

8th Annual

Graduate Research Symposium



A VIRTUAL EVENT

Hosted via [SYMPOSIUM BY FORAGERONE](#)

March 14 to 18, 2022

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 organizations and individuals for their generous time and support of this event:

- ❖ Bayer School of Natural & Environmental Sciences
- ❖ Center for African Studies
- ❖ Center for the Catholic Faith & Culture
- ❖ Center for Community-Engaged Teaching & Research
- ❖ Center for Global Health Ethics
- ❖ Center for Migration, Displacement & Community Studies
- ❖ Center for Women's & Gender Studies
- ❖ Gumberg Library
- ❖ Enrollment Management Group
- ❖ Institute for Ethics & Integrity in Journalism
- ❖ Mary Pappert School of Music
- ❖ McAnulty College and Graduate School of Liberal Arts
- ❖ School of Nursing
- ❖ Office of the Provost
- ❖ Office of Research, Christine Pollock & Mary McConnell
- ❖ Rangos School of Health Sciences
- ❖ Peer Selection Committee

Chair: Zachary Dehm, *Theology*

Shane Cowan, *Biology*- Rachael Dittmar, *Clinical Mental Health Counseling*-

Jessica Neshier, *Nursing Education*- JoVonne Tabb, *Education*-

Curtis Taylor, *Counselor Education*- Lori Wickham, *Educational Leadership*

SCHEDULE OF EVENTS

<p>March 14 to March 18 All Week Long!</p>	<p>Interactive Poster Session via Symposium by Forager One Browse through posters and videos. Comment and ask questions.</p>
<p>Monday, March 14</p>	<p>Welcome - Symposium Site Launch!</p> <p>10:00 am to 10:45 am - "Writing an Effective CV" – Virtual Workshop Debra L. Saffer, M.Ed, NCC, LPC - Asst. Director/ Career Consultant for Science, Engineering, and Health Care, Center for Career Development</p> <p>3:00 pm to 4:00 pm – “All of US Pennsylvania” – Virtual Discussion Precision medicine, genetics, and evidence based engagement as a research framework for improvements in health care. Mylynda, Massart, MD, PhD, Medical Director, UPMC Primary Care Precision Medicine Center, Department of Family Medicine, Co-Director Integrating Special Populations Lori Vish Stearns, M.Ed., M.S., Director, Engagement All of Us Pennsylvania Research Program, University of Pittsburgh, Clinical and Translational Science Institute</p>
<p>Tuesday, March 15</p>	<p>1:00 pm to 2:00 pm – Fulbright Discussion - Virtual Discussion Christine Pollock, Senior Director, Sponsored Programs Office of Research & Innovation</p>
<p>Wednesday, March 16</p>	<p>11:00 am to 12:00 pm - "Everyday Mindfulness" - Virtual Discussion Amber Lasure - Assistant Director, Wellness & Fitness, Duquesne University <i>Discuss and practice the foundations of meditation, stress reduction tips, as well as applications for use in everyday life.</i></p> <p>2:00 pm to 3:00 pm - The Journal Article Publication Process and Strategies for Submitting Journal Articles – Virtual Workshop James P. Purdy, Ph.D., Associate Professor of English/Writing Studies University Writing Center Director</p>
<p>Thursday, March 17</p>	<p>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</p>
<p>Friday, March 18</p>	<p>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.</p> <p>Note: This is the final day to comment and respond on your posters in order to qualify for the “participation” award.</p>

Live Oral Presentations (Online)
SESSION 1 : Thursday, March 17
Moderator: Sara Magoun

10:00 - 10:15	Shawana Moore School of Nursing School of Nursing: Graduate Department Faculty Advisor: Rick Zoucha, PhD, PMHCNS-BC, CTN-A, FAAN <i>Understanding Perceptions, Beliefs, Values, and Meaning of Mental Health in Young Adolescent African American Females Residing in Low-Income Resource Urban Settings: A Mini Focused Ethnography Study</i>
10:15 - 10:30	Yashika Kamte School of Pharmacy Pharmacology Faculty Advisor: Lauren O'Donnell, Ph.D. <i>Viral infection in the pediatric brain leads to a loss of mid-stage and differentiating neural stem cells</i>
10:30 - 10:45	Odile Enslin Bayer School of Natural and Environmental Sciences Forensic Science and Law Faculty Advisor: Lyndsie Ferrara, Ph.D. <i>Suicide Rates and Trends in Allegheny County During 2010-2019</i>
10:45 - 11:00	Kira Hurley Bayer School of Natural and Environmental Sciences Forensic Science and Law Faculty Advisor: Pamela Marshall, Ph.D. <i>An Enhanced DNA Extraction Method for Charred Human Remains Using Pressure Cycling Technology (PCT)</i>

Live Oral Presentations (Online)
SESSION 2 : Thursday, March 17
Moderator: Asef Faruk

1:00 - 1:15	<p>Gabriella Agostaro McAnulty College and Graduate School of Liberal Arts Healthcare Ethics Faculty Advisor: Gerard Magill, Ph.D. <i>Gene Editing Therapy for Psychological Conditions - The Potential to Reduce Suffering Through Therapeutic Interventions</i></p>
1:15 - 1:30	<p>Zara Wenzinger Bayer School of Natural and Environmental Sciences Department of Forensic Science and Law Faculty Advisor: Pamela Marshall, Ph.D. <i>The Relevance of Current Forensic Firearms Examination Techniques When Applied to 3D Printed Firearms</i></p>
1:30 - 1:45	<p>Angela Godwin School of Nursing PhD, Nursing Faculty Advisor: Melanie Turk, PhD, RN <i>The Bariatric Surgery Process as Experienced by Black Women</i></p>
1:45 - 2:00	<p>Kathleen Wilson Bayer School of Natural and Environmental Sciences Bayer School of Natural and Environmental Sciences Faculty Advisor: Brady Porter, Ph.D. <i>Assessing Water Quality in the Buffalo Creek Watershed via Fish Community Surveys</i></p>

Live Oral Presentations (Online)
SESSION 3 : Thursday, March 17
Moderator: Victoria Hrach

2:30 - 2:45	Meredith Bennett Bayer School of Natural and Environmental Sciences Biology Faculty Advisor: Brady Porter, Ph.D. <i>Detecting Native Freshwater Mussels in Pennsylvania Waterways: Traditional Methods vs. Environmental DNA</i>
2:45 - 3:00	Rachel Parshall, Bhoomika Sripathi, Olivia Price Rangos School of Health Sciences Physical Therapy Faculty Advisor: Matthew Kostek, Ph.D. <i>Jo-1 Protein Induces Autoimmune Response and Loss of Force Production: A Myositis Mouse Model</i>
3:00 - 3:15	Brooke Deal Bayer School of Natural and Environmental Sciences Biology Faculty Advisor: John Pollock, Ph.D. <i>Sex differences in efficacy of mechanical hypersensitivity relief by nanotherapeutic correlates to macrophage infiltration</i>
3:15 - 3:30	Claire Kreider McAnulty College and Graduate School of Liberal Arts Department of History Faculty Advisor: John Mitcham, Ph.D. <i>"The Subsistence of the People," Climate-Induced Food Insecurity in Pre-Revolutionary France</i>

Live Oral Presentations (Online)

SESSION 1: Friday, March 18

Moderator: Anna Vietmeier

10:00 - 10:15	Heather Roesinger School of Education School Psychology Faculty Advisor: Tammy L Hughes, PhD, ABPP <i>Trauma-Informed Teaching</i>
10:15 - 10:30	Noah Dimas McAnulty College and Graduate School of Liberal Arts Center for Global Health Ethics Faculty Advisor: Gerard Magill, Ph.D. <i>A New Directive: An Ethical Analysis of the Ethical and Religious Directives and Catholic Healthcare Mission to Promote and Sustain Catholic Healthcare</i>
10:30 - 10:45	Kandarp Dave School of Pharmacy Pharmaceuticals, Graduate School of Pharmaceutical Sciences Faculty Advisor: Devika S Manickam, Ph.D. <i>Engineered Extracellular Vesicles for Mitochondria and HSP27 Delivery to Protect the BBB in Ischemic stroke</i>
10:45 - 11:00	Sarah Hejnosz Bayer School of Natural and Environmental Sciences Chemistry and Biochemistry Faculty Advisor: Thomas Montgomery, Ph.D. <i>[3+2] Cycloadditions: A New Pathway to Versatile Synthetic Motifs</i>

Live Oral Presentations (Online)

SESSION 2: Friday, March 18

Moderator: Ashwini Gumireddy

1:00 - 1:15	<p>Jennifer Hamann McAnulty College and Graduate School of Liberal Arts English Faculty Advisor: Eva Simms, Ph.D. <i>The American Opioid Epidemic: A Case Study in the Phenomenology of Cononyms</i></p>
1:15 - 1:30	<p>Kathleen Burch McAnulty College and Graduate School of Liberal Arts Department of History Faculty Advisor: Jennifer Taylor, Ph.D. <i>Gendered Norms in Community-Based Engagement: Oral Histories of Women in the Elsinore Bennu Think Tank for Restorative Justice</i></p>
1:30 - 1:45	<p>Jessica Rong School of Nursing Nursing Faculty Advisor: Richard Zoucha, Ph.D. <i>The Lived Experience of Intensive Care Unit Nurses During the COVID-19 Pandemic: A Mini-Phenomenology</i></p>
1:45 - 2:00	<p>Karl Jancart Other authors: Justine J. Vecchiarelli, Melanie Tommer, Amber DelPrince, Melanie Schultz, Katrina Bucher, Jessica Spirnak, Claire Boe, Regina T. Harbourne School of Education, Rangos School of Health Sciences, McAnulty College and Graduate School of Liberal Arts Counseling, Psychology, and Special Education; Physical Therapy; Modern Languages Faculty Advisor: Regina Harbourne, PhD, PT <i>Infant Sleep as a Moderator in the Relationship Between Sitting and Focused Attention</i></p>

Live Oral Presentations
SESSION 3: Friday, March 18
Moderator: Samuel Henson

2:30 - 2:45	Rochel Gasson McAnulty College and Graduate School of Liberal Arts English Faculty Advisor: Thomas Kinnahan, PhD <i>Gertrude Stein: The Making of a Jewish Feminist Modernism</i>
2:45 - 3:00	Sophia Bakar Bayer School of Natural and Environmental Sciences Center for Environmental Research and Education (CERE) Faculty Advisor: David Kahler, PhD <i>Hydrologic Modeling with Remote Sensing for Groundwater Resource Management within the Sand River Catchment, South Africa</i>
3:00 - 3:15	Jill Bodnar McAnulty College and Graduate School of Liberal Arts Media Faculty Advisor: Maggie Patterson, MFA <i>Righteous: What Holocaust Rescuers Can Teach Us About a More Altruistic Society</i>
3:15 - 3:30	Kari Danser Bayer School of Natural and Environmental Sciences Forensic Science and Law Faculty Advisor: Lyndsie Ferrara, Ph.D. <i>Examining What Successful Re-entry Looks Like: Looking Beyond Recidivism Rates to the Human Experience</i>

AWARDS

BAYER SCHOOL FOR NATURAL AND ENVIRONMENTAL SCIENCES

Award for Graduate Research-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

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.

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 NURSING

Award for Graduate Research: \$250

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

ABSTRACTS

*Denotes Live Oral Presenter

Historical Memory and Identity in the United Farm Workers

Sarah Babcock

McAnulty College and Graduate School of Liberal Arts | History

Faculty Advisor: John Dwyer, Ph.D.

ABSTRACT:

My project aims to understand how United Farm Workers (UFW) leadership appealed to historical memory to build a multi-ethnic, multi-racial identity among California's agriculture laborers. I will examine visual, written, and spoken allusions to popular historical events to understand this rhetorical strategy. Chief among these subjects are Mexican revolutionaries. I employ several issues of *El Malcriado* (the UFW's newspaper) that refer to Emiliano Zapata and Pancho Villa in writing or drawings. I also hope to include Aztec symbols, religious imagery, American politicians, union leaders, and celebrities.

I am interested in analyzing how these varying appeals to well-known but ideologically heterogeneous household names were used to invoke historical memory in creating a multi-racial farmworker identity. In many instances, these works seem to depict Mexican national and cultural pride more than an explicit connection between agrarian reform and farmworker justice. That, too, is interesting considering the explicitly multi-racial composition of the farmworkers movement, especially in leaders and sponsors, but also among the rank and file union members.

My project will examine if these appeals to a broad historical trend of Mexican resistance are more than rhetorical. That is, to try to determine if these posters, paintings, articles, murals, and buttons represent the way Mexican American agricultural laborers saw themselves in the arc of Mexican history, especially as the unionization battles played out in California's fields. Beyond that, I am interested in examining how the non-Mexican farmworkers embraced or resisted these rhetorical appeals centered around Mexican identity and culture. The visual nature of this project lends itself to a poster presentation, where audience members will be able to see these rhetorical connections for themselves.

***Gendered Norms in Community-Based Engagement: Oral Histories of Women in the Elsinore Bennu Think Tank for Restorative Justice**

Kathleen Burch

McAnulty College and Graduate School of Liberal Arts | Department of History

Faculty Advisor: Jennifer Taylor, Ph.D.

ABSTRACT:

The state of the criminal justice system in the United States is one in need of repair. A local Pittsburgh group – the Elsinore Bennu Think Tank for Restorative Justice – challenges its members and the community to engage in restorative justice. The group comprises professors, returning citizens, police officers, and lawyers to initiate change through restorative justice in communities impacted by crime.

The Elsinore Bennu Think Tank for Restorative Justice (EBTT) Oral History Project at Duquesne University uses the methodology of oral history to gather stories of change, inspiration, and trauma from EBTT members. I will analyze the aural text of three narrators, Dr. Cathleen Appelt, Dr. Sarah Kuehn, and Dr. Cindy LaCom, all women in academia and involved in the project. As the facilitator of a branch of the EBTT, Dr. Cathleen Appelt leads the Big Idea Team, an

intergenerational working group. Dr. Sarah Kuehn works as an Inside-Out instructor, leading classes with her university students and men in the Pennsylvania State Correctional Institution. Dr. Cindy LaCom brings her knowledge of gender and social justice to the EBTT, where the returning citizens are all male, and works on initiatives within the EBTT. The goal of their oral histories is to illuminate how gender impacts the EBTT and Inside-Out classes.

This research is vital to understanding the prison system, restorative justice, and how the role of gender can change or challenge these traditionally male dominated spaces. I will document each woman's community engagement through her oral history, as a measure for changing patriarchal norms and establishing justice.

***Engineered Extracellular Vesicles for Mitochondria and HSP27 Delivery to Protect the BBB in Ischemic stroke**

Kandarp Dave

Other Authors: Donna B. Stolz, Michael J. Reynolds, Riyan Babidhan, Duncan X. Dobbins, Younsoo Bae, Sruti S. Shiva, Devika S Manickam

School of Pharmacy | Pharmaceutics, Graduate School of Pharmaceutical Sciences

Faculty Advisor: Devika S Manickam, Ph.D.

ABSTRACT:

Ischemic stroke-induced oxygen and glucose deprivation (OGD) in brain endothelial cells (BECs) leads to mitochondrial dysfunction resulting in endothelial cell death and BBB tight junction breakdown during ischemia and ischemia/reperfusion (restoring blood flow post-ischemia) conditions. The impaired BBB integrity leads to the infiltration of immune cells and neurotoxins from blood to the brain parenchyma resulting in long-term neuronal and cognitive dysfunctions. Therefore, restoring endothelial mitochondrial function and BBB tight junctions is a viable strategy to increase endothelial cell survival and BBB integrity under ischemic conditions. Extracellular vesicles (EVs) secreted from the live cells contain mitochondrial components in their innate vesicular cargo. Therefore, EVs mediated mitochondria transfer to the BECs could be a promising strategy to increase endothelial cell survival post-ischemic stroke.

Furthermore, studies have shown that overexpression of Heat Shock Protein 27 (HSP27) in the brain endothelial cells restored tight junction protein complexes, increasing BBB protection in the ischemia/reperfusion mice model. Surface engineering of EVs with HSP27 to form EV/HSP27 mixtures could facilitate HSP27 delivery to the BECs. Therefore, we hypothesized that EV/HSP27 mixtures treatment to the BECs could restore the BBB tight junction via HSP27 delivery and increase endothelial cell survival via EV-mediated mitochondria delivery during ischemia and ischemia/reperfusion conditions in vitro.

In the present work, we isolated two subclasses of EVs, small EVs (sEV) and medium-to-large EVs (m/IEV), from a human cerebral microvascular endothelial cell line (hCMEC/D3). sEV and m/IEV retained their characteristic particle diameters, zeta potentials, and membrane integrity during freeze/thaw cycles and post-storage. EVs treated primary human brain microvascular endothelial cells (HBMECs) showed a four-fold increase in ATP levels in hypoxic conditions. Interestingly, m/IEV showed a higher mitochondrial load than sEV and transferred mitochondria to the recipient HBMECs, which subsequently colocalized with the recipient mitochondrial network. Notably, EVs increased the oxidative phosphorylation and glycolytic functions of recipient endothelial cells under normoxic and hypoxic conditions. Lastly, EVs showed the ability to interact and load exogenous therapeutic HSP27 proteins. EV/HSP27 mixtures showed substantial and prolonged BBB protection compared to their counterparts during ischemia/reperfusion. In conclusion, EVs showed great promise to transfer exogenous mitochondria and therapeutic proteins to protect the BBB post-ischemic stroke.

Understanding the cultural perceptions and beliefs of law enforcement cadets on officer wellness: A mini ethnographic study

Carrie Hintz

Other Authors: Rick Zoucha, PhD, PMHCNS-BC, CTN-A, FAAN

ABSTRACT:

Background: Law enforcement has been recognized as one of the most stressful and high-risk occupations in the United States. Inherent dangers present in law enforcement have long-term effects on officer physical and mental health, contributing to higher rates of morbidity and mortality in law enforcement. At present, evidence is needed about the emic (insider) and etic (outsider) values and beliefs that impact officer health practices.

Purpose: The purpose of this mini ethnonursing study was to understand the cultural perceptions and beliefs of Northern Nevada Law Enforcement Academy cadets on officer wellness. The research questions that guided the study were: 1) what are the cultural perceptions and beliefs of law enforcement cadets in a Northern Nevada Law Enforcement Academy on officer wellness; and 2) what is the role of nursing in promoting and improving officer wellness?

Methods: The study used a qualitative ethnonursing design to understand cadet perceptions and beliefs about officer wellness. This method also allowed the researcher to determine care methods that can promote culturally competent and congruent care. Four cadet participants were recruited from a Northern Nevada Law Enforcement Academy with the assistance of organizational leadership, and were interviewed individually. Leininger's four phases of data analysis were used to identify initial findings. **Results:** All participants were male and aged between 25-35 years. Two participants identified as white, one identified as non-white Hispanic, and one participant identified as African American. Twelve categories of data emerged, such as law enforcement culture, officer wellness, and technology/social media. These categories supported one pattern: a higher calling to serve. Data saturation was not met.

Discussion: Further research through a full-scale study is needed to explore these identified cultural implications on officer health and wellness, especially as the cadets' immersion in the law enforcement culture continues. This research will help to inform specific avenues for nursing to help improve officer health and wellness, through understanding the beliefs, values, and practices from a cultural context impacting their calling to serve.

Impact of COVID-19 on Sexual Assaults in the City of Pittsburgh - A Case Study

Brooke Baker

Other Authors: Lisa Ludvico, PhD, Duquesne University; Elizabeth Wisbon, MS, Allegheny County Office of the Medical Examiner; Brian Kohlhepp, MA, Ross Township Police Department
Bayer School of Natural and Environmental Sciences | Forensic Science & Law
Faculty Advisor: Pamela Marshall, Ph.D.

ABSTRACT:

Sexual assaults are one of the most under-reported crimes with a large number of rapes not reported. The rate of sexual assaults has been shown to increase during states of emergency. At the start of COVID-19 quarantine in 2020, many organizations reported an increased demand for sexual assault victim services, but many hospitals and police departments reported a substantial decrease in the number of forensic sexual assault exams performed and rape kits collected. While 911 calls reporting domestic violence were shown to increase during lockdown, official police reports and arrests declined. This research examined how the COVID-19 pandemic has impacted the rate of reported sexual assaults and rape kit collection regionally, nationally, and globally. A literature review was done to examine factors that may have contributed to the change in sexual assaults, reports, and rape kits collected throughout the pandemic. Rape kit data from 2019-2021 was obtained from the crime lab at the Allegheny County Office of the Medical Examiner and UPMC Children's Hospital of Pittsburgh. Interviews were then conducted with a select few individuals in Pittsburgh with an inside perspective on this topic to get their views on this issue. The results of the literature review, data analysis and

interviews showed that the COVID-19 pandemic has impacted the rate of reported sexual assaults and the number of rape kits collected in various ways. This was forensically relevant because it demonstrated how a worldwide crisis like the COVID-19 pandemic can greatly impact another major issue like the sexual assault crisis. It points out flaws in the system and highlights the need for changes to be made so that a crisis like COVID-19 won't interfere with sexual assault victims' accessibility to resources in their pursuit of justice.

Direct Isotope Dilution Mass Spectrometry Quantification of Dried Blood Spot Cards to Identify Drugs of Abuse

Caley Moore

Other Authors: Logan Miller, Jeremiah Jamrom, Ph.D. Candidate, Ashley Trouten, Ph.D. Candidate, Matt Pamuku, Stephanie Wetzel, Ph.D.

Bayer School of Natural and Environmental Sciences | Forensic Science and Law Program

Faculty Advisor: H.M. "Skip" Kingston, Ph.D.

ABSTRACT:

The current opioid epidemic warrants the need for an immediate drug detection technique which can identify illicit and prescribed substances, consumed above the therapeutic level. The employment of dried blood spot cards provides a minimally invasive, stable, and portable medium to collect blood samples via finger prick technology; a technique which can facilitate rapid drug detection for law enforcement and emergency personnel. In this study, quantitative dried blood spots were assessed for twenty drugs of abuse in their natural and isotopically enriched states via Isotope Dilution Mass Spectrometry (IDMS). IDMS ensures accurate quantification in various matrices while eliminating inherent errors produced by traditional calibration curves.

Initial analyte recovery was demonstrated on dried formats via manual extraction of spiked plain cellulose cards and Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS) assay. LC-MS/MS methodology demonstrated optimized parameters, extensive MRM transitions, and detection limits as low as parts per billion (ppb). Further extraction from a blood matrix was successful via GERSTEL Dried Blood Spot Autosampler desorption partnered with LC-MS/MS separation and detection. This automated method exhibited drug viability in blood serum on dried formats while maintaining quantitative recovery of all analytes in ppb. Developed methods will facilitate portable drug detection applications to improve public health and safety.

***[3+2] Cycloadditions: A New Pathway to Versatile Synthetic Motifs**

Sarah Hejnosz

Other Authors: Martin Neal

Bayer School of Natural and Environmental Sciences | Chemistry and Biochemistry

Faculty Advisor: Thomas Montgomery, Ph.D.

ABSTRACT:

A multitude of natural products and pharmaceuticals incorporate nitrogen-containing heterocycles in their overall structures. These heterocycles are responsible for a range of bioactive properties depending on their structure and chemical environment. New and reliable methods to form these motifs are highly sought after because it is typically challenging to form the heterocyclic core in an efficient and selective manner. This research is focused on overcoming this obstacle by exploring a synthetic route to nitrogen containing heterocycles through [3+2] cycloadditions using tertiary N-oxo amines and silyl protected imines as precursors. The resulting imidazolines can be further transformed into valuable building blocks for complex synthetic targets such as natural products or pharmaceuticals.

Birth Plan Z: An Ethical Analysis of Uterine Transplantation and Its Impact on Reproductive Choice + Society

Fayla Junior

ABSTRACT:

Absolute uterine infertility is caused by a non-functional or the absence of a uterus and affects roughly 20,000 per 100 million women of reproductive age. As of 2021, published data provides 31 live births via uterus transplantation (UTx) procedures that have been performed worldwide. Uterus transplantation is expanding, evolving, and enhancing the landscape of organ transplantation and reproduction. With the addition of uterus transplantation, solid organ transplantation embarks upon elective surgeries to offer those with absolute infertility a new option for reproductive choice. The goal of such intervention will inherently alter the current fabric of organ donation, family planning, and society. Analyzing various research studies is essential for understanding the procedure and societal implications. Therefore, UTx requires analysis in four main areas: allocation of resources, the reproductive choice for infertile individuals and couples, societal worth and values, and ethical considerations. The four primary areas of inquiry survey and challenge: 1) the demand and necessity of UTx, which is costly and currently not covered by insurance, 2) risk-benefit ratio for donors and recipients, and 3) societal views of assigning worth and value to individuals. Overall, UTx is a multifaceted, burgeoning field worthy of ethical analysis.

***The Lived Experience of Intensive Care Unit Nurses During the COVID-19 Pandemic: A Mini-Phenomenology**

Jessica Rong

School of Nursing | Nursing

Faculty Advisor: Richard Zoucha, Ph.D.

ABSTRACT:

Purpose: The purpose of this study is to understand the experiences of ICU nurses working at the bedside during the COVID-19 pandemic that provided care.

Research Questions: The research question for this study is, what was the lived experience of the ICU nurse working at the bedside during the COVID-19 pandemic.

Background: There is a gap in the literature regarding the experience of the ICU nurse providing care during the pandemic. Many nurses are leaving the bedside now and more must be understood about what transpired during the COVID-19 pandemic for the bedside ICU nurse.

Methods: This was a descriptive phenomenological mini study. The participants were three women with ages ranging from 25-44 years old. Data was collected in one individual interview with each of the participants via recorded Zoom meeting. Data was analyzed using Giorgi's (1997) five basic steps.

Results: Initial data resulted in six break in codes; anger, lack of PPE, poor patient care, sadness, safe environment and unsupported. The data was then further analyzed into 4 organized nursing codes of grief and sadness, lack of organizational support, patient care delivery and safe work environment.

Conclusions and Implications: Initial data warrants further study. Further research must be done to better understand if initial data correlates to a broader nursing population. This research could have implications to the general well-being of ICU nurses after caring for patients during the COVID-19 pandemic and potentially why they are leaving the bedside.

Trauma-Focused Programming for Incarcerated Youth

Chelsea Williams, Hailey Murray, Emily Wuenschell

School of Education | PsyD School Psychology

Faculty Advisor: Tammy Hughes, Ph.D.

ABSTRACT:

According to the National Child Traumatic Stress Network “...more than 80% of justice-involved youth report experiencing trauma, with many having experienced multiple, chronic, and pervasive interpersonal traumas.” The Academic Institute is a school within Allegheny County Jail (ACJ) that is tasked with educating children who are incarcerated at the facility. The school sought guidance on how to help youth who have a history of trauma while providing mental health support in the facility.

The National Child Traumatic Stress Network’s ‘Complex Trauma: A Guide for Youth and Those Who Care About Them’ was implemented to 25 students in small groups. Psychoeducational materials and activities addressed what complex trauma is, how it can impact kids, ways youth cope, and how to improve life after experiencing trauma. Personal awareness of the physical and mental health impact of trauma was measured. Art therapy was integrated into the modules to expand opportunities for therapeutic expressions. Student progress and counselors perceptions of the usefulness of the program are presented.

Cleaning is the hardest part: best practices for chemically defleshing fixed, irregular human bones

Annie Panageas

Other Authors: Bobbie J. Leeper, Pamela L. Marshall, Lisa Ludvico, Michael I. Seaman, Anne M. Burrows
Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Anne Burrows, Ph.D.

ABSTRACT:

Accurate sex determination of human skeletal remains is highest when the pelvis and skull are present, but these are not always available. Small and irregular bones are more often present so developing techniques to establish sex of human skeletal remains using these bones is important. Accurate measurements of these bones depend on clear visualization of landmarks, so cleaning these bones must be done completely but not so aggressively that they are damaged. The present study focused on assessing the best cleaning methods for select human irregular and small bones using chemical defleshing techniques. We gathered the hyoid, the medial and intermediate cuneiforms, and other select small bones from 30 human cadavers. We tested four cleaning methods for each bone using sodium carbonate solution: 1) chemical defleshing with bones being immersed prior to the solution reaching boiling point, with no prior manual cleaning, 2) chemical defleshing with bones being immersed after the solution reached boiling with no prior manual cleaning, 3) and 4) options 1 and 2 but with prior manual cleaning of the bones. Results indicated that immersing the hyoid bone in the solution prior to the boiling point sometimes resulted in them becoming overly porous with 25% of them becoming too damaged to measure. All bones without prior manual cleaning were successfully cleaned. Results revealed that chemical defleshing cleaning techniques for these bones should be tailored to the individual bone and that prior manual cleaning of the bones is not necessary.

***The Relevance of Current Forensic Firearms Examination Techniques When Applied to 3D Printed Firearms**

Zara Wenzinger

Bayer School of Natural and Environmental Sciences | Department of Forensic Science and Law

Faculty Advisor: Pamela Marshall, Ph.D.

ABSTRACT:

As 3D printing technology progresses and becomes more accessible to consumers, the rapidly emerging field of 3D printed firearms poses a significant threat to public safety. This research investigates how the Trace Evidence and Firearms & Toolmark sections of forensic science can be applied to 3D printed firearms. Is gunshot residue (GSR) depositing the same way and is thermoplastic polymer residue from the 3D printed firearm present? And are unique

striae being deposited on bullets and cartridges cases fired by 3D printed firearms that could be used for identification purposes? A 3D printed model, the Liberator, was printed on a cheap commercial printer out of polylactic acid (PLA). After printing and handling the barrels, GSR stubs after were taken and analyzed using SEM-EDS to ensure no thermoplastic polymer particles were present in trace amounts and that lead, antimony, and barium were not deposited during the printing process. After firing, GSR stubs were collected from the cartridge case, the bullet, and the barrel. These GSR stubs were analyzed using SEM-EDS for standard GSR (lead, antimony, and barium) and identified GSR particles were observed manually to determine if PLA residue could be identified. All three samples had more than 100 three-component particles, the threshold for the program, but more analysis must be done to identify any presence of polylactic acid. The bullet and cartridge case will be viewed using a Leeds LCF Firearms Comparison Microscope with Olympus SZX12 to identify any class or individual characteristics present. No rifling was present on the bullet and the cartridge case did not have a firing pin impression meaning both would be classified as unsuitable for identification. In conclusion, this novel research aims to answer questions regarding the analysis of forensic evidence obtained from 3D printed firearms before any potential widespread use.

Use of a Small-Scale Feed Frame Simulator for Development of Iterative Optimization Technology

Samuel Henson

Other Authors: Adam J Rish, Anik Alam, Yang Liu, James K Drennen, Carl A Anderson

School of Pharmacy | Pharmaceutics

Faculty Advisor: Carl Anderson, Ph.D

ABSTRACT:

As the pharmaceutical industry moves toward continuous manufacturing (CM), the necessity of developing in-line process analytical technology (PAT) tools and associated modeling strategies is drastically increased. In CM production lines, there is often less access to intermediate materials, resulting in a need for monitoring material attributes in-line. PAT systems are capable of in-line monitoring, but often generate complex multivariate data which require an appropriate modeling strategy for interpretation. Partial least squares (PLS) models have become recognized across the industry for their ability to extract relevant information from multivariate data. One practical application of PLS is determining the blend potency from near-infrared (NIR) spectra. While PLS results in accurate predictions, its calibration demand leaves room for improvement, especially as the industry pursues material-sparing calibration approaches. Typical PLS calibration sets are required to contain the expected variations in the data which correspond to changes in material attributes. Pure component models, such as iterative optimization technology (IOT), can overcome this calibration demand by requiring a reduced number of spectra in the calibration set. In the presented work, IOT is informed by a development set generated on a small-scale simulator. The development set maintains a material-sparing approach while providing enough data variation to inform IOT. Various model metrics are explored for their value in selecting the most appropriate pure component information. Informing pure component approaches with development set data is shown to produce appropriate in-line model performance.

The Impact of Federal Regulations on Falls Among Older Adults Residing in United States Long Term Care Facilities

Karen Robson

Other Authors: Dr. Linda Garand PhD, GCNS-BC, Committee Chairperson, Dr. Nina M. Flanagan PhD, RN, GNP-BC, PMHCS-BC and Sr. Rosemary Donley PhD, APRN, FAAN

School of Nursing | School of Nursing

Faculty Advisor: Dr. Linda Garand, Ph.D.

ABSTRACT:

Background/ Purpose

When older adults are given antipsychotic medications (APMs), there is an increased risk for falls. Due to the negative effects of APMs, federal regulations were enacted in 2011 to reduce APM use in U.S. long-term care facilities (LTCFs). The purpose of the study was to determine the impact of the regulations on falls in LTCFs.

Methods

Using a cohort study design, secondary analysis of data representing all LTCF residents were analyzed to compare the proportion falls experienced by residents before and after regulations were imposed to stop the use of APMs for residents with dementia. Descriptive analysis was used to describe the sample. Variables of interest included race/ethnicity, dementia diagnosis, and falls.

Results

The rate of falls did not significantly change (17.36% in 2011 vs. 16.29% in 2021) after the 2011 regulations restricting APM use were enacted. The census of LTCFs decreased from 1,446,226 (2011) to 1,195,025 (2021). There were fewer residents with the diagnosis of dementia in 2021 (41.65%) when compared to 2011 (43.09%). Females still comprise the majority of LTCF residents (61.4%, 67.2% in 2011 and 2021 respectively). The number of White LTCF residents decreased in size from 2011 to 2021 (77.15% vs 72.44%). All other race/ethnic groups increased in size with the Black / African-American population demonstrating the largest increase (almost 2% increase in ten years) when compared to other race/ethnic groups.

Conclusions and Implications

Federal regulations restricting the use of APMs did not reduce resident fall rates in U.S. LTCFs. Actions beyond the survey and certification process are needed to achieve adherence to regulations restricting APM use in LTCFs. Future research is needed to help organizations develop effective, culturally sensitive practices ensuring the safety and well-being of older adults requiring care in U.S. LTCFs.

Surviving COVID-19: A mini-phenomenological study

Monica Smith

School of Nursing | Nursing: Ph.D track

Faculty Advisor: Rick Zoucha, Ph.D

ABSTRACT:

Background: Patients who survive the intensive care unit (ICU) often have lasting physical, cognitive, and psychological effects as well as reporting fear of death, loss of independence and confusion about what is real. However, little is known regarding the experience of surviving COVID-19.

Purpose: The purpose of this mini-study was to examine the lived experience of surviving COVID-19 that required intubation and/or ventilation and to explore the potential for a full-scale study.

Research question: What is the lived experience of patients recovering from COVID-19 who previously required intubation during their illness?

Method: This interpretive phenomenology study utilized the data analysis method developed by Colazzi. Due to the limited sample size, data was only analyzed to theme clusters.

Results: Five participants, hospitalized between January of 2020- August 2021, ranged in age between 28-65. The three female and two male participants reside in four states and were all of Caucasian ethnicity. Transcripts were read and 61 significant statements extracted, formulated into seven meanings, and ultimately three theme clusters of anxiety and coping about COVID, COVID illness experience, and role changes after COVID illness.

Conclusions and Implications: The results of this study demonstrate the potential lasting impact COVID-19 has had on individuals that required intubation and/or ventilation as well as offering insight to nurses and other healthcare providers about the needs of individuals who survive COVID-19. However, a full-scale study is needed to further describe this phenomenon fully.

Fatty Gastrocnemius Muscle: A Case Report

Siyu Liu

Other Authors: Kailey Omstead

Rangos School of Health Sciences | Health Science

Faculty Advisor: Matthew Kostek, Ph.D

ABSTRACT:

Background: The gastrocnemius muscle is a superficial two-headed muscle located in the posterior compartment of the leg, consisting of two heads: medial head and lateral head. The gastrocnemius muscle plays a significant role in our daily activities because its function is plantar flexing the foot at the ankle joint and flexing the leg at the knee joint. We report a very rare case of fatty gastrocnemius.

Methods: The abnormal gastrocnemius muscles were encountered during the dissection of the lower limbs of a 63-year-old female cadaver. For histological examination, muscular samples were sectioned from the top, middle, and bottom of two heads of both legs. A total of six muscular slides, nerve slides, artery slides were all stained with Hematoxylin and Eosin (H&E) stains. Slides were analyzed using light microscopy.

Result: For anatomy analysis, the medial heads of both gastrocnemius muscles of the lower limbs are completely infiltrated by adipose tissue. But the lateral heads of gastrocnemius muscles on both sides are almost healthy. Only the bottom of the lateral head of gastrocnemius muscles shows adipose tissue, but the middle and top do not. Additionally, the medial heads connect to the tibial nerve and arteries normally. No abnormal adipose tissue was observed in other muscles throughout the body. For histological analysis, the entire medial heads and the bottom lateral heads are replaced by adipose cells, but the middle and top of the lateral heads are healthy muscle cells. No abnormalities or pathologies were observed in the nerves or arteries.

Conclusion: Both medial heads of the gastrocnemius muscle appear to have become adipose tissue. While no underlying cause was identified it appears the pathology was spreading to the medial head.

***Sex differences in efficacy of mechanical hypersensitivity relief by nanotherapeutic correlates to macrophage infiltration**

Brooke Deal

Other Authors: Laura Reynolds, Charles Patterson, Dr. Jelena M. Janjic

Bayer School of Natural and Environmental Sciences | Biology

Faculty Advisor: John Pollock, Ph.D.

ABSTRACT:

Before 2016, the consideration of sex as a biological variable was not mandated in preclinical research. This means that the foundational understanding of the mechanisms of neuroinflammatory pain is based primarily on data from male models leaving female neuroinflammation less understood. Currently, it is known that the macrophage is a main immunological influencer of neuroinflammation producing the inflammatory cytokine of prostaglandin E2 (PGE2). PGE2 induces neuronal hypersensitivity along with acting as a chemoattractant for various immune cells. Other scientists have acknowledged the presence of the macrophage in female neuroinflammation but have attributed the pain to the

influence of the T cell. This study uses a novel nanotherapeutic to block the production of PGE₂, thereby, decreasing mechanical hypersensitivity and local inflammation of macrophages. Following chronic constriction injury (CCI) of the sciatic nerve, both male and female rats experience equivalent mechanical hypersensitivity, in addition to both attaining significant relief following nanotherapy. Interestingly, while a standard dose of the nanotherapeutic provides significant relief from hypersensitivity for males, persisting for 5 – 6 days, the same dose in females provides significant, but attenuated relief. Immunohistochemistry of the right sciatic nerve for males treated with the nanotherapeutic shows a correlation in the decreased number of infiltrating macrophages at the site of injury compared to the level of mechanical hypersensitivity relief. Equivalent analysis of females reveals that while there is a reduction in the number of infiltrating macrophages, they have a higher number of macrophages present than the males. The trend of higher inflammation in females after injury was again supported through the visualization of CD8 positive cells. Lastly, infiltration of T cells was evident in the epineural sheath of the injured nerve, but there was no difference between sex or treatment with nanotherapeutic.

Semen Identification through the Detection of Fructose Levels

Emily Chadwick

Other Authors: Michael Seaman, Ph.D, Benjamin Cooley, M.S., Elizabeth Wisbon, M.S.

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Pamela Marshall, Ph.D

ABSTRACT:

Body fluids such as semen, blood, saliva, urine, and vaginal fluid are commonly found at crime scenes and can give investigators insight into what occurred. In order to differentiate body fluids, presumptive and confirmatory tests have been developed and are used to determine the composition and identity of a body fluid. Currently, the acid phosphatase test is used to detect semen. However, vaginal fluid can also contain acid phosphatase which can lead to a false positive or negative test result causing problems in sexual assault cases. Although semen contains acid phosphatase, it also contains a high concentration of fructose. The purpose of this study is to determine if the concentration of fructose can be used as a detection method for semen. In this study, the concentration of fructose in semen, blood, urine, and vaginal fluid samples were determined by identifying the amount of free fructose in each sample with the use of a fluorometric assay. This fluorometric assay takes the free fructose in the samples and converts it enzymatically to β -glucose which determines the concentration of fructose present in the sample. Results showed that the concentration of fructose in a liquid sample was able to be quantified using the fluorometric assay. Data showed fructose has a high concentration in semen. It was determined fructose concentrations could be quantified using dried samples on cotton swabs. If this method of identifying semen is found to be viable it will benefit sexual assault casework.

***A New Directive: An Ethical Analysis of the Ethical and Religious Directives and Catholic Healthcare Mission to Promote and Sustain Catholic Healthcare**

Noah Dimas

McAnulty College and Graduate School of Liberal Arts | Center for Global Health Ethics

Faculty Advisor: Gerard Magill, Ph.D.

ABSTRACT:

Catholic healthcare has always been hallmarked by its unique understanding of care for the sick. At the heart of all Catholic healthcare is the duty to further the healing ministry of Jesus Christ. This duty is rooted within the Christian understanding of human dignity as a consequence of our shared Creator. However, some in Catholic healthcare may not fully know nor understand these foundational Catholic teachings and as such may not fully know how to respond to common ethical conflicts within Catholic healthcare. As such, there exists a simple but rich guide in giving direction to these healthcare professionals, the USCCB's Ethical and Religious Directives for Catholic Health Care Services. This

document acts as both a primer and set of guidelines regarding Catholic doctrine, the Catholic moral tradition, and how both inform the Catholic response to common ethical concerns. However, these directives have begun to show their faults. One particularly concerning fault is the ERDs' focus on explicit directives rather than guiding frameworks. This can be useful when direct guidance on a specific ethical concern is needed. However, it fails at aiding healthcare professionals and ethicists in understanding and further applying Catholic teachings onto healthcare ethics. This is especially true when considering the notion of Catholic healthcare mission as defined above. This mission is what drives all of Catholic healthcare forward to greater forms of care. However, this forward momentum is stunted when there is little room for growth and understanding within the ERDs. All these concerns, then, are the cornerstones of this essay. First, this essay aims to provide discussion regarding the history and purpose of mission within Catholic healthcare, especially in the modern era of Catholic healthcare. Second, this essay will discuss the strengths and weaknesses of the current edition of the ERDs. Doing this will then give rise to the third and final point this essay aims to explicate, how a new ERD edition can and should be written to align both Catholic healthcare ethics and the current understandings of Catholic healthcare mission with modern understandings of healthcare ethics to provide a more content-full ethical-moral framework.

***An Enhanced DNA Extraction Method for Charred Human Remains Using Pressure Cycling Technology (PCT)**

Kira Hurley

Other Authors: Lisa Ludvico, Ph.D., Angie Ambers, Ph.D.

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Pamela Marshall, Ph.D.

ABSTRACT:

Charred human remain samples may be submitted for forensic DNA testing from a variety of scenarios, including arson, wildfires, vehicular accidents, accidental fires, and terrorist attacks. Extraction of DNA from charred samples is particularly challenging. Exposure to heat damages DNA, thereby reducing the quality and quantity of genetic data that can be recovered to assist in making a positive identification. Teeth themselves present a complicated matrix to work with for extractions, as minerals present within the microstructure can act as PCR inhibitors and create downstream issues in the analysis of the DNA. In this study, the application of Pressure Cycling Technology (PCT) was used in an attempt to enhance the extraction of DNA from charred remains and increase yield. Human teeth were burned at various, pre-defined incremental temperatures in a muffle furnace. After burning, half of the teeth were subjected to standard DNA extraction protocols, while an additional PCT step was incorporated into the protocol for the other set of samples. DNA yield, as well as the quality of the profiles generated, were compared between the two experimental groups. A modified organic extraction was utilized for both sets of teeth, with the additional PCT step occurring during lysis for the experimental group. Extracted DNA was quantified using the Quantifiler™ HP DNA Quantification Kit (ThermoFisher Scientific) and an Applied Biosystems QuantStudio 5 Real-Time PCR System. The samples suitable for typing were amplified using the GlobalFiler™ PCR Amplification Kit and a GeneAmp PCR System 9700 Thermocycler (Applied Biosystems). Amplified product was genotyped using an Applied Biosystems SeqStudio Genetic Analyzer and GeneMarker® HID Human Identity Software.

Pressure cycling has been shown to reduce the effect of inhibitors in the PCR process, generating cleaner profiles and higher yields from extracted samples. By exploring and optimizing methods to extract DNA from charred human remains, genetic recovery from bodies compromised by fire could be improved, thereby assisting in the resolution of a greater number of unidentified human remains (UHR) cases.

The Effects of Video Modeling as an Early Intervention on Social Skills for Young Children with ASD

Sarah Alzahrani

School of Education | Department of Counseling, Psychology, and Special Education

Faculty Advisor: Bridget Green, Ph.D.

ABSTRACT:

Children with autism spectrum disorder (ASD) frequently struggle to develop social skills. One of the evidence-based practices that have been successfully used in teaching a variety of skills to this population is video modeling (VM). The purpose of this systematic literature review is to shed light on the efficacy of VM as a form of early intervention with a focus on social outcomes. This literature examined 19 studies that used VM to help young children with ASD improve their social skills. The identified studies were divided based on three skills: nonverbal social skills, social interaction, and social and solitary play skills. The findings of this review strongly supported the effectiveness of VM for preschool-aged children with ASD. Furthermore, the review discussed the intervention's delivery model and its limitations and several for future research.

Total Synthesis of Chrysosporazine D: Combating Multidrug Resistance in Cancer Cells

Alexander Cocolas

Other Authors: Katie Kaczynski, Nya Gayluak, Thomas Montgomery

Bayer School of Natural and Environmental Sciences | Chemistry & Biochemistry

Faculty Advisor: Thomas Montgomery, Ph.D.

ABSTRACT:

Chrysosporazines are a family of newly isolated natural products that have demonstrated an ability to reverse chemotherapeutic resistance in cancer cell lines. To date, the chrysosporazines are only produced by the *Chrysosporium* sp. fungus found within an Australian Mugil mullet fish's gastrointestinal tract, thus limiting future studies. Herein, we propose the first total synthetic route towards chrysosporazine D following a convergent strategy using a palladium-catalyzed cyclization to generate the piperazine core motif. This protocol is flexible, allowing for chrysosporazine E to also be isolated with slight modification.

Investigating the effects of dissolved oxygen-assisted corneal cross-linking (CXL) on porcine corneas

Julianni Dar

Other Authors: Greene, Caitlin; Vande Geest, Jonathan P.; Jhanji, Vishal; Yang, Bin

Rangos School of Health Sciences | Engineering

Faculty Advisor: Bin Yang, Ph.D.

ABSTRACT:

Corneal cross-linking (CXL) is a clinical procedure known to stop the progression of keratoconus, an eye disease that affects the cornea's structure and results in vision loss. The typical treatment plan includes UV-A light and riboflavin to stiffen the cornea, and it takes around 60 to 120 minutes. There are two types of CXL pathways, with Type-II CXL requiring oxygen. Naturally, the dissolved oxygen is limited in the cornea; therefore, limiting the effect from Type-II CXL. To reduce the overall treatment time while maintaining efficacy, we propose to improve the Type-II CXL contribution by introducing dissolved oxygen during the treatment. In this study, we assess the enhancement of the cornea's mechanical properties with oxygen-assisted CXL (O2CXL). Overall, the O2CXL showed a significant increase in biomechanical enhancement compared to the standard CXL. Such enhancement could be attributed to the supplied oxygen, which prolonged the Type-II CXL; thus, improving its stiffening effect. O2CXL should be further investigated to optimize the current CXL procedure, such as reducing the overall treatment time.

Validation of an LC/MS/MS Method for 23 Fentanyl Analogs in Oral Fluid

Nicole Haase

Other Authors: Erin Divito, PhD; Frederick Fochtman, PhD; Haley Berkland, MS; Ashley Trouten, BS,

Bayer School of Natural and Environmental Sciences | Forensic Science & Law

Faculty Advisor: Stephanie Wetzel, Ph.D.

ABSTRACT:

Currently, synthetic opioids including fentanyl analogs are the leading cause of overdose deaths in the United States.¹ New fentanyl analogs are being made regularly and are used to avoid classification as illegal, policy restrictions on manufacturing, and/or detection in standard drug tests.² This causes the need for quick and efficient drug detection methods for fentanyl analogs in various matrices. Oral fluid is an advantageous matrix because it is easy, cost-effective and requires noninvasive sample collection.³ In this study, a rapid LC/MS/MS method was developed and validated for analyzing expectorated oral fluid samples for 23 fentanyl analogs. Samples were prepared by phospholipid depletion and protein precipitation using 200 microliters of either whole blood or oral fluid and 1% acetic acid in acetonitrile. Separations were completed using an Agilent ZORBAX Eclipse XDB-C18 (2.1x100mm) with a Vanquish™ Ultra High-Pressure Liquid Chromatography (UHPLC) System. Gradient elution was performed with 0.1% formic acid in water and acetonitrile. Identification and quantitation were conducted with a TSQ Endura™ Triple Quadrupole-Mass Spectrometer (QQQ-MS) operating in selective reaction monitoring (SRM) mode. This LC/MS/MS technique combines low complexity sample preparation with the selectivity and sensitivity of LC/MS/MS. Limits of Quantitation (LOQ) for this method are typically 0.05 ng/mL with an analytical measurement range reaching 25 ng/mL. Validation results show that analytes are detected in oral fluid at significantly lower LOQs than can be achieved in whole blood.

Keywords: LC/MS/MS, fentanyl analogs, oral fluid

Determination of Death by Suicide or Homicide through Hyoid Bone Fracture Patterns

Roger Sherman

Bayer School of Natural and Environmental Sciences | Forensic Science and Law Program

Faculty Advisor: Pamela Marshall, Ph.D.

ABSTRACT:

Distinguishing between a true suicidal hanging and a homicidal strangulation with subsequent simulated hanging is difficult even for highly trained professionals. A possible way to distinguish between the two modes of death is through examination and comparison of the neck structures, particularly the hyoid bone and noticeable fractures. Not much work has been done on identifying differences in fracture patterns, as most investigators search for obvious signs that indicate the mode of death, such as ligature marks or defensive wounds. The purpose of this research was to determine whether the hyoid bone fractures alone can be used to determine whether a victim committed suicide, or the aggressor staged a suicide postmortem when more obvious types of evidence are missing, and to determine whether a model-based approach is a valid simulation type for fracture interpretation. Two male and two female hyoid bones were harvested from cadavers and cleaned using an aqueous sodium carbonate solution. The processed bones were then scanned using a clinical cone beam CT imaging system to develop STL files for use in 3D printing. Six models of each bone were printed using an Ender-3 printer and FibreTuff® polymer. The models were then embedded into collagen gel and crushed at front facing and side profile angles using a Torbal® Odyssey test stand and force gauge. Slight variations in the force required to fracture the models were found, but enough similarities to literature values were present to allow for the model-based approach to be considered a viable method, allowing for simulations to be performed and proving that a model-based approach is a valid testing method. The information gathered about hyoid bone fracture patterns could allow for better detection of staged suicides and provide more resources for investigators to determine the mode of death.

Keywords: hyoid, manner of death, strangulation

DNA Integrity and Fungal Contamination as a Function of Time in Freshwater Drowning Deaths

Maeve Godshalk

Bayer School of Natural and Environmental Sciences | Forensic Science & Law Program

Faculty Advisor: Jana Patton-Vogt, Ph.D.

ABSTRACT:

Drowning and drowning deaths are categorized as a public health issue. Fatal and potentially criminal drowning often results in the inability to process evidence. The tissue of the deceased is subject to fungal contamination due to decomposition of the body and the nature of a freshwater environment. Materials for biological testing are expensive and it is not cost effective to process potentially contaminated samples. Many crime labs will choose not to process such samples. This is because of assumed DNA degradation, often due to *Candida albicans*. *C. albicans* is an opportunistic, pathogenic fungus found in the human body. It lives on the skin and inside of the body, typically without any harm to the host. When an individual is immunocompromised, it is the primary organism to invade and contaminate the host. This is also true in freshwater environments. By inoculating tissue samples with a clinical wild-type strain of *C. albicans* in river water, optical density readings at different time points can be taken to determine the rate at which the fungus grows in the presence of the tissue. Tissue extraction, quantitation, amplification, and analysis will be completed to determine the level of tissue degradation in the presence of *C. albicans*. The results are expected to support the hypothesis that as fungal growth increases, DNA integrity decreases. This work aims to give forensic laboratories a better understanding of tissue contamination as it relates to fungus, and improve decision-making in regard to processing such samples.

***Examining What Successful Re-entry Looks Like: Looking Beyond Recidivism Rates to the Human Experience**

Kari Danser

Other Authors: Joshua T. Ellsworth Ph.D., Thomas Farrell J.D.

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Lyndsie Ferrara, Ph.D.

ABSTRACT:

Each year thousands of individuals are released from prison and re-enter society. In research, successful re-entry is commonly defined as the absence of recidivism without examining the experiences of those who have successfully re-integrated back into society. Recidivism measures the individuals who commit a criminal act or have a parole violation following release from prison. Rather than focus on recidivism, this study examines successful re-entry as defined by those with lived experience. To better understand the re-entry process, semi-structured qualitative interviews were conducted with male and female returning citizens. Data analysis revealed the barriers encountered by these individuals align with historical re-entry research that highlights primary challenges with housing and employment. Although re-entry experiences were determined to be unique to each individual, common themes of self-care and support systems were identified as key contributors to successful re-entry. This work highlights the importance of the human experience when examining successful re-entry.

Feeling of Knowing: A Pilot Study of Graduate Students' Knowledge and Perceptions of Special Education Law

Taylor Steeves

Other Authors: Dr. Bridget Green, Dr. Lilianna Castellon

School of Education | Department of Counseling, Psychology, and Special Education

Faculty Advisor: Bridget Green, Ed.D.

ABSTRACT:

Educators and administrators largely lack the knowledge and skills surrounding special education law, how such legislation affords students with disabilities (SWDs) access to a free appropriate public education (FAPE), and the opportunity to progress appropriately within a least restrictive environment (LRE; Davidson & Algozzine, 2002; O'Connor et al., 2016). With approximately 63% of SWDs ages 6-21 spending 80% or more of their day in general education

(McFarland et al., 2018), it is imperative educators and administrators are knowledgeable of special education law (O'Connor et al., 2016). Of the few peer-reviewed studies examining educators' knowledge of special education law, results suggest that although educators often perceive they have sufficient understanding of special education law, both general and special educators need further training in special education law, procedures, and evidence-based practices (Brookshire & Klotz, 2002; Markelz et al., 2021). Research also demonstrates that pre-service teacher candidates lack adequate knowledge and misperceive their lack of knowledge of policies and procedures. In response to these needs and limited available research, this study presents the development and pilot of the Knowledge and Perceptions of Special Education Law (KAPSEL) survey to understand graduate students' knowledge and perceptions of special education law. Three research questions were addressed: (a) In what ways do graduate students report receiving effective preparation in special education legislation? (b) To what extent are graduate students knowledgeable of special education law? and (c) Do graduate students' perceptions of special education law predict their knowledge of special education law?

Graduate students (n = 509) enrolled in the School of Education were invited to complete the KAPSEL. A total of 106 responses were received; however, only 61 of the 106 responses had complete data, for a completion rate of 57.5%.

Results revealed over 90% of participants reported a need for more training in special education legislation. Participants were somewhat knowledgeable (M = 14.95, SD = 3.99) of special education law, with no participants answering all 24 knowledge items correctly. Psychometrics and fit indices were examined using a Rasch analysis to examine the relationship between persons and the items that operationalize the latent trait under investigation (e.g., knowledge of special education law). Multiple linear regression was used to examine whether perceptions of having sufficient knowledge of special education law and confidence implementing policies and procedures predicted total knowledge scores. Entering all predictor variables simultaneously, the independent variables explained a significant portion of the variance in overall knowledge, ($F(2, 60) = 12.74, p < .001, R^2 = .31$).

Our results suggest two key findings: (a) graduate students require continued training in special education law, and (b) a formative aspect of that required knowledge needs to address students' understanding and application of FAPE and LRE consistent. Recommendations the importance of teacher preparation programs and professional accreditation bodies in guiding educators' practical expertise in special education law.

DIFFERENCE IN LEVELS OF L-KYNURENINE, TRYPTOPHAN AND VASCULAR ENDOTHELIAL GROWTH FACTOR IN DIFFERENT MANNERS OF DEATH

Sara Magoun

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Stephanie Wetzel, Ph.D.

ABSTRACT:

Elevated levels of inflammatory biomarkers have been linked to suicidal behaviors in multiple studies. Previous research suggests that Kynurenine (KYN), Tryptophan (TRP) and Vascular Endothelial Growth Factor (VEGF) are proinflammatory molecules that are suspected to play a role in brain inflammation, which has been identified in cases of patients with major depressive disorder, and patients displaying suicidal behavior.

Brain inflammation causing symptoms of mental illness is a relatively new concepts and has not been extensively explored. This is primarily due to mental health research lagging several years behind physical body research.

One hundred blood samples from autopsied cases were collected from the Westmoreland County Coroner's Office. These blood samples were spun down into plasma and an internal standard was added to each. A liquid chromatography

triple quadrupole mass spectrometer and a calibration curve were used to measure amounts of KYN, TRP, and VEGF in these samples.

The purpose of this research is to determine if the ratios of KYN, TRP, and VEGF differ depending on manner of death. By using this method, it could be seen that one manner of death has a higher Kyn/Trp ratio compared to another one. Identifying elevated levels of these markers may not only advance mental health research, but this method could also be used by forensic pathologists in cases where manner of death is not clear or is disputed.

Down the Drain: Embalming Fluid Disposal

Tiffany Hoke

Other Authors: Pamela Marshall, Ph.D.; Nicole Rial, J.D.; Stephanie Wetzel, Ph.D.

Bayer School of Natural and Environmental Sciences | Biochemistry and Chemistry

Faculty Advisor: Stephanie Wetzel, Ph.D.

ABSTRACT:

Embalming fluid has been used for hundreds of years as a way of preserving loved ones after they have passed. The main preservative found in embalming fluid is usually formaldehyde which can have adverse effects on the environment. It has recently come to the attention of the public and disposal companies that the embalming fluid used in funeral homes and medical examiner offices is simply washed down the drain along with other bodily fluids, including blood. This method of disposal could propose adverse health effects to the people who drink, swim, or cook with the treated fluid.

A method was developed to determine how different funeral homes across Pennsylvania dispose of their embalming fluid. A list of questions was created and one funeral home from each county were selected to be interviewed over the phone about their embalming fluid disposal practices. A literature search was also performed to evaluate the already published works on this topic. With this research, it is hopeful that the disposal methods can either be deemed safe due to the dilution of the fluids in water or be deemed as a health hazard with possible solutions for funeral homes like extra treatment steps or other ways to safely dispose of the fluid.

***"The Subsistence of the People," Climate-Induced Food Insecurity in Pre-Revolutionary France**

Claire Kreider

McAnulty College and Graduate School of Liberal Arts | Department of History

Faculty Advisor: John Mitcham, Ph.D.

ABSTRACT:

France experienced extreme weather events in 1788 and 1789 that resulted in low-yield harvests, dead livestock, ruined crops, damaged property, and frozen rivers. Any one of these extreme weather events would have caused widespread suffering on its own, but collectively, mixed with the bleak pre-existing political and economic conditions in eighteenth century France, they proved disastrous. Based on archival research such as contemporary French and British periodicals, weather journals, and diplomatic correspondences, I argue that in pre-revolutionary France extreme weather episodes resulted in food insecurity and increased the political and economic instability of an already volatile and vulnerable state. These factors destabilized France and helped the middle-class overthrow the existing regime, thus commencing the French Revolution. Although there is a vast array of scholarly material concerning the French Revolution no scholar has analyzed the impact climate-induced food insecurity had on revolutionary events.

Even before COVID-19, reduced incomes, disrupted supply chains, and chronic and acute global hunger were on the rise due to various factors including civil conflict, socio-economic conditions, and climate change. The year 2020 marked the

most severe increase in global food insecurity, especially impacting the households of returned citizens, undocumented immigrants, and Black and Brown families. This paper relates the extreme actions that occurred when France suffered a minor change in weather. We can only wonder what will happen as our weather becomes more and more erratic and our current means of agricultural production are no longer applicable to our new climate reality and even larger population. Although nutritional security and sustainable agricultural production are not key speaking points in any current national political agenda, they certainly should be given increasing priority and taken off the backburner immediately. Now is the time to increase research and funding for climate-induced food insecurity, sustainable agriculture, and equitable food distributions policies. It is only through increased research and funding that we will be able to finally solve the same problems that plagued France in 1789 and us today.

****Detecting Native Freshwater Mussels in Pennsylvania Waterways: Traditional Methods vs. Environmental DNA**

Meredith Bennett

Other Authors: Dr. Brady Porter

Bayer School of Natural and Environmental Sciences | Biology

Faculty Advisor: Brady Porter, Ph.D.

ABSTRACT:

Freshwater mussels are native clams in the family Unionidae, which exhibit life cycles that alternate between bottom-dwelling adults and specialized larvae (glochidia) that live parasitically on fish hosts. North America is home to over 300 freshwater mussel species, with 67 known species in Pennsylvania. They are highly imperiled organisms due to several threats including sensitivity to water pollution, competition with invasive species, and habitat destruction/modification. To protect native mussels, consistent monitoring is needed to identify suitable habitat and track changes in mussel abundance. Traditional surveys rely on visual identification of mussels, but individuals tend to be rare and difficult to identify morphologically. In addition, SCUBA equipment is needed to sample larger rivers, and samplers often need to disturb mussels by removing them from the substrate for identification. An alternative, non-invasive, method is to extract environmental DNA (eDNA) from water samples. Environmental DNA from mussels can be in the form of shed cells, sperm, glochidia, and scat from predators. Researchers can then detect specific organisms in the samples by using specially designed DNA primers and next-generation sequencing. eDNA-based methods have several advantages over traditional sampling, including lower costs, enhanced detection of rare species, and fewer hazards to researchers and the organisms being studied. Few studies have applied eDNA-based methods to freshwater mussels or compared them to traditional mussel surveys. In this project, I seek to describe native mussel populations in several waterbodies of Western Pennsylvania, including Pine Creek and its tributaries, the Allegheny River, and the Kiski River. Data will be collected at these sites using both traditional morphological surveys and eDNA. Using both methods will provide a more accurate picture of mussel communities than could be provided by either method on its own. In addition, the efficacy of eDNA surveys will be compared with traditional methods to determine whether eDNA is an effective tool for monitoring freshwater mussels. The eDNA-based methods described in this project could make surveys faster, more affordable, more accurate, and less invasive. This improved monitoring will then lead to more informed, effective conservation endeavors, protecting native mussels and improving water quality.

***Gene Editing Therapy for Psychological Conditions - The Potential to Reduce Suffering Through Therapeutic Interventions**

Gabriella Agostaro

McAnulty College and Graduate School of Liberal Arts | Healthcare Ethics

Faculty Advisor: Gerard Magill, Ph.D.

ABSTRACT:

Genetic sequencing has introduced scientists to the critical role that genes contribute to human function. As discoveries have been produced, revolutionary techniques have emerged to tackle issues associated with genetically linked conditions.

Targeted treatment methods are utilized for therapeutic interventions in patients suffering from cancer due to genetic markers discovered in the human body. With the aid of these genetic markers, clinicians can recognize genes that increase a patient's likelihood of developing cancer and, more precisely target cancer treatment regimens. While we can now determine genetic links for many physical diseases, it is essential to explore the relevance of gene editing in psychological conditions.

Schizophrenia is characterized by delusions, hallucinations, and distortions of reality. This disorder has recently been linked to over 100 possible genetic risk loci in the human body. Similarly, bipolar disorder is a psychological condition characterized by intense mood swings. This condition has been associated with potential genetic links such as the ANK3 and DGKH genes. Given the psychiatric nature of these conditions, the possibility of homelessness, violence, and illegal drug use are increased.

As technology has progressed through the 21st century, innovative problem-solving has become crucial to compelling advancements in modern science. Therapeutic gene editing offers scientists the ability to recognize genetic markers, target more enhanced treatment methods, and eradicate diseases within our community. While it is currently illegal to correct psychological disorders in the embryo, this scientific development has the potential to eradicate these diseases entirely. This eradication could contribute to lower reported levels of incarceration, homelessness, and caregiver burden.

The Ethical Implications of Genetics in Psychiatry

Mariah Chobany

McAnulty College and Graduate School of Liberal Arts | Healthcare Ethics

Faculty Advisor: Gerard Magill, Ph.D.

ABSTRACT:

Genomic medicine's success has led to individualized diagnoses and treatments, which motivated efforts to advance precision in medicine, especially in psychiatry, where nearly all diagnoses have a behavioral and subjective phenomenology. Psychiatric disorders have a high level of complexity with a wide variety of symptoms and high rates of comorbidity. Currently, psychiatric illnesses are classified by the clustering of symptoms as outlined in the DSM-5; little is known about the biological underpinnings of psychiatric disorders, often leading to the wrong diagnosis and course of treatment. I examined the current use of genetics and other biological mechanisms in psychiatry, then explored the possibility for precision in psychiatric diagnostics and biologically based therapies, along with the associated ethical implications. The literature revealed findings suggestive of biomarkers and genetic underpinnings of specific psychiatric illnesses. Still, their lack of validity, small sample sizes, and ethical implications— including privacy concerns, increased stigmatization, lack of public knowledge of genetics, and harm risks delay their use in clinical psychiatry. In theory, moving beyond the subjective symptomology of the DSM-5 and incorporating genetics into psychiatry seems doable given the advancements in technology and genomic algorithms; however, based on the literature, the achievability of this is not nearby. Applying genomic tools to psychiatric disorders and stigmatized behaviors or symptoms associated with a disorder raises unique concerns. Scientists can limit the ethical concerns by implementing legal protections against discrimination, expanding future research and access to follow-up care, and improving the public's understanding of genetics and genomics, thus encouraging its use clinically. With such ethical safeguards, the hope is that psychiatry can be less subjective and instead be a precise field of medicine.

Identifying Cellular and Viral Factor Recruitment to HSV-1 Replication Forks

Jessica Packard

Other Authors: Jill A. Dembowski
Bayer School of Natural and Environmental Sciences | Biology
Faculty Advisor: Jill Dembowski, Ph.D.

ABSTRACT:

Herpes simplex virus type 1 (HSV-1) is a ubiquitous pathogen that replicates the viral genome within the nucleus of host cells. Replication of the HSV-1 genome is carried out by viral replication machinery consisting of a DNA polymerase (UL30), processivity factor (UL42), helicase-primase complex, origin binding protein (UL9), and a single stranded DNA binding protein. We found that host Proliferating Cell Nuclear Antigen (PCNA) interacts with HSV-1 DNA at replication forks and associates with viral DNA in a replication-dependent manner. PCNA is a sliding clamp that moves along the cellular DNA strand to aid in replication and recruitment of select DNA damage response and DNA repair factors to cellular replication forks. We therefore hypothesized that PCNA associates at viral replication forks to promote HSV-1 replication while also tethering cellular DNA repair proteins to replicating viral DNA. We used a known PCNA inhibitor, PCNA-I1, to identify how associated factors change as a function of PCNA. We found that PCNA-I1 reduces viral yield and blocks HSV-1 DNA replication. To determine the mechanism of inhibition, we performed a technique adapted from isolation of proteins on nascent DNA (iPOND) to isolate HSV-1 DNA from infected cells. We then identified viral and cellular proteins that associate with viral DNA during PCNA inhibition compared to an uninhibited control. We found that despite treatment with PCNA-I1, PCNA is associated with viral DNA. Viral replication proteins UL30, UL42, and UL9 decreased in the presence of PCNA-I1. Host DNA damage response proteins such as mismatch repair proteins and RECQL both decreased. Of note, proteins that make up the MRN complex, a class of proteins that functions in DNA break repair, restart of stalled replication forks, and viral DNA infection, increased in response to PCNA-I1 treatment. Given this data, PCNA may be essential in tethering viral replication proteins and/or cellular DNA repair proteins to viral replication forks.

Identifying the Role of the Human Integrator Complex in Herpes Simplex Virus Type-1 Infection

Joseph Heath

Other Authors: Jill A. Dembowski
Bayer School of Natural and Environmental Sciences | Biological Sciences
Faculty Advisor: Jill Dembowski, Ph.D.

ABSTRACT:

Herpes Simplex Virus Type-1 (HSV-1) is a common human pathogen that infects the majority of the human population. Infection with this virus usually results in cold sores, but can cause more severe manifestations such as herpes keratitis or deadly encephalitis. Despite the prevalence and potential severity of this virus, we do not have a complete understanding of the infection process. To facilitate infection, HSV-1 requires a combination of both viral and cellular factors. Our lab has previously characterized the human proteins that associate with the viral genome during infection, and found that members of the human Integrator complex are present throughout infection. In uninfected cells, this 14-subunit complex regulates transcription of both coding and non-coding RNAs. This regulation is facilitated using Ints11, an Integrator subunit that acts as a pair of molecular scissors to cut and release nascent RNAs as they are produced. Also of interest is that certain Integrator subunits are capable of acting outside of the complex and perform independent essential cellular functions, such as repairing damaged DNA. Interestingly, the Integrator complex has previously been identified as a key factor leading to the production of RNAs in Herpesvirus Saimiri, a primate herpesvirus. However, the function of the Integrator complex with respect to HSV-1 infection has yet to be studied. Here, we discuss our plans to investigate the role of the Integrator complex in HSV-1 infection, and detail preliminary data supporting these studies. Our primary goals are 1) to identify how HSV-1 infection alters Integrator DNA, RNA, and protein interactions, and 2) to deplete specific subunits of the complex to define their functions during HSV-1 infection. These data will broaden our understanding of Integrator complex function and how a virus can adapt a human protein to aid in the infection process.

DNA Extraction and Chemical Analysis of Metacarpals

Sydney Reed

Bayer School of Natural and Environmental Sciences | Forensic Science & Law

Faculty Advisor: Pamela Marshall, Ph.D.

ABSTRACT:

Identifying victims based on bone remains can be a difficult feat based on their condition due to many environmental, physical and chemical factors. These factors can affect the yield of adequate DNA for identification and can pose multiple challenges in commonly used extraction methods. The original purpose of this research was to develop a technique to extract an adequate amount of the co-mingled, degraded DNA from the sample by adding Pressure Cycling Technology as a purification step. Metacarpals were to be overlapped and burned at 400°C to mimic the process of comingling. The bones were then ground into a powder using the SPEX SamplePrep Freezer Mill to prepare them for the extraction process. The extraction used was an Organic Extraction, also known as PCI, along with purification using a Qiagen QiaQuick PCR Purification Kit. Half of the samples were also to be exposed PCT, Pressure Cycling Technology in effort to further increase DNA yield. Unfortunately, the control samples did not yield enough DNA to process through amplification and it was later determined that the metacarpals may have been treated with a preserving agent. Preserving agents can cause mutations in nuclear DNA as they act as electrophiles. The new objective of this research turned to identifying and quantifying the preserving agent. This was done using the Agilent 1200 Series HPLC tandem Agilent 6460 Triple Quadrupole Mass Spectrometer with a standard curve created with standards of a formalin fixative solution, embalming fluid and formaldehyde as they are the most common preserving agents used today. Determining the preserving agent used to preserve the metacarpal standards will aid in the understanding as to why the Organic DNA extraction method did not yield any DNA in the control samples.

Direct Sampling and Identification of Illicit Substances Impregnated in Paper using Paper Spray Ionization Mass Spectrometry

Kyra Hardenburg

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Michael Van Stipdonk, Ph.D.

ABSTRACT:

Illicit drugs continue to be significant threats to public health, law enforcement, and national security. In the United States, drug poisoning deaths are the leading cause of injury death, outnumbering deaths by firearms, motor vehicle crashes, suicide, and homicide. In many prisons around the United States, illicit substances being brought into prisons through drug-soaked mail has been a major problem. As the number and potency of illicit drugs rise, the need for rapid, selective, and sensitive analytical techniques increases as well. Paper spray ionization (PSI) is a newly developed ambient source used to analyze solid or liquid compounds on the surface of a paper substrate. PSI has been developed as a direct, fast, and low-cost sampling and ionization method for mass spectrometric (MS) analysis of complex mixtures without the need for sample preparation or cleanup. This new method can run the samples in a faster time with the same sensitivity and selectivity of other methods while having little to no sample preparation. This research hopes to answer the question: is paper spray ionization mass spectrometry (PSIMS) an effective method for direct sampling and identification of illicit substances impregnated in paper? The illicit substances analyzed were phenethylamine, methamphetamine, and heroin. For the first application method the drug was directly added to the paper after it was clipped to the paper spray instrument then analyzed. For the second application method the drug was directly added to the paper triangles two days prior to analysis. This information can be put towards reducing the threat illicit substances pose on society, specifically on prisons and jails. It is expected that the findings obtained from this research will confirm that this method is an effective test for identification of illicit substances impregnated in paper. After this method is

proven to be effective, it could be incorporated in the prescreening of inmate mail to help lessen the number of drugs being smuggled into these correctional facilities.

Suicide Rates and Trends in Allegheny County During 2010-2019

Odile Enslin

Other Authors: Mandy Tinkey, M.S., Anita Zuberi, Ph.D

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Lyndsie Ferrara, Ph.D

ABSTRACT:

In 2017, the suicide rate for the state of Pennsylvania was 13.8 deaths per 100,000 residents. At the same time, Allegheny County's suicide rate was 15.8 deaths per 100,000 residents. While numerous research studies have established trends within the scope of suicide, examining differences across gender, age, and race, fewer studies have focused on community-level factors such as income.

In this study, suicide data from the Allegheny Medical Examiner's office during the period of 2010 through 2019 was examined alongside with poverty threshold data from the Census Bureau's American Community Surveys. This research examined whether impoverished communities have higher suicide rates than non-impoverished communities. Furthermore, this study asked: do impoverished communities have different rates and trends when examining cause of death in suicides?

In defining key aspects of this research, poverty was defined by using the Census Bureau's poverty threshold. This is a commonly used measure calculated by the Census Bureau that is meant for statistical analysis. The poverty threshold accounts for differences in family size and composition. An example would be a family of 4 comprised of 2 children under 18, would have the poverty threshold of \$26,246 in 2020.

This research makes a unique contribution by pairing data collected by the Medical Examiner's Office with place-based data from the U.S. Census. Results from this study aim to improve education and preventative measures in different communities with higher rates of suicide. Examining suicide rates in coordination with location and income levels provides a macroscopic examination of suicide beyond examining individual cases to provide another layer of contextual information that can aid future prevention efforts.

Transparency: The Ethical Improvements with Electronic Health Records

Amanda Lang

McAnulty College and Graduate School of Liberal Arts | Health Care Ethics

Faculty Advisor: Joris Gielen, Ph.D.

ABSTRACT:

In a world with burgeoning technology there are advertisements about the latest smart phone or latest advancements in automobile technology. But what about the "must have's" for technology when it comes to medicine? Technology is contently growing to help people stay connected via streaming services, social media, and video chatting with friends and family. While these were all advancing, so have technological advancements in healthcare for patients and their care providers. Some advancements in medicine include Artificial Intelligence (AI) and telehealth. As important as those are, it is just as important to recognize the growth of health records. Transparency is an ongoing desire from patients when it comes to healthcare. A majority of patients want to know details about their care, why certain tests are being ordered, and maintain open-communication between them and their physician. One major advancement in improving transparency electronically with patients is with electronic medical records. Electronic Medical Records (EHRs) allow for

patients to have easy access to their medical chart right at their fingertips. Patients have access to view and make appointments, chat with a care provider through messages, phone calls, or telehealth visits, and even view the chart notes that physicians put in from appointments with OpenNotes. Allowing patients to have access to their medical information and notes from visits has benefited not only patients, but also physicians and other members of the care team. EHRs allow patients to view the results of any tests or scans they have done, review notes and suggestions that might be forgotten that the physician has put into their medical chart, and easily set up future appointments without having to call someone and wait on hold. Physicians and other care team members benefit from the ability of a patient reviewing the medical chart for anything discussed during the appointment that might be forgotten, messaging patients back in a timely manner rather than having to sit on the phone all day calling back patients, and sending the patient notes, recommendations, or referrals electronically rather than the mail or paperwork when they leave their appointment which can get lost. The advancement of EHRs has also led to Personal Health Records which allows patients to take control of their own health and share it with their physician or any other members of their care team. An example of a common PHR is any fitness app that helps track calories, exercise, water intake, etc. PHRs allow patients to easily keep track of their health, show their physician about any progress or concerns, and then help set up a plan for future health progress. This is just the start of technology increasing transparency within medicine between patients and their physicians.

Detection of Methanol in Cocktails by Paper Spray Ionization- Mass Spectrometry

Derek Heacox

Other Authors: Stephine Wetzel, Ph.D., Luke Metzler, M.S.

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Michael Van Stipdonk, Ph.D.

ABSTRACT:

In May of 2020, as a result of SARS-CoV-2 virus, distilleries in Chiconautla, Mexico were labelled non-essential, resulting in an influx of counterfeit liquors by criminal organizations. 20 people in Chiconautla died as a result of consuming the counterfeit liquor. As of April 2021, 326 people have been treated with methanol poisoning and 127 people in the Dominican Republic have died as a result of consuming methanol-laced alcoholic beverages. The consumption of counterfeit alcohol is a worldwide problem and developing a method to the legitimacy of alcohol consumed could save thousands of lives yearly. 30 mL of methanol was determined to be the amount of methanol, when consumed, to cause severe illness, such as blindness or death. The purpose of the study is to determine if a counterfeit alcohol can be found in a cocktail-like solution using Paper Spray Ionization-Mass Spectrometry (PSI-MS). A triangular piece of filter paper was infused with silver nitrate, a series of deuterated ethanol and methanol standards were created to determine if methanol could be found using the PSI-MS methods. A vodka soda sample was then made containing a lethal amount of methanol, Pinnacle Vodka, and Sprite. In the pure Pinnacle Vodka sample only trace amounts of methanol were found. During the distillation process one hundred percent of the methanol cannot be removed, but trace amounts of methanol can be passed through the body without harm. During a home distillation methanol is cut-in to the final product to increase the overall yield, this was a main contributor to methanol poisoning. Standard experiments have been conducted to determine the limit of detection of the PSI-MS. Methanol-d4 had be utilized to determine the detection limit of the instrument.

Further experiments will be conducted to determine if quantification of ethanol and methanol can be determined using the PSI-MS method. This will be used to aid in the determination of whether if a person had enough methanol in their system to cause dizziness, illness, or death. Methanol was a volatile liquid; a time trial will be conducted in order to ascertain a time limitation of which the methanol would be detected. Methanol that had been present on a filter paper minutes or hours after preparation are to be expected to. This would lead to further studies to create a litmus test for

methanol laced beverages. A consumer could dip their drink on a testing paper and a color change would indicate trace or potentially lethal amounts of methanol in their beverage.

Bacterial bioremediation of iron in passive remediation systems treating abandoned mine drainage via nitrate dependent iron oxidation metabolism

Anna Vietmeier

Bayer School of Natural and Environmental Sciences | Biology

Faculty Advisor: Nancy Trun, Ph.D.

ABSTRACT:

In Pennsylvania (PA) ~11,000 abandoned mine drainage (AMD) sites contaminate ~5,000 km of streams, impact the \$29.1 billion recreation industry, and will cost \$15–\$50 billion to remediate [1]. AMD is rich in sulfuric acid and metals, including iron (Fe), that negatively affect water aesthetics and infrastructure. Water high in Fe is poisonous, associated with cancer, and carries an increased infection risk. AMD can be remediated in passive systems that rely on geochemistry to increase the pH and precipitate metals. PA has over 300 passive remediation systems (PRS) to treat AMD. Microbial populations naturally colonize these systems, and some of the microbes can reduce soluble contaminant levels (bioremediation). Bacterial metabolism can impact the redox states of contaminants, changing their solubility [1, 2]. At an acidic pH, microbes drive Fe²⁺ oxidation and precipitation by transferring electrons to cytochromes [3-5]. Nitrate dependent Fe²⁺ oxidation (NDFO) couples nitrogen reduction to iron oxidation [2, 6]. In the acidic AMD at Boyce Park PRS (pH ~4) where Fe exits above EPA limits for aquatic organisms and drinking water, we have identified a bacterium (AV1-W) that oxidizes Fe via NDFO. Genome sequencing of AV1-W predict Fe specific cytochromes and nitrate reducing NapA. The long-term objective of this project is to understand how microbial communities and their metabolism impact AMD remediation and investigate methods to improve their impact and monitor system effectiveness.

Mental Health Resources in Oral History Interviews

Hannah LeComte, Makenna Graves

Other Authors: Alonna Carter, Sarah Babcock (contributed to project, not presenting)

McAnulty College and Graduate School of Liberal Arts | History

Faculty Advisor: Jennifer Taylor, Ph.D.

ABSTRACT:

In the fall semester of 2021, graduate students in the course Speaking to the Past: Oral History in Methodology and Practice at Duquesne University conducted oral history interviews with members of the Elsinore Bennu Think Tank for Restorative Justice (EBTT). The EBTT is a Pittsburgh-based group comprised of returned citizens (formerly incarcerated citizens) and community members that seeks to use ideas of restorative justice to heal community divisions. To ensure that our narrators felt safe during the oral history interviews, we researched the role of mental health and the importance of trauma-informed interviewing techniques.

To build rapport and trust with the EBTT narrators, our class invited members of the EBTT to meet us so that we could ensure our narrators would be comfortable with the project and build rapport. We also closely examined our interview questions for triggers. We framed our questions as to not directly pressure our narrators to discuss their experiences on the "inside." Lastly, we developed a mental health resource guide to be shared with our narrators at the time of their interviews. The guide included warning signs of emotional distress, crisis line information, local and national resources, insurance information, Mental Health First Aid information, and self-care tips. While not all-encompassing, the guide

contains valuable information for anyone coping with mental health issues (MHI) even after the interview process. The design of the guide can be universally used and adjusted based on the individual project and location.

Our poster will highlight the questions oral historians should consider when conducting trauma-informed interviews on sensitive subject matters, as well as display the themes and information in our mental health resource guide. With the ongoing pandemic crisis elevating the amount of mental health crises, we hope that sharing our project will add to the conversation on mental health and oral history best practices.

***Infant Sleep as a Moderator in the Relationship Between Sitting and Focused Attention**

Karl Jancart, Justine J. Vecchiarelli, Melanie Tommer, Amber DelPrince, Melanie Schultz, Katrina Bucher, Jessica Spirnak, Claire Boe

Other authors: Regina T. Harbourne, Ph.D.

School of Education, Rangos School of Health Sciences, McAnulty College and Graduate School of Liberal Arts | Counseling, Psychology, and Special Education; Physical Therapy; Modern Languages

Faculty Advisor: Regina Harbourne, PhD, PT

ABSTRACT:

Infants' ability to sit has been shown to herald cognitive benefits (An et al, under review). In particular, newly sitting infants have been shown to have greater focused attention while supported during sitting as compared to sitting independently (Soker-Elimaliah et al., 2021). Difficulties with sleep during infancy, have been shown to have deleterious effects on attention and behavior problems at approximately 3-4 years of age. The purpose of this ongoing study is to investigate the influence of sleep on the relationship between sitting and focused attention in infants who can sit independently but not crawl. Infants (n = 30) were assessed virtually on Zoom in their own homes. Sitting postural control was measured using the Angles Goniometer App (Cunha et al., 2020), while focused attention was measured using three different toys that were placed in front of the infant for 90s each (Lawson & Ruff, 2001). Recordings of these measures were later coded by trained coders and reliability was calculated. Nanit (a tool for parents to measure various facets of infant sleep) dashboard screenshots, which included total time asleep and sleep quality from the night prior to the sitting and focused attention assessment, were provided by parents during or after the assessment. Results of the study will provide information about the importance of infant sleep and its impact on the relationship between sitting (a motor skill) and focused attention (a cognitive skill).

Development of a Rapid Drug Detection Method for Insects using Paper Spray Ionization Mass Spectrometry (PSI-MS)

Alexandria Plyler

Other Authors: Michael Van Stipdonk, Ph.D.

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Michael Van Stipdonk, Ph.D.

ABSTRACT:

Insects can reflect the chemical environment that they have developed in. Thus, necrogenous insects can reflect the chemical environment of cadavers they have fed on. Forensic scientists can potentially utilize insect larvae as an alternate biological matrix to detect drugs in cadavers that are skeletonized, burned, or otherwise badly damaged.¹⁻³ Analysis of insects using paper spray ionization mass spectrometry (PSI-MS), an analytical method requiring little to no sample preparation, could provide a rapid, cost-effective, and non-destructive mode of toxicological analysis.⁴ Traditional tissue analysis via liquid chromatography mass spectrometry (LC-MS) often requires lengthy sample preparation, uses expensive reagents, and is destructive to cadaver tissues.

The goal of this project is focused on exploring PSI-MS of insects to detect the presence of drugs in damaged cadavers. Several different extraction techniques for drug detection in the model insect *T. molitor* were explored, including methanol extraction, QuEChERS (Quick, Easy, Cheap, Effective, Rugged, Safe) extraction, and a novel "bug-spray" technique.

T. molitor insects fed on substrate spiked with phenethylamine (PEA), a surrogate for illicit monoamine drugs such as methamphetamine. By applying each extraction method and analyzing the insect samples using PSI-MS with collision induced dissociation (CID), the most effective detection method was developed. In addition, the potential of insect corpses/moltings as toxicological matrices were also explored.

Coppers and coffeehouses: People and places in eighteenth-century British runaway slave advertisements

Avery Wehrs

McAnulty College and Graduate School of Liberal Arts | Public History

Faculty Advisor: Jotham Parsons, Ph.D.

ABSTRACT:

Interest in the history of people of color in Great Britain has grown in recent years, and the 2007 bicentennial of the abolition of the slave trade in the British Empire in particular spurred a wave of projects examining the nation's history of slavery. One such project at the University of Glasgow resulted in the digital database "Runaway Slaves in Britain: Bondage, Freedom, and Race in the Eighteenth Century," a collection of more than 800 advertisements from around 60 English and Scottish newspapers.

This research uses these advertisements as window into the identity of the enslaved and the role of slavery in eighteenth-century British society. Taken together, the ads reveal a diverse group with origins ranging from Angola to Barbados and Maryland to Java. Familiar locations make regular appearances — including a host of coffeehouses, whose egalitarian reputation contrasts sharply with the business of slavery taking place within their walls. An examination of the third parties — neither slavers nor enslaved — mentioned in the advertisements hints at the connection between the slave trade and the fledgling professional police organization in London.

Scholars of American slavery have long recognized the value of newspaper advertisements as primary sources. This research demonstrates that their British counterparts are a similarly rich body of evidence. They connect individuals and institutions to slavery in a direct and visceral way, locating enslaved people alongside white Britons in the context of everyday life. Furthermore, they offer an avenue to shift the focus of historical narratives from prominent slavers to the ordinary people and places that drove, enabled, benefitted from, or were otherwise touched by slavery. In a moment when academia and the public alike are particularly interested in connections between the history of slavery and inequality in the present, newspaper advertisements can speak powerfully to the significance of the banal in creating and maintaining systems of oppression.

Developing the Duquesne Psychoanalytic Discourse Analysis (D-PDA) Method

Anna Kreienberg John Dall'Aglio, Michael Basiewicz, Matthew Devine, Varun Viswanathan

McAnulty College and Graduate School of Liberal Arts | Psychology

Faculty Advisor: Derek Hook, Ph.D.

ABSTRACT:

Lacanian Discourse Analysis (LDA) refers to a broad category of qualitative research methods that study structural aspects of speech from a Lacanian psychoanalytic perspective. LDA has previously been applied to a wide range of cultural materials such as books, newspapers, clinical interviews, political speeches, film scripts, and court documents. These studies have sought to freshly consider the status of knowledge, subjectivity, and what constitutes discourses by analyzing how psychoanalytic processes operate in the formal elements of a text. However, this broad scope has been paralleled with equally broad approaches to employing these psychoanalytic concepts. Many studies using LDA reinvent how certain concepts are applied, often with a rigorous theoretical explanation but lacking in precise methods for operationalization (there are exceptions, e.g., Swales et al., 2020). Our project will develop a research methodology that is inspired by LDA but that strives toward greater consistency in the operationalization and application of key concepts.

Called the Duquesne Psychoanalytic Discourse Analysis (D-PDA) Method, this project will operationalize “primary process” phenomena such as condensation, displacement, and negation in order to analyze psychotherapy transcripts using rigorously-defined criteria. To develop this operationalization, we will iteratively analyze transcripts from Merton Gill’s “Analysis of Transference” for primary process phenomena, in dialogue with theoretical and contemporary applied work on these concepts. Using Clara Hill’s Consensual Qualitative Research method, we will collectively define and operationalize these terms through consensus coding. By developing this novel D-PDA methodology, this project aims to improve consistency in the operationalization and application of psychoanalytic concepts in research. Given the dearth of psychoanalytic psychotherapy process research methodologies, we hope that D-PDA can eventually be applied in clinical research to study how the formal dimensions of psychic processes undergird manifest clinical phenomena.

Identification of novel *Asaia bogorensis* Type I secretion signals

Marisa Guido

Bayer School of Natural and Environmental Sciences | Biological Sciences

Faculty Advisor: David Lampe, Ph.D.

ABSTRACT:

Malaria is one of the deadliest vector-borne diseases, and is responsible for thousands of deaths annually. Plasmodium parasites are the causative agent of malaria, and are spread through the bite of infected female Anopheles mosquitoes. Despite the use of traditional preventative measures like insecticide treated bednets, indoor insecticide spraying, and artemisinin combination therapy, Plasmodium infection resulted in over 600,000 deaths in 2020. This indicates a desperate need for new ways to combat the spread of Plasmodium. One potential strategy, called paratransgenesis, involves utilizing native mosquito symbiotic microorganisms to secrete molecules that kill the parasite within the mosquito, thus preventing the mosquito from becoming infected. *Asaia bogorensis* is a Gram-negative bacterium, and common symbiont within Anopheles mosquitoes with several characteristics that are beneficial for paratransgenesis. Previous research using transgenic *A. bogorensis* has shown reduction in oocyst prevalence when challenged against *P. berghei* parasites. However, we observed reduced fitness when using Type II secretion signals to secrete antiplasmodial molecules. The fitness costs associated with paratransgenic expression may be alleviated by using Type I secretion signals. Little is known about Type I secretion in *A. bogorensis*, but through the use of an online search tool called BastionHub, we were able to identify 33 potential Type I secretion signals[3]. The top five candidates were then evaluated for secretion ability by fusing the C-terminal Type I signal to GFP and analyzing the amount of GFP in the cell lysate compared to the supernatant. These constructs can be used to continue designing paratransgenic systems that do not negatively impact the fitness of *A. bogorensis*.

Labeling Melanoma Cells With Black Microspheres For Improved Sensitivity In Detection Via Photoacoustic Flow Cytometry

Tori Kocsis

Rangos School of Health Sciences | Biomedical Engineering

Faculty Advisor: John Viator, Ph.D.

ABSTRACT:

Melanoma is an aggressive form of skin cancer known for developing into metastatic disease. Current clinical diagnostics, including medical imaging and tissue biopsy, provide poor prognosis since the cancer is in 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*. Although this method exploits the naturally-produced melanin within the cells, it has only shown success detecting highly-pigmented melanoma cell lines. 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. We achieved this by coating black dyed

microspheres with monoclonal Anti-Melan-A antibodies, which is a melanocyte differentiation antigen specific to melanoma cells. By labeling the melanoma cells with darkly-pigmented microspheres, they are primed for detection using the same photoacoustic flowmetry principles as highly-pigmented cells. 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.

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

Kyle Emerson

Bayer School of Natural and Environmental Sciences | Biological Sciences

Faculty Advisor: Sarah Woodley, Ph.D.

ABSTRACT:

Microbes present in the immediate local environment at birth or hatching are the first to colonize the vertebrate gastrointestinal (GI) 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 can impact neural signaling pathways that are associated with cognitive and behavioral impairments. While environmental factors impact the gut microbial composition throughout host development, evidence suggests disrupting microbial colonization in early life can be particularly detrimental. Here, I investigated whether manipulating the available microbial species pool in the local environment at hatching impacted relative brain size, relative brain shape and behavior in Northern Leopard Frog tadpoles (*Lithobates pipiens*). Amphibians are an excellent model to study the impacts of environmental factors on the gut microbiota because all of development occurs 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 stages of 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 immediate local environment. Development in autoclaved natural pond water resulted in tadpoles with relatively larger brains, relatively narrower medullas, and decreased locomotory activity in response to novel sensory stimuli. These results support my hypothesis that the available microbes present in the local environment impact neurodevelopment and behavior in a larval amphibian model. Future directions for this experiment are to sequence the gut microbial communities to confirm treatment altered the gut microbiota. Further, I want to investigate other environmental factors that alter the host gut microbiota and subsequent physiological development in the underutilized amphibian model.

Estimating Decomposition Time Via Bacteria from Rat Models

Kayce Boggess

Other Authors: Lisa Ludvico, Ph.D., Jan Janecka, Ph.D., Evan Penrod, M.S.

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Lyndsie Ferrara, Ph.D.

ABSTRACT:

Microbiomes are unique individualized communities of microbes that live on and in human bodies. In closed environmental decomposition, these microbes can be the only decomposition agent. Traditional research looks at an open-air environment that considers the amount of decomposition to determine a time of death. This leads to decomposition looking completely different in closed environments when only the microbiome and other bacterial species are present to decompose. The purpose of this study is to use the microbiome's abundance and patterns to determine if these can be used as an indicator of the time of death. This study looks at previous literature and explores the various phyla below that could indicate a pattern. By using a literature review of previous studies exploring necro-

microbiomes, a more accurate post-mortem interval can be established. In addition, it utilizes a week-long outdoor trial of 40 decomposing rats, half in an open-air setup and half in a closed-air setup. The rats were swabbed every other day from three different locations. This study found the best source of bacterial data by using DNeasy PowerSoil Pro Kit DNA extraction and quantitation on the Nanodrop Lite. The four main phyla, Proteobacteria, Firmicutes, Actinobacteria, and Bacteroidetes, seem to fluctuate the most when looking at post-mortem interval with strong evidence pointing to the rectal region as the most abundant region for collection. This study concludes if there is a pattern and/or order of bacterium in microbiomes that relates to decomposition time and if there is a major difference in this information between closed and open-air environments.

Keywords: Microbiome, Decomposition Time, Post-Mortem Interval

From Class Project to Research Tool: Portable and Cost-effective 3D-Printed Microscope

Madison Burchfield, Benjamin Bernarding

Other Authors: Garrett Craig, Julianni Dar, Tori Kocsis, Nathan Lingenfelter, Ngoc Pham, Amir Rastegar, Anneliese Troidle, Amanda Trusiak, Anita Saraf, Bin Yang

Rangos School of Health Sciences | Biomedical Engineering

Faculty Advisor: Bin Yang, Ph.D.

ABSTRACT:

Microscopy plays an important role in biomedical research and STEM education. Microscopes allow the user to see things that are too small to be visible to the naked eye. However, microscopes can often be expensive, stationary, and may require proper training. By utilizing 3D printing technology, we aimed to develop a portable and cost-effective microscope for STEM education and research. This project started as a course project for Modern Methods in Biomedical Engineering. We utilized a M12 lens to pair with a camera module of a smartphone with a 3D printed holder. The smartphone-based microscope achieved a magnification of about 4x with excellent resolution. Recognizing its imaging capability, we are currently developing a 3D-printed portable microscope for cardiomyocyte imaging in a cell culture incubator. Our preliminary results showed a 5x magnification. We have successfully imaged cardiomyocytes at their early and late stages.

***JO-1 PROTEIN INDUCES AUTOIMMUNE RESPONSE AND LOSS OF FORCE PRODUCTION: A MYOSITIS MOUSE MODEL**

Rachel Parshall, Bhoomika Sripathi, Olivia Price

Other Authors: Dana Paula, Madisen Omstead

Rangos School of Health Sciences | Physical Therapy

Faculty Advisor: Matthew Kostek, Ph.D.

ABSTRACT:

Myositis is a chronic autoimmune disorder which causes muscle inflammation and can be severely debilitating. There is no cure and the cause is unknown. Yet, most patients develop autoantibodies against the Jo-1 protein (Histidyl-tRNA synthetase). There are currently no standard animal models of the disease, which hinders research. This study's purpose was to verify a myositis model using Jo-1 protein to mediate a pathologic immune response. Male and female mice were split into two groups. Mouse gastrocnemius muscle was injected with Jo-1 protein (experimental) or saline (control) on day 0. Muscle physiology testing was performed 10 (n=24), 21 (n=21), and 42 (n=22) days after injection, followed by hind-limb muscle collection and preservation for H&E and F480 histological analysis. A weekly endurance test was also conducted as a supplemental measure of muscular function in the 42-day groups. T-tests were used to compare group differences. All animals completed the experiment. Mice that received Jo-1 protein had significantly lower muscle force production compared to mice that received saline ($P < 0.05$). Peak muscle damage occurred at 21 days for both male and females. Histological analysis is ongoing, but preliminary observations concur with the muscle physiology testing. Injections of the Jo-1 protein triggers inflammatory processes and consequent muscle fiber damage that are similar to

those seen in clinical myositis patients. Peak muscle damage in our mouse model was observed at the 21-day time point. Injection of Jo-1 protein appears to be a good model of myositis that can be used to test multiple interventions. Our laboratory is currently planning therapeutic trials.

***Viral infection in the pediatric brain leads to a loss of mid-stage and differentiating neural stem cells**

Yashika Kamte

Other Authors: Manisha N. Chandwani, Dr. Lauren A. O'Donnell

School of Pharmacy | Pharmacology

Faculty Advisor: Lauren O'Donnell, Ph.D.

ABSTRACT:

Outcomes of a viral infection are often age-dependent. Several neurotropic viruses lead to profound neuropathology in younger hosts compared to older hosts. Neural stem cells (NSCs) are multipotent progenitor cells that are often disrupted during viral infections. NSCs populate the brain with neurons and glial cells and are primarily found in two neurogenic niches [hippocampus and sub-ventricular zone (SVZ)]. In these niches, NSCs exist at different stages of differentiation depending on the age of the host. We hypothesized that a pediatric infection could disrupt the NSC pool, potentially through changes in these NSC subsets. To test this hypothesis, we determined the effect of a viral infection and anti-viral immunity on NSCs in pediatric mice, where measles virus (MV) only infects neurons and NSCs are spared from the infection. MV and mock-infected mice were evaluated for survival, viral antigen expression, and neural cell populations at 9 days post infection (dpi). Survival studies showed that 30% of infected pediatric mice become sick and succumb to the infection by 15 dpi, while the remaining survive infection without illness. Irrespective of illness, viral antigen was detected throughout the brain. Flow cytometry revealed infiltrating innate and adaptive immune cells in the brain at 9 dpi, indicating that the pediatric immune system responds to the infection. The anti-viral immune response led to a drastic decrease in the NSC pool (Nestin+) in both neurogenic niches. Mid-stage NSCs (Musashi-1+ Nestin+) and NSCs early in differentiation (DCX+ Nestin+) also decreased in both brain regions, but early stage NSCs (SOX2+ Nestin+) were spared. Thus, anti-viral immunity is detrimental only to more differentiated subsets of NSCs in the pediatric brain. Immature neurons (DCX+ Nestin-) increased in both brain regions, while mature neurons (β -III tubulin+) increased only in the SVZ. These data suggest increased differentiation of NSCs into neurons. Our current studies focus on understanding the cause and consequences of NSC loss during infection.

The Ethical Justification of Research in Pediatric Healthcare with an Emphasis on the COVID-19 Vaccine

Brianne Helfrich

McAnulty College and Graduate School of Liberal Arts | Healthcare Ethics

Faculty Advisor: Joris Gielen, Ph.D.

ABSTRACT:

Pediatric research within medicine is a widely debated topic on ethical and moral principles. In this paper, the reasoning behind the importance of medical research will be explored. The risks and benefits associated with medical research will be discussed, as these are topics that can persuade an individual into participating. The beginning of this paper will emphasize the importance of COVID-19 research and the ethical conflicts associated with it. Being in a global pandemic, this research has provided society with many benefits regarding diagnosis of disease, vaccines, and treatments. Exploring this topic will provide readers with a real-life scenario of the benefits and risks of participating in medical research. Throughout this paper, the moral imperative of pediatric research will be explored. I will discuss how we ought to conduct pediatric research, why it is essential for society and distinguish the difference between pediatric consent and assent. Within pediatric healthcare, ethical concerns surrounding these patients participating in medical research stems from their ability, or lack thereof, for consent. Many argue that pediatric patients, especially mature minors, should have the ability to make their own decisions regarding their participation in research projects. In the case where

a patient is unable to provide assent or consent, surrogate decision makers and their ability to be decisional will be evaluated. The example of the COVID-19 vaccine for minors will be presented. This paper will discuss common ethical concerns for utilizing pediatric patients in research. The respect for the child's privacy, child protection and nonmaleficence ("do no harm") to the patient are commonly argued as factors against pediatric research. Finally, the last section of this paper will discuss proposed future research studies to gain more insight into the reasoning why children debate participating in studies, and why parents may or may not provide their consent.

***Understanding Perceptions, Beliefs, Values, and Meaning of Mental Health in Young Adolescent African American Females Residing in Low-Income Resource Urban Settings: A Mini Focused Ethnography Study**

Shawana Moore

School of Nursing | School of Nursing: Graduate Department

Faculty Advisor: Rick Zoucha, PhD, PMHCNS-BC, CTN-A, FAAN

ABSTRACT:

Purpose: The purpose of this study is to understand the perceptions, beliefs, values, and meaning of mental health in young adolescent African American females residing in low-income-resource urban settings. **Research Question:** What are the cultural perceptions, beliefs, values, and meaning of mental health in young adult African American females residing in low-income-resource urban settings? **Background:** Mental health disparities in the U.S. are persistent among women, especially women of color (Catabay et al., 2019). Stigma has been identified in the literature as the most significant barrier to seeking mental health services among African American women (Okeke, 2013; Taylor & Richards, 2019). Understanding the perceptions, beliefs, values, and meaning of mental health in young adolescent females may assist with bridging the gap between seeking treatment versus not seeking treatment for African American women. **Methods:** The research study was qualitative mini-focused ethnography. Participants completed a demographic survey and were interviewed using a semi-structured interview guide. Leininger's four phases (McFarland et al., 2012) of data analysis were used to analyze data collected. **Results:** Three African-American women participants' ages were 22–24-year-old; residing in Philadelphia, Virginia, and New York; college-educated. Initial findings included ten categories (avoidance; depression; generational differences; insurance and cost; life transitions; pressure and expectations; prioritizing self; stigma; supportive friends; treatment) from the data, which resulted in the initial emerging of a pattern of barriers to discussing mental health. **Conclusion and Implications:** Based on the initial and emerging pattern, it would be beneficial to explore the study further. Completing a full-scaled study will assist in completing Leininger's four phases which may lead to implications to nursing practice, research, and education related to mental health in young African American females.

The Effects of Sperm Competition on the Evolution of Prostatic Acid Phosphatase in Hominids

Brandon Dimick

Bayer School of Natural and Environmental Sciences | Biology

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

ABSTRACT:

Selective pressures and their effects on protein structure and function can be found by comparing genes or proteins from different organisms. Sexual selection occurs when an organism acquires traits that give it an advantage in mating and producing offspring. Due to different mating systems among species, sexual selection has been shown to affect seminal proteins in hominids due to variation in sperm competition. One such protein, Prostatic Acid Phosphatase (PAP), is known to dephosphorylate a number of targets in seminal plasma. It has been shown computationally that ACPP, the gene that produces PAP, is under strong positive selection in chimpanzees (a species with high sperm competition) and purifying selection in humans and gorillas (both species with weaker sperm competition than chimpanzees). It is hypothesized that varying degrees of sperm competition have resulted in differences in enzymatic activity of PAP among

hominids. Coding sequences for ACPD were obtained for human, chimp, and gorilla homologs. The sequences were each inserted into an expression vector and transfected into mammalian cells. The phosphatase activities of the PAP homologs were compared using a fluorescent substrate assay. Each protein was tested for pH optima, phosphatase activity at a fixed substrate concentration, and kcat/km. The PAP homologs exhibited similar pH profiles, with a pH optimum between pH 5.0-6.0. However, it was found that chimp PAP exhibited elevated phosphatase activity when compared to the other hominid homologs, and this was consistent across a varying pH range. Gorilla PAP showed the lowest activity among the three species. There were also differences in kcat/km between species. These results suggest that the positive selection of chimp ACPD has resulted in a more efficient PAP protein with elevated activity when compared to other hominids. Gorilla PAP may be behaving like other male reproductive proteins within the species that are undergoing pseudogenization. Overall, the data suggests that differences in sperm competition due to varying mating systems have resulted in functional differences in the PAP homologs of hominids. By using wet lab techniques in conjunction with computational approaches, we are beginning to understand the effects of specific selective pressures on the function of proteins.

The Role of Juror Bias Relating to Sexual Assault Cases

Noelle Sadaka

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Lyndsie Ferrara, Ph.D.

ABSTRACT:

Sexual assault trials take place to aid a victim in gaining justice for the assault that they had to endure as well as sentencing the defendant with the punishment they deserve. Often, the verdict reached does not reflect the truth of the incident. Upon evaluation of sexual assault cases, there is a large amount of bias present in jurors. Outcomes of these cases are subsequently affected, and victims often lose their chance for justice. The purpose of this study was to examine if juror bias related to sexual assault cases can be identified and if so, what biases are present. Subsequently, this study may be used to determine how the juror biases affect sentencing outcomes. A survey was created using Qualtrics survey software. It was distributed individuals through social media including Facebook, Instagram, and LinkedIn. Included in this survey were mock scenarios depicting sexual assault cases. Two versions of each of the scenarios were administered with changing contextual elements. The versions received by each participant were randomized. Questions following the scenarios served to assess the participants interpretation of the case therefore providing insight to biases that were present. The factors analyzed were response changes based on the plaintiff's age, respectability, relationship to the perpetrator, sexual orientation, and the environment of the incident. Statistical analysis was performed on the data collected to determine if the variation of responses between scenarios was significant. It was hypothesized that various forms of bias would be largely evident, including age bias, gender bias, environmental bias, and situational bias. The results of this study indicated various forms of bias present including age, gender, environmental, and situational bias. Based on results of this study and an understanding of the prevalent biases that affect jurors, mitigation and reform can be implemented. Specifically, jury selection procedures may be reformed.

3D imaging and characterization of skin injuries using a TrueDepth camera

Amir Rastegar

Other Authors: Rosanna Henry

Rangos School of Health Sciences | Biomedical Engineering

Faculty Advisor: Bin Yang, Ph.D.

ABSTRACT:

Skin injuries, such as burn wounds and ulcers, require proper and timely medical attention. In current clinical practice, the treatment plan and management are often based on the subjective visual inspections and empirical guidelines. Such

practice could result in discrepancies between qualitative assessments and actual realities of skin injuries, such as injury surface area, which could lead to over- and under-treatment. To improve the accuracy and consistency of skin injury assessment, we propose to use advanced 3D imaging and processing technology. In this study, we repurposed the FaceID camera (TrueDepth camera) of an iPad Pro to acquire both the color and 3D shape of skin injuries. We have developed 3D classification and quantification methods to analyze the properties of skin injuries, such as size and location. We tested our technique on a nursing manikin with a simulated burn injury and a pressure ulcer. The preliminary data suggest that the simulated burn could be accurately segmented from its surrounding normal tissue with an accurate estimate of its surface area.

Systematic approach for explicit solvation when modelling mechanisms with highly charged intermediates: N-oxide double deprotonation

Martin Neal

Other Authors: Jeffrey J. Rohde, Jeffrey D. Evanseck, and Thomas D. Montgomery
Bayer School of Natural and Environmental Sciences | Chemistry and Biochemistry
Faculty Advisor: Thomas Montgomery, Ph.D.

ABSTRACT:

Sophistication of the physical model has been shown to be crucial in the accurate calculation for charged structures, energies, and mechanism elucidation. Specifically, the competition between two possible transition states when modelling N-oxide deprotonation with LDA requires an increase in sophistication of the physical model to describe and predict the mechanism. We report the dependence of deprotonation starting from an implicit solvation model then adding explicit solvent strategically positioned to satisfy coordination of charged atoms in both ground states and transition structures to obtain calculations that agree with experimental results. Our physical model evolved from a simplistic implicit model of bulk THF effects, to include one then two explicit coordinating solvents per lithium, bringing lithium's total coordination to three. We calculated the enthalpies for each transition state using density functional theory, with Truhlar's M06-2x functional and dunning's correlation consistent basis set JUL-cc-pVDZ, checked with 2nd order Møller-Plesset perturbation theory, and using Tomasi's polarizable continuum model to simulate bulk solvent effects. Additionally, Hirshfeld charge analysis was utilized to determine the impact explicit solvent has on charge stabilization. In order to achieve accurate energies, the physical model needed to fulfill the coordination number of lithium with explicit solvent. Creation of a limited physical model led to improper interpretation of this reaction, highlighting the role solvent plays in the total quantum system. Solvent involved at polarization sites departs from bulk solvent properties becoming a part of the quantum system and driving reaction kinetics. We propose the physical model as a third dimension for the well-known Pople diagram to predict accuracy in a quantum systems.

The Voices of Pittsburgh Youth: Educational Experiences during COVID

Anna Marie Paolicelli Mary Comis, Hollen Tillman, Cortney VanHook
Other Authors: Cortney VanHook
School of Education | Education
Faculty Advisor: Tammy Hughes, Ph.D.

ABSTRACT:

Statement of the Problem

As youth returned for the 2021-2022 school year, they were at high risk of shouldering the burden of learning loss during the previous 2020-2021 school year due to COVID-19. While youth are resilient, this is an unprecedented disruption in the way they engage with education, connect with other individuals their age and teachers, and how they

move through support systems within their schools. Based on the youth's involvement in the ever-changing decisions from school districts this past school year, their unique concerns, ideas, and suggestions should be captured and magnified. This project sought to partner with school-aged youth to support and raise their voices so that their experiences can be heard and considered by school personnel.

Subjects

Seven high school-aged youth (14-18 years old) enrolled in a community-engaged participatory research project provided during a summer camp for black girls. These youth created a self-designed survey and then collected the perspectives of other school-aged youth (11-18 years old), specifically those in sixth grade and higher, within their friend group, at their summer camp, in their community, and outside of the state (n=146).

Procedure

Over the course of one week, these youth were trained in ethical research methods, sampling, and survey development. The seven-youth then created and led the recruitment for their survey. The youth used face-to-face collection methods by promoting the survey during meal times at the summer camp, entering other classrooms to encourage youth participation, and speaking to their friends outside of camp. Additionally, these youth used electronic methods such as texting and social media. After gathering their information, the seven youth helped plan data dissemination outlets through weekly check-ins.

Results

Results indicate 70% of youth endorse that the pandemic negatively impacted their mental health. Further, the pandemic seemed to negatively impact relationships with 75% of youth agreeing that it caused a loss of friendships. Academically, virtual classes appeared to be difficult for students with 78% of youth endorsing they were not motivated during virtual class. In relation to the social justice movements during the pandemic, 75% of students reported their teachers discussed these movements in class.

Conclusions

In addition to the perspectives that were reported by youth, this project also examines the process of community-engaged participatory research where youth were provided the opportunity to create their own survey on how COVID-19 impacted their learning and socio-emotional health. This poster serves as one outlet for youth to express their perspective on what youth need help with as they transition back to in-person learning.

Cognitive insights and implications of singing: actions, proprioception, and perception in vocal performance.

Juanita Leal

Mary Pappert School of Music | Voice

Faculty Advisor: Meghan Althouse, D.M

ABSTRACT:

Studies in vocal performance have suggested the interdependence of cognitive reactions and performative proprioceptions. This interdependence suggests an introspective self-evaluation process during the act of musical performance. While affected by singers' judgment of vocal production, this process may account for implicit competitive roles in the music performance environment.

Singing can affect a person's body in many ways, beginning with the brain's responses when completing this task in different environments. Likewise, singing can relieve stress, stimulate the immune response, release endorphins, and improve overall mental health and mood. It also gets affected by the primitive parts of our brain that set responses to stimuli that it might sense as dangerous (for example, being stared at by an audience). However, what are the specific

cognitive functions and processing when singing, and how does each person perceive their singing voice? How does the singer respond to vocal performance within the critical artistic and academic environment? What makes the brain relate the sound it senses to our bodies, and what cognitive process is involved in judging said sound?

In this project, I delve deeper into the ways the brain recognizes aspects of vocal sounds, how it reacts to the process of singing, and how it can identify it as its own. By reflecting on existing research and conducting a series of interviews with college voice students, I will aim to understand how they perceive their voices during the act of vocal performance and whether they notice a change in said perception while they think they are being judged. In the end, I will compare the results of my interviews with the literature reviewed to determine whether perceptual aspects of singing map onto the results that researchers have found.

This project closes the gap between what singers perceive when performing music, and how their experience connects to cognitive psychology (or cognitive neuroscience). By shedding light on what happens in the brain when singing in public, this project provides a deeper understanding of the vocal instrument, in turn offering pedagogical implications for singers and voice teachers.

Keywords: Voice, perception, singing, cognitive music psychology, musical mind, performance studies, music education, music therapy.

****Assessing Water Quality in the Buffalo Creek Watershed via Fish Community Surveys**

Kathleen Wilson

Bayer School of Natural and Environmental Sciences | Bayer School of Natural and Environmental Sciences

Faculty Advisor: Brady Porter, Ph.D.

ABSTRACT:

The Buffalo Creek watershed drains 171 square miles of eastern Butler County, western Armstrong County, and a small region of northern Allegheny County in western Pennsylvania. The watershed contains 348.7 miles of streams that offer habitat for many fish and birds. The quality of the Buffalo Creek watershed is declining, with stream impairment increasing 10.5% since 2008. As of 2019, a total of 37% of the watershed's stream miles were impaired from various pollutants, including agriculture (16.9%), abandoned mine drainage (12.4%), and natural sources (10.4%). With 26% of impairment miles having unknown causes, identifying impairments is critical for watershed protection. Thus, the Audubon Society of Western Pennsylvania (ASWP) has coordinated conservation efforts to improve the health of the Buffalo Creek Watershed. In order to prioritize rehabilitation sites, current stream health was assessed through 5 backpack electrofishing surveys and water quality analysis from October to November 2021. For each site, an Ohio Index of Biotic Integrity (IBI) was calculated and compared to the results of the 2013 Unassessed Waters surveys to assess changes in fish community structure. The IBI ranges are calculated by considering life history and watershed metrics, such as dietary guilds and pollution tolerance, to better understand changes in the environment. Increases in specific metrics occur in similar ways across sites. Our results show improved stream IBI ranges at all sites, with two sites increasing significantly, indicating healthier fish communities compared to 2013. This suggests tributary-level and watershed-level changes within Buffalo Creek.

Distribution of Drugs on Paper via the Soak and Spray Method

Hannah Spitzer

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Stephanie Wetzel, Ph.D.

ABSTRACT:

The drug epidemic has been a prominent issue within the United States and continues to grow at alarming rates. This problem directly correlates to the increase of trafficking and use of illicit substances within correctional facilities. Individuals have used the “soak and spray method” in attempt to smuggle illicit substances through the mail into correctional facilities via birthday cards, letters, documents, etc. This method entails spraying or soaking the paper in a mixture of a household solvent such as nail polish remover and the desired drug. The method of soaking and spraying mail makes detection of the drug difficult and poses a risk to those who come into contact with the paper. The purpose of this research is to observe distribution patterns of various drugs on paper using the soak and spray method. Samples are created mimicking this method while changing a number of variables such as number of dips or sprays, type of paper, and location on the paper. Samples are created using a mixture of HPLC grade acetone and the desired drug with a concentration of 3.33mg/mL. Samples are extracted using methanol solution, syringe filtered, and analyzed via the Agilent Gas Chromatography Mass Spectrometer. This project focuses on two surrogate drugs, caffeine and acetaminophen, to observe how these methods distributes drugs on various types of paper. During the surrogate drug phases of this study computer paper and blank greeting cards are used as the matrix with Gas Chromatography Mass Spectrometry being used for detection. Observing distribution methods of drugs on paper will allow for subsequent testing to assess variability of detection of these methods. This research hopes to assist in creating a reduction of illicit substances trafficked into correctional facilities.

An Oral History of the Elsinore Benu Think Tank for Restorative Justice

Megan Wetherington, Kathleen Burch

Other Authors: Sydney Yates, Sarah Babcock

McAnulty College and Graduate School of Liberal Arts | History Department

Faculty Advisor: Jennifer Taylor, Ph.D.

ABSTRACT:

The Elsinore Benu Think Tank (EBTT) for Restorative Justice was founded by Dr. Norman Conti and his Inside Out class in 2007. EBTT began as professors, university students, and incarcerated men who met inside a prison where many incarcerated members were serving life sentences. Since then, EBTT has begun meeting on Duquesne University’s campus and Zoom to serve the local Pittsburgh community. It is currently composed of citizens returned from incarceration, professors, students, and local professionals. Meeting each week, members exchange ideas on how to achieve restorative justice and give back to the community through service projects. EBTT invites the stranger to come converse about the difficult topics that encompass restorative justice and incarceration.

The beginnings of this project were in a course under the advisement of Dr. Jennifer Taylor, we are continuing to conduct an oral history of EBTT outside of the classroom. The goal is to produce an archive that will be useful to the members of the Think Tank and historians researching a variety of topics. Through this oral history, we hope to give a voice to those who are often systemically and societally ignored. We hope to disseminate this piece to a large audience through a digital platform where anyone will be able to listen to clips of the audio recordings with the hopes that this will reach a larger community and create a dialogue surrounding the goals of the Think Tank. One potential outcome is that this project will inspire others to create similarly structured groups in order to expand the impact of the Elsinore Benu Think Tank for Restorative Justice. Thus this project is ongoing and will continue to grow. The oral history class is committed to maintaining co-ownership over this project so that the final product best serves this organization, the community it represents.

Production of Recombinant Semenogelin Protein Fragments for the Improved Antibody-based Detection of Body Fluids

Thomas Washington

Other Authors: Michael I. Jensen-Seaman

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

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

ABSTRACT:

The identification of body fluids on evidence items is an important component of forensic science. Sometimes, simply identifying a body fluid is enough to impact a case. A body fluid commonly discovered at crime scenes is semen. Targets of current forensic semen identification tests include the seminal enzymes prostate-specific antigen (PSA) and acid phosphatase (AP), as well as spermatozoa and semenogelins. Semenogelin-I and semenogelin-II are the main structural proteins of the gelatinous mass formed by human semen after ejaculation. These proteins make up 20–40% of all seminal plasma protein. The coagulum liquefies 5–20 minutes after ejaculation. PSA plays a large role in this process, by cleaving semenogelin proteins through protease activity. Current forensic semen identification tests have flaws, including false positives and false negatives. Therefore, we seek to develop an improved semen identification test.

To do this, we produced and purified fragments of semenogelin-I protein located between PSA cleavage sites. Using databases of human genetic variation, we found one such fragment of semenogelin-I (later named the THW fragment) containing no common nonsynonymous single nucleotide polymorphisms (SNPs). We used PCR to amplify the coding sequence for this fragment, an *E. coli* expression system to express the protein, and affinity chromatography to purify the THW fragment. A different fragment of semenogelin-I (the SPMI fragment) targeted by a commercially available test, along with an allelic variant of the SPMI fragment containing a common nonsynonymous SNP, were also produced and purified using the same system. We evaluated the ability to detect these recombinant semenogelin protein fragments with a commercially available semenogelin-targeted semen identification kit.

Overall, the study seeks to improve serological testing aimed at semen identification by providing a test less prone to false positives and negatives, through targeting semenogelin and consideration of common allelic variants.

***Hydrologic Modeling with Remote Sensing for Groundwater Resource Management within the Sand River Catchment, South Africa**

Sophia Bakar

Bayer School of Natural and Environmental Sciences | Center for Environmental Research and Education (CERE)

Faculty Advisor: David Kahler, PhD

ABSTRACT:

The Limpopo River Basin (LRB) is a transboundary river basin that spans Botswana, Mozambique, South Africa, and Zimbabwe. The basin is home to approximately 18 million people and biodiversity hotspots. Groundwater is a critical resource, especially in the context of population growth and climate change. Data are needed for proper management of these water resources. In regions where groundwater data are sparse in time, space, or both, the most promising solutions come from satellites and hydrologic models. The Soutpansberg Mountains, specifically the Sand River Catchment act as a high-elevation water tower with uncertain groundwater resources. To estimate groundwater resources, a hydrologic model that integrated groundwater, surface water, and precipitation was developed. Groundwater data were obtained from NASA's Gravity Recovery and Climate Experiment (GRACE). Precipitation was obtained from the Global Precipitation Measurement (GPM) program and ground-based gages. Surface water was obtained from the South Africa Department of Water and Sanitation gage network. Integrated data were also obtained from the Global Land Data Assimilation System (GLDAS) that combines satellite and ground-based data with land surface models and data assimilation. Baseflow was examined with a hydrologic modeling software (HEC-HMS from U.S. Army Corps of Engineers). Model results suggest that the water resources within the Soutpansberg Mountains contribute significantly to baseflow and are an integral component of water security in the downstream Sand River Catchment.

Bullying and Job Satisfaction in PA School Psychologists

Brianna Drischler, Taylor Steeves

Other Authors: Dr. Laura Crothers, Kelly Paulson, Jessica Cowley, Dr. Jered Kolbert
School of Education | School Psychology
Faculty Advisor: Laura Crothers, Ed.D.

ABSTRACT:

The presence of workplace bullying has been linked to lower job (Hauge et al., 2010; Rodríguez-Muñoz et al., 2009) and life satisfaction (Nauman et al., 2019). Among teachers, bullying is associated with transferring schools and leaving the profession (Moon et al., 2020). Yet, the presence of workplace bullying has not yet been documented as a concern among school psychologists. In order to better understand the relationship between bullying and its influence on job satisfaction, researchers administered an electronic survey through Qualtrics to 95 Pennsylvania school psychologists. The survey included 61 items related to workplace conditions, which included workplace bullying and job satisfaction. Participants also responded to 15 items that pertained to various aspects of their job position, such as the amount of pay they receive, their position rank, and the degree to which they are fairly paid. Multiple linear regression was used to examine the relationship between bullying types (e.g., indirect, verbal, physical, and cyber) and job satisfaction. Individual Likert-scale items related to pay, rank, occupational opportunities available, accomplishments, contributions made, and varied and interesting employment were added to create a total composite score of job satisfaction. Overall findings revealed that school psychologists reported moderate job satisfaction (N = 94, M total score = 51.69, SD = 9.27; M item score = 3.45). Results also revealed that the experiences of workplace bullying significantly predict overall job satisfaction. However, only indirect bullying ($\beta = -3.10$, $p < .001$) and verbal bullying ($\beta = -2.81$, $p < .001$) significantly contributed to the model, explaining 6.00% and 4.04% of the variance in job satisfaction, respectively. Results from this study indicate that overall, the school psychologists sampled were comparatively satisfied with their jobs in many domains of employment, which mirrors previous findings indicating school psychologists' satisfaction with their employment (Van Voorhis & Levinson, 2006). However, results suggest that workplace bullying is a concern for school psychologists with verbal and indirect bullying predicting a relatively large portion (18.2%) of their job satisfaction.

Boxing, Levinas, and the Ethics of Face-to-Face Encounters: Firsthand Experiences in the Ring

Jennifer Hamann

McAnulty College and Graduate School of Liberal Arts | Clinical Psychology

Faculty Advisor: Eva Simms, Ph.D

ABSTRACT:

The present study was an existential-phenomenological examination of the experience of receiving a punch to the face, specifically, within the social context of the sport of boxing. Participants of this study included three novice and two seasoned boxers. Qualifications for participation in this study entailed either the one-on-one training ritual of sparring and/or a sanctioned competitive fight in the ring. Data was collected via semi-structured oral interviews and through participant observation at the gym where they trained. Data analysis of these interviews utilized Interpretative Phenomenological Analysis (IPA) that employed a hermeneutic interpretation and focused on the idiographic experience of each informant. This research also analyzed each interview through the ethical lens of Emmanuel Levinas (1969), which incorporated his understanding that each moment of an interaction with an Other is its own unique ethical event. A number of themes were shared by many of the informants including a sense of personal identity, power and weakness, and, most significantly, the ability to temporarily overcome Levinasian ethics in the ring. These findings suggest that individuals can gain personal growth and awareness through the practice of boxing. This research also shows the potential for personal therapy and the practice of boxing to be used together to facilitate healing.

Keywords: Levinas, ethics, boxing, the face, the Other

Ethics of Xenotransplantation Procedures and Experimentation on Human Subjects

Scott Dyer

ABSTRACT:

The primary purpose of this work is to examine the ethical guidelines that should be established for xenotransplantation procedures as well as the experimentation on human subjects that is necessary for future procedures. After the successful xenotransplantation of a pig's kidney into a brain-dead patient by Dr. Robert Montgomery and his team at New York University (NYU) Langone in New York City in October of 2021, several ethical questions arose. These questions range from the carrying out of the procedure itself on a brain-dead patient, the welfare of and ethical ramifications of using animals in such a procedure, and the role of research moving forward. The successful xenotransplant of a pig's heart in a human patient at the University of Maryland in January '22 further deepened these questions. While additional research is needed before pig organs are harvested en masse for human use, using living patients who are able to benefit from the procedure should, I argue, be the next step.

The materials and methods used in this paper stem mainly from peer-reviewed literature and sources such as medical and bioethical journals. The October xenotransplant at NYU was the driving force influencing this work, as well as various normative bioethical theories. The general success of the NYU Langone and University of Maryland xenotransplantations demonstrates the viability of the procedure and the urgent need to replicate it on living patients who can benefit. The guidelines and laws established by the World Health Organization and the FDA ensure proper raising of the animals, and the use of animal organs in humans is, I argue, ethically sound, until an alternative such as lab-grown organs becomes a viable option. Further, finding living patients willing to undergo the procedure should be widely sought after by medical professionals in the hopes of continuing this groundbreaking research.

Literature Review: Compiling Genetic Markers Associated with Posttraumatic Stress Disorder (PTSD)

Meghan Kolcum, Nina Liu-Guechev

School of Education | Counseling, Psychology, and Special Education

Faculty Advisor: Yih-Hsing Liu, PhD, NCC

ABSTRACT:

The purpose of this paper is to determine the association between genetic markers and posttraumatic stress disorder (PTSD). Much of the current research has identified genetic markers that are implicated in comorbid disorders such as schizophrenia (SCZ), bipolar disorder (BD), and major depressive disorder (MDD). Their impacts are largely to do with the common symptoms of these disorders -- including PTSD -- thus leading us to question whether the focus should turn more to symptomatology rather than primarily diagnosis. Although components affiliated with the biopsychosocial model -- such as a client's presenting symptoms, experiences, and history -- help contribute to an overall diagnosis, the researchers seek to draw connections affiliated with biological components, which may lend to the heritability of PTSD. While these are currently being investigated, they still have not been as extensively explored. Research into the heritability of PTSD is still relatively new and predominantly focuses on gene by environment (GxE) diagnoses, which examine the affiliation of traits and/or genes that are affected by environmental factors. This project aims to further explore associations between genetic markers and PTSD by conducting a literature review to compile a list of those genes and analyzing, as well as synthesizing data collected thus far. Furthermore, the researchers hope to provide insight into potential avenues for early intervention and monitoring concerning PTSD diagnosis. Early intervention(s) will ideally provide future clientele with increased remission rates and more specified treatment plans.

Analysis of Full-Spectrum CBD Oils to Determine THC Levels Using Liquid Chromatography-Mass Spectrometry

Jordyn Essinger

Other Authors: Lyndsie Ferrara, Ph.D., Frederick Fochtman, Ph.D.

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Stephanie Wetzel, Ph.D.

ABSTRACT:

The purpose of this presentation is to highlight the different components present in a variety of cannabidiol oils, including an analysis of tetrahydrocannabinol (THC) levels involving both the $\Delta 8$ and $\Delta 9$ isomers. The use of marijuana for medical, pseudomedical, and religious purposes first began as early as 5000 years ago. With the ongoing legalization of CBD in several states, new products are being developed at increasing rates. $\Delta 9$ -tetrahydrocannabinol ($\Delta 9$ -THC) remains illegal in all 50 states if it is in excess of 0.3%. However, $\Delta 8$ -THC falls into a gray area in terms of legality under the 2018 Agricultural Improvement Act. This act, also known as the Farm Bill, legalized both hemp and its derivatives. This allowed hemp-derived $\Delta 8$ -THC products to stay under the radar.

In this study, a liquid-liquid extraction method was developed to purify and separate the compounds within full-spectrum CBD oils from four different companies: Neurogan, Leafbloom Organics, SuperTrees, and Farmulated CBD. Full-spectrum extracts contain all of the cannabinoids naturally found in the marijuana plant, including THC. After extraction, the samples were tested using liquid chromatography-mass spectrometry (LC-MS) to identify and quantify the expected four main components: CBD, cannabinol (CBN), $\Delta 8$ -THC, and $\Delta 9$ -THC. The main focus of the study was to determine if the total THC content in each sample exceeded the maximum federal limit and if $\Delta 8$ -THC and $\Delta 9$ -THC could be differentiated using the developed method.

LC-MS, CBD, THC

***The Bariatric Surgery Process as Experienced by Black Women**

Angela Godwin

Other Authors: Rick Zoucha, PhD, PMHCNS-BC, CTN-A, FAAN

School of Nursing | PhD, Nursing

Faculty Advisor: Melanie Turk, PhD, RN

ABSTRACT:

The purpose of this study was to explore the process experienced by Black women leading to bariatric surgery. Black women have the highest rate of obesity within the US (Hales et al., 2020). Obesity and morbid obesity are highly correlated to multiple disease processes including hypertension, hypercholesterolemia, stroke, myocardial infarction, diabetes, cancer, sleep apnea, depression, and various endocrine disorders (Afshin et al., 2017; Apovian, 2016; Kral, 2001). Despite this, limited studies have been found exploring barriers to bariatric surgery. No studies were found on Black women exploring this process. This led to the research question: What is the process leading to bariatric surgery as experienced by Black women?

Data from the interviews were coded utilizing a grounded theory study design. One-on-one interviews were conducted via Zoom and included collection of data regarding the process leading to bariatric surgery. Grounded theory seeks to develop a model concentrated on the comparative analysis of data (Chun Tie, Birks & Francis, 2019). For this mini-study, grounded theory was utilized in an effort to discover a theory underlying the process towards bariatric surgery for Black women.

Initial findings resulted in 15 initial codes. Further analysis resulted in the following intermediate codes: "Lack of internal confidence", "Lack of social and external support", "Social and external support" and "Sought out information for informed decision making". Due to the mini-study design utilizing 5 participant interviews, saturation of data to obtain theoretical coding could not be reached. The five participants were all professional women, middle-aged, who self-identified as African American. These preliminary results show large factors and possible barriers related to support and education.

Study implications are vast and range from the individual level to socio-economic associations. A larger study first needs to be conducted in order to reach saturation, theoretical coding and model development. Ultimately, improved utilization of bariatric surgery by underserved populations can mitigate the gap currently seen in health disparities and can lead to a better quality of life.

A Microfluidic Assay for Single Cell Bacterial Adhesion Studies Under Shear Stress

Amanda Trusiak, Anelise McGee

Other Authors: Karli Sutton, Rachel Fernandez, Selvin Hernandez, Melikhan Tanyeri

Rangos School of Health Sciences | Biomedical Engineering

Faculty Advisor: Melikhan Tanyeri, Ph.D

ABSTRACT:

The study of bacterial adhesion to host cells is important in understanding bacterial pathogenesis and developing new therapeutic techniques. Bacterial adhesion under shear stress was studied through a novel microfluidic method. Specifically, the adhesion of a uropathogenic *E. coli* strain (FimHOn, ATCC 700928/CFT073) to mannose-modified substrates under flow conditions was studied. The FimHOn *E. coli* strain expresses FimH which is a mannose-specific adhesin on the fimbriae of the bacteria. This allows us to mimic bacterial adhesion to urothelial cells. First, the microfluidic channels were modified by sequentially adsorbing mannose and BSA assays. Bacterial solutions were then introduced to the microfluidic channels and bacterial interactions with the modified surface were imaged at 5 fps for 2 minutes using phase contrast microscopy under flow conditions. Manual tracking and TrackMate extensions of ImageJ were used to analyze and quantify surface adhesion of bacteria on the simulated mucosal surface. Bacteria-surface interactions were studied with substrates modified using 5%, 10%, and 15% mannose solutions. Through image analysis, the percentage of bacteria interacting with the surface and the total interaction times were determined. The results indicated that as mannose concentration increased the average transient adhesion time and percentage of bacteria adhered to the surface also increased. It was also observed that bacteria permanently attached to the surface increased with time due to non-specific binding, indicating limitations in surface modification. This led to the conclusion that the FimHOn *E. coli* specifically and transiently interacts with the mannose-modified surface. By mimicking molecular interactions and flow-induced shear stress within the gastrointestinal, respiratory, and urogenital tracts, our microfluidic platform may help explain mechanisms underlying bacterial infections at the mucosal epithelium. Overall, our microfluidic approach provides a favorable platform to study bacterial host cell interactions to enable drug discovery and testing.

The Acyltransferase Gpc1 is Both a Target and an Effector of the Unfolded Protein Response (UPR)

Victoria Hrach

Other Authors: Laura Nelson, Will King, Shane Conklin, and Jana Patton-Vogt

Bayer School of Natural and Environmental Sciences | Biological Sciences

Faculty Advisor: Jana Patton-Vogt, Ph.D.

ABSTRACT:

The unfolded protein response (UPR) is sensitive to both proteotoxic stress and membrane bilayer stress. These stresses are sensed by the ER protein Ire1. When activated, Ire1 dimerizes and splices HAC1 mRNA, producing a mature transcription factor that binds to UPR elements (UPREs) in the promoters of target genes. Hac1 targets include not only genes involved in protein folding, secretion, and degradation, but also a subset of lipid metabolic genes. During the course of lipid metabolism, phosphatidylcholine (PC) is deacylated via phospholipase activity to produce glycerophosphocholine (GPC). In *Saccharomyces cerevisiae*, GPC can be reacylated in a novel two-step process catalyzed first by GPC acyltransferase Gpc1, followed by acylation of the lyso-PC molecule by Ale1. This metabolic cycle has been termed the PC deacylation/reacylation pathway (PC-DRP). In prior studies, loss of Gpc1 was shown to result in an

increase in di-unsaturated PC species at the expense of mono-unsaturated PC species, indicating a role for PC-DRP in PC acyl chain remodeling. Here, we probe the role of Gpc1 as both a target and an effector of the UPR. Exposure to the UPR-inducing compounds tunicamycin, DTT, and canavanine results in an increase in GPC1 message that is dependent upon the UPR transcriptional activator Hac1. The importance of this increased expression to cellular function is illustrated by the finding that cells lacking Gpc1 exhibit increased sensitivity to those compounds. In a converse set of experiments, we show that that loss of GPC1 results in upregulation of the UPR as measured by expression of the ER chaperone KAR2. Consistent with these findings, we show that Gpc1 primarily colocalizes with the endoplasmic reticulum.

Extraction of CBD from Gelatin Edibles with Analysis by PSI-MS

Cheyenne Granger

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Michael Van Stipdonk, Ph.D.

ABSTRACT:

The United States has recently observed a rise in the use and consumption of cannabis-related products. This comes as a result of increased popularity and many states legalizing the use of these products. With this observed increase, an influx of cannabis related evidence will likely be seen in crime laboratories across the country. This influx of evidence would likely cause a significant disruption to evidence processing leading to a greater chance of backlogging.

For gelatin CBD (cannabidiol) edibles, a popular cannabis food product, the current methods of analysis may become inhibitory due to their lengthy preparation/analysis times. These methods include HPLC (high performance liquid chromatography) and GC-MS (gas chromatography mass spectrometry), the latter of which requires derivatization. While these methods are extremely useful, the use of PSI-MS (paper spray ionization mass spectrometry) may provide increased efficiency of identification and quantification of the CBD in gelatin edibles.

For this research project, a technique called SIPS-MS (silver impregnated PSI-MS) was developed for the rapid detection and possible quantification of CBD in gelatin edibles. Through this technique, a more efficient identification of CBD extracted from a gelatin matrix was observed. The quantification of the extracted CBD from a gelatin matrix has been preliminarily tested, but current results demonstrate a need for improvement and validation.

Overall, this research may demonstrate there could be significant improvement to CBD gelatin edible analysis via SIPS-MS. If the equipment is available, crim laboratories may lower the cost and time needed for CBD analysis from gelatin matrices. In addition, it may provide a significant solution to offset any backlogging created by increased cannabis usage. This research may also be considered significant for the quality assurance of cannabis edibles. Future research with SIPS-MS may further impact cannabis forensic analysis.

Ecological Resiliency: Humanity's End or Nature's End in a Biotechnological Era

Franics Sarpong

McAnulty College and Graduate School of Liberal Arts | Center for Global Health Ethics

Faculty Advisor: Gerald Magill, Ph.D

ABSTRACT:

The unleashing of viruses from Wuhan's "wet" market resulted in the covid 19 pandemic. The human consumption of animals, microbes, and plants results in several extinct species, destruction of habitats, pollution, and degradation. These losses disturb the ecology endangering the human species. Humans consider themselves as the subject of creation. Consequently, the human species utilize other species for their ends. This idea is behind transplanting animal organs in humans with failing organs. The ethical argument favoring xenotransplantation rests on beneficence to humanity. Xenotransplant is a substitute in the face of human organ shortage with life-saving prospects. Whereas non-

human species can serve human purposes, they have a purpose in themselves. This understanding of nature's teleology grounds the survival of the human species since nature has the inherent capacity to sustain its teleology. Climate resiliency, therefore, relies not on interventions aiming at human beneficence but nature's beneficence.

Recent Developments in Artificial Intelligence (AI) within the Auditing profession

Tessa Franchi

A.J. Palumbo School of Business Administration | Accounting

Faculty Advisor: Congcong Li, Ph.D.

ABSTRACT:

The use of artificial intelligence (AI) has been on the rise recently and has proved to provide major benefits to many industries, especially accounting. This study provides a discussion about the recent developments in AI and how they can be useful for the auditing profession. Specifically, I will discuss how implementing AI into audit procedures leads to a change in the skillsets of auditors and enhanced efficiency and accuracy of audit results. Despite the common assumption that implementation of artificial intelligence leads to a reduction in jobs available for auditors, the implementation simply changes the skill requirements from hard, technical skills to soft, non-technical skills. Another misconception is that implementing AI into audit activities will result in lower audit fees. This is not the case, but it will lead to higher quality audits that are performed in a more timely fashion. Finally, I will discuss the use of machine learning for detecting fraud during audits. This includes some implications for the use of machine learning as well as some challenges associated with it.

Laying the Digital Groundwork of Preservation

Bethany Leone

McAnulty College and Graduate School of Liberal Arts | History

Faculty Advisor: Stephanie Gray, Ph.D.

ABSTRACT:

The world of preservation is physical and fiscal: real change happening with real money. Yet on the road to produce these projects, I realized that digital tools empower real, personal action by encouraging and guiding emotional and financial investment. During my time as a content developer intern at Pleasant Hills Historians, a local genealogy and preservation firm based out of New Castle, Pennsylvania, we laid digital foundations for future preservation projects.

3 Project Targets

First, I raised awareness of the North Hill neighborhood's original historical significance by creating an "About" page detailing the context of the area from the historic district's National Register nomination. Second, I developed marketing appeals on the website to articulate the intended audience and how the open source could help private interests, sentimental reminiscences, or hands-on preservation. This gives the user an appreciation for what the "North Hill Historic District" is... and what it could be. Finally, I researched and troubleshot best WordPress plugins to catalogue generations of residents and their buildings.

5 Preservation Goals

The future goals of this initial digital preservation work are:

1. To help owners, residents, potential residents, visitors, and researchers easily locate facts about buildings, beyond previous owners and structural facts
2. To inspire the public to preserve the historic built environment to preserve remaining buildings and New Castle community

3. To record evidence of recent occupants and explore untold stories of minority (specifically black) communities
4. To serve and encourage private preservation efforts by providing information and local preservation resources to implement on their home preservation initiatives
5. To encourage mindful development in cooperation with preservation and city revitalization strategists

While these initiatives are still in the future, the essential groundwork for making them happen -- creating the website structure of NorthHillHD.live -- is now complete.

The use of Functional Communication Training Intervention with Children with Developmental Disabilities

Abdulrhman Ashgar

School of Education | Special Education

Faculty Advisor: Dr. Bridget Green, Ph.D.

ABSTRACT:

This literature review paper aims to focus on the effectiveness of Functional communication training (FCT) in early childhood settings. FCT is among the most widely effective evidence-based practices, which is a treatment for challenging behaviors exhibited by children with Developmental Disabilities (DD), including Autism Spectrum Disorder (ASD) and Intellectual Disability (ID). Since Carr and Durand (1985) introduced the FCT, various investigations on the strategy's aspects and applications have been examined. This paper provides a scoop review on FCT use within and across childhood settings (Clinics, preschools, homes). Specifically, this paper examines how the FCT was carried to children with challenging behavior from birth to six years old.

"We Don't Talk Anymore": A Critique of Modern Bioethics' Departure from Philosophy and a Call for Reconciliation

Bethany Flanders

McAnulty College and Graduate School of Liberal Arts | Center for Global Health Ethics

Faculty Advisor: Gerard Magill, Ph.D.

ABSTRACT:

This paper aims to illuminate the weaknesses and harmful implications the biomedical model of medicine has on the field and practice of bioethics by providing a brief historical review, in-depth philosophical analysis, and ethical critique of the biomedical model and its contribution to the quality-of-care crisis in healthcare today. Following the analytical and critical evaluation of the biomedical model and the harmful aspects of its impact on bioethical theory and methodology, a proposal for a re-integration of philosophy into bioethics is offered. This new philosophical approach, building off a synthesis of old ideas and contemporary literature from the fields of philosophy and bioethics, is intended to aid in the effort to solve the quality-of-care crisis modern healthcare systems face across the globe by encouraging a return to a more humanistic, ethically conscious medical worldview lens. Though the proposal only provides a preliminary foundation for this alternative philosophical approach, the hope is that such an outline may serve as the groundwork for creating a more authentic, patient-centered, empathetic ethic of care.

***Trauma-Informed Teaching**

Heather Roesinger

School of Education | School Psychology

Faculty Advisor: Tammy L Hughes, PhD, ABPP

ABSTRACT:

Trauma is defined as a response to a negative event that includes both an emotional and physiological component. Two thirds of children experience some form of a traumatic event by the age of 16 (Cavanaugh, 2016). Many youth with

disabilities, particularly emotional and behavioral, have experienced trauma and show visible signs of difficulty in the classroom (Cavanaugh, 2016).

Four professional development trainings were delivered to school staff working with at-risk students to address: a) the impact of trauma on student learning, b) requirements to build positive student-faculty relationships, c) elements needed for classrooms to be characterized by feelings of safety, and d) how to support staff burnout and compassion fatigue. The Attitudes Related to Trauma Informed Care (ARTIC) and Professional Quality of Life Scale (PROQOL) were used to measure staff's attitudes about trauma-informed instruction. The current presentation discusses the results of these measures as well as recommendations for school teams.

Impact of Different Soil Matrices on Human DNA Leaching from Tissue

Kaylee White

Other Authors: Pamela Marshall, Ph.D., Lyndsie Ferrara, Ph.D., Timothy Gallagher, Ph.D.

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Lisa Ludvico, Ph.D.

ABSTRACT:

When bodies undergo the process of decomposition, DNA leaches into the surrounding environment, usually soil. Soil is a complex mixture, unique in compositions to certain areas around the world. The purpose of this study is to research and understand the specific interactions between DNA and different types of soil. In this study, small pieces of tissue were allowed to decompose in the following types of soil: organic loam soil, sand, sandy-loam mixture soil, Houston area Texas Red Clay, and agricultural soil. The soil and flesh were placed in one gallon grow bags to mimic the natural burial environment. Samples of the soil and flesh piece were collected every 2 months for 6 months. The DNeasy PowerSoil Pro Kit was used to perform DNA extraction for each soil sample. Unlike the soil samples, the flesh samples were processed through the DNeasy Blood & Tissue Kit. The extracted samples were then quantified through the use of the Quantifiler HP Kit and taken through amplification with the GlobalFiler PCR Amplification Kit. The samples were then analyzed on the Life Technologies SeqStudio with the Gene Marker HID Kit in order to determine the amount of DNA absorbed into each soil type. Based off previous research, it is expected that there will be a smaller quantity of DNA extracted from the sand and sand-based soil and a higher quantity of DNA extracted from the clay due to the specific structure and composition of the sand and clay particles. The findings from this study aim to provide specific information on the different absorption and retention rates of DNA in different soil mediums. The knowledge gained from this research can be utilized to aid in the recovery of human remains, such as providing more specified information on how the soil environment impacted the rate of DNA leaching.

Old Planes, Ships, and Cars

Zachary Ference

McAnulty College and Graduate School of Liberal Arts | History

Faculty Advisor: Stephanie Gray, Ph.D.

ABSTRACT:

When I was younger, driving past the local war memorials would always grab my attention. Not because of some sort of reverence for the deceased, though that was there, but because of the fact that one of the memorial had an old field gun and a missile nearby. Across town there was a preserved light tank from the Second World War. As I grew older, I realized why these old pieces of war material were preserved. I had also started to notice that seemingly military vehicles were getting the largest share of preservation efforts when it comes to non-building resources. Civilian vehicles would only be preserved in the case of them being exceptional, like the Spruce Goose or associated with some famous person or event. Otherwise, civilian vehicle preservation is the domain of private citizens for personal use. In this poster, I will relate why buildings and landscapes are preserved to why non-building are. I will also discuss how the preservation

of non-building resources is done and why it seems to be mostly military related and how civilian preservation is done. Old places provide anchors for continuity and identity and vehicles can act in much the same way. Military vehicles seem much rarer in comparison to civilian vehicles due to the rigors of combat and thus, they are given higher priority for preservation.

***Righteous: What Holocaust Rescuers Can Teach Us About a More Altruistic Society**

Jill Bodnar

McAnulty College and Graduate School of Liberal Arts | Media

Faculty Advisor: Maggie Patterson, MFA

ABSTRACT:

Stories about Holocaust rescuers are not well known to the general American public. These unsung heroes were a small subset of non-Jews from across Europe who went against the dark climate of antisemitism and racial cleansing led by Nazi Germany in the 1930s and 40s. As the reality of the Final Solution grew, these rescuers made the moral decision to risk their lives to save innocent Jewish friends, neighbors, and strangers from capture and death. On top of the rarity of their actions, after the war they often did not speak of their work, largely because they did not see it as special. In their mind, it was their place to do the right thing, to protect those in need. Out of 300 million Europeans in World War II, just over 27,700 rescuers have been verified and designated as “Righteous Among the Nations” by the Yad Vashem World Holocaust Remembrance Center.

In the 1980s, researchers interviewed hundreds of rescuers to get to the core of what separated their moral choices from so many bystanders. They found rescuers exhibited high degrees of altruism and empathy, reinforced by their family, and values shared in their communities, which saw all humans as equals. Rather than portraying rescuers as superhuman heroes with extraordinary courage, this research showed that their behavior could be modeled and potentially replicated. These attributes are just the values needed in our current individualistic society as we battle many of the echoes of hate and discrimination from nearly 100 years ago. Young, impressionable students today need the guidance of moral courage and acceptance of others as they wrestle with their own struggles between good and evil on a daily basis.

This Capstone project brings together academic and book research, survivor and rescuer video testimonies, and new interviews with local Holocaust researchers and educators to bring to light stories that cannot be forgotten. Multimedia pieces, including a literary research paper, photos, videos, interactive maps, and a website explore the roots of rescuer altruism, how it is used in Holocaust education, and how it could be applied today and encouraged in everyone.

***Gertrude Stein: The Making of a Jewish Feminist Modernism**

Rochel Gasson

McAnulty College and Graduate School of Liberal Arts | English

Faculty Advisor: Thomas Kinnahan, PhD

ABSTRACT:

Either by default or design, studies of literary modernism (roughly 1900-1950) seemingly remain indifferent and at times antagonistic toward religious principles and practices, particularly in discussions of women’s writings. I seek to bridge a gap found between modernist and religious studies by conducting a close textual study of Gertrude Stein’s, seminal publication, *The Making of Americans: Being a History of a Family’s Progress* (TMOA). For the purposes of this paper, I will be conducting a close reading on segments Stein’s influential work to show that as a Jew, an American, and a woman, she engages in an experimental use of “radical” language(s) to (re)form notions of immigration, exile, and definitions of home. I argue that her employment of Jewish liturgical texts based in Hebrew, Yiddish, and English presents alternative ways of thinking about religious principle and practice while shaping and conceptualizing the “self.”

De-coding segments of Jewish texts known as, Gematria (גמטריא), or alphanumeric encryptions, allows for a more in-depth examination of how TMOA displays Stein's methodology (both in form and function), based in a double, even "triplely marginalized identity." Moreover, her intertextual implementation of multiple languages offers diverse connections, identifications, and relationships to Judaism that arguably shape a feminist modernism. I propose that in TMOA, Stein composes a proto-Jewish-feminist ideology developed from her self-identifications with Judaism. This smaller part of a larger project will begin to trace and connect how Jewish practices circulate in particularly gender-centered writings.

Understanding Foundational Ethical Content Necessary for Educating Future Forensic Scientists

Sarah McKendrick

Bayer School of Natural and Environmental Sciences | Forensic Science and Law

Faculty Advisor: Lyndsie Ferrara, Ph.D.

ABSTRACT:

Generally, many people consider themselves to have a proficient understanding of ethics to work in their specific disciplines. Though this may be true sometimes, employers have reported deficiencies of ethics education in the workplace. A lack of well-structured ethics courses steered towards forensic science calls for research to be conducted to investigate what should be included in such a course. The work completed focused on gathering information pertaining to ethical content that should be included in an undergraduate ethics course for forensic science majors. This work was completed in tandem with research aimed towards creating course content for ethics education in forensic science.

This two-part study collected data from ethics educators and active forensic science practitioners. During part one interviews were conducted with ethics educators. Those who participated gave direction pertaining to which philosophical ideas should be included for an ethics course for forensic science students. Results indicated that philosophical ideas by Immanuel Kant, Aristotle, and David Hume should be included in the course content. Additionally, it was determined that ethics is best taught by balancing student engagement and course material.

Part two included surveys and interviews completed by forensic scientists who were asked questions pertaining to experiences in the workplace and their understanding of ethics. Participants completed a survey through Qualtrics or an interview via Zoom. Questions asked pertained to practitioners' experience of ethics in the workplace and personal thoughts on the content necessary to educate future forensic practitioners. Results from the survey indicate that 65% of participants have encountered an ethical dilemma in the workplace. Honest, integrity, and impartiality were indicated as important concepts for upcoming forensic scientists. Future direction of this research includes using the data to create ethics content for upcoming forensic scientists.

***The American Opioid Epidemic: A Case Study in the Phenomenology of Contronyms**

Jennifer Hamaan

McAnulty College and Graduate School of Liberal Arts | Clinical Psychology

Faculty Advisor: Eva Simms, Ph.D.

ABSTRACT:

Currently, in the United States, a public debate on the multiple meanings of the term 'narcotics' is contentiously playing out amongst the media, professional medical associations, and the federal government. Presently, the term 'narcotic' is

colloquially referred to as an illegal, dangerously addictive recreational drug and identified as the root cause of the current opioid epidemic. But, depending on the context, 'narcotic' can also have a very different meaning. The examination of Janus-like contronyms will reference Frege's contribution of sense, as well as Gödel's Incompleteness Theorem with respect to theory. From the practical perspective, the ideas of Chomsky will explain how our individual phenomenological perceptions of terms and their meanings are constantly being influenced by our embedded social powers. This critical examination of Janus-like terms, such as 'narcotic', leads to several conclusions with respect to the phenomenology of language. When the meanings of critical, keywords in a social debate are intentionally manipulated by social powers, efforts to attain legitimate resolutions are obstructed. The American opioid crisis is a case study in controlling the public narrative by deception. This deception is most evident in our news media. The crisis is not simply a short-term narcotic epidemic, as social powers want us to perceive, but rather a long-term endemic psychological struggle.

Main Effects Screening of Anti-inflammatory Nanoemulgels for Local Treatment of Burn Wounds

Leah Dickey

Graduate School of Pharmaceutical Sciences | Pharmaceutics

Faculty Advisor: Jelena M. Janjic, Ph.D

ABSTRACT:

The skin is the body's largest organ and first line-of-defense against external forces. It is susceptible to a wide variety of insults, with one of the most traumatizing and damaging of these being burns. Of all reported burns, approximately 80% are a result of thermal heat damage. Nearly half a million Americans require medical interventions for thermal burn wounds each year, with >3,000 instances resulting in death. The gold standard of severe burn wound treatment are skin grafts; however, in cases where there is significant overall damage, grafts can be a challenging endeavor. Topical treatments are commonly utilized to provide temporary relief and help drive the wound healing process into a proliferative state. This is commonly achieved by dispersing small molecule anti-inflammatory APIs, such as NSAIDs, into cream or gel bases. However, these APIs can have poor water solubility and low bioavailability. Our lab has demonstrated that incorporating Resveratrol (RSV), a hydrophobic, anti-inflammatory natural product, into oil-in-water nanoemulsions can aid in reducing inflammation *in vitro*. We propose RSV-nanoemulsions dispersed into a hydrogel matrix, assembling nanoemulgels, can support local burn wound healing as a topical dosage form. In this session, we will discuss the development and optimization of Resveratrol nanoemulgels by reviewing results from a main effects screening Design of Experiments and future directions for this project.

LIST OF PARTICIPANTS BY SCHOOL

LIST OF PARTICIPANTS BY SCHOOL

Participant name

*Poster Session and Live Oral Presenter

**Live Oral Presenter only

A.J. Palumbo School of Business Administration

Franchi, Tessa

Bayer School of Natural and Environmental Sciences

*Bakar, Sophia

Baker, Brooke

**Bennett, Meredith

Boggess, Kayce

Chadwick, Emily

Cocolas, Alexander

*Danser, Kari

*Deal, Brooke

Dimick, Brandon

Emerson, Kyle

*Enslin, Odile

Essinger, Jordyn

Godshalk, Maeve

Granger, Cheyenne

Guido, Marisa

Haase, Nicole

Hardenburg, Kyra
Heacox, Derek
Heath, Joseph
*Hejnosz, Sarah
Hoke, Tiffany
Hrach, Victoria
*Hurley, Kira
Magoun, Sara
McKendrick, Sarah
Moore, Caley
Neal, Martin
Packard, Jessica
Panageas, Annie
Plyler, Alexandria
Reed, Sydney
Sadaka, Noelle
Sherman, Roger
Spitzer, Hannah
Vietmeier, Anna
Washington, Thomas
*Wenzinger, Zara
White, Kaylee
**Wilson, Kathleen

Mary Pappert School of Music

Leal, Juanita

McAnulty College and Graduate School of Liberal Arts

*Agostaro, Gabriella
Babcock, Sarah
Basiewicz, Michael
**Bodnar, Jill
*Burch, Kathleen
Chobany, Mariah
Dall'Aglio, John
DelPrince, Amber
Devine, Matthew
*Dimas, Noah
Dyer, Scott
FERENCE, Zachary
Flanders, Bethany
**Gasson, Rochel
Graves, Makenna
*Hamann, Jennifer
Helfrich, Brianne

Junior, Fayla
*Kreider, Claire
Kreienberg, Anna
Lang, Amanda
LeComte, Hannah
Leone, Bethany
Sarpong, Franics
Viswanathan, Varun
Wehrs, Avery
Wetherington, Megan

Rangos School of Health Sciences

Bernarding, Benjamin
Boe, Claire
Bucher, Katrina
Burchfield, Madison
Dar, Julianni
Kocsis, Tori
Liu, Siyu
McGee, Anelise
*Parshall, Rachel
Price, Olivia
Rastegar, Amir
Schultz, Melanie
Sripathi, Bhoomika
Tommer, Melanie
Trusiak, Amanda

School of Education

Alzahrani, Sarah
Ashgar, Abdulrhman
Drischler, Brianna
*Jancart, Karl
Kolcum, Meghan
Liu-Guechev, Nina
Murray, Hailey
Paolicelli, Anna Marie
*Roesinger, Heather
*Steeves, Taylor
Vecchiarelli, Justine
Williams, Chelsea
Wuenschnell, Emily

School of Nursing

*Godwin, Angela
Hintz, Carrie

*Moore, Shawana
Robson, Karen
*Rong, Jessica
Smith, Monica

School of Pharmacy

*Dave, Kandarp
Dickey, Leah
Henson, Samuel
*Kamte, Yashika