analysis of Eight Lithuanian Temporal Bones with Anatomical Abnormalities and Skeletal Evidence of Middle Ear Infections

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ABSTRACT:

Recent research has suggested that the mastoid temporal bone is one of the best places to retrieve DNA in human remains due to its robust nature and lack of modification throughout development. There is no universal technique for ancient DNA (aDNA) extraction due to difficulties with degradation, contamination, and environment. Eight Lithuanian temporal bones with anatomical abnormalities from 200-400 AD were obtained. The history of Lithuania during this time shows numerous Baltic tribes inhabiting the region, as well as evidence of invasion by Nomadic peoples, likely the Huns. It is possible the graves were an execution site of a Baltic tribe due to an invading tribe. The goals of this research are to use anthropological and osteological techniques to analyze the bone structures, and be able to extract a usable DNA yield in order to perform next generation sequencing and gain information about the population. It is hypothesized that the individuals will show a degree of relatedness based on the burial sites. The ancient bones were physically compared to modern temporal bones in order to compare the structure and pathologies. They were each x-rayed, inspected with an otoscope, and cut with a Gigli saw to examine the insides. Some of the individuals may have had mastoiditis, an infection of the middle ear that can spread to the mastoid air cells causing bone damage and cysts. Studying infectious diseases in ancient populations can provide important information about their lifestyle and habitat. The bones were powdered using a SPEX Sample Prep 6775 Freezer/Mill, and aDNA was extracted using the Demineralization Extraction of Skeletal Remains procedure from the UNT Center for Human Identification. The aDNA was then quantified with QuantStudio5 real-time PCR and analyzed on the MiSeq FGx Sequencing System. The results of this research provide further information on means of analysis and identification of skeletal remains for the forensic science field. It can be applicable for extracting any human skeletal DNA that has been compromised, contaminated, or destroyed.

Investigating the Impact on Private Water Supply of Hydraulic Fracturing Communication With an Abandoned Gas Well in New Freeport, PA

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Faculty Advisor: John Stolz, Ph.D.

ABSTRACT:

More than 43 million people, 15 percent of the U.S. population, rely on domestic (private) wells as their source of drinking water⁴. The construction and water quality of these wells are normally regulated, but not Pennsylvania. Given the lack of policy and management, a recent environmental case arose in New Freeport, PA where communication by hydraulic fracturing targeted an abandoned well. As concerns arose, private homeowners volunteered to have their well water tested. Groundwater samples from 17 wells, 5 springs and surface water (1 pond sample) were collected and analyzed for cations, anions, and light hydrocarbons (methane, ethane, ethene, propane. Methane was found in 11 of the samples, all located within the “zone of impact”, and mass ratio analyses indicated contamination from both unconventional and conventional wells. Although methane is not a known health concern for drinking, levels in excess of 7ppm increases the chance of explosion. Remote sensing analysis was conducted over the New Freeport area. The analysis revealed clear uplifts in June where contamination issues were reported. Based on the town’s advisory not to drink the water, there is need for continued investigation and measurements of different water quality parameters to deem the water safe for drinking.

A Connection Between DNA Repair Protein APE1, Alpha-Synucleinopathy, and Biological Sex in Rodents and Humans

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Faculty Advisor: Rehana Leak, Ph.D.

ABSTRACT:

Lewy body disorders are characterized by proteostatic and redox disequilibrium, leading to deposition of alpha-synuclein in hallmark inclusions and oxidative damage to DNA. One common pathway for repair of oxidative DNA damage is base excision repair (BER), involving coordinated activity of several enzymes, including apurinic/apyrimidinic endonuclease 1 (APE1). The main goal of this study was to assess APE1 in rodents and humans with alpha-synucleinopathy, and to test the functional impact of APE1 in the preformed alpha-synuclein fibril model. First, we report that knockdown of APE1 with two independent shRNA sequences or inhibition of APE1 DNA repair activity increased inclusions bearing pathologically-phosphorylated alpha-synuclein (pSer129) in preformed fibril-treated primary hippocampal cultures. Second, we examined APE1 expression in a mouse model of limbic-centered alpha-synucleinopathy, in which alpha-synuclein fibrils are infused into the olfactory bulb/anterior olfactory nucleus (OB/AON). Six months later, we observed a fibril-induced decrease in APE1 expression in the brains of male mice and an increase in females. Similar sex-opposing patterns were noted for APE1 mRNA expression. Third, we demonstrated that the loss of APE1 in fibril-infused male mice in vivo is mediated by oxidative stress, as APE1 loss was abolished by dietary administration of the antioxidant N-acetylcysteine. Fourth, men with Lewy body disorders displayed lower APE1 expression in the OB compared to women with Lewy body disorders, similar to fibril-infused mice. Finally, we infused alpha-synuclein fibrils into the OB/AON of wildtype or human APEX1-overexpressing transgenic rats. Preliminary data demonstrate that hemizygous APEX1 Tg/0 overexpression mitigates fibril-induced loss of body weight in males and reduces disease-induced sucrose anhedonia and marble burying deficits in females. These findings reveal a sex-biased impact of limbic alpha-synucleinopathy on APE1 expression, but also suggest that APE1 overexpression attenuates alpha-synucleinopathy in a sex-dependent manner.

Computational Modelling of UV-Vis Absorption for aza-DIPY Compounds

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ABSTRACT:

Metal chelates of an aza-dipyrromethene (aza-DIPY) core provide interesting synthetic targets due to their intense absorption and emission profiles. The photophysical properties of these compounds present numerous applications in both physical and biological sciences, such as molecular imaging sensors, light activated therapeutics, or solar cells. Utilizing computational tools, we have developed a method for predicting the maximum absorption wavelengths of a variety of aza-DIPY chelated compounds. Initial structure optimization by density functional theory (DFT) using the B3LYP functional with Dunning's JUL-cc-pVDZ basis set, followed by time-dependent DFT (TD-DFT) at the same level of theory, calculates absorption wavelengths within 7% error of the values generated by experiment. Application of our computational approach permits quick screening of aza-DIPY substitutions, speeding up the process of identifying structures with ideal absorption ranges, and stream-lining the generation of new synthetic targets.

A Phenomenological Approach to Social Anxiety

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ABSTRACT:

This paper will be a Husserlian phenomenological investigation of the experiences of the phenomenon of social anxiety as its own distinct phenomenon, without conceptually reducing it to another more central notion of anxiety (e.g. generalized anxiety disorder, existential anxiety, etc.). I will first lay out an interpretation of the DSM-V in order to develop an understanding of the experience and inner logic of social anxiety. I then will analyze the shift that Husserl describes when a subject is introduced into the intersubjective constituted objective world by encountering others for the first time. I read this shift as a change in the constitution of objects in the intersubjective world, which then gets reflected back into the subject through the mechanism of retention in the structure of inner time consciousness. Utilizing inner time consciousness, I will show how this retention of the experiences of the shift in the world from the first social encounter changes how the subject interprets future events through the corresponding mechanism of protention. Finally, I argue that, when this shift in the constitution of the world is properly taken on a communal level, we can actually understand social anxiety alongside many cases of generalized anxiety as well. Specifically, this form of anxiety arises from the inability to meet the demands of society, which defines it as definitively social. This final point allows us to understand many of the issues and symptoms that are commonly associated with generalized anxiety as a form of social anxiety persisting alongside it.

Assessing Genetic Diversity Between Wild and Captive Turkeys (*Meleagris gallopavo*) in Pennsylvania

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ABSTRACT:

The wild turkeys, *Meleagris gallopavo*, endemic in North America, are a common and popular game species. Though the species is native to North America and has had an important history, there remains inadequate knowledge in assessing genetic diversity and identifying breeding populations of the wild turkey.¹ Turkeys, a giant bird hunted by Native Americans, was typically used for meat and feathers, and continue to be an economically important game species. Hunting of the Eastern wild turkey is permitted but only during specific times of the year, varying from state to state. And each state has its own hunting season complicating wildlife management's efforts in trying to prosecute a strong case against poachers.² Illegal hunting adds to the illicit wildlife trade (IWT), a transnational organized crime that

generates billions of dollars annually.³ Wildlife forensics focuses on using genetic techniques to identify wildlife parts and products to family, genus, species, population, or individual source. The IWT has become a growing problem, and wildlife forensics can be used only to identify the victim. In Pennsylvania, hunting is only permitted from the end of October through mid-November. For Ohio, hunting season starts in October through November and then in late April through late May. If a turkey is hunted outside a state's designated hunting period or hunted without a proper license, that turkey is poached.⁴ Because of the gray areas between hunting, poaching, and state lines, there is a need for more genetic testing. Fortunately, the development of a Short Tandem Repeat (STR) primer panel for the wild turkey has been completed (11 loci). In this study amplification of microsatellites in wild and captive turkeys may reveal genetic differences and changes due to domestication. It is expected that more diversity is more common amongst the wild turkeys, and less variation is present in the domestic turkeys. These findings are essential as it can help identify the origins of the turkey meat; wild-caught or domestic. Determining genetic differences between wild and domestic populations can help identify the origins of the turkey meat.

Christ: The Revelatory Symbol of Divine Self-disclosure

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ABSTRACT:

The unequivocal belief of the three-world religions: Judaism, Christianity, and Islam, that the existence of the world and the final destiny of humanity depend on all powerful and perfect God who, though distinct from the world is the creator of all that exist is paramount in their expressions of divine self-disclosure to them. These religious groups confess to earn their basic vision from God's own testimony (a historically divine revelation) and not from mere human speculations. Christian faith and theology, for almost two thousand years, is grounded on the belief that God offered a permanently well-grounded revelation about himself in biblical times progressively through the patriarchs, Moses, and the prophets, until it attained a climax in Jesus Christ. The Christian Church has been faithful to this revelation and has sought to spread it, protect it, and clarify its inferences by holding on the belief that Christ is the ultimate symbol of divine revelation. Symbol depicts something else, either directly or indirectly. In line with Christological view on Christ as the revelatory symbol, contemporary theologians like Paul Tillich and H. Richard Niebuhr have contributed to the teaching on Christ as the symbol of divine essence. The revelatory sense of Christ is explained by the two main symbols of the Cross and the Resurrection. The Cross and the Resurrection, for Tillich, are not truths but symbols established on truth. Their revelatory character relies on the ability of the symbol to communicate the strength of the new existence or new life. H. Richard Niebuhr, though he did not elaborate on the complete ideology of symbol, supported a symbolic Christology, "Jesus Christ," he inscribed, "is a symbolic form with the aid of which men tell each other what life and death, God and man, are like; but even more he is a form which they employ as an a priori, an image, a scheme or pattern in the mind which gives form and meaning to their experience." Christ, the Symbol of God, and new life, discloses God to humanity in his incarnation (the word made flesh), life, teachings and in his ultimate death and resurrection.

***Ethical Conscience in the Care of Patients with Autism Spectrum Disorder within Healthcare Organizations**

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ABSTRACT:

Autism spectrum disorder is both a genetic and neurodevelopmental disorder. Interventions in autism spectrum disorder include advocacy, research, diagnosis, and treatment. Each of these interventions poses serious ethical issues. For instance, clinical intervention in patients with autism spectrum disorder presents some ethical challenges that can impinge on the worth of a patient with autism spectrum disorder. A major problem in clinical interventions in patients with autism spectrum disorder within healthcare organization is lack of care. Some parents who have children with

autism spectrum disorder have reported lack of empathy from healthcare providers towards their children who have autism spectrum disorder as one of the issues that they encounter in clinical setting.

Patients with autism spectrum disorder are deficient in communication, behavior, and social interaction, which make it difficult for healthcare providers to detect their values, preferences, and concerns. The challenge of detecting the values, preferences, and concerns of each patient may warrant the application of a general approach to every situation, which can negatively impact decision making in clinical setting. Clinicians and healthcare organizations need to devise a means of detecting the values, preferences, and concerns of each patient with autism spectrum disorder. To ignore their values, preferences, and concerns patients is to violate their right and worth.

This paper will identify and analyze lack of compassion and negligence as ethical issues that clinical diagnosis and treatment present, and so argue for ethical consciousness and compassionate care in clinical intervention in autism. The thesis of this paper is that clinicians and healthcare organization need to be ethically conscious of the worth and unique situation of every patient with autism spectrum disorder.

Ethical consciousness refers to utmost concern for the rights, values, concerns, preferences, and dignity of a patient in diagnosis, treatment, and care. Caring of and caring about are important stages of care that should be considered in clinical interventions in healthcare organizations. Without care patient's outcome cannot be regarded as qualitative. Healthcare organizations should develop policies that can guarantee care for patients with autism spectrum disorder.

***PCNA Inhibition Results in Stalled HSV-1 Replication Forks**

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Faculty Advisor: Jill Dembowski, Ph.D.

ABSTRACT:

Herpes simplex virus type 1 (HSV-1) relies on both viral and cellular factors during infection. One of these cellular factors is proliferating cell nuclear antigen (PCNA), the DNA sliding clamp that tethers DNA polymerases and DNA repair proteins to replicating DNA. Previous research has found that PCNA knockdown results in reduced HSV-1 yield and that PCNA associates with viral replication forks. We therefore hypothesize that PCNA plays a role in HSV-1 DNA replication or replication-coupled processes. We used a PCNA inhibitor, PCNA-I1, to understand the role PCNA plays during HSV-1 infection. PCNA-I1 stabilizes the PCNA homotrimer that encircles double stranded DNA, potentially preventing PCNA from loading and unloading from replicating DNA. We found that PCNA-I1 reversibly inhibits viral DNA replication, blocks late viral gene expression, and reduces virus production but has no effect on immediate early or early viral gene expression. We also performed an adaptation of isolation of proteins on nascent DNA (iPOND) to identify viral and cellular proteins that associate with replicating HSV-1 DNA during PCNA inhibition. Compared to an uninhibited control, PCNA recruitment to replicated viral DNA did not change with PCNA-I1. HSV-1 replication proteins including the DNA polymerase and origin binding protein decreased with PCNA-I1 inhibition. PCNA-I1 treatment also resulted in reduced host protein recruitment to viral genomes including mismatch repair factors, base excision repair factors, and components of the cohesion complex. Of note, viral single stranded DNA binding protein ICP8 and MRN complex members Mre11 and Rad50 were more abundant on viral DNA during PCNA-I1 inhibition. The MRN complex binds to double strand breaks and colocalizes at sites of stalled replication forks. Given these data, we conclude that PCNA-I1 treatment results in a stalled viral replication fork and a decrease in association of viral replication factors and host DNA repair proteins to replicating viral DNA.

***Theological Perspectives of the Mass in B minor**

Maria Picado Sandi

Mary Pappert School of Music

Faculty Advisor: Benjamin Binder, Ph.D.

ABSTRACT:

In 1733, the great German Lutheran composer Johann Sebastian Bach presented the beginnings of what would become his only Catholic work, the Mass in B minor, to the newly elected King of Poland, August III. This first draft was a compilation of extracts from five different Lutheran Masses that he had already composed, including a Kyrie and a Gloria.

Over the years, musicologists have put forth various theories as to why such a devoted Lutheran such as Bach wrote a Catholic mass (e.g. Wolff 2001). My research clarifies how specific sections of the Mass express both Catholic and Lutheran beliefs and theological perspectives. To accomplish this, I analyze the text and music of these portions of the Mass, but I also consider the ways in which Bach adapted some of his other Lutheran compositions for inclusion in the Catholic Mass. These adaptations include the opening chorus of Cantata BWV 29 ("Gratias agimus tibi" in the Mass) and some music from Cantata BWV 46 ("Qui tollis peccato mundi" in the Mass).

My investigation of the theological orientation of Bach's Mass also considers the role of performance, a crucial factor when considering the meaning of any piece of music. Previous studies have evaluated different performance practices of Bach's music from a historical point of view (Butt 1991, Melamed 2018), including the various choices that performers must make today in comparison to how this work would have been performed during Bach's lifetime. Along those lines, I analyze two different recordings of the Mass, one with the English Baroque Soloists and Monteverdi Choir under the direction of, John Eliot Gardiner from 1985, and another by the Berlin Philharmonic and Chorus conducted by Hebert von Karajan in 1974. I show how the different musical choices made by each conductor and ensemble radically change the theological meaning of the text and the music. Ultimately, I address the question of whether or not Bach wrote this work exclusively for the Catholic Church or if the role of performance changes the theological meaning of it making it acceptable to also be used in a Lutheran service.

Edna Detection of *Lycorma Delicatula* Using Various Forensic Swabs Via STR Analysis

Maeve Picariello

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Faculty Advisor: Lisa Ludvico, Ph.D.

ABSTRACT:

The purpose of this research was to determine the most effective forensic swab for use in proactively detecting the presence of the invasive spotted lanternfly *Lycorma delicatula* early into its life cycle during its invasion of non-native regions so that the environmental damage it causes can be prevented. This objective was addressed by utilizing short tandem repeat (STR) analysis of a *L. delicatula* STR. Environmental DNA (eDNA) was collected on Duquesne University's campus using three different types of forensic swabs, which were compared based on their ability to collect *L. delicatula* DNA from environmental surfaces early in the insect's lifecycle. In this study, early life forms of *L. delicatula* were targeted because they are less capable of damaging plant life, so it is preferable to detect them and take invasive species control measures in these stages to prevent further damage. Swabbed eDNA was extracted then amplified with species-specific primers then analyzed via capillary electrophoresis (CE) to determine the presence of *L. delicatula* in environmental samples. It was predicted that *L. delicatula* would be detected at the earliest post-hatch date in wet cotton swab extracts. So far, the data do not show a difference between swab types regarding effectiveness for this method.

Cultural Values, Beliefs, and Perceptions of Mental Health Nursing Care from Black/African American Patients: A Mini-Focused Ethnography

Kathy Pitten

School of Nursing

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

ABSTRACT:

Purpose: The purpose of this qualitative mini-focused ethnography was to understand the cultural values, beliefs, and perceptions of mental health nursing care from Black/African American patients.

Research Question: What are the cultural values, beliefs, and perceptions of mental health nursing care from Black/African American patients?

Background: Factors impacting the quality of mental health treatment for African American patients include clinician acceptance of non-traditional healthcare practices, clinician acceptance of the cultural role of spirituality, and clinician acceptance of the cultural role of family. However, it is unclear how Black/African American perceive the mental health treatment they receive.

Methods & Analysis: This study used a focused ethnography method. Data was collected from semi-structured interviews and analyzed using Leininger's four phases of qualitative data analysis.

Results: Participants in this study were Black/African American males between the ages of 25-32 years old. All participants held a bachelor's degree and were employed. Through analysis, the following categories were identified in the second level of analysis: culture, family, friends, mental health, nursing care, religion, and stigma. The third level of analysis resulted in a pattern of mistrust of how others perceived them was identified. Due to the nature of the mini-study, data was not collected or analyzed to the fourth level of analysis.

The participants experienced nursing care incorporating cultural values and beliefs. However, the participants expressed that it was more important to have a trusting relationship with their nurse than culturally competent care.

Conclusions & Implications: Future research should include a full-scale focused ethnography to identify additional patterns resulting in theme identification. It may be important for nurses to understand Black/African mistrust of how others perceive them and the potential impact of care and seeking mental health treatment.

Allegheny City: Fate and Fortune

Evan Portman

McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Andrew Simpson, Ph.D.

ABSTRACT:

On July 4, 1890, the Pittsburgh Dispatch printed the headline, "One Great Big City," foreshadowing the annexation of Allegheny City by its greater metropolis. Local mythology holds that the North Side represented a place for economic opportunity for the region's immigrant population, but a closer examination of the community's history offers a more nuanced story of its early prosperity and its eventual fall.

While the city stood as a center of industry, ethnicity, and culture throughout the nineteenth century, the city's economic decline began soon after the Civil War—decades before the deindustrialization of other communities in Western Pennsylvania. As iron forges and cotton mills moved out of town, community leaders sought a transition to a service economy and light manufacturing to remedy the city's decline in industry. The city's vibrant ethnicity fostered equally strong ethnic traditions, allowing German American residents to establish prosperous breweries. Officials at

Western Penitentiary in Allegheny City embraced inmate labor to produce commodities such as shoes, brooms, and cigars.

However, the community's stark ethnic divisions and complex relationship with the greater metropolis of Pittsburgh both encouraged and ultimately hampered this solution. Allegheny City's decline and civic leaders' attempt to recover its lost industry ultimately foreshadowed the fate of numerous other communities in Western Pennsylvania. This study complicates the Pittsburgh narrative and informs how the North Side reached its current socioeconomic state as well as how the community should act to achieve new prosperity.

The Beliefs, Values, and Experiences of Health in Transgender Youth Experiencing Homelessness

Mary Poskin

School of Nursing

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

ABSTRACT:

Purpose: To gain understanding of the perspectives and experiences of health in transgender youth experiencing homelessness.

Research Question: What are the beliefs, values, and experiences of health in transgender youth ages 18-25 yr. experiencing homelessness?

Background: The transgender population is a unique population within the LGBTQ+ community, with the highest rates of homelessness, violence, and mental health adversities compared to their heterosexual and cisgender peers. Transgender youth may experience difficulty accessing medical/ mental health care and housing because of their gender identity. There is a lack of research addressing the health beliefs, values, and experiences of homeless transgender youth.

Methods: A focused ethnography method was used for this study. Data was analyzed according to Leininger's four phases of data analysis using semi-structured interviews.

Results: Three homeless youth, ages 20-24 years, all identifying as transgender, participated in semi structured interviews. After in-depth analysis and coding, eight categories were identified. Further analysis of the data resulted in two patterns identified: Pattern of External Influences on My Life and Pattern of Finding My Way.

Conclusion: Based on the analysis, homeless transgender youth experience significant adversity in their lives, yet also believe in the possibility for a better future. A full study is indicated to better understand the perspectives and experiences of transgender youth experiencing homelessness. This information would inform targeted interventions and pathways to stable housing and self-sufficiency for improving health and well-being.

Assessment of the Accuracy of Obtaining Facial Images from DNA

Matt Potock

Bayer School of Natural and Environmental Sciences

Faculty Advisor: Pamela Marshall, Ph.D.

ABSTRACT:

Deoxyribonucleic acid (DNA) has been one of the most commonly used and important forensic tools since its first use in the US legal system in 1987. DNA is known to contain the markers that code for specific facial features of each individual human. The purpose of this study was to sequence the genetic code and determine if an accurate 3D model of a human's face could be constructed from their DNA. 12 buccal swab samples were taken from volunteers of different races, ethnicities, and genders were extracted and amplified with the Qiagen DNA extraction kit. Massively Parallel

Sequencing (MPS) was used to process multiple DNA sequences in parallel, which means thousands of forensic markers be analyzed to sequence level in a single assay. This was done through the use of the Verogen Forenseq Signature Prep Kit, which provides high resolution sequencing of 153 identifying markers (including 27 autosomal short tandem repeats (STRs) 7 X-chromosomal, 24 Y-chromosomal haplotype markers and 94 single nucleotide polymorphisms (SNPs)) and the MiSeq FGx Sequencing System. The Forenseq Universal Analysis Software was used to interpret phenotypical data and give information such as biological ancestry, skin color, facial structure. Data from the Universal Analysis Software will be used to create three dimensional models of each subjects' face which will be compared to photos of each subject to determine accuracy. Accuracy will be determined by a number of factors including if the distance between eyes, length of nose, distance between mouth and nose were relatively similar between created model and each subjects' true face. The results of this study are still in their preliminary stages, but it hopes to find that accurate models can be created to match their real-life counterparts. The findings of this study will expand our DNA knowledge and provide a new technique for crime labs and police departments to locate and identify possible persons of interest, re-open cold cases, and identify skeletal remains.

Keywords: DNA, Massively Parallel Sequencing, Forenseq Signature Prep Kit

***Malonate Hijacks Solvent Into Its Quantum System for Uncatalyzed Decarboxylation Reaction**

Unnikrishnan Puthumana

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Faculty Advisor: Jeffrey Evanseck, Ph.D.

ABSTRACT:

Enzymatic catalysis is pervasive in biological systems, yet the molecular origin of the catalytic activity is not fully understood. The enzymatic decarboxylation of malonate, a b-keto acid plays an important role in the metabolism of *Pseudomonas aeruginosa*, a serious level threat species. The study of uncatalyzed reaction provides a crucial reference for the molecular level understanding of the enzyme. Kinetic experiments have been recently reported to characterize the thermodynamic and kinetic parameters of the uncatalyzed decarboxylation reaction of several b-keto acids, including various ionization states of malonate. However, computational efforts in the field have so far been unable to reproduce experimental activation parameters. We implemented a hybrid solvation model using the polarized continuum model as implicit solvent in conjunction with explicitly defined $[H_2O]_n$ where $n = 3, 4$ or 10 waters. Both quantum mechanics (QM) and hybrid quantum mechanics-molecular mechanics (QM/MM) methods were used to carry out the geometry optimizations and frequency analysis. Specifically, the M06-2X density functional paired with Dunning's correlation-consistent basis sets were used for QM. The AMBER forcefield using an ONIOM subtractive scheme was used for the QM/MM computations. The results were then extrapolated to the complete basis set limit and compared to the experimental value of $\Delta H^\ddagger = 30.0$ kcal/mol in aqueous buffer solution reported by Wolfenden et al. Our computations yield a fundamental mechanistic shift between the gas and aqueous phases. The pseudo-chair conformation of malonate with intramolecular charge-assisted hydrogen-bond in gas-phase is replaced with an "orthogonal" conformation stabilized by a hydrogen-bonded network of waters in aqueous phase. QM/MM reveals that the waters in the newly identified water cluster, coined as the "hydration buckle" gets polarized by the charge on malonate and develop special geometries different from bulk-phase waters. In fact, these waters become part of-or get hijacked into-the malonate quantum system underscored by strong and cooperative hydrogen-bonding. The results from our study of the uncatalyzed malonate decarboxylation reaction in the aqueous phase show a novel conformation and interpretation of hydration buckle that aligns with experiment, suggesting a new reference point in understanding enzymatic mechanism of the decarboxylation of b-keto acids.

Idiopathic Pulmonary Fibrosis and GERD: What's the connection?

Harshitha Ramanan

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Faculty Advisor: Faina Linkov, Ph.D.

ABSTRACT:

Purpose: Idiopathic Pulmonary Fibrosis (IPF) is a chronic, progressive disease of unknown origin. Gastroesophageal reflux disease (GERD) has been implicated in IPF patients but the exact relationship between IPF and GERD is still subject to debate. This study aimed to determine whether patients with IPF were experiencing symptoms of GERD due to it being a risk factor or a co-morbidity. We also aim to explore the future directions of IPF management, such as Barium Swallows Study (BSS) to study the anatomy and physiology of the esophageal track, as well as studies of lung volume characteristics in patients with IPF.

Methods: Extensive literature review of the association between IPF and GERD was performed. Additionally, novel treatment approaches to diagnose and treat IPF and GERD have been reviewed (confirmed by BSS). Systematic literature searches have been performed using PubMed and focusing on data published between 2017 and 2023. Studies were excluded if they were published in languages other than English or discussed IPF without accounting for GERD. The following terms have been used in the database for studies: IPF, GERD, meta-analysis, barium swallow, early detection, and early intervention. The systematic review examined the typical BSS findings in IPF patients.

Results: Using the search criteria above, 98 potential papers were found, and 12 papers were used. Findings indicate that there is interest in the effects of GERD interacting with IPF as either a comorbidity or risk factor. There is a lack of literature incorporating barium swallows studies to identify GERD in IPF patients. Only one paper was identified with this, however, it was outdated. Recent studies are mentioning how lung pressure imbalances due to IPF and GERD may be exacerbating symptoms, however, there is not much research done in this area.

Conclusions: IPF is a devastating rare disease with a survival of 3-5 years post-diagnosis. Although many factors have been observed in association with IPF, research points to GERD being a comorbidity of IPF. Currently, most literature reviews suggest that additional studies and data are necessary. The next steps point towards conducting BSS to look at the impact of GERD on exacerbating IPF.

Comparative Life Cycle Assessment of Small Vertical Axis Wind Turbines and Natural Gas at an Urban University

Mary Kate Ranii

Bayer School of Natural and Environmental Sciences

Faculty Advisor: David Kahler, Ph.D.

ABSTRACT:

Environmental, health, and climate imperatives demonstrate the need to reduce fossil fuel consumption. Institutions across sectors seek solutions that provide low-pollution and low-carbon electricity. Small-scale wind turbines, especially vertical axis wind turbines (VAWTs), provide opportunities for generation, even within urban areas, close to many consumers. Researchers collected wind speed and directional data from a potential turbine installation site at Duquesne University to demonstrate the benefits in an urban university location. The data was used in a life cycle assessment framework and a social review to better understand the impacts and value of electricity produced by a small-scale VAWT as compared to that produced by natural gas.

Quantification of 3D Surface Area of Skin Wounds Using a Mobile Device

Amir Rastegar

Rangos School of Health Sciences

Faculty Advisor: Bin Yang, Ph.D.

ABSTRACT:

Skin lesions, including burn wounds, are characterized by several key physical properties. They include the size, shape, and coloration of the wound. Assessing the state of the wound, and thus the patient, is critical to ensure best chances of patient recovery. In this study, we investigated the feasibility of characterizing skin wounds, such as surface area, based on their 3D models. Such models can be conveniently acquired with a mobile device. We repurposed the face scanning capability of an iPad for 3D scanning. We developed a global color thresholding algorithm to accurately segment out the targeted region by primarily utilizing the Otsu's method. With the device, we conducted studies to optimize the imaging condition, validated its performance on quantifying the 3D surface area, and tested it on simulated burns. We determined that a high accuracy is achieved if the distance between the iPad and the object is less than 18 inches. Segmenting out a region works consistently as long as the region is evenly lit and uniformly colored, though utilizing multistep segmentation can aid in varied colored regions. Our results on control shapes with known area demonstrate an accuracy of within 5% and a variation of less than 3% for quantifying the surface area. On the much more complex geometry of simulated skin burns, we found that the coefficient of variation was about 10 percent between samples.

Effects of Water Submersion on the Recovery of DNA from Firearms

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Bayer School of Natural and Environmental Sciences

Faculty Advisor: Pamela Marshall, Ph.D.

ABSTRACT:

Firearms are often used and handled in crimes. They are commonly found in bodies of water and submitted to forensic laboratories for DNA testing. Over time it is generally assumed that water can have negative effects on the collection of DNA from submerged items. This study aims to determine the effects of water submersion on the recovery and extraction of DNA from firearms. A 24-hour trial and a 72-hour trial were conducted in triplicates. In both trials, trace DNA was deposited on pistol magazines then submerged, dried, and collected. The Promega DNA IQ™ System Casework Protocol extraction protocol was employed, and the DNA quantities recovered were compared using Real-Time PCR. Genotypes were obtained using GlobalFiler™ PCR Amplification Kit and analyzed using GeneMarker® HID software. It is hypothesized that partial and full profiles will be developed from these magazines. Given this research the authors predict that more firearm related crimes will be solved using DNA technology.

***Peripheral Minds: a Phenomenological Analysis of Dyslexia**

John Henry Reilly

McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Lanei Rodemeyer, Ph.D.

ABSTRACT:

This presentation endeavors to provide a novel way of understanding Dyslexia through the phenomenology of Edmund Husserl. Dyslexia is currently defined as a neurodevelopmental disorder. It is "a specific and persistent learning disability affecting the acquisition and development of the written language code (reading and spelling) and causing significant handicap to academic achievement and/or activities of daily life ." This medicalized definition has several conceptual problems and does not commensurate with the lived experience of Dyslexic people.

In philosophical terms, Dyslexia is defined by negation—it is defined through what it is not. This presentation utilizes Husserlian phenomenology to work toward an affirmative definition—a definition of what Dyslexia is. Husserlian

phenomenology helps illuminate a collection of attributes of Dyslexia and enables us to conceptualize it as something more than a disability which must be fixed and remediated.

Lanei Rodemeyer's work explicates Husserl's analysis of embodiment on 5 distinct but interconnected levels: Hyletic Flow, Passive Synthesis, Active Synthesis, Intersubjectivity 1, and Intersubjectivity 2. This presentation analyzes Dyslexia at the first 3 levels of embodiment, beginning at the level of Hyletic flow. Eight major studies have demonstrated that Dyslexics possess a "peripheral bias," i.e. they experience stronger peripheral vision and weaker focal vision compared to controls. All relevant studies indicate that all Dyslexics invariantly experience this. With a "peripheral bias," a Dyslexic experiences raw sense data differently than a neurotypical person—comparable to experiencing the world through an ultra-wide-angle lens rather than a telephoto lens. This leads to differences on the level of Passive Syntheses, namely a comparative difference in orthoaesthetic, motivated sensations, associations, and affectivity. Yet while comparative differences exist between a neurotypical and Dyslexic person, both will encounter their respective experiences as their own "normal." On the level of Active Synthesis, Dyslexics can consequently conduct categorial syntheses through the faculty of Phantasy, i.e. Dyslexics can think visually rather than linguistically, a phenomenon widely reported by Dyslexics.

In conclusion, Dyslexia does not need to be understood solely through the medical lens of pathologization. Phenomenological analysis elucidates how Dyslexia can be conceptualized and defined affirmatively and delineates what such traits may be.

***Student Family Navigators Promoting Social Communication Outcomes for Infants and Toddlers from Lower-Income Families**

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Rangos School of Health Sciences
Faculty Advisor: Abigail Delehanty, Ph.D.

ABSTRACT:

Current research demonstrates that there are significant income-related disparities in language skills at school entry.¹⁻³ This study investigated the feasibility of a virtual prevention intervention for families of infants and toddlers from lower-income backgrounds designed to promote social communication and language development and increase access to early intervention services as needed. The intervention was delivered by three Duquesne University Speech-Language Pathology students who were trained in social communication development and family centered practices. Nine families were identified from the community with children between the ages of 8 and 17 months. Families completed a preliminary social communication and language screening administered via Qualtrics. They then attended a series of seven online Zoom sessions in which students presented reader-friendly, evidenced-based resources and provided the opportunity for parents to reflect on their practices and ask questions. Upon completion of the sessions, parents filled out another social communication and language screening. Out of the nine families who began the study, seven completed the program. Five of these children met typical social communication and language milestones throughout the intervention, and two were helped to pursue further developmental evaluations and early intervention services. After the study, feedback was collected from the families as well as the student intervention providers. In general, families reported that the intervention helped to increase their confidence in supporting their child's communication. They also said they were given the opportunity to ask questions and believed the program was worth their time and effort. Students stated that, while at times it was difficult to maintain contact with families, they increased their confidence in talking with parents. Overall, this study demonstrated that the mobile technology platform was feasible for this study, and screenings and resources were perceived as supportive and valuable among families.

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***A Peculiar Home: A Phenomenology of Place**

Gabriela Sanchez

McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Lanei Rodemeyer, Ph.D.

ABSTRACT:

There are places where individuals may feel more 'at home' in than others. Home is often this place for people; both meaningful and familiar, with a sense of belonging. Often, there are other places that make, or have made, one feel uncomfortable or alienated: like a turn down an unfamiliar dark street or waiting in an airport terminal line. Then, there are places that may just feel indifferent; neither comfortable nor alienating, somewhat unimportant: like driving down the road to a frequent grocer. A subject experiences places and objects in context: in relation to a meaning, familiarity, or alienation and in relation to many other factors including some factors that constitute what qualifies as alien or significant, for example. Sometimes, in English, we even say that places or particular objects composing, or existing in, those places 'speak to us' or 'move us' in one way or another. What is meant by those phrases and how can objects seemingly interact with subjects to the extent where they can influence subjects?

I argue that Husserlian phenomenology can help us understand how material objects, and their contextual environment, become meaningful through a correlational account of judgement and value-noema. Further, I claim that objects themselves affect structures of consciousness by pulling the regard of subjects according to particular constructions of the noetic-noematic strata. For the sake of this investigation, I postulate that the noema of valuable experiences of belonging are prioritized over meaninglessness and alienation and that objects can possibly affect these experiences. Through my work, I attempt to give a few examples of noematic differences towards a singular noematic correlate, noematic variation, and how an object can determine, to some degree, what noematic content is prioritized over another.

Material objects seem to be able to affect structures of consciousness. Thus, noemas like a judgement-noema of alienation can be altered and mitigated, to some limited degree, by the presence of some material object. Through changes in an object that take an individual or group's content variances of structures of consciousness in to account - changes that acknowledge and represent variances of value-judgment-noeses-noema - more diversely hospitable environments can be created. This analysis can be employed on behalf of persons that objects in the built-environment assume whose structures of consciousness are constituted otherwise - this may pertain to migrants, refugees, veterans, gender & racial marginalizations, persons with disabilities, and psychosomatic variations. This account provides a direction to further investigate how the material world can be affected so that valuable, meaningful experiences and judgments of belonging, instead of alienation, can be prioritized in noetic-noematic strata for all persons.

Analyzing *Pseudomonas aeruginosa* with Bacteriophage Tags using Photoacoustic Flow Cytometry

Jennifer Schinke

Rangos School of Health Sciences

Faculty Advisor: John Viator, Ph.D.

ABSTRACT:

The number of daily bacterial infections is climbing and the CDC explains that this is due to the antibiotic-resistant threat in the United States. With this in mind, it is important to find a faster way of bacterial identification. It currently takes 1-4 days for a medical lab to get a successful culture diagnosis to identify bacterial infection. Photoacoustic flow cytometry (PAFC) can be used as an alternative method resulting in swift identification within an hour (Edgar, 2019). *Pseudomonas aeruginosa*, cell line PA01, will be coated in up to a few hundred red-dyed phages making it detectible by the photoacoustic flow cytometry system. Bacteriophages (phages) are viruses that attach and replicate within their specific

bacterial cell. Once the phage recognizes and infects PA01, replication within the cell rapidly occurs until the lytic stage is reached, at which point the cell bursts. The lytic stage takes about 45 minutes to occur, so as long as the tagged cells are tested before lysing, detections should occur if *Pseudomonas aeruginosa* is present. This research may provide evidence of a more efficient method to identify bacteria in the medical setting within an hour.

***Long-Term Care Current Development in China Urban Area: A Literature Review**

Haibin Shi

Rangos School of Health Sciences

Faculty Advisor: Faina Linkov, Ph.D.

ABSTRACT:

Background: China is facing a more and more serious aging problem, with a 260 million elderly population (over 60 years) currently. The elderly population will reach 400 million in 2035, accounting for more than 30%. Developing a diversified and hierarchical long-term care system is very important. This study conducted a literature review to explore the current situation of long-term care in China. Especially under the impact of the pandemic, and the development trend of long-term care models.

Design and methods: I used a comprehensive approach to identify eligible publications for this review, including English (EBSCO, PubMed, MEDLINE, and Google Scholar) and Chinese literature (CNKI, VIPC) published between 2010 and to date. Policy-related information can be downloaded from the official website of the governments.

I organized this review with a thematic pattern, including three subsections: current long-term care models, existing problems, and development trends.

Results: Much Chinese literature was identified, and little English literature was found. Only a few articles were identified to study the long-term care model during the COVID pandemic.

Conclusions: The biggest change in the long-term model is the transition from home care to public long-term care because the size of the family shrinks. This change prompts the development of community service (community-based long-term care) and nursing homes. In recent years, many innovative models have emerged, including the endowment insurance plus community model, integration of medical care and long-term care model, etc.

Long-Term Care Current Development in China Urban Area: A Literature Review

Haibin Shi

Rangos School of Health Sciences

Faculty Advisor: Faina Linkov, Ph.D.

ABSTRACT:

Background: As an aftermath of the one-child policy, China is facing a problem with accommodating an increasing proportion of the elderly population. By 2035, the elderly population will reach 400 million, accounting for more than 30% of the population. Developing a diversified and cost-effective long-term care system is very important. This literature review is conducted to explore the current trends in the development of long-term care models in China, specifically focusing on the impact of the pandemic and the experiences of other countries in handling the development of effective long-term care models.

Design and methods: Publications were included in this review if they were published in English or Chinese languages between 2010 and 2023 and focused on long-term care models in China. Multiple databases were used including EBSCO, PubMed, MEDLINE, Google Scholar (in English), as well as CNKI, and VIPC (in Chinese). Additionally, several policy-related articles were downloaded from the official website of the US and Chinese governments.

Results: A total of 58 articles have been identified 15 in English and 43 in Mandarin Chinese, revealing a big gap in the literature. Current long-term care models identified several issues, including financial sustainability and the inability to handle expanding population of elderly individuals. Future development trends will focus on developing a comprehensive system of home care and community-based care. In recent years, many innovative models have emerged, including the endowment insurance plus community model, integration of medical care and long-term care model, etc.

Conclusions: The biggest change in the long-term model is the transition from home care with care delivered by family members to public long-term care. This change prompts the development of community service (community-based long-term care) and nursing homes. Experiences from other countries need to be explored for applications in China, specifically focusing on countries with large populations and similar cultures.

Comparison of Extraction Methods for Methamphetamine and Metabolites from Vitreous Fluid via LCMS/MS-QQQ Analyzation

Erika Sobol

Bayer School of Natural and Environmental Sciences

Faculty Advisor: Stephanie Wetzel, Ph.D.

ABSTRACT:

An efficient way to extract and quantify methamphetamine (MAMP) and its metabolites, amphetamine (AMP) and parahydroxymethamphetamine (PMAMP), has not been developed for vitreous fluid via Liquid Chromatography Mass Spectrometry (LCMS/MS-QQQ) analyzation. Vitreous fluid is the matrix of choice due to its ability to retain drug concentrations and its resistance to decomposition. This study is focused on multiple extraction techniques, like solid phase extraction and QuEChERS, to isolate MAMP, AMP, and PMAMP from vitreous fluid. These methods are the point of comparison for efficiency and recovery of the drugs which is analyzed via the LCMS/MS-QQQ. Quantitative analysis methods were employed to compare each extraction method's results to each other to determine which would be the most useful to examine MAMP, AMP, PMAMP. Future research needs to be focused on low cost, efficient approaches to test for MAMP, metabolites, and other drugs in vitreous fluid.

Person-Centered Voice Analysis: The Effect of Positive Mental Characters on Acoustic Measures of Voice Production

Yuting Song

Rangos School of Health Sciences

Faculty Advisor: David Ford, Ph.D.

ABSTRACT:

The purpose of this study was to explore the relationship between positive mental characters, based on personality trait theory, and acoustic measures of voice production. Specifically, correlation analysis was performed to identify associations between wisdom and knowledge, courage, humanity, justice, temperance and transcendence and fundamental frequency (F0), noise-to-harmonic ratio (NHR), mean jitter (%), mean shimmer (%), and the maximal performance task, s/z ratio. Results of this study will directly inform clinicians by providing recommendations for implementing person-centered acoustic analysis for patients with voice disorders, based on personality traits.

Differentiating the Spatiogenetic Roles of Rsm Paralogs in *Pseudomonas Fluorescens*

Sadhana Srinivasa

Bayer School of Natural and Environmental Sciences

Faculty Advisor: Wook Kim, Ph.D

ABSTRACT:

Bacteria frequently form densely populated communities on surfaces, where individual cells fiercely compete with one another for limiting nutrients and space. In previous studies, we have demonstrated that diverse rsmE mutants

repeatedly emerge in overcrowded *Pseudomonas fluorescens* colonies by creating three-dimensional spatiogenetic patches with a dramatic reduction in cellular density. Mutations in *rsmE* result in the secretion of a mucoid polymer and a biosurfactant, which are primarily responsible for creating space and preventing the encroachment of neighboring cells into the newly created space. *RsmE* is a translational repressor, thus, *rsmE* mutations act to de-repress various extracellular secretions that are normally repressed. *P. fluorescens* possesses three *Rsm* paralogs (*RsmA*, *RsmE*, and *RsmI*) that are generalized to be functionally redundant due to high sequence conservation and similar secondary structures. In this study, we knock out each paralog to show that *RsmE* is exclusively responsible for the formation of spatiogenetic patches. In addition, we demonstrate that *RsmE*-driven patch formation also uniquely confers dramatic fitness advantage in a crowded population. Our results strongly suggest that *RsmE* is functionally unique from its paralogs, which opens up enticing opportunities to explore how functional specificity is achieved through extremely limited sequence variations.

Hostile Attribution Biases in an Emerging Adult Sample: Evidence of a Two Factor Model

Taylor Steeves

School of Education

Faculty Advisor: Laura Crothers, Ed.D

ABSTRACT:

The present study involved a psychometric evaluation of the Assessment of Intent Attributions (Bailey and Ostrov, 2008; Crick, 1995), a self-report measure of hostile attribution biases (HAB). Specifically, the associations between gender, age, and hearing status with relational and instrumental HAB subtypes, were explored in a study of college-age students (N = 503). Despite a considerable body of literature on human aggression and HAB in child and adolescent samples, research on HAB in the emerging adult population, specifically college-aged individuals, has been hindered by the lack of psychometrically sound measures. In accordance with recent research examining HAB in young adult populations (Bailey and Ostrov, 2008; Godleski and Murry-Close, 2022), in this study, confirmatory factor analysis supports that the Assessment of Intent Attributions measures two internally consistent constructs: relational hostile attribution biases and instrumental hostile attribution biases. The measure had adequate reliability and validity and the factors demonstrated unique relationships with a number of dependent variables. In particular, gender was significantly related to both factors but in opposite directions, while age and hearing status were significantly related to only one factor. The findings highlight the importance of assessing subtypes of HAB in emerging adult samples and ways in which this measure can extend research in HAB past childhood and adolescent populations.

Phenomenology of Growing Up in a Hoarded Home: A Preliminary Investigation

Brianna Stich

McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Eva-Maria Simms, Ph.D.

ABSTRACT:

This research presents some results from preliminary work on the phenomenology of the hoarded home as experienced by the child. This project entailed phenomenological analysis of detailed reflections of two adult children who each grew up in hoarded homes. Interpretative Phenomenological Analysis of these reflections was used to ascertain the following themes: protecting the world from the house, finding ways to play, spaces as nonsensical, and developing “tendencies” or unconscious habits of navigating the home. For this project, these themes were dialogued with extant literature on the phenomenology of the home. This research hopes to sensitize others, and especially those in helping professions who may encounter children growing up in a hoarded home, to difficulties which may attend growing up in such an environment. In these explorations, the child’s comportments are considered evidence of creative adaptation rather than maladjustment—this underscores the productive capacity of the child to adapt to difficult environments, and in the spirit of freedom unique to human beings, to find a way to “make it work.”

The Study of Hyoid Bone Fracture Patterns

Grace Stockmal

Bayer School of Natural and Environmental Sciences

Faculty Advisor: Pamela Marshall, Ph.D.

ABSTRACT:

Commonly referred to as the “Hangman’s Fracture”, the hyoid bone found in the neck has been observed to partially or completely break when compressed by a ligature in suicidal hangings and homicidal strangulations. Due to its location below the mandible, the hyoid tends to fracture when a ligature is applied to the neck and compression is applied. Previous studies have determined neck damage and frequency of thyrohyoid fractures, but scientists need to develop effective methods to investigate manners of death and patterns of fracture within the hyoid bone. Typical crime scene reconstructions do not include the condition of the victim, but it is a possibility to enhance death investigation with experimental three- dimensional (3D) reconstruction of manners of death. It is proposed that homicidal strangulations by ligature can be accurately reconstructed using a 3D hyoid model and manner of death simulation. To test this proposal, hyoid bones were collected from deceased individuals, and cleaned of biological material using an Oxi-Clean™ solution. These hyoids were CT scanned into files that were able to be 3D printed utilizing FibreTuff® polymer, a material commonly used in biomedical engineering due to its similarities to bone composition. The Torbal FT Odyssey force gauge was used to measure the newtons required to partially fracture these models and allowed observation of fracture patterns. Ligatures—including belt, electric wire, and cotton rope—were placed around ballistic head models with inserted 3D model hyoids and were used to simulate homicidal strangulation methods. These measured forces and recorded patterns of fracture were compared to case studies of homicidal strangulations and their findings. Research involving 3D reconstruction of human bones to simulate homicides can enhance death investigation and advance connections to forensic anthropology and physical observations of hyoid fractures. Future autopsies with unidentified manners of death, involving asphyxiation and abrasive damage to the neck, can investigate the hyoid bone for patterns of fracture that correlate to homicide by ligature markings.

Air-Jetting Based Bioprinting of Alginate Droplets for Human Pluripotent Stem Cell Encapsulation Toward Biomanufacturing of Pancreatic Islet Organoids

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Faculty Advisor: Bin Yang, Ph.D.

ABSTRACT:

This study investigates the use of alginate-cell hydrogels formed from air-jet droplet printing, a promising technique for fabricating three-dimensional (3D) tissue constructs of small diameter. Alginate, a biocompatible and biodegradable material, was chosen due to its ability to cross-link in the presence of divalent cations, like calcium chloride, which are not lethal to the cultured cells. There has been growing interest in alginate cell droplet printing for tissue engineering and regenerative medicine applications, due to its potential to produce functional tissues and organs with high precision and reproducibility. Optimization of our current 3D-droplet printing device, including extrusion and air flow rates, has now led to the incorporation of cells. In this paper, our optimized 3D-droplet printing device is used to print human induced pluripotent stem cells (hiPSCs) which are then differentiated and cultured. The study focuses on optimizing the printing parameters, including cell density and droplet size, to achieve high viability and functionality of encapsulated cells. Additionally, we highlight the challenges and opportunities for the future development of this technology, such as the need to improve cell viability and function, the integration of multiple cell types and biomaterials, and the scale-up for clinical translation.

Client-Centered Therapy & Multiculturalism: Examine China's Case in the Historical and Contemporary Context

Mo Sun

McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Elizabeth Fein, Ph.D.

ABSTRACT:

The multicultural counseling competence movement emerged at the end of the 20th century. Coming to the 21st century, the Multicultural Guidelines released by the American Psychology Association (APA, 2017) increasingly stress the importance for psychologists to learn, recognize, understand, and practice along the lines of seeing and respecting individuals in their lived world in which a careful read on the historical and contemporary context is critical. Considering Carl Rogers's Client-Centered Therapy (CCT) whose quintessence was around showing unconditional positive regard, empathy, and genuineness in a non-directive manner that facilitates an environment for the growth of humans' self-actualizing force, CCT could be a universally applicable approach. However, research shows conflicting results regarding CCT's compatibility with multiculturalism (Quinn, 2012; Spinelli, 1989; Usher, 1989). To examine the relationship between CCT and cross-cultural counseling, this study compared the environment within which CCT developed and that of China's coeval history to hint at a social reason for the Derridean "absent" (Derrida, 2016) of CCT there. I also present the status quo of psychotherapy in China since the new Mental Health Law was released, which made it almost impossible to do psychotherapy afterward, let alone popularize CCT that subordinates to it. Overall, this presentation takes China as a real cross-cultural case from the perspective of historical and social context to provide more information for psychologists with a humanistic approach who ponder upon the controversial relationship between CCT and multiculturalism.

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Profiling Bacterial Communities for Future Manipulation of Abandoned Mine Drainage Contaminants

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ABSTRACT:

Abandoned mine drainage (AMD) is a significant source of freshwater pollution in Pennsylvania and is an overlooked source for rare earth element recovery. These elements are required for the development of high-technology products and are chemically attracted to precipitates in AMD passive remediation systems (PRS). A PRS is an environmentally engineered mechanism that encourages the precipitation of common contaminants found at a specific mine through a variety of approaches. Within a PRS, environmental contaminants from abandoned mines react with local geological formations such as limestone beds and naturally occurring microbial communities that promote either oxidation or reduction of the contaminants. The microbial communities located within a PRS are diverse, vary seasonally, and develop naturally in the contaminated environment of the PRS. Kentucky Hollow, a PRS in Pennsylvania, has been engineered to exhibit swift pH changes from acidic to neutral and is more likely to contain high concentrations of accessible rare earth elements than naturally neutral discharges. Recent findings indicate relatively low bacterial abundance at the Kentucky Hollow PRS compared to other evaluated systems. Developing a 16S rRNA gene

sequencing protocol to analyze samples with low bacterial biomass is critical to constructing plans for future microbial mediated rare earth element recovery. Recovery of rare earth elements from AMD can alleviate the need for mineral acquisition from the international community, while also providing construction and maintenance funding for additional PRS. This creates a positive feedback mechanism in which rare earth elements from AMD can support further mining remediation efforts, rather than relying on funding from federal and state government environmental project allocations.

Optimizing a Method for Separating and Quantifying Novel Psychoactive Cannabinoids from Buccal Fluid on the LC/QQQ/MS

Jessica Thompson

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Faculty Advisor: Stephanie Wetzel, Ph.D.

ABSTRACT:

Cannabis sativa L., better known as marijuana, has sparked controversy for decades due to the psychoactive activity of the best-known cannabinoid, (–)-trans- Δ^9 -tetrahydrocannabinol (Δ^9 -THC), however there are more than 200 other cannabinoids that have been used for medicinal benefits since 2700 B.C. As medicinal and recreational use are in the process of being legalized, there is a need for an optimized method to both identify and quantify cannabinoids for accurate measurements of intoxication. The current standard drug tests use urine, which can test positive for Δ^9 -THC for up to a month after consumption. Oral fluid can not only be used to determine more recent use, but it can also help distinguish between structurally similar Δ^9 -THC derivatives whose metabolites are almost indistinguishable in urine. A quantification method for Δ^9 -THC and CBD from oral fluid was developed with liquid chromatography/ triple quadrupole/ mass spectroscopy due to the sensitivity of the instrument. The method was further optimized and expanded to include other psychoactive THC analogs such as Δ^8 -THC, Δ^{10} -THC, AND THC-O.

Collaborating with Duquesne University and Place of Employment to Conduct Practicum Project

Daniel Trompeter

School of Education

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

ABSTRACT:

Board Certified Behavior Analysts (BCBA) trainees are graduate-level students enrolled in coursework for Applied Behavior Analysis (ABA). As part of the requirements for the Master's Degree in ABA at Duquesne University, students are required to enroll in a practicum experience that corresponds with their coursework. Practicum experiences allow BCBA candidates to apply what they have learned in ABA coursework throughout their Master's program to the field of ABA under the direct supervision of a credentialed BCBA in a school or clinic experience. In addition to the requirements set by universities, BCBA candidates must adhere to the supervised fieldwork requirements of the Behavior Analyst Certification Board (BACB). BCBA trainees are required to obtain 2,000 hours of supervised fieldwork by a BCBA with 5% of sessions supervised per period OR 1,500 of concentrated fieldwork hours by a BCBA with 10% of sessions supervised per period (Behavior Analyst Certified Board, 2013). Receiving quality supervision enhances the development of effective and ethical practitioners, will benefit the client receiving services, and will strengthen the field of ABA (Turner et al., 2016). Supervision will strengthen the field of ABA by having BCBA's support their trainees' growth and understanding of evidence-based practices and how to apply it in the field. Being able to complete practicum and fieldwork experiences where the supervisee is already engaged in behavior analytic work can make the fieldwork experience more practical. This poster will examine the process of a collaboration between the graduate student, a BCBA professor at Duquesne University, and his place of employment to design a practicum experience that did not exist at the time. The design was developed by the graduate student under the supervision of his professor and employer. This development of this experience will highlight the outcomes of design, collaboration efforts, challenges, and future directions for the BCBA trainee program at this community setting.

Training, Education, and Certification of Forensic Document Examiners Across the United States

Lauren Turnacioglu

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Faculty Advisor: Lyndsie Ferrara, Ph.D

ABSTRACT:

The purpose of this study was to investigate the training, certification, and education of forensic document examiners in the United States. A survey was conducted using Qualtrics™ software. The survey included questions on demographics, certification, training, and education. Recruitment emails were sent to forensics organizations. Qualitative and quantitative comparisons were used to determine if there was significant variation among different laboratories. It was concluded that the field lacked uniformity in how training standards were applied, as respondents' answers differed. Vast variations in timing existed for the time since last certification and proficiency test. Type of education and training required by different organizations varied greatly. Another notable trend was the status of accreditation based on the type of laboratory where the examiner was employed. All respondents employed at a government laboratory indicated the laboratory was accredited, while most examiners employed privately indicated the opposite.

Trends in Profiles of Offenders Caught using Forensic Genetic Genealogy (FGG)

William Vause

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Faculty Advisor: Pamela Marshall, Ph.D.

ABSTRACT:

Forensic genetic genealogy (FGG) is a new tool in the forensic science community which allows violent offenders to be identified by genetic similarities their relatives share with a DNA sample. Since FGG is so new and limited in its use, it is important to examine the types of offenders FGG is successfully identifying in terms of previous criminal record and whether or not a sample is in CODIS. Currently, there are no studies effectively analyzing FGG with regards to trends in cases where it has been successfully used. In order to address this topic a way to analyze the cases which provided insight into variation in the offenders was developed. This entailed analyzing the case to determine the criminal record of the offender and whether or not they were in CODIS, as well as if a DNA was taken or should have been taken. From there potential cases involving violent offenders were identified by research and Freedom of Information Act (FOIA) requests were subsequently filed. Through these the case files for each individual case were obtained which allowed criminal history, the date of the crime, and other key information to be identified. In cases where this information needed to be supplemented, certain detectives on these cases were contacted and interviewed. The research is vital because it helps to provide more insight into a fast growing field of forensic science and one that will surely be integrated into law enforcement techniques as it becomes more fully understood.

Biocontamination of Manganese in Passive Remediation Systems Treating Abandoned Coal-Mine Drainage Driven by Manganese Reducing Bacteria

Anna Vietmeier

Bayer School of Natural and Environmental Sciences

Faculty Advisor: Nancy Trun, Ph.D.

ABSTRACT:

Abandoned mine drainage (AMD) that is rich in sulfuric acid and solubilized metals (including manganese) degrade PA's ecosystem and economy. Passive remediation systems (PRS) are designed to precipitate metals using geochemistry. Since these systems are open to the environment, they are naturally colonized by microbes that can impact remediation positively (bioremediation) or negatively (biocontamination). The acidic Boyce Park PRS (pH ~4) is characterized by levels of manganese that exceed the Environmental Protection Agency (EPA) limits for aquatic wildlife exposure and drinking water. Due to the low pH in acidic systems, manganese is found in its soluble reduced form (Mn²⁺). To detect manganese reduction that is microbially driven, manganese reducing bacteria (MnRB) were isolated from the acidic

system using an agar that detects manganese reduction. From each of the eight ponds at Boyce Park, eight isolates were collected, in total 64 MnRB candidates have been isolated. From pond 1 at Boyce Park MnRB isolates AV20, AV21, AV22, AV23, and AV24 have been confirmed to reduce manganese oxide using the EPA's formaldoxime (FAD) assay. Although MnRB will drive biocontamination in the PRS, manganese reducers in an industrialized setting with manganese-rich AMD precipitants can aide in biomining through the release of a subset of rare earth elements (REE) that co-precipitated with manganese in certain AMD PRS. Stimulation of the growth of MnRB in situ may be possible through supplementation with carbon sources, which are limiting under these circumstances. The long-term objective of this project is to understand how microbial communities impact AMD and what interventions can be used to improve long-term remediation in passive remediation systems.

The Effects of Temperature and Precipitation on the Amount of Recoverable Human DNA From Soil During Decomposition

Wesley Wagner

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Faculty Advisor: Pamela Marshall, Ph.D.

ABSTRACT:

Human decomposition is a field that has been greatly studied, with multiple projects having focused on any number of variables, including, but not limited to, temperature, soil pH, soil type, insect activity, medical conditions of deceased, soil moisture, weather patterns, scavenging activity, and many others. However, much of this research focused on the rates of decomposition. Rather than focusing on the decomposing remains, this research expands its interest to the soil surrounding the remains, specifically, the potential recoverable DNA. This research examined the relationship between the two most influential factors on the rate of decomposition, temperature and soil moisture, and their potential relationship with the amount of recoverable DNA from soil during the decomposition process. This was done by burying fifteen human tissue samples of equal sizes into separate pots and allowing decomposition to occur outdoors. At periods of 2, 6, 8, 9, and 10 months, three pots were removed and the soil directly above, around, and below the tissue samples was collected. The DNA was then extracted from the soil and quantified using quantitative polymerase chain reaction (qPCR). For the samples with the highest concentration from each month, the extracted DNA will also be genotyped using capillary electrophoresis (CE). It is predicted that an increase in soil moisture will be correlated with an increase in the DNA concentration, while a decrease in temperature will be correlated with a decrease in concentration.

***The LEARN Scale: Use of Toys in Early Intervention**

Chloe Warham

Rangos School of Health Sciences

Faculty Advisor: Regina Harbourne, PT, Ph.D., FAPTA, PCS

ABSTRACT:

Background: Children with motor delays are seen in Early Intervention where physical therapists use toys in various ways. Research has shown that play and toy exploration contribute to overall development and not just motor skills¹. Pediatric PT uses various toys every session with many age groups. Our research study asked how PTs utilized toys in intervention to promote learning.

Methods: Our categorical scale, LEARN (Learning, Exploration, Activity, Repetitive, Navigation) was created to measure the therapist's use of toys. The scale ranged from 0 to 4, with 0 reflecting no toys/ non-toys were used to 4 reflecting uses of toys to explain or enhance learning during a task. We utilized videos from archival data from the START-Play comparison of intervention trial² to compare therapists who were trained in toy use for learning (START-Play approach) and those who were not (usual care early interventionists). Coders blinded to groups scored the therapists every 15 minutes and averaged the overall scores to compare and describe toy use. Sessions were approximately 30- 45 minutes long and done in the child's home.

Results: Therapists in the START-Play group averaged a score of 3 (Toy is used and explained for an intended task and only occasionally used as a distraction/ reward during intervention) and usual care therapists averaged a score of less than 1 (Toys only used only as a distraction/reward to produce movement) on our scale. There was a general trend of fluctuating scores throughout the treatment session with scores dropping off near the middle to end. Usual care therapists consistently scored lower 1 or 0.

Discussion/Conclusion: Although developmental research consistently supports blending areas (cognitive, motor, social) for optimal early intervention³, physical therapists have not integrated that knowledge into usual care. The scale developed here is simple to use and can be a method to target behavioral change of therapists in early intervention. Using toys in specific ways during pediatric physical therapy may enhance overall development in children with motor delays. This pilot study can be expanded further to understand best practices in early intervention for children.

Determining the Functional Specificity of the Posttranscriptional Regulator RsmE in *Pseudomonas fluorescens*

Meghan Wells

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Faculty Advisor: Wook Kim, Ph.D.

ABSTRACT:

RsmA, RsmE, and RsmI are paralogous post-transcriptional regulators in the bacterium *Pseudomonas fluorescens* that are generalized to be functionally redundant. However, we have recently demonstrated that RsmE exclusively represses the production of multiple extracellular secretions. The primary sequence of Rsm paralogs can be arbitrarily divided into two distinct segments: the highly conserved core and the variable C-terminus tail. The variable C-terminus tail of the three paralogs are individually conserved across divergent species, which implies a potential role in functional specificity. To address this hypothesis, three sets of chimeric proteins were constructed by shuffling the core and tail segments of the paralogs in a rsmE knockout: i) RsmE core with either the RsmE tail (RsmE/E), RsmA tail (RsmE/A), or RsmI tail (RsmE/I), ii) RsmA core with either the RsmE tail (RsmA/E), RsmA tail (RsmA/A), or RsmI tail (RsmA/I), and iii) RsmI core with either the RsmE tail (RsmI/E), RsmA tail (RsmI/A), or RsmI tail (RsmI/I). We observed that RsmE/E and RsmE/I uniquely restored repressive function, resulting in no secretions being produced. In contrast, none of the C-terminus tails restored the repressive function when attached to the RsmA or RsmI core. Collectively, these results indicate that the C-terminus tail indeed contributes to RsmE's unique function, but the RsmE tail alone cannot convert RsmA or RsmI to function like RsmE. An intriguing question is why the RsmI tail restores the repressive function of RsmE despite the differences in the primary sequence. Future work will focus on the function of RsmE's tail to disentangle whether the specificity manifests through key residues and/or impacting local or global structural changes.

Unique Eats and Unique Histories: An Oral History of EatUnique

Megan Wetherington

McAnulty College and Graduate School of Liberal Arts

Faculty Advisor: Andrew Simpson, Ph.D.

ABSTRACT:

Situated on Pittsburgh's historic Craig Street, EatUnique Café has served the Oakland community unique eats for twenty-five years. In 1997, Lisa and Dave Brown opened EatUnique Café under the name Craig Street Coffee, and the café has grown and changed alongside neighboring local shops and restaurants over the past two decades. Interested in the growth and development of the café and Craig Street as a commercial district, Hannah LeComte and Megan Wetherington documented a community history of the café, using oral histories to highlight the experiences of local restaurant owners, service workers, and real estate developers. LeComte and Wetherington conducted twelve oral history interviews, approximately two-hours in length, with 13 narrators and created a brief documentary for the café's twenty-fifth year anniversary. Themes that arose from the resulting case study include the urban planning and development of Craig Street, the effects of the Covid-19 pandemic on local restaurants, societal attitudes toward the service economy, University's influence on the local economy, and the distinctions between local restaurants and

corporate food chains. Additional topics narrators shared included finding employment after being incarcerated and desires for unionization. LeComte and Wetherington premiered the documentary in December 2022, bringing together the restaurant owners, staff, and community members to share and celebrate the history of EatUnique Café.

The Impact of Audit Data Analytics on the Auditing Process

Erica Young

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Faculty Advisor: Congcong Li, Ph.D.

ABSTRACT:

The procedures related to planning, testing, and communicating the results of an audit are changing now more than ever. The industry is seeing the use of audit data analytics (ADAs) increase and become more compatible with various other artificial intelligence tools. This is transforming the way in which audit engagements are executed. The scope, nature, timing, and extent of procedures are shifting to be more analytical so conclusions may be based on a wider range of information. Machine learning and robotic process automation (RPA) tools can be used to apply targeted automation to perform tasks such as document matching or developing managerial estimates. There are four types of data analytics - descriptive, diagnostic, predictive, and prescriptive. The outputs from ADAs are helping auditors to identify trends and patterns, gain insight into why things happened or what will happen in the future, and figure out desired solutions to current existing problems. Currently, there is no legislation on which ADA tools must be used or how they are used, allowing auditors to choose what fits their methodologies best to maintain and enhance audit quality. ADAs are helping to reduce human error and detect misstatements, whether intentional or unintentional. However, there are still uncertainties related to ADAs and the potential threats or negative impacts they could have. Since there is no framework or standard surrounding the use of ADAs, there is no guarantee that every auditor involved in an engagement, whether internal or external, will have adequate knowledge to use ADA tools and interpret the results appropriately. Incorporating new software and digital tools is also introducing new cybersecurity threats that challenge the confidentiality and privacy of data. Gaining a deeper understanding of how ADAs are being used, applied, and relied on can help mitigate the risks associated with these developing technologies.

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