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2021 Graduate Research Week Abstracts

* Live Oral Presenter and Poster Session Participant

**Live Oral Presentation Only

A Survey on Blockchain for Information Systems Management and Security

David Berdik, Nikolas Schmidt

McAnulty College and Graduate School of Liberal Arts || Mathematics and Computer Science

Faculty Advisor: Yaser Jararweh Ph.D.

ABSTRACT:

Blockchain technologies have grown in prominence in recent years, with many experts citing the potential applications of the technology in regard to different aspects of any industry, market, agency, or governmental organizations. In the brief history of blockchain, an incredible number of achievements have been made regarding how blockchain can be utilized and the impacts it might have on several industries. The sheer number and complexity of these aspects can make it difficult to address blockchain potentials and complexities, especially when trying to address its purpose and fitness for a specific task. In this survey, we provide a comprehensive review of applying blockchain as a service for applications within today's information systems. The survey gives the reader a deeper perspective on how blockchain helps to secure and manage today information systems. The survey contains a comprehensive reporting on different instances of blockchain studies and applications proposed by the research community and their respective impacts on blockchain and its use across other applications or scenarios. Some of the most important findings this survey highlights include the fact that blockchain's structure and modern cloud- and edge-computing paradigms are crucial in enabling a widespread adaption and development of blockchain technologies for new players in today unprecedented vibrant global market. Ensuring that blockchain is widely available through public and open-source code libraries and tools will help to ensure that the full potential of the technology is reached and that further developments can be made concerning the long-term goals of blockchain enthusiasts.

This research has been published in the Journal of Information Processing and Management:
<https://www.sciencedirect.com/science/article/pii/S030645732030892X>

The Lived Experience of Postpartum Women experiencing Dysphoric Milk Ejection Reflex

Stephanie Herr

School of Nursing || Graduate Nursing

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

ABSTRACT:

“The Lived Experiences of Postpartum Breastfeeding Women Identifying as Experiencing Dysphoric Milk Ejection Reflex”

Primary Investigator: Stephanie L Herr MSN RNC-OB

Abstract

Purpose: The purpose of this qualitative mini-phenomenology is to explore and understand the lived experiences of postpartum breastfeeding women who have identified as experiencing Dysphoric Milk Ejection Reflex (DMER).

Research Question: “What are the lived experiences of breastfeeding women who have identified as having experienced Dysphoric Milk Ejection Reflex (DMER)?”

Background: The dysregulation of emotions during breastfeeding sessions is an important area that is under-researched, specifically an occurrence called Dysphoric Milk Ejection Reflex (DMER). The client may report experiencing varied emotional sensation during the letdown phase of milk production.

Methods: A Mini-Descriptive Phenomenological Qualitative study, based on the philosophy of Giorgi’s phenomenology was conducted and included five semi-structured interviews, to explore and understand the experiences of women who self-identify as experiencing DMER.

Results: Due to the nature of being a mini-study initial analysis from Giorgi’s descriptive process of analysis resulted in 19 meaning units and five lived meanings. The five lived meaning constituents emerged within the interviews were as follows: harboring emotional sensations during milk letdown, granting community belonging and provider knowledge, fostering past identical emotional sensations, enduring an assistive device delivery, and conceptualization of a traumatic birthing experience. The lived meaning elements embodied the essence of the mothers’ thoughts and feelings connected to her breastfeeding experiences.

Conclusion & Implications: The study findings inform recommendations for nursing research and practice. These findings show a lack of knowledge related to community and provider knowledge, and demonstrate the feelings and attitudes related to experiencing DMER. Future research may include increasing sample size, correlation related to symptomology, and increasing the community’s knowledge surrounding the phenomenon.

***Understanding the Meaning of Well-being in Older Adults: A Mini-phenomenology**

Francesca Ezeokonkwo

School of Nursing || Nursing

Faculty Advisor: Kathleen Sekula Ph.D.

ABSTRACT:

Background and Objective: Loneliness is a major concern in older adults due to age-related losses. Older adults are the fastest-growing segment of society. As the aging population continues to rise, so will their vulnerability to loneliness. Previous studies suggest that promoting well-being is a potential strategy to prevent or reduce loneliness. The aim of this mini-study was to explore the meaning of well-being in older adults.

Methods: A qualitative descriptive mini-phenomenological research design was utilized. Four older adults ages 72 to 78 (mean age of 74.3) participated in the study. Data was collected through audiotaped, open-ended face to face interviews, field notes, and observations. Giorgi's (2012) methodology for data analyses was used to analyze the data. All interviews were transcribed verbatim and entered into NVivo 12 data analysis software. Codes were created from the data and merged into categories. The categories led to the formation of descriptive themes.

Results: Three initial major themes emerged for the meaning of well-being: (1) Living a healthy and fulfilled life, (2) Being involved with family and friends, and (3) Having a relationship with God.

Conclusions and Implications: The findings have significance for the holistic care of older adults and generate insights into the areas where nurses and those working with older adults should focus while developing interventions to promote well-being. This mini-study provides a basis for the feasibility of conducting a larger study.

***The Killing Power of Words: The Role of Social Media and Legal Precedents in the Perpetuation of Social Violence**

Ollie Gratzinger

McAnulty College and Graduate School of Liberal Arts || Media

Faculty Advisor: Pamela Walck Ph.D

ABSTRACT:

Over the course of the last few decades, social media use has proliferated rapidly, leading to a new digital culture with its own set of norms, values, linguistic cues, and politics. These websites, however, frequently serve a dual purpose as both a tool and a weapon — largely unregulated, social media are regarded as bastions of free speech upon which knowledge may be shared freely, or battlegrounds upon which harmful ideas are planted and grown. This paper will examine a series of legal precedents set by notable Supreme Court cases, and apply the rulings therein to the field of social media studies. The findings demonstrate that digitization has happened at such a rapid rate that the American legal system had been underprepared to face the social challenges presented by the new online forum. Section 230(c)(1) of the Communications Decency Act (CDA) says that "No provider or user of an interactive computer service shall be treated as the publisher or speaker of any information provided by another information content provider." (US CODE: Title 47,230). This means in part that social media sites cannot be held accountable for the things that their users post on them. However, when the CDA was written in 1996, social media did not exist as it does today. This paper will further explore the constitutional reasons why the argument for removing posts (or allowing them to remain) presents so many challenges. Finally, it will pose and seek to answer the question of where First Amendment protections end and incitement begins.

Antipsychotic Medication (APM) Use in Long-Term Care Facilities (LTCFs): An Integrative Literature Review (IR)

Karen Robson

School of Nursing || School of Nursing
Faculty Advisor: Linda Garand PhD, GCNS-BC

ABSTRACT:

Background/ Purpose

One-third of long-term care facility (LTCF) residents are inappropriately prescribed antipsychotic medications (APMs) to manage neuropsychiatric symptoms (NPS) associated with dementia (U.S. Government Accountability Office, 2015). The purpose of the integrative literature review (IR) is to understand characteristics of United States (U.S.) LTCF residents inappropriately prescribed APMs.

Methods

The search strategy used for the IR reflects the published literature describing the characteristics of LTCF residents administered APMs. The subject headings used to retrieve data included: dementia, skilled nursing facilities as well as the brand, generic and chemical names for each APM. The search did not limit dates of publications to illustrate patterns, trends, and the evolution of research investigating LTCF resident characteristics associated with APM administration. The IR was guided by a process outlined by Whittemore and Knafl (2005) and was supported with the use of research software, Covidence®. Three databases were queried: CINAHL, PubMed, and Scopus. Inclusion criteria included: discussions of U.S. LTCF residents 65 years and older, had a dementia diagnosis of any type, and the literature addressed the characteristics associated with APM administration.

Results

The literature search yielded 52 articles from 1991 to 2018. Fifteen articles (28.9%) reported results of epidemiological studies of the prevalence of APM use in LTCFs, 23 (44.2%) were research reports of primary studies, and 14 (26.9%) were theoretical literature.

Conclusions and Implications

Independent, ambulatory, and male residents are more likely to receive APMs than LTCF residents who are dependent for ADLs, non-ambulatory, or female. The negative health effects associated with APMs include falls, fractures, functional decline, and bladder incontinence. APM use is not associated with weight changes or sleep patterns. Identifying characteristics associated with APM administration reveal key variables to consider when designing interventions to reduce the inappropriate prescriptions of APMs in LTCFs.

***Using Video-Based Interventions to Support Soft Skills Acquisition for Enhancing Employment Opportunities for Individuals With Autism, Intellectual and Developmental Disabilities**

Cliff Oliech, Olajumoke Oshokoya
School of Education || special education
Faculty Advisor: Bridget Green Ph.D

ABSTRACT:

Preparing individuals with Autism and Intellectual Disabilities for work in their communities is an accountability issue established through indicators 13 and 14 of the State's Performance Plan in the Individuals with Disabilities Education Act (2004). Unfortunately, transitioning into jobs for individuals with Autism (ASD) or intellectual and developmental disabilities (IDD) has not been very successful to

date because of soft skill deficits that hinder their chances of obtaining and maintaining employment, despite documented benefits of work. The purpose of this systematic literature review was to establish the types of video technology (VT) researchers and practitioners have used in teaching soft skills that may enhance employment opportunities for individuals with ASD and IDD. Also, to determine what soft skills researchers and practitioners have targeted using the available VT interventions. This review established that the use of VT is ubiquitous. Video modeling is the most common VT intervention, followed by virtual reality, video feedback, video prompting, and mixed reality. Soft skills targeted across the studies include job interview skills, employment-related social skills, problem-solving skills, decision-making skills, customer service skills, requesting assistance, and telephone skills. Overall, the use of VT to teach soft skills for employment is promising, given the evidence of its successful use, as reported in this study.

Speech-Language Pathologists' Perceptions of Lateralization Errors: A Qualitative Study

Sarah Mazeika, Katherine Birch, Lauren Devorace, Julianna Ioli
Rangos School of Health Sciences || Speech-Language Pathology
Faculty Advisor: Megan Overby PhD, CCC-SLP

ABSTRACT:

This mixed-methods study addresses the lack of published data regarding contemporary assessment and treatment for lateralization errors (LEs). 215 licensed speech-language pathologists' (SLP) perceptions about LEs were explored regarding common causes and co-occurring disorders, effective treatment, challenges in treatment, consequences, and length of therapy/treatment time to provide a better understanding of the challenges that SLPs face and the gaps in research that still need addressed.

A 26-item pilot survey was developed, piloted, and distributed using a SurveyMonkey link. Qualitative data were analyzed using a grounded theory approach with no a priori codes. Themes and subthemes were subsequently identified.

Results found that (1) 59 comments noted inappropriate articulator placement and control, environmental/developmental factors, and other speech sound disorders as common causes of LEs, (2) 42.79% and 40.93% of participants stressed evidence-based practice and specific strategies and techniques for effective treatment respectively, (3) speech structure and functioning (32.09% of participants) and carryover/generalization (26.05% of participants) were the most reported challenges in treatment, (4) 43.72% of participants noted poor social interaction/social stigma as the major consequence of untreated LEs, and (5) varying lengths of therapy time were reported, but 11.63% of participants concurred on the need for more time in treating LEs.

In conclusion, (1) a variety of factors are believed to cause LEs, (2) evidence-based practice is needed for effective treatment, (3) speech structure and functioning and carryover/generalization cause challenges in treatment, (4) poor social interaction/stigma is a major consequence of untreated LEs, and (5) there is a strong need for adequate time in treatment of LEs. These findings suggest that clinicians do not have sufficient resources to address LEs effectively despite their high prevalence. Thus further research on LEs is warranted to ensure effective, evidence-based treatment.

***Misrepresentation of Female Victimhood during the Victorian Period**

Elizabeth Davidson
McAnulty College and Graduate School of Liberal Arts || English
Faculty Advisor: Laura Engel Ph.D.

ABSTRACT:

The sensation novel in the Victorian period often portrayed female victims as “fallen women.” These women would have encompassed those who suffered from addiction, made a living through prostitution, had changed their identities or were otherwise homeless. However, these “fallen women” were generally misrepresented in both novel and reality. The female victim, Anne Catherick, in *The Woman in White* by Wilkie Collins and the victims of Jack the Ripper are all represented as having ended up in precarious situations, resulting in their deaths, by their own accord. However, these sets of victims traversed a multitude of missteps and unavoidable tragedy before their untimely deaths. The women who fell victim to Jack the Ripper as well as “the woman in white,” Anne Catherick, have more similarities than previously understood. I will be arguing that in both *The Woman in White* as well as through the lives of Jack the Ripper’s victims, it will be evident that Victorian women are misrepresented as just victims and that their demise was not purely a result of poor individual choices. Both fictional and historic victims have suffered the same fate in the remembrance of their stories in the last several decades. Anne Catherick, Polly Nichols, Annie Smith, Elizabeth Ericsson, Kate Eddowes, and Mary Jane Kelly could have changed their fates, if they had only been given the opportunity and the tools to do so.

***Multi-ion Bridge Pathway of N-Oxide 1,3-Dipole Formation**

Martin Neal

Bayer School of Natural and Environmental Sciences || Chemistry

Faculty Advisor: Thomas Montgomery Ph.D.

ABSTRACT:

Roussi’s landmark work on the generation of 1,3-dipoles from tertiary amine N-oxides has not reached its full potential since its underlying mechanism is neither well explored nor understood. Two competing mechanisms were previously proposed to explain the transformation involving either an iminium ion or a diradical intermediate. Our investigation has revealed an alternative mechanistic pathway that explains experimental results and provides significant insights to guide the creation of new N-oxide reagents beyond tertiary alkylamines for direct synthetic transformations. Truhlar’s M06-2x functional and Møller-Plesset second-order perturbation theory with Dunning’s [jul,aug]-cc-pv[D,T]z basis sets and discrete-continuum solvation models were employed to determine activation enthalpies and structures. During these mechanistic explorations, we discovered a unique multi-ion bridged pathway resulting from the rate determining step, which was energetically more favorable than other alternate mechanisms. This newly proposed mechanism contains no electrophilic intermediates, strengthening the reaction potential by broadening the reagent scope and limiting the possible side reactions. This more thoroughly defined mechanism supports a more direct route for improving the use of N-oxides in generating azomethine ylides with expanded functional group tolerance and scope of chemistry.

***Air Pollution in the Steel City: Assessing the Impact of COVID-19 on Air Quality in Allegheny County**

Carissa Lange

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

Faculty Advisor: David Kahler Ph.D

ABSTRACT:

The city of Pittsburgh has long been viewed as a leader in iron and steel production. However, while an industrial past helped shape the city’s economic, social, and political environment, it also contributed to severe air pollution that continues to persist today. Much of the reason for the city’s poor ambient air quality is due to high levels of particulate matter with an aerodynamic diameter $\leq 2.5 \mu\text{m}$ (PM_{2.5}). In Pittsburgh, 70% of this PM_{2.5} pollution comes from two industrial sources, the Edgar Thomson Steel Works and the Clairton Coke Works. Though the novel coronavirus (COVID-19) has sickened tens of

millions of individuals, lockdown measures have been shown to significantly improve air quality. Thus, this study sought to determine how large of a role the COVID-19 lockdowns played in improving air quality in the Pittsburgh region. Data analyzed was obtained by the Allegheny County Health Department from 11 monitors located in and around the city of Pittsburgh. Upon analysis, it was determined that NO₂ pollution significantly decreased during the lockdown period and that PM₁₀ pollution decreased at nearly all monitoring sites. However, decreases in PM_{2.5} pollution were not as apparent, as significant results were only observed at one of the monitoring locations. The location which observed significant decreases in PM_{2.5} was located in close proximity to the Clairton Coke Works, which experienced slowed coking times during the pandemic. Thus, this finding confirms that industry plays a larger role than transportation in producing PM_{2.5} pollution in the Pittsburgh region, and it suggests that future efforts to reduce the city's PM_{2.5} pollution should target industrial sources.

****PCNA Inhibition Suppresses HSV-1 DNA Replication**

Jessica Packard

Bayer School of Natural and Environmental Sciences || Biology Department

Faculty Advisor: Jill Dembowski Ph.D.

ABSTRACT:

Over half of the world population is infected with herpes simplex virus type 1 (HSV-1). HSV-1 is a 152 kbp double stranded DNA virus that replicates within the nucleus of host cells. Replication of the viral genome is catalyzed by the viral replication machinery consisting of a DNA polymerase (UL30), processivity factor (UL42), helicase-primase complex, origin binding protein, and a single stranded DNA binding protein. Despite encoding a viral DNA polymerase processivity factor, our lab has 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 homotrimer that provides processivity to cellular DNA polymerases and selectively recruits DNA damage response and DNA repair factors to cellular replication forks. We therefore hypothesized that PCNA associates at viral replication forks to promote viral replication and help in viral integrity maintenance. We utilized two established PCNA inhibitors with different mechanisms of action, T2AA and PCNA-I1, to test the involvement of PCNA in viral processes. PCNA-I1 stabilizes the PCNA homotrimer to alter DNA binding whereas T2AA blocks specific PCNA protein-protein interactions. Inhibitor experiments were carried out under conditions that do not cause cell death. We measured viral DNA replication over a span of 24 hours post infection in the presence of the inhibitors. We found that T2AA had little to no effect on viral DNA replication or infectious virus production. In contrast, PCNA-I1 had a dramatic effect on viral yield and DNA replication suggesting that PCNA-DNA binding is important for viral infection. Furthermore, during HSV-1 infection, host DNA replication is shut down, suggesting that viral modification of PCNA may play a role in this. In ongoing experiments, we are also investigating how viral modification of PCNA alters cellular processes such as DNA replication and DNA damage responses.

***Unpacking the Academic Interventions for Improving the Academic Skills of Black Girls with Disabilities: A Scoping Review**

Olajumoke Oshokoya, Cliff Oliech, JoVonne Tabb, Mary Comis

School of Education || Counseling, Psychology, & Special Education

Faculty Advisor: Temple Lovelace PhD, BCBA-D

ABSTRACT:

Most research on Black girls seem to have focused more on their behaviors (Morris, 2007), when compared to their White peers. It is even worse for Black Girls with Disabilities (BGDs) who have

continued to be academically marginalized along the intersection of race, gender, and disability. As more special education research exists for improving the academic achievement of students with disabilities across United States' K-12 schools, it becomes critical to systematically scope the academic interventions that have been used to improve the academic skills of BGDs. Using the PRISMA-ScR checklist (Tricco et al., 2018) and Askey and O'Malley's (2005) framework, 15 studies were scoped. Results from this scoping review revealed that nine academic interventions were used to improve the academic skills of BGDs across the 15 studies. With a narrative synthesis, themes on current strengths and gaps across the studies found are discussed in line with systemic reasons why they are important to improving the academic skills of BGDs. Overall, repeated reading interventions (RRIs) delivered through computer assisted instruction (CAI) were more prevalent at improving the academic skills of BGDs. Limitations and recommendations for future research are discussed.

Keywords: academic skills, Black Girls with Disabilities, interventions, intersectionality, scoping review

Erasing Renewal or Renewing Erasure? A Community Profile of East Liberty

Aubrey Parke

McAnulty College and Graduate School of Liberal Arts || History

Faculty Advisor: Andrew Simpson Ph.D.

ABSTRACT:

Most accounts of Pittsburgh's East Liberty neighborhood focus on the rise and decline of its commercial center, neglecting the district's dual identity as a financial hub and a lived-in community. This approach obscures the stories of working class, migrant, and African-American residents who transformed East Liberty from a wealthy commuter suburb in the mid-1800s to "Pittsburgh's second downtown" in the 1930s. Through a six-minute video based in historiographical and primary source research, I ask how East Liberty's pre-1970s past can inform its current development efforts. I argue that the interplay between top-down investment and the more spontaneous effects of local life, labor, and migration gave birth both to neighborhood's economic success and its postwar decline. Historical photographs, maps, and charts illustrate East Liberty's evolution from a semi-rural suburb to a working-class business district and, finally, to a revived but gentrifying neighborhood. The film combats historical erasure by highlighting the stories of migrant and African-American populations and emphasizing the importance of affordable housing if local leaders hope to maintain a diverse neighborhood.

While this short video format is unusual for the Graduate Research Symposium, it will enrich the event by encouraging other scholars to explore new formats for sharing their work with non-academic audiences. Succinct videos can reach people who may not read a journal article or attend a panel session. For example, I plan to publish my video online, along with a full bibliography. This kind of accessible research can be useful not only to other scholars, but to activists, developers, and local residents. As a public history student, all my research has this kind of public engagement as its ultimate goal.

Title: The experiences of inpatient nurses caring for COVID-19 patients during the COVID-19 pandemic in the United States.

Jennifer DonGilli

School of Nursing ||

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

ABSTRACT:

Purpose: The purpose of this study was to explore and understand the experiences of inpatient nurses caring for COVID-19 patients during the pandemic in the United States.

Research Question: What are the experiences of inpatient nurses caring for COVID-19 patients during the COVID-19 pandemic in the United States?

Background: A new type of coronavirus, COVID-19, emerged in Wuhan, China in December 2019, sparking a global outbreak of respiratory illness. Many hospitals in the United States modified their delivery of services in response to COVID-19, adjusted infection prevention practices and have had changes in staffing patterns. For many, resources have been strained, particularly around personal protective equipment and nursing personnel. The experiences of inpatient nurses caring for COVID-19 patients amid this outbreak are important to explore.

Method: This mini-study is a qualitative, descriptive phenomenology based on Husserl's philosophy. Data was collected through unstructured interviews of Registered Nurses having worked with COVID-19 inpatients and a demographic questionnaire. Participants were recruited through social media and the snowball method. Due to this being a mini-study, data was analyzed through the third step (formulated meanings) of Colaizzi's 7-step process.

Results: Interviews were conducted with 4 females, 1 male; aged 29-50. Participants worked with COVID-19 inpatients for 2.5-8 (mean 5.5) months. Per Colaizzi's method, 19 significant statements were identified, resulting in 7 formulated meanings. Initial findings indicate nurses experience uncertainty; grief; lack resources, power, and voice; are overwhelmed and exhausted; and some are reconsidering their careers; nurse-to-nurse support brings hope and motivation to continue the work.

Conclusions and Implications: Future research is needed related to COVID-19 and care; the small sample size and use of the snowball method is limiting. Working through the pandemic with COVID-19 patients amplified a lack of empowerment many nurses face; it can be overwhelming; peer support strengthens nurses' capacity to continue.

Exploration of the cultural beliefs, values and practices of African American women regarding postpartum depression: A mini-focused ethnography

Stephanie Jacobs

School of Nursing || Graduate School of Nursing

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

ABSTRACT:

Purpose: The purpose of this study was to understand the cultural values, beliefs and practices of African American women regarding postpartum depression.

Research Question: What are the cultural care beliefs, values and practices of African American women regarding postpartum depression?

Background: Postpartum depression (PPD) is the most prevalent perinatal mental health illness in women and affects approximately 10 to 20% of all women in the United States. African American women have a disproportionately higher prevalence of postpartum depression (35-67%) and experience it differently.

Methods: This mini-focused ethnography focused on understanding the cultural beliefs, values and practices through semi-structured interviews of four African American women about their unique

cultural beliefs of postpartum depression. Interviews were transcribed verbatim and analyzed using Leininger's four phases of qualitative data analysis with the assistance of NVivo12 software program.

Results: Four African American women served as participants in the study. Data analysis resulted in the emergence of two patterns from the third phase of data analysis. The patterns identified were: "mistrust of health care providers" and "striving to be a perfect mother", reflecting the challenges of postpartum depression of the four participants.

Conclusions and Implications: Initial data from this study revealed two emerging patterns that the participants identified as significant issues regarding postpartum depression. The importance of being a good mother, as well as distrust with the medical system were pertinent issues influencing their perspective of postpartum depression. The mini-focused ethnography provided valuable insight from African American women identifying cultural perceptions and beliefs about postpartum depression. The initial findings suggest a need for future research such as a full focused ethnography to fully explore the data about postpartum depression in African American women. The findings may provide and promote culturally congruent care from nurses with the goal of improving maternal health outcomes for African American women.

***Neural stem/progenitor cell proliferation and neurogenesis is increased in the adult brain during a viral infection**

Manisha Chandwani

School of Pharmacy and the Graduate School of Pharmaceutical Sciences || Pharmacology

Faculty Advisor: Lauren O'Donnell Ph.D.

A B S T R A C T:

Viral infections in the adult central nervous system (CNS) can cause physiological changes despite successful viral control. Neural stem/progenitor cells (NSPCs) may be altered during an infection either by direct infection and/or the anti-viral immune response, potentially contributing to changes in neurological function. To define the components of the anti-viral immunity that regulate NSPCs, we utilized a mouse model of CNS measles virus (MV) infection. In this model, human CD46+ (a MV receptor) is expressed only on mature neurons, restricting MV to neurons and sparing the NSPCs from infection. Two-month-old mice were infected with MV, and flow cytometry was conducted at 7 and 60 days post infection (DPI) to quantify the NSPC, neuronal, and glial populations. NSPC numbers were increased at 7 and 60 dpi in the hippocampus, a key neurogenic niche involved learning and memory. NSPC proliferation trended towards an increase during and after infection, implying long-term changes in NSPC activity. Mature neurons were reduced at 7 dpi, possibly due to infection-mediated cell death, but then recovered to basal levels by 60 dpi. Neurogenesis was enhanced in the hippocampus during infection, which may account for the recovery of mature neurons at later time points. Microglia, T-cells, and B-cells were increased early in infection (7 dpi); however, only resident memory T-cells remain at 60 dpi after the infection is resolved. In the absence of adaptive immunity (CD46+/Rag2-KO), NSPCs increased during infection similarly to wildtype mice. Microglia were upregulated in both CD46+ and CD46+/Rag2KO mice, and positively correlate with hippocampal NSPCs in CD46+ mice, suggesting that microglia may regulate NSPC activity during infection. Current studies address the role of microglia in modulating NSPC activity in vivo and in vitro. These studies emphasize that NSPCs undergo long-term changes as a result of a successful anti-viral immune response in the adult brain.

The anti-viral immune response in the pediatric brain alters neural/stem progenitor cells

Yashika Kamte

School of Pharmacy and the Graduate School of Pharmaceutical Sciences || Pharmacology
Faculty Advisor: Lauren O'Donnell Ph.D.

ABSTRACT:

Outcomes of CNS viral infections are often age-dependent, where younger hosts generally develop more profound neuropathology. In pediatric mice, key neurodevelopmental processes such as synaptogenesis, myelination, and pruning are underway. Neural stem cells (NSCs) are multipotent progenitor cells that populate the brain with neurons, astrocytes, and oligodendrocytes. With age, the NSC pool contracts predominately to two functionally-distinct neurogenic niches in the brain (hippocampus and sub-ventricular zone (SVZ)). Thus, ongoing physiological development makes the pediatric CNS vulnerable to infections. Here we determined the effect of a CNS viral infection and anti-viral immunity on NSCs in pediatric mice. We used a neuronally-restricted model of measles virus (MV) pathogenesis, where MV selectively infects mature neurons and NSCs are spared from infection. MV and mock-infected mice were evaluated for illness, viral antigen expression, and neural cell populations at 9- and 90-days post infection (dpi). Flow cytometric analysis of the hippocampus at 9 dpi revealed a decrease in NSCs and immature neurons, whereas oligodendrocyte progenitor cells (OPCs) increased. At 90 dpi, astrocytes and OPCs increased in the hippocampus. The SVZ showed a decrease in NSCs and an increase in mature neurons, the target of MV in our model, at 9 dpi. At 90 dpi immature neurons decreased and OPCs increased in the SVZ. Innate and adaptive immune cells were detected at 9 dpi, while only B cells remained in the CNS at 90 dpi. However, MV antigen was detected at both 9 and 90 dpi in the hippocampus, suggesting that the pediatric immune response is unable to control the virus. Thus, pediatric anti-viral immunity is detrimental to NSCs and immature neurons in the hippocampus early in infection and immature neurons in the SVZ long-term. Current studies aim at understanding the mechanisms driving the decline in NSCs and long-term behavioral effects in surviving mice.

***At Your Side: The Role of End-of-Life Doulas in the Mitigation of Compassion Fatigue, Burnout and Moral Distress in Nursing Practice**

Adele Flaherty, Fahmida Hossain

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

Faculty Advisor: Joris Gielen Ph.D

ABSTRACT:

The need for hospice and palliative care is growing rapidly as the world's population ages, medical technology continues to increase life expectancy and as hospice and palliative care become more accepted. Nurses in general are tasked with providing physical, emotional, and sometimes spiritual and psychological support while balancing other everyday stressors associated with the provision of healthcare. Palliative care and hospice nurses in particular are in contact with individuals on a regular basis who are confronting debilitating illnesses and end of life issues, which may compromise their ability to provide quality, compassionate care. Phenomena such as compassion fatigue (CF), secondary traumatic stress disorder (STS), moral distress (MD) and burnout are common. These may lead to decreased job satisfaction and diminished patient outcomes. Current strains on health care systems already make recruitment and retention of nurses difficult, so it is vital that organizations address these issues proactively and systematically to help decrease their effect on staff and clientele. To address such issues, organizations are incorporating a variety of workplace strategies to help address some or all of these conditions - particularly those who work in subspecialties such as palliative care and hospice, who are faced with stressors unique to their discipline. These nurses are particularly prone to distress, as they are continuously surrounded by individuals who are seriously ill or dying. Some of these practices include the introduction of support groups, mental health days, routine check-ins, increased

amount of breaks and relaxation or meditation rooms where nurses and other practitioners can go to decompress from the stress of the shift. The focus of this discussion is an underutilized strategy for addressing these issues: the incorporation of “death doulas” into end of life nursing practice. A doula (“woman caregiver”) is commonly associated with the birthing process. However, recent shifts in attitudes towards death and dying - as well as increased demand for palliative and hospice care - have created a new niche for those who wish to assist in the dying process. Integration of end of life doulas into the palliative and hospice care model may not only have a significant impact on the effects of moral distress, compassion fatigue and burnout in these nursing subspecialties, they may also mitigate their effects in nursing practice in general.

***Teacher Collaboration to Create Curricular Coherence: Shifts During Covid-19**

Mona Baniahmadi

School of Education || Educational Foundation & Leadership

Faculty Advisor: Amy M Olson Ph.D.

ABSTRACT:

Education policy and standards strive for more coherent curricula because “a coherent, well-articulated curriculum is an essential tool for guiding teacher collaboration, goal-setting, analysis of student thinking, and implementation” and students learn better when “connections are made from one year to the next, from one idea to another, from one representation to another” (NCTM, 2016, p. 1). This suggests teachers must work to make connections not only across topics, but also across practices, representations, and strategies.

Vertical coherence occurs when teachers who teach the same course collaborate across the grade level. In contrast, a curriculum that is horizontally coherent occurs when teachers at the same grade level collaborate to align their learning activities, instruction, and assessments (The Glossary of Education Reform, 2014). Both assume teachers should collaborate with their colleagues to develop a high-quality, coherent curriculum (Chalk, 2020). Yet teachers today are inundated with diverse curricular resources that may not be well connected vertically or horizontally.

In this study, we surveyed 524 public elementary mathematics teachers about their curriculum. Results indicate that prior to Covid-19 teachers relied on curriculum resources, standards, and other online materials to make connections vertically and horizontally. Fewer teachers mentioned they collaborated with other teachers, and collaboration mostly occurred across grade levels. But during Covid-19 and the switch to remote instruction, they could not use the same strategies to build coherent connections. They instead relied more heavily on each other and collaboration with their colleagues to design a coherent curriculum. In such an unprecedented time it was a surprise to find an increase in teacher collaboration as teachers were socially isolated. It is also evident from the data that many teachers are thinking of how they can best support each other through their learned experiences.

Developing a Method to Stop the Degradation of $\Delta 9$ -THC in Oral Fluid

Colette Miranda

Bayer School of Natural and Environmental Sciences || Forensics

Faculty Advisor: Stephanie Wetzel Ph.D.

ABSTRACT:

With more states legalizing medicinal and recreational marijuana every year, it is important to be able to identify how much is in a person's system. By using oral fluid as the biological matrix, it is able to be easily obtained at the scene through a noninvasive collection method. As $\Delta 9$ -Tetrahydrocannabinol (THC) can be detected in oral fluid for up to 22 hours, it provides a narrower window to identify to see if the accused was under the influence of marijuana at the time of the crime.² $\Delta 9$ -THC is being studied in this project because as the parent drug, it would be in the oral fluid whereas the drug metabolites would be found more in urine or in blood.

This project utilized Solid Phase Extraction (SPE) and Gas Chromatography-Mass Spectrometry (GC-MS) to extract and analyze the samples. This project studied what type of material was best to store the spiked samples in: unsilanized glass, silanized glass, and plastic. The samples were prepared by using donor oral fluid and a $\Delta 9$ -THC drug standard to make a concentration of 375 ng/mL in the oral fluid. These samples were prepared in series of 5 and kept in the cold room for 48 hours before extraction. An internal standard ($\Delta 9$ -THC-d3) was used to account for potential errors in the extraction process. It was hypothesized that the silanized glassware will yield the least amount of degradation.

Though it may be legal to use marijuana in some states, it is still illegal to drive while impaired. Driving while under the influence can have a serious impact, including loss of life. This research can aid ongoing and future research projects to be able to ensure that the samples being collected will maintain their integrity and can be examined to find the concentration of $\Delta 9$ -THC.

Building a New City: New Castle, Pa

Bethany Funk

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

Faculty Advisor: Andrew Simpson Ph.D.

ABSTRACT:

Residents of a city can easily experience historical amnesia – forgetting what past events and perspectives brought them to the present moment – leading to a lack in appreciation for the unique value of a place. This presentation utilizes the history of New Castle, PA to challenge the conventional late-1900s Rust Belt city economic decline narrative and place the beginning of the city's economic dismantling between 1900 and 1910, occurring as a part of – not apart from – the unique manufacturing-driven location, economy, and society of New Castle.

Through an analysis of sources such as city histories, newspaper commentaries, and worker and employer personal reflections to detail the history of New Castle, the presentation shows how New Castle gradually lost its role as a cross-roads for trade and hub for local manufacturing as it the economy transformed from local ownership to national industry leader ownership, as was the case with Carnegie Steel. This is important because as growing manufacturing businesses moved from the region to adapt new technologies, New Castle's industrial infrastructure remained to the present day with manufacturers, like Ellwood Quality Steels, seeking to utilize that space.

This presentation concludes by examining public policies that will leverage the heritage and inheritance of the city's transportation, manufacturing, and housing infrastructure: For New Castle to experience healthy urban revitalization, it should use this early-20th century "manufacturing-middleman" positioning and utilize the transportation and building infrastructure present to accommodate heritage tourism and, through building reuse strategies, for digital service-oriented businesses that embrace the shift to digital and technical skills. Encouraging current residents and city workers in these efforts with a past-honoring narrative will empower the people of the city in future revitalization efforts.

***Machine Learning Applied to Colloidal and Rheological Properties of Perfluorocarbon Nanoemulsions for Imaging in ARDS/ALI**

Marco Hosfeld

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Faculty Advisor: Jelena Janjic Ph.D.

ABSTRACT:

Acute Respiratory distress Syndrome (ARDS) and Acute Lung Injury (ALI) are inflammatory lung pathologies consisting of non-hydrostatic pulmonary edema leading to hypoxia and impaired gas exchange in the lungs. ARDS/ALI is both difficult to study and treat as it is not in itself a specific pathology but rather a syndrome consisting of many pathologies that vary case by case. It is characterized by explosive acute inflammatory response in the lung parenchyma leading to the impaired gas exchange that characterizes ARDS/ALI. Although time has seen to an increase in the understanding of ARDS/ALI the mortality rate remains in the range of 30-50%. For these reasons, nanomedicine may offer solutions to the diagnosis and treatment of ARDS/ALI. Especially in cases of imaging nanomedicine seeks to redress some of the issues seen in traditional imaging such as with more targeted delivery platform. In ARDS imaging, such as CT and MRI, has been used to confirm the condition through pulmonary opacification, however, specific tracking of macrophages using MRI has not been explored. This can be achieved through macrophage targeted nanomedicine platforms, therefore focus of this article will be on macrophage targeted perfluorocarbon nanoemulsions.

We believe that nanoemulsions aimed for macrophage imaging in severely ill patients require the highest quality possible. We will understand the current state of the art through machine learning to determine what manufacturing parameters impact the performance of perfluorinated Nanoemulsions. Machine learning will be used to analyze what parameters of production are critical to the various colloidal attributes (size, zeta potential, and PDI) to the performance of emulsion-based drug delivery platforms. The rheological properties of these systems have not been fully explored. Machine learning will be applied to newly generated rheological data of recently manufactured perfluorocarbon nanoemulsions to understand the role rheology plays in the quality control of such nanoemulsions.

Examining the Assessment Procedures for ACE's Screening

Jeremy Armann M.S.Ed., Mary Comis, M.S.Ed., Zachary Friedman, M.S.Ed., Alexandra Leopold M.S.Ed.,

School of Education || School Psychology

Faculty Advisor: Tammy Hughes Ph.D.

ABSTRACT:

Adverse childhood experiences (ACEs), defined as: abuse, neglect, as well as exposure to house hold dysfunction (Felitti & Anda, 2009) are reported to negatively impact a child's health and mental well-being (Centers for Disease Control and Prevention, 2020). Children exposed to ACEs show a lower resilience to cope with stressors (Bethell, Newacheck, Hawes, et al., 2014). They are also more likely to demonstrate learning and behavioral problems including grade retention, problematic school engagement, and special education needs (Perfect, Turley, Carlson, Yohanna, & Gilles, 2016). In the court case Peter P. v. Compton Unified School District in Los Angeles, a judge ruled that the school failed to "train and sensitize teachers or administrative personnel to recognize, understand, and address the effects of complex trauma" (P.P. v Compton Unified Sch. Dist, 2015). The judge ruled that children who have been negatively impacted by these challenges are entitled to equal access to education and appropriate services (Public Counsel News, 2015). Despite this, evidence suggests that some school psychologists do not routinely address ACEs directly in their assessment battery. Furthermore, trauma

informed practices are not well articulated in MTSS services even though it is well documented that schools are known to be the primary provider of mental wellness and mental health intervention for children (Evans, Stephan, & Sugai, 2014).

Assessment for ACEs is a critical responsibility for school psychologists, especially when ACEs impact disrupts the child's ability to benefit from the educational environment.

This presentation reviews various reliable and valid measures useful for screening the general population of children as well as assessment measures that would be appropriate for determining need for 504 and special education services. Issues of mandated reporting, when school personnel become aware of issues of abuse and neglect – common in assessment of ACEs – is also addressed.

A Landscape Study on Next Generation Sequencing Technology for Forensic Science Applications

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

Faculty Advisor: Lyndsie Ferrara Ph.D.

ABSTRACT:

A landscape study is designed to define the stakeholders, their products, and the features and applications of those products to enable end users to make informed purchasing decisions. This report provides a landscape view of currently available Next Generation Sequencing (NGS) technology. More specifically, it provides forensic decision makers and potential users with an overview of the technology, possible applications, current user experience, comparisons of capabilities and features of instrumentation, training requirements, validation considerations, and other factors affecting implementation, procurement, and use.

NGS is a massively parallel process which enables the sequencing of an entire genome in a single day. NGS, also referred to as massively parallel sequencing (MPS) or high throughput sequencing, allows forensic analysts to achieve an increased level of accuracy for DNA analysis over current gold standard methods by sequencing every amplicon of autosomal STR alleles. Many different instrument models have been developed sharing the same general features but having different technical details making implementation and procurement a difficult process.

This research was performed primarily through an examination of primary and secondary sources including journal articles and industry literature to obtain information related to NGS applications, user experience, and instrument capabilities. Interviews were also conducted with subject matter experts to allow the researcher to investigate how NGS technology has been successfully implemented in crime laboratories. This information was summarized as user profiles to provide a unique insight for the end user.

Since human identification is a key aspect of criminal investigations, it is pertinent that forensic scientists can quickly and reliably keep up with the evolution of forensic DNA analysis and the continuing advancement of sequencing technology. This report will allow forensic decision makers to gain a better understanding of NGS technology and outline what they should consider before choosing to implement NGS technology in their laboratory.

A Comparison of DNA Quantity and Quality in Sexual Assault Evidence Kits Using Varying Conditions of Storage Types and Storage Durations

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Faculty Advisor: Pamela Marshall Ph.D.

ABSTRACT:

DNA evidence collected with sexual assault kits is the most important physical evidence in a sexual assault case. If the evidence is not stored properly, then the DNA could degrade, which effects its quantity and quality for analysis. New technologies are being developed that could improve the collection and storage of this evidence. The Gentueri Sexual Assault Collection Pouch was developed with a desiccation component to keep moisture out of samples and minimize DNA degradation. The purpose of this experiment was to test if the Gentueri Sexual Assault Collection Pouch preserved DNA samples better than the Pennsylvania State Police Sexual Assault Kit, the standard sexual assault kit used in Pennsylvania. This was tested by creating mock sexual assault samples using both kits, which were then put into storage for periods of zero days, 60 days, and 90 days. Storage conditions of -20°C, 4°C, and 25°C, were used to see how they would affect the DNA samples. Swabs from each kit and a 1:200 semen dilution was used to create the mock swab evidence. The swabs were then packaged in their respective kits and put into storage for their designated period. Once taken out of storage, the samples were tested. DNA was extracted from each swab using the DNA IQ™ System, quantified using the Quantifiler™ HP DNA Quantification Kit and the QuantStudio® 5 Real-Time PCR, amplified using the GlobalFiler™ PCR Amplification Kit and thermocycler, had capillary electrophoresis performed using the Applied Biosystems® SeqStudio™ Genetic Analyzer, and was analyzed using the GeneMarker® HID human identity software. This research will have a great impact, as it could lead to new or improved sexual assault kit standards, or a nationalized sexual assault kit. Improvements in these areas could lead to a longer shelf life of sexual assault kit evidence and less DNA evidence loss.

The Failure of the Contagious Diseases Acts: Politics, Society and the Anti-Regulationists Movement

Cassidy Glatz

McAnulty College and Graduate School of Liberal Arts || History

Faculty Advisor: Robin Chapdelaine Ph.D

ABSTRACT:

In 1864 British Parliament passed the first in a series of sanitary acts that aimed to provide preventative care against venereal diseases for the British military by inspecting prostitutes. The implementation of the Contagious Diseases (CD) acts both disproportionately affected the nations working poor and threatened more significant State intervention into their lives. Yet little attention was given to the CD Acts until groups within Parliament wished to extend the Act's coercive sanitary measures to the civilian public. Thus, through the eyes of middle-class conservatives, legalizing prostitution and threatening their rights.

The threat of the legislation's expansion gave rise to an oppositional movement comprised of politicians, religious leaders, working-class men, and early feminists known as the Anti-Regulationists. However, proponents of the legislature, Regulationists, believed that increased sanitary measures would improve military health and the health of the general populace through the treatment of infected prostitutes. This paper ultimately finds that the proposition of transitioning the CD Acts from military health to the civilian population threatened the economic liberties and protection afforded to Britain's middle and upper classes.

Before its proposed extension, the CD Acts as legislation aimed exclusively towards controlling the lower classes. This, however, changed with the proposed expansion of the CD Acts, which threatened to curtail middle and upper-class freedoms, placing them equal to the lower classes whose lives were heavily

subjected to state interventionist laws. By threatening the freedoms enjoyed by the upper classes, the CD Acts and Regulationists movement brought about its end in the domestic sphere.

IMPROVING THE EFFICIENCY OF MITOCHONDRIAL DNA EXTRACTION FROM ANCIENT SAMPLES BY COMPARING HI-FLOW® AND ORGANIC EXTRACTION PROTOCOLS

Lissa Patterson

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

Faculty Advisor: Lisa Ludvico Ph.D.

ABSTRACT:

This presentation aims to provide insight on an extraction method that produces the most pure and high molecular weight DNA from an ancient challenged skeletal sample. This will be done by comparing an Organic PCI extraction method to a Hi-Flow® silica-column extraction method. This research will also attempt to generate a complete sequence of the hyper variable 1 region (HV1) of the sample's mitochondrial DNA(mtDNA).

MtDNA analysis is becoming increasingly popular due to mtDNA's abundance in the cell and polymorphic nature. Through mtDNA analysis, the origin, migration, geographic ancestry, and identification of deceased individuals can be assessed. MtDNA is inherited maternally so it only allows for comparative identification of related individuals and exclusionary profiles.

Ancient DNA (aDNA) is analyzed from specimens that have aged hundreds of years and is considerably degraded. Skeletal material is useful in the analysis of aDNA due to its mineralized tissue that can resist degradation and extreme environments.

The purpose of this study is to analyze the mtDNA in the ancient bone sample 5D, found at the Flevaeis Plot Archaeological Site in Rhodes, Greece. To analyze the bone sample, two extraction methods will be performed. This research hypothesizes that if the Hi-Flow® silica-column extraction method is used to extract mtDNA from bone 5D, there will be an increase in the quality and quantity of resulting DNA compared to the Organic PCI extraction. Once the DNA is extracted, a mtDNA mini primer set created by the Armed Forces DNA Identification Lab (AFDIL) will be used to amplify and sequence the HV1 region. The sequences of each extraction method will be compared to determine if there is a difference in resulting DNA. The sequences will then be compared to known population databases to determine if there is indication of similar maternal lineage between known populations.

The Effects of Fingerprint Development Techniques on Bullet Casing Identification

Andrew Nickischer

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

Faculty Advisor: Lyndsie Ferrara Ph.D.

ABSTRACT:

Fingerprint development is a procedure that is routinely performed on bullet casings recovered from a crime scene. If the casing is to be matched to a known weapon, it will then undergo a casing comparison process. This study was undertaken to identify the effect of fingerprinting techniques on bullet casing identification. To properly collect fingerprints and analyze casing marks, it must be assured that the chemicals used in fingerprinting do not interfere with the casing's ability to be identified.

Cartridges with casing materials of brass, steel, nickel-plated brass and aluminum were loaded and fired at a range. The casings were collected for analysis using careful techniques so that no prints were applied post-firing. The casings were exposed to the most optimized casing fingerprint development techniques which are cyanoacrylate fuming using 15 drops of CA glue in a hood for 20 minutes, gun bluing solution (Birchwood Casey PermaBlue), and a Basic Yellow 40 fluorescent dye stain.^{1,2,3} Casings were exposed to each process individually as well as in a sequence as listed above. This three-step procedure was chosen using a variety of studies so that the method is both effective for enhancing ridge detail and accessible for a wide range of labs.

Images of the developed casings and control casings captured from a comparison microscope under fluorescent lighting. The casings were examined between each step of the three-step development sequence. Casing marks such as Firing pin impressions, ejection port marks, chamber marks, and extractor marks were analyzed. All qualitative differences between the casing marks of the developed and control casings were recorded. It was expected that the application of these chemicals caused no change in the casing's ability to be matched to another casing fired from the same weapon.

An Analysis of Extraction Efficiencies of Various Swabs on Sperm Recovery

Lindsey Campany

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

Faculty Advisor: Pamela Marshall Ph.D

ABSTRACT:

With the advancement in the biological sciences, DNA specifically, more exact profiles can be obtained from mixed samples. Extraction procedures and their reagents have been optimized for maximal DNA yield, but the swabs used and provided for sexual assault examination have not advanced. A variety of swabs types exist that could potentially make collecting and extracting DNA evidence more efficient. Implementation of a more efficient collection device could result in higher quality DNA profiles, higher conviction rates for reported sexual assaults, and decrease the rate of repeat offenders.

Three swabs that this research will be evaluating are Copan nylon flocked swabs, Puritan cotton swabs, and the cytobrush swab. The nylon flocked and cotton swabs have been studied for their efficiency, but no studies have evaluated the cytobrush for evidence collection. Due to the commonality of the cytobrush for gynecological purposes, literature suggests that implementation of the cytobrush has yet to appear in the forensic science field for evidence collection.

Sample preparation consisted of individually submerging three different swabs in microcentrifuge tubes containing 50 μ L of semen from a 1:250 seminal fluid to phosphate buffered saline dilution. These mock sexual assault samples were carried through typical DNA processing methods to analyze what swab yielded the highest sperm DNA concentration and best genetic profile. It was hypothesized that the cytobrush would be most efficient for sperm recovery because of its open structure. Previous research indicated that the cotton swab inefficiently eluted material because of its wound inner matrix. Other swabs, like the nylon flocked swab, reduce the amount of cellular material absorbed. However, implementation of a better collection device has not been made despite the research done on swab efficiencies. With this research, the collection of sexual assault evidence could be optimized and sperm yield could increase providing a higher quality profile.

***Extraction and Genotyping of Human DNA in a Still Body Aqueous Environment**

Samantha Border

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

Faculty Advisor: Lisa Ludvico Ph.D.

ABSTRACT:

The number of missing person cases has increased over the years. This research attempts to provide a novel forensic technique for solving more of these cases. This study will encourage the involvement of forensic applications early on in the search using a DNA processing method in hopes to reduce the time period individual remains are unaccounted for.

This study will determine how long source DNA can be collected and successfully genotyped from an aqueous environment. It will also determine if weather conditions cause a change in the migration or degradation of DNA in this environment. The experiment was repeated during spring and summer, with control samples. The control sample was used to indicate if any interactions within the aqueous environment itself affected the sample. Human epidermal tissue was placed in a still body of water, such as a pond. Only the surface area of skin was considered in the sample size. Collections of 15 mL of water were made every other day for thirty-days, 12 feet from the sample with 5 intervals. Collected samples were filtered and extracted using a Qiagen DNEasy Blood and Tissue kit. This kit is used among crime labs dealing with environmental DNA (eDNA) and ensures realistic case work results. Concentrations were obtained for each sample for analysis. Those with higher concentrations were genotyped using the GlobalFiler PCR amplification kit on the SeqStudio genetic analyzer. Then, short tandem repeat (STR) loci were compared with a known profile. This step ensures the methods work to eventually create new protocols for missing persons cases. This study aims to provide enough evidence that human DNA, collected from an aqueous environment, can obtain a viable genotype for identification. Establishing new protocols could increase the number of cases solved yearly and employ the use of eDNA cases toward a forensic outlook.

The Relationship between Sitting Function and Trunk Alignment in Infants with Severe Motor Delays

Claire Boe, Jessica Spirnak

Rangos School of Health Sciences || Physical Therapy

Faculty Advisor: Regina Harbourne Dr.

ABSTRACT:

The Relationship between Sitting Function and Trunk Alignment in Infants with Severe Motor Delays

Authors: Claire Boe, Jessica Spirnak, Regina Harbourne, Karl Jancart, Amber Delprince, Melanie Tommer, Justine Vecchiarelli, Lin-Ya Hsu, Sarah Westcott McCoy, Sandra Jenson-Willett, Michele Lobo, Stacey Dusing.

Purpose/Hypothesis: Therapists examine trunk alignment as a means of assessing postural control in infants during sitting development, the first means of upright motor control.¹ Neurodevelopmental intervention often focuses on postural control of axial body segments in a cephalo-caudal fashion as a means to achieve dynamic control of the multiple segments of the trunk.² The purpose of this study was to examine changes in trunk segment alignment over time and relate these changes to the Gross Motor Function Measure (GMFM) sitting dimension.

Number of subjects: 19 infants, aged 7-16-months at baseline, a subset from the START-Play study.³

Materials/Methods: Two-dimensional trunk and pelvic angles were measured using the Angles video goniometer© application from sagittal videos.³ Data were collected at baseline, when the infant could prop sit for at least 3 seconds after being placed, and then again at 6 weeks, 3 months, 6 months and 12 months post-baseline. All infants scored ≥ 2.5 SD below the mean on the Bayley III motor test for their age at baseline, indicating significant motor delays. Examiners held the infant in vertical supported sitting, and then released support. The infant then slouched forward and assumed control of the sitting position, either using arms for support or not. Angles were recorded at the furthest forward stopping point after the infant was released. Angles measured were head-to-trunk, upper trunk, mid-trunk, low-trunk and hip. The GMFM sitting dimension was video recorded and scored at those same assessments. ICC=.90 for inter-rater reliability of scoring for both measures. Pearson correlations were used to examine the relationship of all angles to GMFM sitting scores at each time point, and change scores for significant correlations were then used to examine predictors for GMFM sitting scores at 12 months. A Bonferroni correction adjusted $\alpha=0.01$ due to multiple comparisons.

Results: Correlations for mid-trunk angle to GMFM sitting ($r=.31$, $p=.007$) and low-trunk angle to GMFM sitting scores ($r=.44$, $p=.000$) were significant. Change scores for mid-trunk and low-trunk angles, as well as GMFM sitting change scores from baseline to the 12-month post baseline assessment showed the only significant relationship was between the low-trunk angle change and GMFM sitting change ($r=.72$, $p=.001$) and sitting scores at 12-months ($r=.70$, $p=.001$). A multiple regression model with GMFM sitting at 12-months as the dependent variable and mid-trunk change, low-trunk change and low-trunk early change (baseline to 3 months) indicated only low-trunk change as a significant predictor ($\beta=.91$, $p=.000$).

Conclusions: Functional sitting, measured by the GMFM sitting dimension, may not be strongly related to trunk segment alignment change over time, although a moderate relationship exists. Multiple strategies for postural control and attaining sitting independence over time may be used by children to manage multiple body segments.⁵

Clinical relevance: Addressing trunk alignment in a cephalo-caudal manner for postural control may not be supported. Control near the base of support should be considered in addressing developing sitting function.

Use of PCT to Enhance Extraction of DNA from Strangulation Devices

Christina Scott

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

Faculty Advisor: Pamela Marshall Ph.D.

ABSTRACT:

Strangulation frequently occurs during physical or sexual assaults where the attacker may suppress their victims using clothing, pantyhose, or rope. This contact leads to the transfer of small quantities of DNA from the victim and/or perpetrator that can be left behind on the device used. Analysis of these cases usually involves various body fluids including blood, saliva, semen, and touch DNA, but often these low quantities of DNA are not high enough to yield a profile and identify a suspect. In many cases, the needed DNA for forensic testing may also be absorbed into the wefts of the fibers within the device used to strangle the victim, making it difficult to obtain the DNA. Pressure Cycling Technology (PCT) is used to increase the amount of DNA that is extracted from different objects by using alternating cycles of hydrostatic pressure between ambient and ultra-high levels. While PCT has proven to be effective at increasing the quality and quantity of DNA from challenged human remains, its use on strangulation devices is unknown. To begin, 5 known blood samples were DNA tested to obtain the most heterozygous profile. Sample 1 was then diluted, and a serial dilution was performed 5 times to obtain a

low copy number quantity of DNA. Each dilution was then placed on a separate substrate and both substrates were placed on a nonabsorbent pad allowing for bleed through to be reabsorbed. A total of 20 samples split evenly between both strangulation devices with and without Pressure Cycling Technology were analyzed. PCT allowed for a greater amount of DNA to be obtained from the samples when compared with the standard cell lysis methods for extracting DNA.

Something Old into Something New: A History of Greensburg, PA

Samantha Stossel

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

Faculty Advisor: Andrew Simpson Ph.D.

ABSTRACT:

A third-class city located in Western Pennsylvania, Greensburg has long been the region's economic and social heartbeat. Westmoreland County's seat since the late 1780s, Greensburg underwent rapid industrialization along with the rest of Western Pennsylvania in the late nineteenth century. Unlike many other old industrial centers, today Greensburg has not become an urban shell, devastated by the withdrawal of industrial companies. Despite economic and demographic shifts, Greensburg has maintained its city status, kept population numbers well above pre-industrial levels, and now relies on non-coal related industries. The reason this has occurred is not because of an ability to bring in entirely new industries. Instead, the city has successfully shifted its focus to non-industrial economies because these alternate economies were already to some degree present in the community prior to deindustrialization.

This research utilizes a variety of contemporary and historical sources including census data (such as population and economic statistics) and archival and digital records from major institutions in the community. By linking the past and the present it makes suggestions for how Greensburg can continue to develop and maintain a stable, sustainable community. For example, the city can encourage historic preservation projects and support local cultural institutions. Greensburg's story challenges the traditional narrative of rise and decline that has occurred in other Pennsylvania cities, such as Duquesne, PA, which lost 60 percent of its population due to the effects of deindustrialization. Greensburg can thus serve as an example of how a former industrial city can rebuild and continue to thrive in the twenty-first century.

Experimental and Bioinformatic Analyses of Coevolution of Primate Seminal Proteins and HIV/SIV

Emine Kahveci

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Faculty Advisor: Michael Jensen-Seaman Assoc. Prof.

ABSTRACT:

Male reproductive proteins are among the most rapidly evolving proteins in mammals, commonly attributed to sexual selection in the form of sperm competition. However, defense against sexually transmitted pathogens such as HIV/SIV might also be a contributing factor. Previous studies have demonstrated that amyloid fibrils formed from peptides derived from the abundant human seminal proteins semenogelin 1 (SEMG1), semenogelin 2 (SEMG2), and prostatic acid phosphatase (ACPP) are used by HIV to dramatically increase the infectivity rate. Considering the much longer history of SIV prevalence in nonhuman primates compared to humans and the large documented fitness costs associated with SIV infection in chimpanzees, we aim to test whether these proteins in primates have been evolving in response to HIV/SIV. We used maximum likelihood-based sequence analysis to identify codons evolving under positive and purifying selection in primates grouped by their presence or absence

of SIV. The regions of these proteins that form fibrils do not appear to be evolving significantly differently than the non-fibril forming regions. Empirically, we tested synthetic peptides corresponding to the fibril-forming regions of nine primate species for their ability to form fibrils in vitro and to enhance HIV infectivity using the TZM-bl reporter cell line. Human homologs consistently showed a greater ability to form fibrils and enhance infection, most notably compared to those from chimpanzee and gorilla. The inclusion of hypothetical ancestral peptides allowed us to infer the direction of change. Furthermore, using phylogenetic approaches to map character states we extended our prediction of ancestral phenotypes more broadly throughout primates. Taken together, our results are consistent with the hypothesis that several seminal proteins have evolved in response to sexually transmitted viruses in primates, with the strongest patterns seen when comparing the SIV-harboring chimpanzees with humans, who have only very recently been exposed to HIV.

***The Wife of a Pittsburgher: A Story Forged in Iron and Steel**

Cassidee Knott

McAnulty College and Graduate School of Liberal Arts || History

Faculty Advisor: Jennifer Taylor Dr

ABSTRACT:

Pittsburgh once overflowed with steel factories and mill workers, having been called the “Steel City”. Today, the legacy of steel lives on although the furnace flames have died out. The loss of steel affected, the male workers, the economy, and the job market. But what about the family life of those men?

In 2019, a former United States Steel’s Carrie Furnace worker, Jim Kapusta, sat for an oral history interview. He spoke of the loss of income, the unemployment, and his change in identity. As the sole bread winner, he voiced his concern for his family. Often when scholars look at industry in Pittsburgh, they look to see how the man felt; never the women.

The steel industry and later its loss took a toll on women too. During the good times, women saw their husbands less and feared the dangers of the industry. When steel declined, women had to find work, balance family and work life, and deal with unemployed husbands. Neither situation became ideal, but they endured.

Using Jim Kapusta’s interview and research on steel wives, Cassidee Knott wrote a short play about the women of steel. The play follows a steel wife managing her house just prior to the Carrie Furnace closing. Because her husband works nights, she struggles to keep her house in order while keeping her children from waking her husband. The play emphasizes the strain steel life places on the woman, the ‘loss’ of her husband, and her conflicted feelings on the mill. The use of the oral history in a play format allows oral histories to shine outside of academia. Often, oral histories are recorded, transcribed, and stored away. With the play, the oral history reaches audiences beyond those searching in an archive, changing the way they are disseminated.

Investigating the Probative Value of Touch DNA Evidence - A Landscape Study

Annaliese Black

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

Faculty Advisor: Pamela Marshall Ph.D

ABSTRACT:

Touch DNA evidence is received by forensic laboratories on a daily basis and the procedure for discerning each item's probative value varies between labs. An object must be handled repeatedly or for a prolonged period of time in order to retain sufficient touch DNA that will yield a DNA profile. Touch DNA is obtained via sloughed off skin cells on an object's surface, therefore brief interactions with objects or clothing often do not result in ample DNA. Objects that are handled by multiple individuals are more likely to contain multiple DNA profiles. Forensic labs have differing methodologies regarding which evidence gets processed and which evidence gets rejected. This inconsistency can lead to a lack of pertinent evidence collection as well as miscommunications in relation to what law enforcement constitutes as relevant evidence.

This study will consolidate data from crime laboratories to identify similar trends and distinguish differences in their procedures as they pertain to touch DNA evidence processing. Additionally, this study will discern procedural differences between independent crime laboratories and law enforcement run crime laboratories. Through the use of Qualtrics survey software and virtual interviews, members of crime laboratories will be consulted about their independent definitions of touch DNA, the frequency of its submission as evidence and the probative value that evidence holds based on the object itself. The results of this study will allow a comprehensive understanding of commonly practiced crime lab policies pertaining to touch DNA evidence as well as provide information regarding which objects are the most useful for obtaining a DNA profile and thus hold the most probative value. This study will be a useful tool for law enforcement and attorneys who wish to obtain a deeper understanding of crime lab procedures and their impact on submitted evidence.

***Catholic Terminal Sedation: A New Framework for Providing Terminal Palliative Sedation as a Requirement in Catholic Healthcare Organizations**

Noah Dimas

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Faculty Advisor: Gerard Magill Ph.D.

A B S T R A C T:

The present attitudes surrounding death and dying in the United States have been trending toward the acceptance of so-called "Assisted Death" interventions at the end-of-life (EoL), specifically Physician-Assisted Suicide. The acceptance of these interventions is rooted in the notion of autonomy within the American culture of medicine that generally states a patient is allowed to request whatever medical interventions they wish. As such, legislative bodies around the United States have begun to legalize Assisted Death in response to the regularly cited desire to die peacefully and without pain from an expected terminal illness. However, for Catholic healthcare organizations, there is a strong moral and theological objection to Assisted Death. In the Catholic Tradition, the intentional ending of life is highly immoral and deeply rejected. As such, in its present state, Assisted Death is not allowable in Roman Catholic healthcare organizations. However, Catholics are obligated to provide as much ordinary care as possible to the sick in all stages of life. Thus, Catholic healthcare organizations are faced with the dilemma to utilize Assisted Death and thereby practice immoral interventions or deny Assisted Death interventions and potentially cause the terminally ill great pain and suffering in their deaths. This essay will respond to this dilemma by proposing a new framework for Catholic healthcare organizations to utilize present methods of palliative sedation in ways that will reduce intractable pain and suffering in patients specifically as an EoL intervention. This usage of palliative sedation in Catholic healthcare organizations will allow for Catholic morality to be upheld, for the Catholic obligations to care to be met,

and for the desire of terminally ill patients to die without pain and in peace to be respected all without utilizing the present methods of Assisted Death.

Recommendations for Evidence-Based Interventions for Adverse Childhood Experiences (ACEs) in the School Setting

Chelsea Williams, Emily Wuenschell, MS.Ed.; Mary Comis, MS.Ed.

School of Education || School Psychology

Faculty Advisor: Tammy Hughes Ph.D., ABPP

ABSTRACT:

As of 2017, nearly half of all children in the United States had experienced an Adverse Childhood Experience (ACE) (Bethell et al., 2017). These negative, often traumatizing experiences include emotional, physical, and sexual abuse, emotional and physical neglect, and household dysfunctions such as spousal abuse, incarceration, substance abuse, mental illness, divorce, and loss of a parent (Felitti & Anda, 2010). The presence of ACEs in a child's life increases their risk for negative life outcomes including delinquency, negative physical and mental health symptoms, and risk-taking behaviors (Finkelhor, 2018). The frequency and intensity of these ACEs can increase the negative impact on the child's social, emotional, and behavioral development (Hughes et al., 2017). In the educational setting, children who experience ACEs are more likely to have learning, behavioral, social, and emotional difficulties that impact their lives across settings (Perfect et al., 2016; Bethell et al., 2017).

School districts using Multi-Tier System of Support (MTSS), that incorporate mental health services alongside academic support will be best suited to address the needs of children exposed to ACEs. Evidence based practices, such as Trauma Informed Care (TIC) can be implemented across the entire student population as a Tier 1 support (Cavanaugh, 2016). Also, Tier 2 small group counseling could be established to address the students' needs in specific areas such as grief or divorce (Riva & Haub, 2004; Marino et al., 2014; Makhlof, 2020). Finally, for students requiring Tier 3 support individual counseling services could be tailored to their exact needs (Patterson et al., 2018; Haas & Ray, 2020; de Arellano, 2014).

This presentation provides recommendations for selecting evidence-based interventions and programming based on the child's ACEs.

Contamination of Crime Lab Analysis Tools – A Review

Rachel Jacobs

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

Faculty Advisor: Pamela Marshall Ph. D

ABSTRACT:

Contamination can make something impure or corrupt simply by contact and has the potential to be detrimental to the forensic science process. The most vulnerable steps where contamination has the potential to be introduced to evidence are collection and analysis. This can be observed through secondary transfer and evidence exchange whether that's unintentional DNA profiles being present, or evidence being stored together. Evidence collection tools can be a prime mode of contamination during investigation. This can be seen through previously conducted research and the same can be said about the tools used for evidentiary analysis. First responders also have an immense impact on the amount of contamination introduced to evidence, along with other varying factors such as the weather and time constraints. With increasing sensitivity of low copy number DNA methods, it has become easier than ever to pick up single cells when analyzing evidence. This can create new challenges for investigators

who are attempting to analyze a specific profile for a case but are presented with mixtures of personnel responsible for collection. Contamination has the potential to lead to false positives and wrongful convictions, which is a major concern to the forensic field.

Contamination results in a loss of integrity with evidence and it is then impossible to return evidence to any previous conditions after the introduction of possible contaminants. Evidence that was corrupted will not produce routine results, and cannot be fixed or reversed, which can have a severe impact in the courtroom. This study will analyze articles from scientific journals to form a deeper understanding of contamination and its effects on forensic analysis. The review will be comprised of prior research on how contamination of specific evidence collection and analysis tools can affect the overall forensic process.

Keeping Crypts and Secret Warehouses: Archiving Folklore and Paranormal Records

Zachary Ference

McAnulty College and Graduate School of Liberal Arts || History

Faculty Advisor: Thomas White Professor

ABSTRACT:

This paper deals with the archiving folklore records and records pertaining to paranormal beliefs. Folklore and Paranormal beliefs are often different sides of the same coin: local legends going back centuries often form the basis of modern reports of strange creatures in a forest or ghostly figures in a house. Folklore studies are seen as a cultural window into a specific society and its beliefs. As such, folklore studies have gained academic archives established by such places as universities or governments. An example of this would be the Robert V. Mills Archives of Northwest Folklore at the University of Oregon, which has provided a template of how other academic folklore archives are can be assembled and utilized. Beyond study, folklore can help peoples rekindle their interest in their history and culture after years of dominance and oppression. Paranormal beliefs are a modern extension of folklore and as such can provide the same insights into modern societies and cultures. Unlike folklore, contemporary paranormal beliefs are not usually studied in a formalized academic manner. This type of research has a stigma attached to it due to the fringe nature of these beliefs. Existing popular archives of paranormal beliefs differ from their academic counterparts. They may be digital archives and repositories or small collections that straddle the line between tourist attraction and actual archives. Attention should be given to the serious study of paranormal beliefs due to the close nature of the paranormal and folklore and the insights these beliefs can give on the societies that hold them.

***Long-Term Object Permanence and Sitting in Infants with Motor Delays**

Karl Jancart

School of Education, Rangos School of Health Sciences, McAnulty College and Graduate School of Liberal Arts || Physical Therapy

Faculty Advisor: Regina Harbourne PT, Ph.D.

ABSTRACT:

Object permanence (OP), the ability to understand that objects exist when they are unseen, is a cognitive construct developed in infancy (Piaget, 1954). The emergence of OP has been linked to motor skills in typically developing infants (Anderson et al., 2013; Horobin & Acredolo, 1985); however, the relationship between the motor skill of sitting and OP in children with motor delays is unknown. This study investigated the development of OP in infants with varying levels of motor delays and the

relationship between sitting skill development and OP skill over time. Infants (n = 37; baseline mean age = 12mos, 14dys), stratified into groups of mild, moderate, and significant motor delay, participated in a randomized controlled trial (Harbourne et al, 2018). Children were assessed at baseline, 1.5-mos, 3-mos, 6-mos and 12-mos. OP behaviors were coded on a 20-point ordinal scale using Datavyu software. Sitting skill was measured using the Gross Motor Function Measure-88, sitting dimension (GMFM-SD). A Kruskal-Wallis test with Bonferroni correction indicated significant differences between the 3 groups' OP scores at all 5 assessments (p < .001). Dunn's post hoc test showed significant differences between the mild and significant (adj. p range = <.001 - .008) and the moderate and significant (adj. p range = <.001 - .018) groups for OP scores at each visit. Spearman's rho statistic showed significant positive correlations between OP and GMFM-SD scores with r ranging from .503 to .762 (p < .001) at all 5 assessments. Correlations of change scores for OP and GMFM-SD between baseline and 6-months, and between baseline and 12-months, revealed weak positive correlations for 6- (r = .323, p = .051) and 12-months (r = .327, p = .048) assessments, which suggests non-linear progressions of skills. Long-term follow-up could reveal a critical linkage among motor delays, OP development, and cognitive development.

Water quality surveys show mine drainage and conventional gas in the Crooked Creek watershed, tributary the Allegheny River in Southwestern Pennsylvania

Katherine Stupar

Bayer School of Natural and Environmental Sciences || Biology

Faculty Advisor: Brady Porter Ph.D.

ABSTRACT:

Crooked Creek is a tributary of the Allegheny River with a drainage area of 277 square miles. It has been historically affected by mine drainage pollution. Extensive cleanup and monitoring efforts by the Commonwealth of Pennsylvania have taken place over the last four decades. Here we perform a historical trend analysis of the water quality of Crooked Creek incorporating data collected at five different sites from July-September 2020. This data is used to determine how the fish communities and water chemistry have been affected by mine drainage pollution and how they have changed over time with cleanup efforts. Water quality parameters were measured using a YSI (Yellow Springs Instrument) multimeter. Cation and anion levels were measured using inductively coupled plasma - optical emission spectrometry (ICP-OES) and inductively coupled plasma - mass spectrometry (ICP-MS). Mass ratio-analysis was used to identify potential areas of contamination by conventional gas, unconventional gas, and/or mine drainage. Backpack electrofishing surveys were conducted at five sites along Crooked Creek to provide an assessment of the fish community and to conduct a biological analysis of water quality using the Index of Biotic Integrity (IBI). Mass ratio analysis shows the likely presence of mine drainage and conventional oil throughout the system as well as conventional gas at one of the five sites examined. Overall IBI scores indicate some areas of very good to exceptional water quality while others only marginally good. The two sites with marginally good IBI scores both had low numbers of sucker species which indicates past and present water quality issues. While historical data indicates the steady and substantial decline of the intensity of mine drainage, there is still evidence of its presence throughout the watershed. While the system has improved regarding mine drainage, the presence of conventional gas could pose a new threat to water quality.

Osteological, Biochemical and DNA Analysis of Ancient Human Remains from Lithuania

Chelsea Timmerman

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

Faculty Advisor: Lisa Ludvico Ph.D.

ABSTRACT:

When human skeletal remains are found at a crime scene or an archaeological site, identification is important, but can be difficult due to decomposition. In cases where ancient human remains are found, DNA is often highly degraded due to extended exposure to outside elements. Identifying characteristics of the remains can be determined through osteological, biochemical and DNA analysis.

An archaeological site in Lithuania was excavated in 2012, where the remains of nine individuals were found. These skeletal remains were estimated to be from 200-400 AD. An assemblage of 8 ribs, 1 radius, 8 molars and 9 temporal bones from the archaeological site were sent to Duquesne University in 2019. Osteological, biochemical and DNA analysis were performed on the bone samples to provide insight into the identification of the individuals buried there.

Osteological analysis was conducted using morphological features and archaeological reports were examined to determine general identification of the individuals. Such identifying factors included sex, age, and any trauma to the remains. When conducting analysis on skeletal remains, bones are typically sanded to remove the outer layer of contamination and this sanded material is often discarded. However, a biochemical analysis using gas chromatography-mass spectrometry was performed to determine components present in the bones due to decomposition or environmental factors that act as contaminants or downstream inhibitors for DNA analysis. DNA analysis was performed on these remains using mitochondrial DNA, specifically the hypervariable region I, due to its high copy number per cell, since ancient DNA is often highly degraded. Demineralization and a Hi-Flow[®] extraction protocol was performed, followed by quantification and amplification using a mini primer set created by the Armed Forces DNA Identification Lab. The DNA samples were sequenced and compared to known data set sequences from regions around Lithuania to infer any possible maternal lineages.

Evaluating threats to the water quality of Little Buffalo Creek and Sarver Run watersheds through water quality analysis and backpack electrofishing surveys.

Riley Williams

Bayer School of Natural and Environmental Sciences || Biology

Faculty Advisor: Brady Porter Ph.D.

ABSTRACT:

The Buffalo Creek watershed in southwestern Pennsylvania has a total drainage area of 171 square miles. The focus of this study is on Little Buffalo Creek and its major tributary, Sarver Run, which comprise about 21% of the drainage area of the Buffalo Creek Watershed. 64.8% and 52.2% of the stream miles within Little Buffalo Creek and Sarver Run are impaired. Impairment sources to Little Buffalo Creek include agriculture, riparian deforestation, on-site wastewater, and urban runoff. However, impairment sources to Sarver Run are unknown. The Audubon Society of Western Pennsylvania (ASWP) has coordinated conservation efforts to improve the health of the Buffalo Creek Watershed. Our goal was to gain a better understanding of the water quality of Little Buffalo Creek and Sarver Run. Over 70 water samples were collected from June to December of 2020. Inductively coupled plasma mass spectrometry (IC-PMS) and inductively coupled plasma atomic emission spectroscopy (ICP-OES) were conducted to analyze chemical composition. Mass ratio analysis comparing Br/SO₄ and Mg/Li, Ca/Mg and Ca/Sr, Mg/Na and SO₄/Cl, and SO₄/Cl and Mg/Li were performed on each grab sample to assess possible sources of water pollution. Six backpack electrofishing surveys were conducted and Ohio Index of Biotic Integrity (IBI) was calculated for each site. Results of these fish surveys were compared to those calculated for the same sites in 2013. Mass ratio analysis suggests that conventional gas and mine drainage may be influencing the water quality of both systems. A significant

decrease in IBI is observed at one of the locations surveyed in both 2013 and 2020. Percent lithophilic species decreased significantly at one site, indicating potentially increased sedimentation. Our data will help guide conservation efforts outlined in ASWP watershed conservation plan.

****Learning from the Two Great Depressions of McKeesport, PA**

Taylor Noakes

McAnulty College and Graduate School of Liberal Arts || History/ Public History

Faculty Advisor: Andrew Simpson Ph.D.

A B S T R A C T:

For the older residents of the steel town of McKeesport, PA, there were two Great Depressions: the one during the 1930s we've all heard about, and another during the 1980s. In local memory, the second depression seemed far worse than its famous precedent.

In 1982 and 1983, just as the American steel industry began to implode, a federal government make-work program supported an initiative to train McKeesport youth in oral history techniques. Students interviewed some of the older residents of the community who compared their experiences during the Great Depression of the early twentieth century with the collapse of heavy industry and manufacturing during the first years of the Reagan administration. Though most spoke of the hunger, poverty and evictions that so colored their youth, they also recalled a greater sense of hope and community during the Depression than in the 1980s. Indeed, many expressed concern there was no hope for the future of their city. ^{L L L}_{SEP SEP}

This presentation, based on a research paper prepared for Dr. Andrew Simpson's History of Urban America course, will compare and contrast the economic, social and political situation in McKeesport and the Mon Valley during the Great Depression and the collapse of the steel industry in the early-mid 1980s. Drawing from a variety of sources (including oral history, land-use maps & newspaper reports among others), the presentation will focus on solutions—both from the grassroots and from government—that helped weather the storm in the 1930s. It will also look back at McKeesport and the Mon Valley's shared history as a source of potential solutions to contemporary problems—such as protracted economic decline—and examine how community organizing back in the 1930s set the stage for postwar prosperity in the 1950s. McKeesport's future may very well lie in its past.

***Seeking Moral Equality within Professional Hierarchies: An Ethical Analysis of Interprofessional Conflict in the Healthcare Environment**

Anna Meurer

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

Faculty Advisor: Gerard Magill Ph.D.

A B S T R A C T:

Modern healthcare relies on interprofessional collaboration. Operationalized correctly, it makes exemplary use of the diversity of strengths brought by different professions. Coordinated with institutional resources, it is key to providing timely, high-quality, and efficient care. However, the interprofessional model is not without its challenges, especially in the case of ethical dilemmas. Even though there may be as much conflict between members of a healthcare team as there is between the team and patient, frameworks for handling such dilemmas are lacking. This is partially because many teams operate according to a technical hierarchy that positions physicians, with their extensive training and expertise, as the key decision makers. A claim to equal moral primacy is tenuous, but the mindset remains entrenched even as the historical "captain of the ship" doctrine has declined.

Using two contrasting cases, I highlight the ethical challenges inherent in the interprofessional model and defend the claim that moral jurisdiction, or the areas in which individuals may or are obligated to act, is not synonymous with professional role responsibilities. Ignorance of the distinction may fail to prevent moral injury—either from a single major event or the culmination of several small events—and subsequently lead to poor team function, burnout, and turnover. This is particularly true if professionals routinely feel morally disempowered in areas tied closely to their professional identities. I extend the debate on moral equality to suggest four standards to help determine appropriate moral jurisdictional boundaries among teams: distance, gravity, alignment with expertise, and impact. In addition, I argue that a comprehensive institutional strategy is necessary to ensure the balance between optimal team functioning and the wellbeing of healthcare professionals. Core elements of such a strategy include formal and informal pathways for accountability, investment in interprofessional education, and the involvement of a robust ethics service.

***Effects of Alpha Stim® on Reported Anxiety Levels in Homeless Patients in an Extended Stay Shelter Clinic**

Melody Hahn

Rangos School of Health Sciences || Pre-Medical & Health Professions Post Baccalaureate Program
Faculty Advisor: Paula Sammarone Turocy EdD, LAT, ATC

ABSTRACT:

The homeless have higher rates of psychiatric illness and may be at increased risk of developing substance abuse. Finding alternative treatments for psychiatric illnesses like anxiety that do not include potentially addictive medication is important. The Washington City Mission Clinic provided Cranial Electrical Stimulation (CES) treatments for homeless patients with anxiety using the Alpha Stim® M Unit by EPI, Inc. The purpose of this study was to examine anxiety rates in homeless residents and the effect of CES treatment on self-reported anxiety symptoms.

Twenty-nine patients, 21 – 68 years, sought anxiety care at the clinic. Due to incomplete medical records and one outlier, only data from 79 treatment sessions experienced by 24 patients were included in this study.

Pre-treatment anxiety levels were assessed with the Hamilton Anxiety Rating Scale (HAM-A), Generalized Anxiety Disorder Assessment (GAD-7), or Likert Scale. Each patient received the CES treatment following an established protocol. Patient anxiety levels were assessed post-treatment with the same anxiety scale as pre-treatment.

Paired t-tests and Wilcoxon Signed Rank tests ($p < .05$) showed patient anxiety levels significantly improved following CES treatments (HAM-A: t-test $p = 0.00$, Wilcoxon $p = 0.000$; and GAD-7: t-test $p = 0.031$, Wilcoxon $p = 0.011$). The mean differences in reported scores at 95% confidence interval were 6.8 – 10.19 points on the HAM-A and 2.89 – 7.10 points on the GAD-7. Patients reported mild to moderate anxiety prior to treatment. Post treatment, patients reported very low to mild levels of anxiety. While improvements were noted in treatment sessions where Likert Scales were used, improvements were not significant.

Due to the significant improvements in anxiety levels, CES treatments using the EPI Alpha Stim® M was determined to be effective for the treatment of anxiety. Further randomized controlled trial studies and clinical trials are needed.

***Decreased provisioning of aquatic arthropod prey impacts the early development of migratory songbirds**

Brandon Hoenig

Bayer School of Natural and Environmental Sciences || Biological Sciences

Faculty Advisor: Brady Porter Ph.D.

ABSTRACT:

A 2019 publication in the journal *Science* found that North America has lost nearly 3 billion birds since 1970, with one avian group, the wood-warblers, losing over 600 million individuals alone. Many species within this family of charismatic songbirds migrate to North America to initiate their breeding season and capitalize on influxes of arthropod prey to feed to their altricial young. Unfortunately, arthropod populations have experienced similarly drastic declines over this period, which likely places added pressure on breeding adult songbirds attempting to secure sufficient nutrients for their offspring. As threats to both arthropod and avian populations are expected to worsen in the coming years, it is imperative that researchers not only study the relationship between breeding songbirds and their prey, but also the repercussions that these birds incur as a result of prey limitations. In this study, we utilized DNA metabarcoding and stable isotope analysis in conjunction with traditional, morphometric techniques to understand how variation in arthropod prey availability impacts the diet and development of nestling Louisiana waterthrush. Louisiana waterthrush are riparian-obligate, migratory wood-warblers that preferentially breed on high-quality streams and specialize on nutrient-dense, aquatic arthropod prey, such as pollution-intolerant mayfly and stonefly species. However, when aquatic prey abundance is limited by stream pollution or seasonal variation, adult waterthrush are forced to provision their offspring with terrestrial prey, which lack the important dietary lipids found in aquatic prey. Our preliminary results indicate that decreased provisioning of aquatic prey taxa by adult waterthrush is associated with a decline in nestling physiological condition, and that nestlings in poorer condition display lowered concentrations of glucose and lipid metabolites essential for their development. These results further demonstrate the importance of preferred prey for avian species and highlight the potential for molecular techniques to better inform conservation decisions for North American bird populations.

Quantification of Toxins in Commercial Dietary Supplements Using Stir-Bar Sorptive Extraction, GC-MS, and Isotope Dilution Mass Spectrometry

Ashley Dillard

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

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

ABSTRACT:

Toxins are chemicals that have adverse effects on human health. Dietary supplements consisting of botanical material have been found to contain toxins. Dietary supplements are poorly regulated and improper chemistry when formulating these products can cause harmful and persistent toxins to remain in the supplements after processing. Herbal and dietary supplements are composed of materials that are often unknown or not consistent with labeling. The goal of this study was to develop methods to test dietary supplement samples for the presence or absence of toxins including glyphosate and persistent organic pollutants, such as polycyclic aromatic hydrocarbons and organochlorine pesticides. Developments of these methods allows for precise, sensitive, and accurate quantification of toxins in commercially available plant based organic dietary supplements.

In this study, methods were developed to quantify toxins in 12 different dietary supplements using stir-bar sorptive extraction with a polydimethylsiloxane coated stir bar, GC-MS/MS or GC-MS, and Isotope Dilution Mass Spectrometry (IDMS). Due to glyphosate being a polar molecule, to be extracted using a

polydimethylsiloxane coated stir bar, it was first derivatized using N, O-bis (trimethylsilyl) trifluoroacetamide with 1% tetramethylchlorosilane. A known concentration of glyphosate C-13 was also spiked into all of the samples during the extraction step. This spike allowed for IDMS to be used for quantification purposes. By adding an isotopically enriched form of glyphosate into the sample, the isotope ratio could be measured. Within these dietary supplements, on average, 12 persistent organic pollutants were detected in each of the samples with an average concentration of 1.31 ng/g. Each analyte was converted into daily intake by considering what the suggested dosage of each dietary supplement is per day. The development and application of this method is important to further identify and quantify the presence of pollutants in dietary supplements and foodstuffs.

Decipher Yelp Elite Squad Badge

Shristee Sinha

A.J. Palumbo School of Business Administration || School of Business

Faculty Advisor: Wenqi Zhou Dr.

ABSTRACT:

Yelp is an American based public company which publishes crowd-sourced reviews about local businesses on Yelp.com website and Yelp mobile app. It encourages individuals to contribute through writing reviews about various local businesses in their towns. These reviewers are officially recognized by Yelp by awarding Yelp Elite Squad badges on the yearly basis. These Elite badge algorithms are not disclosed in the public domain, and as a result, we attempt to decipher them to understand the expert recognition mechanism on Yelp. Our findings can offer suggestions to Yelp users who are eager to grow their reputations in the review community as well as provide a profile picture of Yelp badge owners.

Using large-scale Pittsburgh restaurant data, we have observed that the reviewers are awarded Elite Squad badges more on the quantitative and qualitative reviews and less on their networks. Being a little counter-intuitive, a high number of friends or fans do not guarantee Yelp reviewers the Elite badge. Instead, the selection criteria put more weights on the useful review count and the user compliment attributes like Useful, Cool, Funny, Hot etc on their profiles. Through reverse engineering the Elite badge algorithms, we also observed that these badges were extensively awarded in the year 2016, 2017 and 2018. In addition, gender difference also exists as a greater number of Elite badges were distributed to female reviewers in these years. This finding supports prior theories that female reviewers are more expressive and tend to give back to the community more than males. They are also more tolerant and less critical, based on their higher average rating than males'. Another possible explanation for the much larger number of female Elite badge can be related to the "#MeToo" movement, through which Yelp is trying to give more public highlights to female reviewers.

Effects of solvent cluster size on the conformational landscape and decarboxylation of malonate

Angel Tamez

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

Faculty Advisor: Jeffrey Evanseck Ph.D.

ABSTRACT:

Decarboxylation reactions are ubiquitous across chemical and biological disciplines, yet the exact origin of non-catalytic effects remain elusive. Specific effects of solvent on structure and energetics have not

been well described, and in fact, may have been inappropriately extended from gas-phase observations. Within our study, Truhlar's Minnesota functional, M062X, with the jul-cc-pvdz basis set was used for geometry optimizations, energy evaluation, and frequency analysis, supplemented with second-order Møller-Plesset (MP2) theory. Bulk-phase solvent effects have been approximated using Tomasi's polarizable continuum model (PCM) for malonate embedded, in water cluster sizes of one- to fifteen-water molecules. Our first principal discovery is that in explicit solvent, malonate adopts a novel orthogonal conformation as the ground state (GS) over the gas-phase pseudo-chair conformation. When malonate is embedded in a ten-water cluster, the orthogonal conformation is preferred over the commonly assumed pseudo-chair conformer by ca. 2 kcal/mol. In our second finding, the computed uncatalyzed activation enthalpy (ΔH^\ddagger) is consistent with the experimental observation of 30.0 kcal/mol for three cluster models investigated. Cluster sizes of three-, ten-, and fifteen-water molecules in the solution-phase computed a ΔH^\ddagger error of 0.6 kcal/mol, 0.0 kcal/mol and 0.2 kcal/mol, respectively. The fifteen-water cluster model was required to satisfy all donor/acceptor positions through a hydrogen bond network. Although the fifteen-water cluster is a representative model, the three-water cluster model delivers the differential solvation effects between the GS and transition structure (TS) to converge to experimental observation. The three-waters identified are referred to as the hydration buckle that selectively stabilizes the GS of malonate with four strong, direct hydrogen bonds. Breaking the strong hydrogen bond network to the TS computes the ΔH^\ddagger to experimental observation. Fundamentally, this study has implications to other α -keto acids and may explain the conformation adopted by these acids prior to entry into enzymatic processes.

***"Webside" Manner? Fostering Trust and Communication in the (Virtual) Patient-Healthcare Professional Relationship**

Lukas Chandler

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

Faculty Advisor: Lukas Chandler MA

ABSTRACT:

Medical innovations can equip clinicians with the tools to make patient care more

effective, efficient, and personalized. However, rapid employment of new technologies can

neglect ethical features of the communicative relationship between patient and professional, such as care continuity, trust, and authentic rapport-building. Institutional constraints, including cost reduction and efficiency incentives, further compound and confuse challenges in patient-professional communication. Virtual healthcare in telemedicine or telehealth changes what it means to be "seen" in a medical context by holding the clinical consultation via videoconferencing or voice calls. Virtual clinical modalities can equip healthcare providers to reach underserved populations for specialty, continuous, and episodic care. However, these modalities also present real challenges to the clinical phronesis or practical wisdom of healthcare professionals in the clinic.

This presentation offers a start for the needed bridge-building between bioethics and health communications literature by 1) explicating historical elements of patient professional relationships, 2) articulating virtual healthcare communication as a distinctive bioethics issue because of its connection to veracity and trust, and 3) identifying the care delivery modality of telemedicine as an opportunity to 3a) enhance the communication abilities of healthcare professionals, which may in turn 3b) improve patient trust in the relationship with the professional. These improvement opportunities can only begin to be realized with a refreshed sense of clinical phronesis in virtual care settings. Healthcare professionals require training and new approaches to practical wisdom in virtual consultations. Bridging

the gap between bioethics and communications literature may offer a richer and more useful understanding of clinical phronesis.

The effects of microbial environment and temperature on neurodevelopment in larval amphibians.

Kyle Emerson

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

Faculty Advisor: Sarah Woodley Ph.D.

ABSTRACT:

Microbes colonize the vertebrate gastrointestinal (GI) tract at birth or hatching as part of a symbiotic relationship important to host development. These microbes shape host physiological development, including neurodevelopment, through the microbiota-gut-brain (MGB) axis. Many environmental factors impact the gut microbial composition and function, including microbial community and temperature. Amphibians are an excellent model to study the impacts of environmental factors on the MGB Axis because all of development occurs in the external environment. Here, we investigated whether manipulating the microbial environment as well as temperature impacted growth, development, relative brain size and brain shape in Green Frog tadpoles (*Lithobates clamitans*). We hypothesized that depleting the microbial environment would reduce growth, reduce relative brain mass, and alter brain shape. We hypothesized that increased temperature would compensate for a depleted microbial environment due to the metabolic effects of temperature. We raised tadpoles in autoclaved pond water (depleted microbial environment) or natural pond water (control) at 14, 22 or 28°C. Microbial depletion resulted in tadpoles with larger body masses and relatively smaller brains compared to control animals. Increasing temperatures resulted in tadpoles with larger body masses and relatively larger brains. We also found that temperature, but not microbial environment, affected brain shape. There were no interactions between microbial environment and temperature. These results support our hypothesis that manipulating the microbial environment as well as temperature during development influences neurodevelopment. Future studies will determine whether these changes in brain size and shape are related to differences in behavior or performance.

Competitive Inhibition of Rodent Steroid Sulfatase by Curcumin

Barathi Balasubramonian

Bayer School of Natural and Environmental Sciences || Biology

Faculty Advisor: Kyle Selcer Ph.D

ABSTRACT:

Herbs have been used as natural remedies for ailments from ancient times across many cultures. Research has shown that the effects of these herbs are due to various phytochemicals present in their extracts. Curcumin is a chemical present in the spice turmeric (from *Curcuma longa*) with known and purported physiological benefits against cancer and inflammation as well as improved immunity and other health effects. Researchers have reported that some of these effects are mediated by a regulatory effect of curcumin on the NF- κ B pathway. We have been studying an enzyme, steroid sulfatase (STS), that is also regulated by the NF- κ B pathway. We took an interest in the effect of curcumin on STS activity due to its effects on NF- κ B and due to curcumin having structural groups that are very similar to some found in the steroid hormone estradiol, a product of STS action. Our goal is to determine if curcumin affects STS activity, and if so, if it does so through a regulatory mechanism or through a substrate inhibitory mechanism or both. STS activity assays were performed in cellular preparations such as

homogenates and microsomes of rodent (rat and mouse) tissues and cell lines (NIH 3T3) in the presence and absence of curcumin. We found that both 10 μ M and 20 μ M concentrations of curcumin inhibited STS activity. Enzyme kinetic inhibition assays revealed that curcumin acts a competitive inhibitor of STS activity. Our next step will be to examine possible regulatory effects of curcumin on STS protein levels using specific STS immunoassays. Our data are the first to reveal competitive inhibition of STS by curcumin, and they may help to reveal the mechanism behind some of the beneficial effects of this widely used phytochemical.

Characterization of genes involved in genome segregation and condensation in *Streptomyces venezuelae*

Catherine Bruno

Bayer School of Natural and Environmental Sciences || Biological Sciences

Faculty Advisor: Joe McCormick Ph.D.

ABSTRACT:

The structural maintenance of chromosome (SMC) complexes play a crucial role during genome segregation in all life. In bacteria, the condensin complex consists of three critical proteins for proper function: SMC and segregation and condensation proteins ScpAB. ScpA belongs to the kleisin protein family and a monomer interacts with the head and coiled-coil region of SMC through its C-terminal winged-helix domain and N-terminal helical domain. ScpB binds to the central region of ScpA as a dimer. Previously, our laboratory isolated *scpA* and *scpAB* mutants in *S. coelicolor* and compared the mutant phenotypes with that of *smc*. The difference in phenotypes was distinct; the loss of *scpA* or *scpAB* displayed a change in the morphology of the condensed nucleoid and did not give rise to a significant segregation defect. Based on the results, it was speculated that ScpA and ScpB not only interact with SMC, but with additional proteins required for regulating development-associated condensation and segregation. While chromosome segregation has been studied in *S. coelicolor*, it will be beneficial to now use *S. venezuelae*. Unlike *S. coelicolor*, *S. venezuelae* can sporulate fairly synchronously in a submerged liquid culture, which makes it an advantageous system to use for genetic, biochemical and time-lapse microscopic analyses. In order to investigate the potential role of ScpAB in *S. venezuelae*, single and double null mutants were created by recombineering. Next, the mutants have been observed using phase-contrast and fluorescence microscopy compared to wild-type and *smc* mutants. In addition, the mutants have been complemented with *scpAB+*. Based on the results of *S. coelicolor*, we will compare the roles of *scpAB* during chromosome segregation, and look to identify other crucial interactions using *S. venezuelae*.

Development of a micro fluidic viscoelastic hemostatic assay

Shay Kent

Rangos School of Health Sciences || Biomedical Engineering

Faculty Advisor: Melikhan Tanyeri Ph.D

ABSTRACT:

Blood coagulation disorders are disruptions in the body's ability to control blood clotting. It can result in either insufficient clotting causing an increased risk of bleeding or excessive clotting obstructing blood flow. The rapid and accurate diagnosis of coagulopathies is an important, unmet need in the clinical setting. Rapidly identifying the source of bleeding, either acquired or inherited, is critical to reduce the risk of major blood loss and deliver personalized hemostatic therapies. Viscoelastic hemostatic assays, or VHAs, deliver an effective solution to the diagnostic testing of coagulopathies by evaluating global hemostatic function using whole blood rather than plasma. VHAs are functional blood tests that monitor

all phases of coagulation by measuring the viscoelastic properties of blood during clot formation and degradation to help determine the root cause of bleeding. Currently, the two major commercialized VHA techniques are the thromboelastometry (TEM) and the thromboelastography (TEG). These two instruments, however, have a high acquisition cost, bulky benchtop size, and are mostly limited to use in surgical procedures. Our research has focused on developing a microfluidic viscoelastic hemostatic assay (uVHA) to facilitate point-of-care hemostatic tests using a method based on digital microfluidics where whole blood samples are partitioned into picoliter sized emulsion droplets. These devices have been fabricated in a clean room environment using soft lithography and photolithography techniques and are capable of determining viscoelastic properties of coagulating blood as a function of time. We employ digital microfluidics where blood samples will be split into nanoliter sized droplets within a microchannel, and viscoelastic properties of blood is deduced from the droplet properties such as droplet length and interdroplet distance. The overarching goal of our research is to develop a novel blood coagulation analysis device, capable of deducing viscoelastic properties of whole blood under low shear conditions, thereby providing information about global hemostatic function from the beginning of clot formation through clot retractions and fibrinolysis. These portable and low cost uVHAs would reduce the footprint and overall cost, broaden potential applications beyond emergency and surgical procedures and enable adoption by military medics for field diagnosis of combat trauma patients.

Mapping of Pediatric Chronic Illness Sequelae to Inform Evaluation Planning

Braelyn Tracy

School of Education || School Psychology

Faculty Advisor: Ara Schmitt Ph.D.

ABSTRACT:

School psychologists must be aware of the psychoeducational sequelae of pediatric chronic illnesses in order to engage in effective and comprehensive evaluation planning. This study identified 11 pediatric chronic illnesses frequently encountered by school psychologists and then surveyed the empirical literature to learn about the neuropsychological and educational sequelae of the conditions, as well as the amount of supporting evidence. Results reveal that school psychologists must be prepared to evaluate across numerous functional domains for most chronic illnesses. Implications for training and practice are discussed.

Experiences of Speech-Language Pathology Graduate Students during a Time of Educational Transition due to COVID-19

Emily Adams, Katherine Carlos

Rangos School of Health Sciences || Speech Language Pathology

Faculty Advisor: Heather Rusiewicz Ph.D.

ABSTRACT:

Technology use in higher education has become increasingly present across colleges and universities over recent years. However, in March 2020 the immediate and complete reliance upon technology and online learning occurred because of the COVID-19 pandemic. Speech-language pathology (SLP) graduate students and educators adapted to online modalities necessary to support academic and clinical coursework. The purpose of this study is to collect and examine the qualitative perceptions and experiences of graduate SLP students during this time of emergency reliance upon technology for learning due to COVID-19. In this phenomenological study, themes regarding students' experiences with educational technology for teaching and learning were explored using a social media-style video

message board. This study is part of a larger investigation of the use of technology for student learning in SLP undergraduate and graduate programs. Understanding the experiences and perceptions of students regarding technology and virtual learning during this time of emergency closure will provide insight for best practices for the online delivery of clinical and academic instruction in SLP higher education, as well as the use of technology for face-to-face teaching and learning.

Determining the Structure-Activity Relationship of the Redox-Neutral organocatalytic Mitsunobu reaction

Matthew Martin

Bayer School of Natural and Environmental Sciences || Chemistry

Faculty Advisor: Aaron Bloomfield Ph.D.

ABSTRACT:

Late 2019 Denton and coworkers published “Redox-Neutral organocatalytic Mitsunobu reactions” in which their team had developed an organophosphorus catalyst capable of performing the Mitsunobu reaction, albeit with limitations. Through their mechanistic studies they elucidated the rate determining step (RDS) to be the first step of the mechanism’s pathway, the elimination of water. In September of 2020, however, Houk and coworkers published a computational study of Denton’s mechanism where they claimed the RDS was actually the last step of the catalytic cycle in which an SN2 reaction takes place and the catalyst resting state is regenerated. Due to these disputed claims of the RDS, our laboratory group aims to settle these disputing claims through the synthesis of twelve novel analogues testing the catalyst efficiency. Through a wide variety of catalyst analogues our aim is to elucidate the structure-activity relationship (SAR) of the catalysts to delineate the RDS and improve the energetics of the catalyst.

Investigating Diabetes Distress, Self-Care and Personal Health Record Use

Khariah Fisher-Grace

School of Nursing || Nursing

Faculty Advisor: Melanie Turk PhD

ABSTRACT:

Diabetes impacts over 34 million Americans and contributes to morbidity and mortality when it is unmanaged (American Diabetes Association [ADA], 2020). Diabetes distress (DD) is an under recognized condition that at high levels has a significantly negative impact on diabetes self-care, higher hemoglobin A1C, and lower self-efficacy (ADA, 2017). Studies have linked personal health record (PHR) use to improvements in clinical indicators of managed diabetes such as lower hemoglobin A1C (HbA1c), blood pressure (BP), and Low-Density Lipoprotein-cholesterol (LDL-C) (Coughlin, Williams, & Hatzigeorgiou, 2017 ; Fonda et al., 2009; & Tendeforde, 2012). What remains unknown is the impact of diabetes distress on intention to use, and actual use of a PHR. The primary purpose of this research is to explore the relationship between levels of diabetes distress, self-care behaviors, intention to use, and actual usage of a PHR within 30 days of hospital discharge in persons with Type 2 Diabetes Mellitus (T2DM).

Using a descriptive correlational research design, a study was conducted with 99 hospitalized patients. Patients with T2DM were surveyed during their hospital stay to determine their level of diabetes distress, evaluate their participation in self-care behaviors, and assess their intention to use a PHR using validated and investigator developed tools.

Actual PHR use was examined 30 days after the patients were discharged. Results of the study demonstrated a relationship between diabetes distress and HbA1c ($p = .01$) as well as a relationship

between diabetes distress and intention to use a PHR ($p = .05$). Understanding the relationship between diabetes distress, clinical indicators of diabetes self-management, and PHR use may help hospitals determine how best to provide diabetes self-management education and promote diabetes self-care for acute care patients who have T2DM.

***Detection and Quantification of Ketamine in Alcoholic Beverages using Paper Spray Coupled with Tandem Mass Spectrometry**

Dylan Arrigo

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

Faculty Advisor: Valerie Lijewski Ms

ABSTRACT:

Drug facilitated sexual assault (DSFA) cases have become more common in club scenes and isolated settings. DSFA is achieved by using common sedative drugs like Ketamine, GHB (Gamma Hydroxybutyrate), and Rohypnol to spike the victim's beverages. Usually, the victim's blood or urine would be tested for the presence of the drug, but testing the drink is a viable option if its available. Current methods of detection and quantitation are LC-MS (Liquid Chromatography-Mass Spectrometry) and GC-MS (Gas Chromatography-Liquid Chromatography). An alternative method of Paper Spray-Tandem Mass Spectrometry (PSI-MS/MS) can be an alternate solution to these extraneous methods. This study aims to optimize a method for the detection and quantitation of Ketamine in an alcoholic beverage using PSI-MS/MS. After a very small extraction process which consists of taking the drink and dropping it onto a piece of paper, and the sample is ready to be ran on the instrument. The method was first optimized with a surrogate drug, phenethylamine, in a 20:80 mixture of ethanol and water. This method was then applied with ketamine in a vodka soda, and vodka cranberry matrix. For quantitation, an internal standard was used with a calibration curve ranging from 1.5-0.046mg/mL. The ratios of the drug vs. the deuterated standard's peak intensities were used for quantitation. The limit of detection (LOD) and limit of quantitation (LOQ) as well as the relative standard deviation was calculated for the quantitation experiments. This study shows how easy and fast Paper Spray can be used to analyze multiple samples in the time that it would take for one sample to run through LC-MS or GC-MS. This can also be extended to an infield instrument that can be used on the crime scene, to quickly see if the victim's beverage was spiked.

***Mapping meaning at the crossroads of crisis: Narratives of renewal in the midst of the opioid epidemic**

Preston Carmack

McAnulty College and Graduate School of Liberal Arts || Communication and Rhetorical Studies

Faculty Advisor: Janie M. H. Harden Ph.D.

ABSTRACT:

This study explores the role of meaning in a crisis situation through the use of Viktor Frankl's tripod of meaning and Matthew Seeger and Timothy Sellnow's narratives of renewal. Drawing from focus groups conducted in a large mid-Atlantic city where community members are embedded in the middle of the opioid crisis, the findings suggest that resiliency in the face of crisis can be encouraged to take root through a mapping of meaning that highlights gratitude and responsibility.

Extraction, Detection, and Quantification of Illicit Substances Used in Drug-Facilitated Sexual Assaults from Gummy Bear Matrices

Alysha Donlan

ABSTRACT:

Gummy candies and other food products are becoming a popular vehicle for illicit substances, the analysis of which can be a significant aspect of many criminal investigations. Currently, there is a need for a standardized set of methods for the analysis of various drug-laced foods, so that matrix effects, as well as possible interferences, are accounted for. When dealing with food product matrices, it is often necessary to perform costly, time-consuming, and laborious pretreatments before the preferred mass spectrometry techniques can be performed. The goal of this study was to determine whether three drugs commonly encountered during investigations of drug-facilitated sexual assaults, specifically alprazolam, 3,4-methylenedioxymethamphetamine (MDMA), and γ -hydroxybutyric acid (GHB), could be extracted, detected, and quantified from gummy bear matrices. A review of drug-facilitated sexual assault studies published over the last twenty years was performed to pick drugs that would be most representative of those currently being used.

The gummy bears were made in the lab, with each containing a known concentration of the drug in question. A liquid-liquid extraction with low temperature partitioning (LLE-LTP) was used to remove the desired drug from this complex sample matrix. This is a quick, simple, and efficient extraction method that has been successfully used as a clean-up step for other samples with complex matrices, such as sugary alcoholic beverages. Following extraction, paper spray ionization mass spectrometry (PSI-MS) experiments were performed to determine the success of the extractions by quickly detecting if the drug of interest was present in each sample. Furthermore, with the addition of a deuterated internal standard, PSI-MS could also be used for quantification of these drugs. PSI-MS requires very little sample preparation and takes less time than GC-MS and LC-MS. If successful, these methods could be used by crime labs for cases involving adulterated gummy candies.

Optimization of Solid Phase Extraction for Organic Gunshot Residue Analysis via LC-QqQ-MS

Jackson Dimalanta

Bayer School of Natural and Environmental Sciences || Forensic Science & Law Master's Program
Faculty Advisor: Stephanie Wetzel Ph.D

ABSTRACT:

Traditionally, GSR has been analyzed using Scanning Electron Microscopy with Energy Dispersive X-Ray analysis (SEM-EDX), which has provided a benchmark for GSR analysis within the legal system for decades. Although SEM-EDX is very effective, it also has the disadvantage of being time consuming and labor intensive. Analyzing by SEM-EDX relies on the presence of the inorganic elements of inorganic gunshot residue (IGSR). Without the presence of these inorganic elements, SEM-EDX analysis has become more obsolete as manufacturers are producing more lead-free ammunition. This has paved the way for new alternative methods to analyze OGSR.

OGSR is the residues of the nitrogen compounds used as the propellant in firearms, which strays away from the IGSR that originates mostly from the primer compounds: lead styphnate, barium nitrate, and antimony sulfide. Lead-free ammunition, which has been on the rise, does not contain the lead styphnate and therefore cannot identify three component particles characteristic of GSR. OGSR consists of 7 organic chemical compounds; diphenylamine (DPA), 2-nitrodiphenylamine (2-NO₂-DPA), 4-nitrodiphenylamine (4-NO₂-DPA), N-nitrosodiphenylamine (N-NO-DPA), ethylcentralite (EC), akardite II (AKII), and methyl centralite (MC). Ethyl and methyl centralite are both unique compounds to OGSR and can be used as an identifier compound for the presence of OGSR.

The goal of this study is to determine if OGSR can be captured by SPE and analyzed by LC-QqQ-MS to establish if a firearm has been discharged. The optimization of SPE was done by looking at multiple extraction methods and tweaking the parameters in order to successfully extract the OGSR from the SPE cartridge.

Preliminary data has demonstrated that the LC-MS method used was efficient and the stock solution was able to be analyzed prior to SPE extraction. Additional experiments are being conducted to optimize an SPE method before looking at extracting off carbon-coated adhesive stubs.

Dynamic and Structural Features of SARS-CoV-2 s2m Using Molecular Dynamics Simulations

Adam Kensinger

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

Faculty Advisor: Jeffrey Evanseck Ph.D.

ABSTRACT:

The ongoing pandemic's severe impact on public health underscores the need for vaccines and antiviral treatments. One avenue for meaningful development is to achieve a clear and detailed understanding of the coronavirus life cycle, including genomic replication events. The function of the highly conserved stem-loop II motif (s2m) in the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is currently unknown but is proposed to play an essential role in viral replication through kissing-complex dimer formation. Differences in crystallographic and solution-phase structures are well known in biophysical systems. Despite the known drawbacks, especially for RNA systems, current molecular dynamics (MD) simulations of viral systems rely primarily on crystallographic initial coordinates, which can be "energetically trapped" in secondary structures that are often different between the solid and solution phases. Currently, the SARS-CoV-2 s2m starting structure for simulations is built from the SARS-CoV crystal structure through two mutations (U5G, G31U). However, NMR assignments for a SARS-CoV-2 s2m have been recently reported indicating that the crystal conditions deliver a structure inconsistent with the solution phase. Our MD simulations have interrogated both secondary structures and coordinates from the crystal and solution phases for the SARS-CoV-2 s2m element. Our interest is discovering how the two structures interconvert and how they relate. The enhanced sampling method of replica exchange MD was applied to the SARS-CoV-2 s2m starting from the crystal structure. We found that RMSD analysis of the replicas showed a structural tendency toward the NMR-derived structure over the simulation and away from the crystal structure. RMSF results revealed the flexibility of the terminal loop region. Our objective is ultimately to sample a three-dimensional SARS-CoV-2 s2m structure to further understand a potential therapeutic target against SARS-CoV-2 and, more broadly, all viruses that harbor the element.

A Landscape Study: Familial-DNA Searching in The Criminal Justice System

Samantha Minoski

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

Faculty Advisor: Pamela Marshall Ph.D.

ABSTRACT:

This presentation will allow attendees to become more aware of what familial-DNA searching is and its purpose in forensic DNA analysis and the criminal justice system. Familial-DNA searching is an emerging investigative tool that can detect and statistically rank potential candidates in CODIS that may be close biological relatives to the unknown individual that contributed the DNA evidence. Each state has their

own methods and/or policies regarding familial-DNA searching. Many states either will not use familial-DNA searching as an option or will only use it under very specific circumstances, such as all investigative leads having been exhausted. Though familial-DNA searching has its positive uses it carries current ethical and constitutional concerns as well. These concerns are mainly over the right to genetic privacy as the relatives of profiles stored in CODIS might be involuntarily involved in these criminal investigations.

Data was collected using an anonymous survey through Qualtrics sent to participants in the following roles in the criminal justice system: Crime lab director, DNA crime lab practitioner, crime scene investigator, criminal prosecutor, or criminal defense attorney. These diverse roles were chosen to obtain the different points of view between the science and legal perspective regarding familial-DNA searching. Each participant was kept anonymous and separated base on their answers to the two (2) demographic questions: state and role. This was to keep the results grouped by who and where the replies were received from. The obtained data from the survey was used to create a statistical comparison based on the participants selected answers; all open-ended answers were compared and analyzed by hand.

The data was able to reflect the differences and similarities each state had involving familial-DNA searching and their methodologies.

***EJAGHAM NAMING SYSTEMS AND ITS CONTRIBUTION TO PNEUMATOLOGY-CENTERED ANTHROPOLOGY**

Besem Etchi

McAnulty College and Graduate School of Liberal Arts || Theology

Faculty Advisor: Sebastian Madathummuriyil Ph.D.

ABSTRACT:

A distinctive feature of Ejagham patterns of naming in Cameroon is its non-consideration of bio-logic. Names do not respect body sex differences, nor do they signify that the person is male or female. A second feature is a pre-colonial dual-name appellation in which the first name belonged to the child and the second name indicated their mother rather than their father. This is unlike the father-family-name bearing system imposed by the present British and French inherited governance systems. A deeper study by tracing genealogies and inquiring name meanings, reveals that Ejagham cosmology perceives humans as human spirits more than human bodies. Spirits do not have genitals, rather, they have peculiarities defined as Ejong and Efongo, and can be deciphered via the circumstances of one's conception or birth or the characteristics of one's Etok . Such a circumstance is the proximity to the recent passing away of a grandparent by which the parent may declare of a child "Mma ywese apetsem" (Kenyang language meaning Mother has come back). Thus, the child obtains the names and respect due the grandparent irrespective of whether the child born is of the same sex or not as their deceased grandparent. As it is the Spirit that gives life, such a pneumatology-centered naming system is allows multiple human identities to exist without being constricted to their bodies at birth. Thus, a greater harmony in social roles and responsibilities is possible. This research paper grounds the phenomenological contribution of ethnically open systems to resolving modern day problems of identity confusion, gender discrimination and depleting development workforce.

Surrogacy in the Pandemic: Implications for Bioethics Education

Dina Siniora

McAnulty College and Graduate School of Liberal Arts || Center for Global Health Ethics
Faculty Advisor: Gerard Magill Ph.D.

ABSTRACT:

The global health emergency has been very disruptive of academic lives and bioethics education, necessitating an urgent need for important changes in curriculum for a post-covid19 bioethics education landscape. Another area of disruption during the pandemic has been surrogacy arrangements, as travel and border crossing were closed. This paper argues that both the Covid19 pandemic and surrogacy can serve as excellent bioethics teaching topics, as they contain multiple ethical issues, and can be used as a contextual starting point for a transformed bioethics education curriculum. It is important because it typifies most bioethical issues that are generally complex with multiple strands; which require complicated reasoning and prioritization of ethical dilemmas to be addressed. For example Covid19 has revealed the gaps in health infrastructure, populations that are vulnerable or marginalized, global injustices, and research priorities among other issues. In Surrogacy, cross-border movement (across national or state borders) is not uncommon to access assisted reproductive technologies (ARTs). Such arrangements, however, raise pressing questions regarding the rights and protections of children born through ARTs. The wellbeing and fair remuneration of reproductive workers is often sidelined in this global inequality between financially challenged reproductive workers and well-heeled consumers.

Surrogacy arrangements and Covid19 both teach that understanding and problem solving in ethics can be complex and nuanced. For this reason, solutions may not always be simple or satisfactory.

Perceptions and Knowledge of Special Education Law: A Pilot Study

Taylor Steeves, Dr. Bridget Green and Dr. Apryl Poch

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

Faculty Advisor: Laura Crothers, Ph.D.

ABSTRACT:

Educators working with students with disabilities largely lack knowledge of special education law. I will describe the creation of a survey we (Dr. Bridget Green and Dr. Apryl Poch) designed on educators' perceptions and knowledge of special education law, and results from a pilot study with School of Education graduate students at a university in the Northeast U.S. (Duquesne University).

Research suggests that special and general educators may be only marginally aware of the rights of students with disabilities. Special educators and general educators alike lack knowledge and training on special education law, leaving many teachers misinformed and potentially in violation of students' legal rights (O'Connor et al., 2016), even though special education teachers often perceive that they have sufficient understanding of special education law (Brookshire & Klotz, 2002). Building and school level administrators (including principals) also report not having adequate training in special education (Davidson & Algozzine, 2002). Unfortunately, little research has explored administrators' knowledge and needs related to special education law (Riehl, 2000). With approximately 63% of students with disabilities ages 6–21 spending 80% or more of their day in general education classes (McFarland et al., 2018), and with increased calls to ensure that students with disabilities receive more meaningful educational benefit (c.f., Andrew F.), there is an immediate need to ensure that educators (including administrators) are knowledgeable of special education law.

In response to these needs and the limited available research, our research team designed a survey to examine educators' perceptions and knowledge of special education law (e.g., Individuals with

Disabilities Education Act, Section 504). We began by examining the available survey research on educators' and administrators' perceptions and knowledge. Using an iterative process of survey development and question evaluation, our survey significantly adapts questions and concepts from existing measures. Our collaborators in the School of Law (including practicing special education lawyers) at our University provided detailed feedback on the survey twice. The Dean of our School of Education, a quantitative methodologist by training, also reviewed our survey questions twice. The survey contains three sections. The first section of the survey contains questions on participants' gender, race/ethnicity, age, and educational preparation. The second section includes Likert-scale items on participants' perception of their knowledge of special education law (e.g., if they believe they have sufficient knowledge and their level of confidence). Items in this section have primarily been adapted from the work of Sanders (2011), Brookshire and Klotz (2002), and Militello et al., (2009). The third section includes items on participants' knowledge of special education law, and contains multiple choice questions adopted from O'Conner et al. (2016), Singh (2015), and Militello (2009), along with one rank order question.

This past summer we piloted the survey with masters and doctoral students across the School of Education before distributing to educators in a large metropolitan area in the Northeast United States. This study will use a quantitative research design, and results will be evaluated using quantitative data analysis techniques (e.g., mean, SD, descriptive statistics, correlation, and an internal consistency coefficient [Cronbach alpha] of the knowledge items) in SPSS. Three research questions are addressed: (a) How do graduate students perceive their knowledge of special education law? (b) To what extent are graduate students knowledgeable of special education law? (c) To what extent do departmental differences exist across graduate students' perception of their knowledge and their actual knowledge?

Participant Outcomes: After viewing this poster, participants will be able to describe the development of our survey, describe the outcomes of our study (e.g., graduate students' perceptions of their knowledge and their actual knowledge of special education law, and whether departmental differences exist across their perception of their knowledge and their actual knowledge), and identify areas in which to build educators' knowledge across education graduate programs.

The Impact of Repeated Reading Intervention on Oral Reading Fluency for Children with Autism Spectrum Disorder (ASD).

Ahmed Al Naji

School of Education || Special Education

Faculty Advisor: Bridget Green, Ph.D.

ABSTRACT:

Autism Spectrum Disorder (ASD) is defined as a neurodevelopmental disorder that causes pervasive difficulties beginning in early childhood and is usually associated with repetitive behaviors and interests. Learners with ASD also appear to have academic challenges, particularly in reading. Since the incidence rate of ASD in children has increased along with their integration into public schools, Evidence-Based Practices (EBPs), which have proven essential for their reading development, are needed for these students. However, limited studies have been done on the effectiveness of EBPs used to develop their reading skills, especially Oral Reading Fluency (ORF). Of these studies, one promising method to improve ORF in students with ASD is the Repeated Reading (RR) intervention, in which children reread the text until they achieve a specific level of ORF. This paper aims to investigate the effectiveness of EBPs, especially RR intervention to improve ORF among children with ASD. It provides a brief description of

children with ASD that understand the condition and their academic performance. It also provides a review of various relevant literature materials that address the ORF performance among the learners with ASD. Lastly, it presents a review of the gaps, limitations, and future research related to the current studies. Nine peer-reviewed studies met the included criteria. Five of them focused on EBPs teaching ORF to learners with ASD, while the remaining focused on the use of RR intervention with learners with ASD.

Keywords: Repeated reading, children with autism, ASD, reading skills, reading fluency, reading interventions

Optimization of BDNF siRNA lipid nanoparticle transfection parameters in microglia and glioblastoma cell line models for neuropathic pain therapy

Dave Kandarp, Namit Chaudhary, Lisa Kasiewicz, Lalah Ali, Kathryn Whitehead, Devika S Manickam
School of Pharmacy and the Graduate School of Pharmaceutical Sciences || Pharmaceutics
Faculty Advisor: Devika Manickam, Ph.D.

ABSTRACT:

Brain-derived neurotrophic factor (BDNF) released from activated spinal microglia via the ATP-P2X4R-BDNF signaling pathway plays a central role in initiating pain hypersensitivity in neuropathic pain. Therefore, knockdown of BDNF expression in microglia using molecules like siRNA can be a promising strategy for neuropathic pain therapy. Our lab is developing lipidoid nanoparticles (LNP) for the delivery of BDNF siRNA (siBDNF) for treating neuropathic pain. We characterized the Spontaneously Immortalized Microglia-A9 (SIM-A9) cell line for the expression of Iba1, P2X4R, and BDNF under resting (non-activated) and ATP/LPS-stimulated conditions. The cytocompatibility of SIM-A9 cells with ATP and LPS was determined using an ATP assay. Intracellular Iba1, P2X4R, and BDNF protein expression in the resting and stimulated cells were characterized using western blotting, in-cell western, and immunocytochemistry. In a pilot study, SIM-A9 and U-87 MG (human glioblastoma cell line that overexpresses BDNF) cells were transfected with different lipid nanoparticle formulations including RNAiMAX (a commercial transfection agent), C12-200, and 3130i10/siGAPDH or siBDNF. Cell viability and changes in GAPDH or BDNF expression were evaluated using ATP assay and western blotting respectively. We present two novel findings: first, SIM-A9 cells expressed P2X4R and BDNF proteins. Second, ATP at a safe dose showed a time-dependent increase in Iba1 and BDNF expression without intracellular toxicity. RNAiMAX/siBDNF complexes showed about 15% (at 40nM siRNA) and 25% (at 100 nM siRNA) reduction in SIM-A9 and U-87 MG BDNF expression. In preliminary studies, LNP/siBDNF at 40 nM were well-tolerated by SIM-A9 cells, however, they showed about 20% BDNF knockdown in SIM-A9 and U-87 MG cells. Currently, we are optimizing LNP formulations and transfection conditions to increase the extent of BDNF gene silencing. We have developed an ATP-activated SIM-A9 cell line model system and screened LNP/siRNA formulations for the treatment of neuropathic pain.

Graduate Student Participation by School

McAnulty College and Graduate School of Liberal Arts: 20

A.J. Palumbo School of Business Administration: 1

Bayer School of Natural and Environmental Sciences: 29

Rangos School of Health Sciences: 12

School of Education: 14

School of Nursing: 6

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