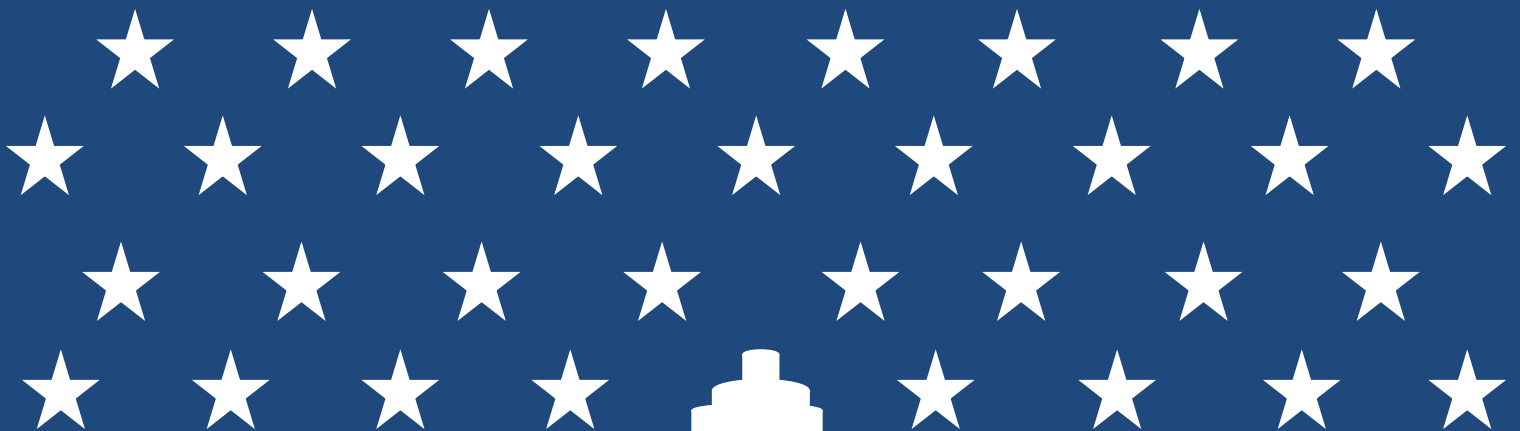


Kansas

Undergraduate Research Day

2023



Kansas Undergraduate Research Day

March 1, 2023



Participating Kansas Board of Regents Institutions:

Emporia State University

Fort Hays State University

Kansas State University

Pittsburg State University

The University of Kansas, Lawrence Campus

The University of Kansas, Medical Center

Washburn University

Wichita State University



KANSAS BOARD OF REGENTS

Kansas Undergraduate Research Day at the Capitol

The Kansas Board of Regents is pleased to support the outstanding students selected to present during the 2023 Kansas Undergraduate Research Days. University research is vital to the economic growth of our state. Students selected for this event are conducting research that makes a difference in Kansas communities, improves the quality of life for Kansans and supports businesses across our state.

Undergraduate students play an important role in the research enterprise of universities. These students learn skills that prepare them for the workforce while promoting engaged learning both inside and outside the classroom. Undergraduate student researchers complete projects that help them grow their personal skillsets, expand knowledge in a variety of fields, and contribute to the prosperity of our state. The talent of these students and their mentors is remarkable.

The Kansas Board of Regents invites you to explore the research selected for presentation from Emporia State University, Fort Hays State University, Kansas State University, Pittsburg State University, the University of Kansas, Washburn University, and Wichita State University.

We are confident you will leave the event with a renewed commitment to continue supporting research that benefits our students and our state and inspired by the outstanding work of these students.

Jon Rolph
Chair, Kansas Board of Regents

Blake Flanders
President and CEO, Kansas Board of Regents

★ LEADING HIGHER EDUCATION ★

Applying Operations Management to the Emporia Municipal Golf Course

Anna D'Ercole

This project placed us in the role of members of an operation management team at the Emporia Municipal Golf Course. Emporia Municipal Golf Course currently provides four types of annual pass fees: individual, couples/additional, seniors, and juniors membership. My project posits the benefits of adding a student membership plan to overall membership numbers and revenue. The final goal is to design a new membership pass for college students. To support this decision, the following five tools are used: 1. quantity decision, 2. customer identification, 3. need analysis, 4. function identification, and 5. location decision.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50605>

A Study on Predictive Models for Estimating the Probability of Default Loans in Peer-to-Peer Lending

Mitchell Regan and Seth Kern

The Peer to peer lending market is an outlet for small business and personal loans that is widely used as a substitute for banking loans. However because of the platform that it resides on there are a lot of issues and as a result the risk of default is fairly high. This study is meant to analyze the data from one of the many platforms and highlight the root causes of default from this information and previous works. Then formulate a model that can predict the possibility of default with the specific characteristics that were found during the analysis. To do this we worked with a couple of different algorithms to get our main set of characteristics. Then with this information we created four different models that tested the probability of default with macro data using different machine learning algorithms. We used the random forest model, XGBoost model, logistic regression, and Knn model to analyze the data and provide us with the results. Comparing the models we are able to show the differences between the methods and which one is more accurate, as well as how much of an impact the macro data has on the probability of default in the peer to peer lending market. The results show that the Random forest is better than the other three ML algorithms and macro-economic data had minimal impact on a loan being defaulted.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50607>

Assessing Recidivism and Rehabilitative Justice in the United States: A Literature Review

Conner Ryan

This literature review is an examination of recidivism within the United States criminal legal system. Since the legal system's shift towards punitive justice in the 1970s-1980s, both incarceration rates and recidivism rates have remained troublingly high. This paper examines recidivism by reviewing the historical context and effects of the legal system's shift towards punitive justice and analyzing the statistics behind mass incarceration and recidivism. Modern research and empirical trends point towards punitive practices as a leading cause of recidivism. Additionally, this paper explores options for reducing recidivism rates, including an analysis of rehabilitative techniques, a discussion of mental illness in the legal system, and factors that may limit the success of rehabilitative programs.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50603>

Research for the Common Good: Can we trust lead-free marketing for drinkware?

Sofia Steigner

Much of our tableware is sealed with a glaze that can contain lead and other heavy metals. If the firing process is imperfect, lead can contaminate food and enter our bodies (FDA, 2010a). In addition to the glaze, the ceramic comprising the tableware can also be a source of lead and other heavy metals. Since even exposure to very low levels of lead is associated with a significant loss of IQ during childhood (which has been a public issue since the

1960s), near-zero levels of exposure to toxins are essential to protect public health (Rabin, Lanphear). Health organizations have published recommended “safe” levels of lead (and other toxins). For example, California Proposition 65: In this study, we tested ceramic cups specifically advertised as lead- and cadmium-free. Our primary goal was to verify the legitimacy of lead- and cadmium-free advertisements as an educational service to consumers. We also tested for levels of chromium and zinc. Specifically, we investigated the level of toxins within the ceramic, amount of heavy metals leaching into the consumable liquids, and changes in leached levels over time. Samples were examined by Inductively Coupled Plasma (ICP) analysis. Our findings show a wide range of heavy metal exposure, indicating that the marketing is false.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50597>

Culturally Responsive Teaching Approaches in Secondary Education Social Science Classes

Drayton Willey

Culturally relevant teaching practices are developing in secondary schools in the United States as a response to the growing diversity of students’ cultural backgrounds. However, determining the methods that best allow teachers to use culturally relevant practices to engage students has not yet been comprehensively determined. This constructivist, mixed methods research aims to determine the teaching approaches which best engage students in culturally relevant high school social science courses and measure these approaches using mixed methods. These methods include: surveys, recording, observation, document analysis and interviews employed across three secondary education social science courses over the span of one week of data collection. **Data collection begins in mid-March or late April, pending.**

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50574>

Fort Hays State University

The Rape Kit Crisis - A Review of the Current Literature

Loganne Ditter

Sexual Assault Kits (SAKs) are difficult exams that many victims of sexual assault will experience after reporting. Victims in rural areas face more barriers in obtaining access to these exams as many hospitals are not equipped. Victims in these areas are already significantly underserved and understudied. As for SAKs that are completed, many go untested, and results are never given. This study aims to understand the reasons SAKs go untested and propose solutions to the issue of obtaining sexual assault exams in rural areas.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50560>

Computational study of open and closed states of human STING: Effects on binding free energies by small molecules

Hannah Gates

The stimulator of interferon genes (STING) is an endoplasmic reticulum-associated transmembrane protein that plays a major role in innate immunity mediating Type I interferons (IFNs) production. STING is a direct sensor of cyclic dinucleotides (CDN), such as 2’3’-Cyclic GMP-AMP (cGAMP), to trigger multiple signaling cascades leading to the production of IFNs. An antitumor agent, DMXAA (5,6- dimethylxanthenone-4-acetic acid, Vadimezan), which mimics the structure cGAMP, was found to be very effective in murine models. But, it failed in human clinical trials [1,2]. Therefore, our research aims to understand how different small molecules affect the active (closed) or inactive (open) state of human STING (hSTING). Using STING agonists cGAMP and diamidobenzimidazole (diABZI), a DMXAA dimer, and a modified DMXAA, we analyzed the behavior of each molecule when placed into the binding site of hSTING in the open and closed states in a solvated system by molecular dynamics (MD) simulations. Here, we present the results to respond to two research questions: 1) What is the role of water molecules in the binding site?

And 2) how does each small molecule affect the binding free energy and the intermolecular interactions with STING in the holo state?

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50556>

Assessing and Improving Science Student #SciComm Skills

Kale Link, Kaiden O'Dell, Laura Wilson, Todd Moore

Introduction: As the population becomes increasingly connected online, there is a growing need for effective science communication on social media platforms (referred to here as #SciComm). Resources for students to get training or experience with online science communication are minimal, hindering science communication in this technological era.

Purpose: We are investigating what #SciComm-related skills students are already exposed to through coursework and then developing methods to train science majors on communicating scientific ideas to the public using popular social media platforms.

Methods: We deployed a survey to all FHSU undergraduate and graduate science students to gauge their experiences with #SciComm. Questions included what training students already receive on communicating science to non-scientists and which classes incorporate building these skills. We also collected data on what #SciComm content students consume on social media and what skills they want to develop.

Findings: Our survey found that a majority of students (78%) have not received any formal training in online science communication. However, many students (68%) reported that they wanted more hands-on #SciComm training. The final survey results also included useful findings on what social media platforms students are most interested in using and developing skills for science communication.

Relevance to Kansas: Results are being used to develop a hybrid workshop for FHSU students to provide a primer on #SciComm during the Spring 2023 semester. Ultimately, we hope to encourage more classroom- and workshop-based activities to better prepare the next generation of scientists for science communication in a digital world.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50533>

Attitudes toward Stuttering of University Instructors in Communication Sciences and Disorders Major and Other Majors: A Nation-wide Survey

Willow Ludwig, Lauren Stallbaumer

Introduction: Stuttering is a communication disorder that may present difficulties such as producing fluent speech, having a fear of speaking, and experiencing limited inclusion, which greatly impacts the quality of life, including education, of people who stutter. University instructors may work closely with students who stutter. Specifically, instructors in the major of communication sciences and disorders (CSD) are critical in educating and influencing the attitudes of future professionals who will advocate for the stuttering community.

Purpose: The purpose of this study is to examine the attitudes toward stuttering of university instructors in the field of CSD, and other majors as well in order to compare.

Methods: The POSHA-S survey was spread to collect data from 300 college instructors in CSD and non-CSD majors. The data collection is in progress. The preliminary data collected so far were analyzed using SPSS and compared to the global data in the IPATHA database.

Findings: Preliminary data collected from 45 CSD faculty and 40 non-CSD faculty showed statistically significant differences between the Overall Stuttering Scores and the Beliefs scores of the two groups. No statistically significant difference was found between their Self-reaction scores. Compared with the IPATHA global data, both groups showed more positive attitudes toward stuttering. However, findings showed that non-CSD instructors need more education regarding their beliefs and overall attitude toward stuttering.

Relevance to Kansas: Multiple Kansas Colleges have been chosen in this study. The colleges in Kansas also showed a high participation rate. This study will help the instructors in Kansas to improve their overall understanding of stuttering and how to work with students who stutter.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50534>

Distance Exploration of Alpine Ecosystems in Elementary Classrooms Using 360 Videos

Brooklyn Whitcomb, Mary Kate Hale

In this study, the team explored using 360 video as a tool to create immersive environmental science experiences in classrooms. The study consisted of surveying teachers to identify perceived barriers in implementing this technology, field work in capturing videos to be used in classrooms, and preparation of lesson plan materials to be made available to teachers.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50527>

Kansas State University

BIOMETRIC PROPERTY OF MUZZLE IN DEEP NEURAL NETWORK-BASED CATTLE IDENTIFICATION

Hursen ADJOVI

Cattle identification is a crucial aspect of cattle management. Traditional approaches for cattle identification perform poorly in terms of scalability and cost efficiency. In recent years, computer vision-based biometrics has been successfully applied to cattle identification. Previous work has shown the efficacy of muzzle-based cattle identification compared to cattle face recognition. However, some interrogations remain about the portion of the muzzle that actually represents these biometric characteristics. This research focuses on the biometric properties of cattle muzzles in the context of deep neural network-based identification. We visualize the learned features to explain the details of muzzle-based biometrics. The general approach for computer vision-based biometrics is to deploy deep neural network-based image classifiers to identify the subject. To study cattle's biometric properties, around 1500 images of cattle faces were captured from 148 individual cows. Using our newly created dataset, we then perform training with two types of networks (YOLOv7 and ResNet101). The finding of this research shows that deep neural networks can effectively capture unique muzzle biometric features. This could set the ground for the creation of a robust cattle identification system that relies on the biometric properties of muzzle-based patterns to accurately classify and identify individual bovine specimens.

Overall, this research provides valuable insights into the biometric properties of cattle muzzles and the effectiveness of deep neural networks in capturing these properties. The results of this research demonstrate the potential of using muzzle biometrics in practical applications, such as livestock management. For the state of Kansas, this could lead to a revolution in the farming industry. Traditional identification techniques such as permanent identification methodology (PIM), semi-permanent identification methodology (SIM), or temporary identification methodology (TIM) could be replaced by non-invasive, cost-effective, and time-efficient systems that develop and improve models to identify individual bovine specimens from muzzle images.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50523>

Political Polarization Among Generation Z in Kansas

Eden Brockman

Political polarization is a rising issue in the United States of America and globally. This study examines the rise in political polarization among Generation Z Kansans. Nine participants had an intervention where they discussed politics together in person. In the control group, twenty-one participants took pre and post-surveys without an intervention. Participants from both parties shared that they enjoyed discussing politics with those of different beliefs in person. Due to the small sample size in the intervention group, the analysis could not ascertain the

statistical significance of the intervention. Qualitative data, however, pointed to the importance of discussing politics and constructive ways of doing that. The topic was further examined with interviews and roundtables in a [separate investigative report](#) for Channel 8 News.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50575>

Do ecotypes of big bluestem grass perform better with their local microbes?

Kian Fogarty

INTRODUCTION AND PURPOSE: Big bluestem (*Andropogon gerardii*) is a dominant forage grass of prairies and is distributed across a steep rainfall gradient in the Great Plains. This gradient has given rise to locally adapted wet and dry ecotypes. Because soil microbes likely vary along this gradient, we investigated how soil microbes affect Big Bluestem growth and whether plant ecotypes are matched to their local soil microbes. We predicted each ecotype would grow better when grown with its native microbes. **METHODS:** We collected seed and soils from six native Big Bluestem populations from western KS and IL. Plants were grown in greenhouse in garden soil and microbes were reciprocally injected into the garden soils weekly and measurements were taken weekly. **FINDINGS:** Ecotype differences affected many results like leaf area, height, and leaf width. Interestingly, ecotypes produced more biomass when grown with their local microbes. Furthermore, chlorophyll absorbance (proxy for photosynthesis) was also enhanced when ecotypes grew with their local microbes, suggesting effects of microbe-mediated nutrient availability. We concluded that local microbes have a large impact on plant growth. **RELEVANCE:** Big Bluestem accounts for roughly 70% of the biomass of prairie ecosystems. Big bluestem has been used to restore millions of acres of land back to prairie and it plays large role in the multi-billion dollar cattle industry of Kansas as it is the major forage for cattle. Understanding how big bluestem interacts with their local soil microbes likely will support increased future growth and productivity of these major Kansas industries.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50511>

Understanding skeletal muscle metabolism as a means to improve livestock feed efficiency

Chanae Parker

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Mounting pressures to increase meat animal production with fewer agricultural resources call for innovative strategies to improve feed efficiency. Skeletal muscle is responsible for up to 90% of all glucose use in meat producing animals, and therefore has become a target to improve nutrient utilization efficiency. For example, an increase in muscle oxidative capacity is associated with lower feed efficiency in pigs. To understand the metabolic regulation that dictates skeletal muscle nutrient allocation and utilization in growing pigs, we collected muscle samples from the *longissimus dorsi* (LD, glycolytic muscle), *latissimus dorsi* (LAT, mixed muscle), and *masseter* (MS, oxidative muscle) from 5 pigs at each 20, 53, 87, 120, and 180 days of age from that weighed an average of 5.7, 20.8, 42.2, 83.4, and 130.5 kg, respectively. Samples were analyzed to determine abundance of several mitochondrial enzymes through Western blotting. Pyruvate dehydrogenase increased at 120 d compared to 53 and 180 d in all muscles ($p = 0.008$), which indicates an increase in metabolites entering oxidative pathways during this time. This notion is supported by an increase in citrate synthase at 120 d compared to all other ages regardless of muscle ($p = 0.008$). Further, glutamic-oxaloacetic transaminase 2 increased from 20 to 120 d in all muscles ($p = 0.005$) suggesting an increase in amino acid synthesis at 120 days of age. These findings have identified a promising timeframe and mitochondrial targets that establish the framework for discovering new metabolic interventions to improve swine feed efficiency.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50520>

Defendant Counterclaim Importance in the Perceptions of Judges' IPV Rulings

Susan Wilkinson

Problem: With the visibility of court proceedings and rulings today, we explored how the type of counterclaim made by a defendant being accused of IPV and the visual perceptions of the judge presiding over the case (i.e., age and sex) impacts trust in authority, future help-seeking, and beliefs in a just world.

Procedure: Participants read through a bench trial (judge the sole authority of sentencing) court case. The court case included a situation in which the plaintiff describes their intimate partner (the defendant) assaulting them and is asking for \$2,000 in damages. However, the defendant makes a counterclaim and also asks for \$2,000 in damages. Next, participants are shown an image of the judges that will be presiding over the case. Last, the judge's decision is either completely one-sided for the defendant or the plaintiff.

Expected results: When the judge was a female ruling in favor of the defendant, participants had significantly more ($t(286) = 2.41, p = .017$) trust in authority ($M = 5.42, SE = .07$) compared to female judges ruling in favor of the plaintiff ($M = 5.18, SE = .07$). Additionally, when a younger judge ruled in favor of the defendant using a permissive counterclaim (i.e., the plaintiff damaged their car), participants were significantly ($t(286) = 2.31, p = .021$) more trusting in authority ($M = 5.46, SE = .11$) than if the judge was older ($M = 5.12, SE = .10$).

Relevance: Best practices to Kansas's Judicial system are important to consider as court cases become more visible to the public via multiple media sources.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50522>

Pittsburg State University

Artificial Intelligence Training of a Line Follower Robot.

Trenton Allison

The goal of the research was to create a neural network to help a robot follow a line formed of black tape. A neural network is a form of artificial intelligence that trains computers data similar to our brain. The neural network used in a microcontroller, a single integrated circuit computer, to recognize a line and follow it. A TI RSLK kit, consisting of a MSP432 microcontroller and Pololu robot, was used. The neural network was trained using the Keras API and Google Colab. The training data consisted of inputs that would be received by eight optical sensors that sense the line and the three one-hot outputs were the directions the robot should move: left, right, or straight. The neural network consisted of three layers: Layer 0 had three neurons and used the ReLU activation function, Layer 1 had four neurons and used the ReLU activation function and Layer 2 had three neurons and used the softmax activation function. The neural network was trained for 500 epochs. After the training, errors in the outputs of the neural network were very small. The weights for the neurons that were generated by Keras were then used to write a C program for the neural networked to be programmed into the line follower robot. The robot was then tested and successfully followed the line.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50632>

Assessment of Inhibitory Control in Fish

Victoria Yoakam

Inhibitory control—the ability to control or inhibit immediate responses in order to achieve a better solution—helps organisms survive in fluctuating environments and is often considered to be highly correlated with intelligence. Among the paradigms used to test inhibitory control in animals, the *detour task* consists of presenting individuals with a situation where a direct route to a food reward is blocked and a detour must be made to reach it. In one version of the task, the food is placed behind a semi-transparent barrier and the subject needs to inhibit its motor impulses to reach for the food directly by moving away from it, thus avoiding to bump or touch the obstacle along the way. We tested nine dottyback fish from the genus *Pseudochromis* (*P. aldabraensis*, *P. flavivertex*, *P. fridmani*), an understudied group of marine fish that inhabit crevices and small caves of coral reefs. As a group, dottybacks

showed a success rate of 10% (18/180 trials), which is significantly lower than the performance of the bluestreak cleaner wrasse—who engage in complex cleaning interactions with other coral reef species—in a similar paradigm (two-tailed Fisher’s exact test, p

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50602>

University of Kansas, Lawrence Campus

Optimization of Enhanced Oil Recovery in Kansas: a Time Continuous Study

Alexander Erwin

This paper presents an expanded economic framework of Carbon Dioxide-Enhanced Oil Recovery (EOR). EOR is a technique in which pressurized CO₂ is injected into oil wells which increases production by driving oil out of the well at higher rates. Additionally, this technique allows for the long-term storage of CO₂ underground. Oil producers earn a tax credit for each unit of CO₂ sequestered. This paper expands upon the existing theoretical framework of EOR. The existing framework involves a producer choosing an amount of CO₂ to inject into an oil well, thereby resulting in changes to oil production and CO₂ sequestration. This study also uses numeric modeling of oil fields over time to calculate optimal input quantities of CO₂ and find profits over time. It incorporates a time continuous framework of oil pricing and carbon tax credit values to allow for more precise forecasting.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50586>

The Responses of Budgerigars to Music and Bird Calls

Vivian Marshall

In order to investigate the behavioral repertoire of budgerigars (*Melopsittacus undulatus*), I recorded the responses of two captive males, C and N, to six types of audio: budgerigar sounds, classical music, jazz music, party music, rainbow lorikeet sounds, and hawk sounds. Both birds tended to lift their right feet more than their left feet while listening to each type of audio besides budgerigar sounds, suggesting that listening to unfamiliar auditory stimuli caused increased activation of the left hemispheres of their brains. Additionally, both birds preened their right sides more than their left while listening to hawk sounds, likely corresponding to increased activation of the left hemispheres of their brains while processing unfamiliar audio, and they preferentially preened their left sides while listening to budgerigar sounds, suggesting that processing of familiar social contexts may predominantly take place in the right hemisphere of the brain in budgerigars. N increased his head bobbing in response to the party music and rainbow lorikeet sounds, likely due to the clear beat and unfamiliar social context respectively. In general, N tended to increase his performance of behaviors in response to audio to a greater extent than C, suggesting that he is more sensitive to environmental stimuli and social contexts.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50624>

Mixed Matrix Membranes as a Potential Method for Separating Hydrofluorocarbon Refrigerant Mixtures

Tessie May

Refrigerants are used daily in transportation, cooling, manufacturing, and entertainment. Because of this, their role is crucial for societal function and day-to-day life. However, due to the high global warming potential of hydrofluorocarbons (HFC) refrigerants, the 2020 American Innovation and Manufacturing (AIM) Act has begun the phase-out of HFCs that will be replaced by hydrofluoroolefins (HFOs) with very low global warming potentials. Currently, if a refrigerant is not recycled, it is often vented or incinerated which damages the environment. However, recycling is challenging because many refrigerant mixtures are azeotropic which prevents separation through standard techniques. The goal of Project EARTH (Environmentally Applied Research Toward Hydrofluorocarbons) is to identify an efficient method to separate and recycle HFC mixtures.

This presentation will focus on a Mixed Matrix Membrane (MMM) method used to address the challenge of separating HFC blends. A MMM combines an ionic liquid (IL), a compound with unique physical properties that make it ideal for working with refrigerants, with a polymer to create a membrane. A highly selective IL will trap one component of the HFC blend while the other portion will continue to flow through the highly permeable membrane to separate the mixture. This poster will discuss the process of creating MMMs and testing them for their potential to separate refrigerant mixtures.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50528>

Analysis of OSCP Deregulation in Alzheimer's Disease

Albert Park

Alzheimer's disease (AD) is a chronic and irreversible neurodegenerative disease that affects more than 44 million people worldwide. There are currently no effective therapies for this devastating neurological disorder and the detailed molecular mechanisms of AD etiopathogenesis remain unelucidated. Mitochondrial dysfunction is emerging as a vital contributor to the development of AD. The molecular pathways that lead to disease-associated mitochondrial abnormalities including impaired ATP production via oxidative phosphorylation (OXPHOS) are under intensive investigation. Previous studies have implicated loss of oligomycin sensitivity conferring protein (OSCP), a key protein of the F₁F_o ATP synthase, in AD pathology; however, the precise mechanism for OSCP degradation in AD conditions remains unknown. Our study aims to establish an age-dependent deregulation of ubiquitinated-OSCP in a mouse model of AD. We have discovered increased ubiquitinated OSCP in a mouse model of AD as compared to their wildtype age-matched counterparts. In contrast, the treatment of amyloid-beta (A β) onto primary cultured cortical neurons revealed increased expression of OSCP. This may be a result of cellular compensation for the increased ubiquitinated OSCP seen in vivo. Further studies will be performed to add clarity to OSCP degradation in an AD context and will be a key to understanding the precise mechanism behind OSCP loss in AD and integrating it as a potential therapeutic target in AD.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50738>

Synthesis of a Hyaluronic Acid-Deferoxamine Conjugate for Local Treatment of Bone Regeneration

Navya Singh

Medically based efforts and alternative treatment strategies to prevent or remediate the corrosive effects of radiotherapy on pathologic fracture healing have failed to produce clear and convincing evidence of success. Establishing an effective pharmacologic option to prevent or treat the development of non-unions in this setting could have immense therapeutic potential. Experimental studies have shown that deferoxamine (DFO), an iron-chelating agent bolsters vascularity and subsequently enhances normal fracture healing when injected locally into a fracture callus in long-bone animal models. However, due to its short half-life and rapid clearance, maintaining DFO at the callus site during peak fracture angiogenesis has remained challenging. In this study, we set out to strategically enhance the therapeutic efficacy of the DFO via covalently attaching the drug molecule hyaluronic acid (HA). HA plays a critical role in cell differentiation, tissue morphogenesis, proliferation, and wound healing. We first prepared an HA-DFO conjugated deferoxamine (HA-DFO) using a two-step synthesis method. We then examined the in vitro release characteristics and the potential cell toxicity of the HA-DFO. Our results suggested that HA-DFO bio-conjugate offered the sustained release of the active DFO.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50709>

Elderspeak within Family Caregiving: The Impact of Relationship and Gender on Elderspeak Use with Dementia Care Recipients

Camille Henderson, SN

Introduction: Elderspeak is a communication style used by younger adults interacting with older persons, especially those with dementia. Elderspeak has been studied primarily in nursing home settings where it has been linked to negative responses from dementia care recipients. There is limited information about the use of elderspeak by family caregivers.

Purpose: This study will describe elderspeak (speech resembling baby talk) by family caregivers caring for a person with dementia and will evaluate whether elderspeak use varies based on relationship and gender.

Methodology: Secondary analysis of transcripts of 144 videos collected by 36 family caregivers-care recipient dyads at home will be used to identify elderspeak (diminutives, collective pronoun substitutions, tag questions, and reflective speech). We will compare whether frequency of each type of elderspeak varies based on relationship and gender.

Findings: Systematic Analysis of Language Transcripts (SALT) software will be used to count the frequency of elderspeak use. We will compare the frequency of elderspeak in dyads of different caregiver relationships (spouse or child) and for different genders of caregivers using descriptive statistics.

Discussion: Knowledge about the frequency of elderspeak use by family caregivers can inform care in relation to how the care recipient responds to the caregiver's use of elderspeak. This information can be used for training family caregivers in best practices for communication.

Conclusion: Findings of this research will fill a knowledge gap by providing information about the use of elderspeak in family dementia care. Ongoing research will evaluate how persons with dementia respond to caregiver elderspeak use.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50763>

COVID-19 and Adults with Asthma

Hanna Mouak, SN

Introduction/Purpose: There is limited research concerning the health-related outcomes for those with asthma who contracted COVID-19. This study examined differences in asthma control, asthma adherence, use of healthcare resources, mask use, and physical health in adults with asthma who have/have not had COVID-19.

Framework: This study was guided by a physiological framework, as asthma is a complex disease process characterized by chronic airway inflammation and intermittent airflow obstruction. Covid-19, a viral infection generally involving the respiratory tract, may impact health outcomes of those with asthma.

Methodology: Participants (n=36) are adults with asthma who previously reported high use of disinfectant/cleaning products during COVID-19 and had poor asthma control. Participants complete online REDCap surveys addressing adherence, self-rated physical health, mask use, and COVID-19 infection status. Data were analyzed descriptively and comparisons between those who had/had not had COVID-19 were assessed using chi squares and t-tests.

Findings: Most participants were female (91.7%), college educated (82.4%), white (75%), and ages (28-75 years). There was no significant relationship between having COVID-19 and asthma adherence ($p > 0.05$). Although not statistically significant, participants who had COVID-19 had more provider visits the prior year compared to those without COVID-19 (75% vs 50%, respectively, $p = .126$) and more had a negative view of face masks (43.8% vs 38.9%, respectively, $p = .593$)

Discussion: Participants having had COVID-19 used healthcare resources more often and disagreed more often that masks provided health benefits for their asthma.

Conclusion: COVID-19 may impact certain health practices and outcomes for adults with asthma.

<https://symposium.foragerone.com/kansas-undergraduate-research-day-2023/presentations/50765>

The Long-term Transferability of Learning Via In-class Simulations to Nursing Practice: a Qualitative Descriptive Study

Mallory Renea Peterman, SN

Purpose & Background: Data indicated only 14% of new graduate registered nurses (NGRNs) demonstrate entry-level competencies as they transition to practice. To close this gap, the use of in-class simulation-based experiences (SBEs) in pre-licensure nursing programs provide increased cognitive knowledge and clinical judgment. This study's purpose was to fill the evidence gap on the long-term transferability of in-class SBE outcomes to practice 3 years post-intervention via interviews.

Theoretical Framework: The interviews used narrative inquiry methodology to prompt storytelling and were semi-structured guided by the integrative framework—Transfer Appropriate Processing (TAP) Theory. It states memory is best when the processes engaged in during encoding (learning) match those during retrieval. Therefore, the assumption was that learners that observed in-class simulations would have better memory because the process engaged in during encoding matched retrieval activities in practice.

Methodology: This qualitative descriptive study utilized recorded semi-structured interviews to answer the research question: To what extent are NGRNs able to transfer learning that occurred via observation of in-class SBEs in their traditional pre-licensure nursing program to their actual practice 3 years later? In total, 9 interviews were conducted.

Results: Three themes emerged: visual recall in practice, confidence, and new cognitive frameworks for clinical decision-making.

Conclusion: In-class simulations facilitate contextualization of student learning and close the practice gap. By bringing the practice environment into the classroom, learners had an opportunity to see how pathophysiology knowledge applies in real-time. This strategy can be recreated by educators to promote retention and transferability of learning for their students.

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Case Study: An Adolescent with CF – Gaining Independence

Sophia Noelle Schneller, SN

Purpose: To explore perceptions of adolescents with Cystic Fibrosis (CF) about growing up with a chronic condition.

Background/ Significance: As adolescents with CF are surviving into adulthood, it is important to explore their perspectives about living with chronic conditions to facilitate transition from pediatric to adult healthcare and improve their quality of life.

Conceptual Framework: Bronfenbrenner's socioecological framework.

Research Question: What are the perceptions of adolescents with CF about growing up with a chronic condition?

Design: Qualitative, individual case study from larger *Adolescents with CF – Peer-2-Peer* study.

Setting and Sample: Adolescents with CF (12-18 years) receiving care at CF-specialty clinic. Individual interview conducted with high school senior (female, age 18 years; Caucasian).

Measures/Instruments: Semi-structure interview developed by the PI.

Data Collection: Semi-structured interview (2-hours) via Zoom while adolescent received IV-antibiotics at home. IRB approval obtained.

Data Analysis: Qualitative content analysis.

Results: Content analysis revealed primary theme, *Gaining Independence*, with three sub-themes: (a) Learning about CF care, (b) Risk-taking and trying to be normal, and (c) Making friends who "know" to protect self.

Conclusions: Adolescents need more preparation for gaining independence during transition from pediatric to adult CF care. The adolescent participant worried about care and had to actively seek out resources regarding her future care. More information regarding how to perform CF self-care will facilitate transition into adulthood.

Implications: Research: There is a need to develop interventions focused on gaining independence for adolescents with CF and their families. More information needs to be discovered about what adolescents have been taught by healthcare providers, to bridge the gap between pediatric and adult CF clinical care. Practice: Transition to adult CF care should be built into practice during adolescence.

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Racial and Ethnic Differences for Pregnancy Anxiety and Depressive Symptoms to Birth Outcomes

Shy'Anna Tyler, SN

Purpose and Background/Significance: This study investigated the ethnic/racial differences for prenatal anxiety and depression to low birthweight (LBW) and preterm birth (PTB). The incidence of pregnancy anxiety and depression is reported between 7-20%. An association exists between pregnancy psychological factors and birth outcomes. The affect of race and ethnicity, specifically on this prenatal interaction is less clear. However, eliminating birth inequities requires an understanding of this interplay in order to develop effective assessments and interventions.

Theoretical Framework: Psychosocial adaptation to pregnancy is a progressive process that produces stress and anxiety that may promote depressive symptoms/depression. This maternal psychological state impacts both maternal and fetal outcomes and varies by parity, race and ethnicity.

Method: Individuals receiving prenatal care at one of three military installations from 2017-2021 were invited to participate if in their first trimester and ≥ 18 years. Ninety-two percent ($n=1717$) of the eligible sample were consented. Measures of pregnancy anxiety and depression were completed in each trimester. Racial/ethnic descriptors were assessed to individual slopes for anxiety and depression measures in both adjusted and unadjusted models and to LBW and PTB.

Results: In all models, participants of Asian/Pacific Islander descent, had the highest anxiety scores. Those identifying as Hispanic and Black, nonHispanic had significantly less anxiety than the reference group (White, nonHispanic), and all had lower depression scores. Race/Ethnicity was significant to LBW, but only for the Hispanic women, who had greater than six times the odds of LBW than White, nonHispanics and greater than four times other groups. No significant racial/ethnic group differences existed for PTB.

Conclusions: Significant differences existed between racial/ethnic groups for anxiety and depression and to LBW. Women of Asian/Pacific Islander descent had the highest anxiety yet the lowest odds of LBW. No racial/ethnic group associations existed for the models to PTB.

Prenatal anxiety and depression are associated with increased risk of LBW and PTB. Both PTB and LBW are reportedly higher in the Hispanic, and Black, nonHispanic populations. Our findings highlight unique individual differences that emphasize the importance of precision health approaches in combatting inequities in maternal and birth outcomes.

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Washburn University

Students' Perceptions of University Health Care Centers

Jossie Hicks

The purpose of this study was to analyze how students in midsized teaching institutions perceive the healthcare available to them on campus. Specifically, the ways in which students adjust their communication style when receiving or seeking out health care, and the student's perceptions of healthcare providers' communicative choices. The aim is to better understand why some students take advantage of campus healthcare and others do not. This study includes discussion of access to health care, social inequalities, and health communication practices between patients and providers. Participants were all enrolled in institutions of higher learning. The data was collected through an online anonymous survey that had multiple choice as well as open answer sections. The results indicate that the perception students have of their campus healthcare team is influenced by the healthcare team itself. Most students scored their campus health care as an 8/10 indicating further usage. The study also found that among the dissatisfied students there was some consistency in complaints. The most consistent issue was with the staff itself, this included everyone from the receptionist to the care provider. This study has the potential to benefit midsized teaching institutions by providing insight into the student experience and provide insight into how to improve student health care. Limitations included a small sample size and that the researcher attends a midsized teaching institution.

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Indigenous Peoples' Relative Risk of Homicide in the USA: A Systematic and Meta-Analytic Review

Grace Hawks

Evidence suggests that Indigenous Peoples have the highest rate of death by homicide compared to other ethnic groups in the USA. Despite this alarming disparity and its fatal implications, there seems little attention paid to this crisis outside of Indigenous communities, and literature on the violence perpetrated against this population is comparatively scarce. Among the 574 federally recognized tribes and 326 reservations across the USA, there is great diversity. Yet, Indigenous Peoples share similar experiences of colonialism, genocide, oppression, and marginalization. These experiences highlight how existing social structures and systems continue to function as oppressive forces against Indigenous people. The current study meta-analytically synthesized the existing body of knowledge to summarize current understandings of the relative risk of homicide faced by Indigenous Peoples. Following systematic searches of published and grey literature, data were extracted from 38 eligible studies. As hypothesized, Indigenous Peoples' risk of homicide was consistently about three times greater than that of others in the USA over the past generation, but counter-hypothetically no gender divide was observed. These findings suggest prevalent, grave and longstanding social-structural and ultimately, health inequities among Indigenous Peoples in the USA. Future research needs and policy implications are discussed.

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Effect of Repeated Maze Treatment on Sentence Formulation Accuracy and Response Time

Logan Hutchens

The purpose of the current study was to examine the effects of repeated use of the maze task from the field of sentence processing as a treatment for sentence formulation in people with aphasia in terms of accuracy and response time. Aphasia is a language impairment resulting from stroke or brain injury, including difficulty with word finding and formulating sentences. The maze task involves formulating sentences one word at a time by choosing the correct of two options at each step. This quasi-experimental design study included seven participants with chronic aphasia. The treatment involved performing the computerized maze task for six sessions. In order to investigate how effective the treatment was, accuracy and response times were recorded during each treatment session for later analysis. Preliminary results indicated that, overall, participants' accuracy on the task increased and their response time decreased with repeated performance of the task. Further analysis is needed to see if these effects are significant. Additionally, follow-up is needed to determine whether these effects persist in the long-term. The study also allowed investigation of how the participants with aphasia comprehended the meaning of the sentences at each step. The data collected from the current study can be used in comparison with previous research on adults with typical language abilities who performed the same task. This comparison allows examination of the strategies that each person with aphasia utilized when processing the sentences and, thus, what they may need to focus on in further therapy.

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Community and Rooftop Solar Options for Rural Areas in Kansas

Mary Peterson

Globally, the improving economics of solar and wind generation is enabling both large-scale solar and wind and small-scale rooftop solar PV for more renewable energy. In the U.S., energy providers are regulated to supply uninterrupted power to every consumer, requiring them to enhance energy infrastructure periodically.

Much of the energy distribution infrastructure in rural Kansas was designed and built decades ago. As these systems age, and as the need for renewables becomes more pressing, the power system in western Kansas experiences new

infrastructure management challenges. Aging infrastructure makes rural communities in Kansas increasingly vulnerable to power outages.

This research analyzes the costs and benefits of replacing electric infrastructure, and of alternatives such as renewables at the residential level. For Kansas, which is one of the top ten states in the U.S. for solar generation, renewables located within a rural community could be an economically effective way to supply power during an outage.

This research uses real data from a farming town in rural Kansas to evaluate how implementing a utility-owned solar farm, or residential rooftop solar PV, could impact this community. Specifically, this research shows how these renewable options would impact customers and the utility financially, and how it could improve the reliability of power supply to the community served.

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Modeling Electric Vehicle Charging Load on Power Grid Considering Travel Behavior

Rachel Stukey

Electric vehicle penetration is increasing around the world. Due to the random nature and the size of batteries in the vehicles, they impose a significant impact on the electric grid if they are not managed effectively. The objective of this project is to increase the prediction accuracy of the electric vehicle charging load. This work will incorporate electric vehicle driving patterns and consumer behavior. The agent-based modeling approach is considered in this work to predict the charging load at the residential level. An open-source tool, NetLogo, is used to model the consumer behavior and driving patterns of individual vehicles. The following random behaviors are considered in this work: the amount of charge at arrival, vehicle availability for charging, frequency of charging, travel purpose, geographical impact, and willingness to change their behavior. This model will help utility electric utilities plan for large penetration of electric vehicles. Companies such as Evergy will be able to use this information to better supply and distribute electricity to Kansans.

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