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Featuring Graduate Student Research from:

Emporia State University

Fort Hays State University

Kansas State University

Pittsburg State University

University of Kansas

University of Kansas Medical Center

Wichita State University

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Emporia State University

PERCEIVED STIGMA OF IMMEDIATE VERSUS DISTANT FAMILY MEMBERS TOWARDS INDIVIDUALS CURRENTLY DIAGNOSED WITH, IN TREATMENT FOR, OR PREVIOUSLY TREATED FOR A SUBSTANCE USE DISORDER

Layna Adams

School of Applied Health Sciences

Addiction is defined in terms of a mental health diagnosis, and its impact is large enough to be deemed an epidemic in the United States (Anderson et al., 2022). In 17 years, more than 500,000 Americans die due to addiction, a crisis akin to an epidemic in the United States (Anderson et al., 2022). The entire population faces the risk of substance addiction, surpassing fatalities from common causes like car accidents (Piotrowski et al., 2021; Ashley et al., 2020; Parlier-Ahmad et al., 2021). Substance use disorders (SUD) are ranked as one of the most stigmatized conditions in the United States and worldwide, which impacts the ability to adhere to human compassion and empathy (Smith et al., 2016, p. 34; Avery & Avery, 2019). The treatment processes for addiction varies greatly for individuals; however, perceived stigma impacts the time requirement and success of the treatment (Pettersen et al., 2019). Therefore, it's crucial to grasp the perceived stigma from both immediate and distant family members towards addiction; this study involves participants who are family members of individuals struggling with addiction issues. Participants will complete one of the variations of the Perceived Stigma of Addiction Scale (PSAS) and a personal survey that will disclose their relation to an individual with an addiction. The findings from this study may be useful in understanding the comparison of stigma toward addiction from family members. Understanding this information may provide insight into treatment effectiveness or external factors that may interfere with treatment success.

A SOCIAL ROBOT AS A HEALTH EDUCATOR FOR HEART FAILURE PATIENTS USING THE TEACH-BACK METHOD

Lisa Armstrong

School of Library and Information Management

Heart Failure (HF) is a chronic, progressive disease process affecting 6.7 million Americans, with numbers expected to rise to 8.5 million by 2030. HF prevents the heart from effectively pumping blood throughout the body, depriving tissues of the vital oxygen and nutrients required to function correctly. HF patients' inadequate understanding of their condition, prescribed treatments, and self-care negatively impact their clinical outcomes and diminish their quality of life. Additionally, frequent unnecessary hospitalizations of HF patients due to poor self-management and self-care place undue demands on healthcare

providers and systems while increasing the lifetime cost of care. Assisting patients in achieving an acceptable level of health literacy to engage in effective HF self-care management begins with patient education. The purpose of this project is to evaluate HF patients' achievement of learning goals associated with greater health literacy, improved understanding of treatment regimens, and increased self-care behaviors using the Furhat social robot as a patient health educator. Furhat is an AI-powered, interactive robot head designed for social interactions with a human-like expressive face and sophisticated voice capabilities. I have based the delivery of HF education to HF patients by the Furhat social robot on the teach-back method, an evidence-based strategy used in healthcare to improve communication and enhance learning during clinician-patient encounters. Concurrently, I will measure patients' perception of trust before and after the social robot health educator encounter to examine the influence of trust on the achievement of learning goals.

EQUIPPING KANSAS FOR THE FUTURE WORKFORCE: NAVIGATING TECHNOLOGICAL ADVANCEMENTS AND JOB TRANSFORMATION

Mohammad Ikbal Hossain, Mohammad Majbah Uddin, and Ayesha Arobee
School of Business and Technology

This research analyzes the impact of technological advancements on job transformation in Kansas. It identifies key trends and their influence on the local workforce, assesses existing skill gaps, and proposes strategies for equipping Kansas with the necessary skills and competencies to thrive in a rapidly changing job market. This research analyzes global technological trends and their effects on job markets, particularly in Kansas, assessing the state's workforce skills gap and identifying essential future job skills compared to other regions. This study proposes various strategies for workforce development, including policies and programs for skill development and training, the role of educational institutions and vocational training centers, and public-private partnerships. These strategies aim to future-proof Kansas's workforce by enabling continuous adaptation to technological changes and creating a sustainable and resilient workforce ecosystem. This research also unearths the potential challenges and opportunities of implementing these strategies and provides strategic recommendations for policymakers, educators, and business leaders. It also outlines future research directions to further enhance the understanding of the changing job landscape and prepare Kansas for the future workforce.

SANDTRAY THERAPY WITH OLDER ADULTS UTILIZING VISUAL INDICATORS IN LIFE REVIEW

Jeran Nycum
School of Applied Health Sciences

Erikson's final stage of integrity verses despair is a significant psychological marker in older adulthood. Researchers, gerontologists, and therapists have utilized Erikson's

psychosocial theory as a central concept in working with older adults. Art therapy has proven successful with older adults in its nonverbal communication and diverse application. Sandtray therapy may be underutilized as a therapeutic tool with older adults. This study observed three older adults' participation in sandtray therapy in response to the given prompt, "Make a scene about your life." The researcher hypothesized that Erikson's developmental indicators of integrity verses despair would be observed in the sandtray scenes created. All participants displayed developmental indicators of Erikson's final stage in their created sandtrays and accompanying narratives. Given the symbolism and metaphor commonly utilized in sandtray therapy, older adults may benefit from this therapeutic modality in their final psychosocial goal of integrating integrity and despair.

CRYPTORAN: CRYPTOJACKING AND RANSOMWARE ATTACKS WITHIN THE BANKING INDUSTRY: THREATS, CHALLENGES, AND PROBLEMS

Naresh Kshetri, **Mir Rahman**, Sayed Abu Sayeed, Irin Sultana

School of Business and Technology

In the banking industry, ransomware is a well-known threat, but since the beginning of 2022, cryptojacking, an emerging threat, is posing a considerable challenge to the banking industry. Ransomware has variants, and the attackers keep changing the nature of these variants. This research studies the complex background of these two threats and scrutinizes the actual challenges and problems that the banking industry and financial institutions face. These threats, though distinct in nature, share commonalities, such as financial motivations and sophisticated techniques. We focus on examining the newly emerged variants of ransomware while we provide a comprehensive idea of cryptojacking and its nature. This study involves a detailed breakdown of the specific threats posed by cryptojacking and ransomware. It explores the techniques cybercriminals use, the variabilities they look for, and the potential consequences for financial institutions and their customers. This research also finds out how cybercriminals change their techniques following security upgrades and why financial firms, including banks, need to be proactive about cyber threats. Lastly, we introduce a Digital Forensics and Incident Response (DFIR) approach for up-to-date cyber threat hunting processes for minimizing both crypto jacking and ransomware attacks in the banking industry.

GENDER CLASSIFICATION IN FACIAL IMAGES: A COMPREHENSIVE CONVOLUTIONAL NEURAL NETWORKS ANALYSIS

Jose Ambrosio

Department of Computer Sciences, Fort Hays State University

Gender recognition from facial images has emerged as a vital area of research in computer vision and artificial intelligence. This research aims to develop a robust system that automatically determines an individual's gender based on facial features. Such a system can be used in various applications, including demographic analysis, targeted advertising, enhancing security protocols, personalizing user experiences, and even medical diagnosis. The Convolutional Neural Networks (CNNs) technique is used to build the detection model. By employing CNNs, we scrutinize the effects of different convolutional layer and max-pooling layer configurations (ranging from 1 to 5) on both accuracy and computational efficiency. The results showcase a validation accuracy of 91%, highlighting trade-offs between accuracy and computational resources. The study suggests considerations tailored to specific application needs and outlines potential avenues for future research, thus enriching the ongoing discourse surrounding facial recognition technologies.

PROSPECT MAPPING IN EXPLORATION FOR PTERANODON STERNBERGI FOSSIL DEPOSITS USING ARCPRO

AJ Anderson

Department of Geosciences, Fort Hays State University

Paleontologists typically have prospected for fossils by consulting geological maps to find fossil bearing rocks of correct age and land management agencies, such as the Bureau of Land Management or the United States Forest Service, for determining localities for legal fossil collecting. Paleontologists then go to these localities and scour the landscape collecting whatever fossils are exposed by chance. Herein, this general method of fossil exploration is refined to narrow the potential search area for specific fossils by incorporating paleobiogeographic range derived from known fossil occurrences as a factor, which is exemplified using *Pteranodon sternbergi* as the target fossil species. This refined method of targeted fossil deposit exploration looks to 1) enable paleontologists to look for specific genera/species fossils and 2) visualize narrowed down collecting areas that also indicate what agencies or landowners should be contacted to get access to exploration sites. It is the hope that this refined method can be combined with future fossil detection and

exploration techniques to develop a robust field of fossil deposit exploration, like that of mineral and petroleum exploration.

DISTRIBUTION OF PERV-C AMONG FERAL PIGS IN EASTERN KANSAS

Robin Cesur

Department of Biological Sciences, Fort Hays State University

Allotransplantation (human to human transplant) is not a service most people in the United States can utilize readily due to lack of human organs. Xenotransplantation offers the benefit of having more cells, tissues, or organs available. Pigs are an appropriate animal that may be used for this due to similar organ size and physiology to humans. Pigs can be a problem when it comes to Porcine Endogenous Retrovirus (PERV). This is a retrovirus that can become integrated in all cells of that organism through the germ line. Infectious viral particles have been released in some immortalized pig cell lines causing immunodeficiencies and lymphomas. There are three subtypes based on cell tropism, sequence variation, and receptor interference; A, B, and C. A and B are present in all pigs and infects pigs and humans. C is only present in some pigs and only infects pigs. A and C can recombine in two known varieties, long and short. Since A can infect humans, so can these hybridizations. By looking at recombinant envelope regions, it can be hypothesized how prevalent this hybridization is in feral and domestic samples. This study is using PCR to detect the presence of PERV-C in samples from Eastern Kansas. This will also guide further studies in learning structure and function in retroviruses and their related family members (Koala retrovirus, Murine leukemia virus, etc.) It was found that 44/53 (83%) were positive for PERV-C and 13/31 (42%) were positive for PERV A/C hybrid long.

APPLICATION OF ARTIFICIAL INTELLIGENCE IN OPTIMIZING GREEN AMMONIA PRODUCTION

Amirsalar Bagheri, Thiago Oliveira Cabral, and Davood B. Pourkargar
Department of Chemical Engineering

Ammonia is vital in producing fertilizers, which play a crucial role in global agriculture, supporting over half of the world's population. Additionally, ammonia is gaining attention in the energy sector due to its potential as a carbon-neutral hydrogen carrier for sustainable energy storage and transportation. However, the traditional method of producing ammonia via the Haber-Bosch reaction in high-temperature reactors has room for improvement in environmental sustainability and cost-efficiency. To address this, we propose leveraging artificial intelligence (AI) methodologies to optimize the ammonia manufacturing process. To enhance our understanding of ammonia production, we developed a multiscale model that combines ammonia production kinetics with reactor dynamics. However, the complexity of this system posed challenges for real-time optimization. To overcome this, we employed AI techniques to streamline the reactor's model and integrated it with an advanced optimal process control approach. The results showed that the AI-based model accurately predicted ammonia production dynamics. When combined with the advanced control strategy, it led to significant improvements in production efficiency, reduced energy consumption, and decreased waste generation. This research highlights the synergy between AI technologies and advanced process control and optimization methods. Simplifying complex processes through AI-based models holds promise for achieving efficient production outcomes, with widespread benefits for agriculture and the promotion of cleaner energy solutions. This approach can potentially contribute to sustainable agriculture and cleaner energy production, addressing critical global challenges.

REDEFINING TRADITIONAL LONG-TERM CARE SENIOR LIVING RESIDENCES THROUGH ACCESSIBLE RESOURCE IMPLEMENTATION TO PROMOTE HEALTHIER OLDER ADULTS

Holly Ellis[1] and Migette Kaup[2]
[1]*Department of Architecture;* [2]*Center on Aging*

To promote healthier older adults living in long-term care residential settings, they need access not only to the necessities of life, but also to life-enriching amenities. These amenities provide an abundance of mental and physical health benefits, leading residents to live longer and happier lives. Unfortunately, oftentimes these residences are not adequately programmed for residents to use these amenities, hindering their living experience. There is a need for redefinition of traditional long-term care residences by integrating an opportunistic, educational, walkable campus to promote healthier residents.

Data collected can be assessed under the Activity Theory, which notes that an older adult's degree of commitment, rather than the number of activities, is most critical in perception of quality of life. Older adults will also seek Residential Normalcy; this theoretical framework focuses on older adults who feel they occupy incongruent places, like long-term care residences as aforementioned. When the older adult participates in activities and utilizes a residence's resources as described, they benefit tremendously mentally and physically. When providing older adults access to these amenities through a neighborhood-reminiscent accessible community, their quality of life is improved by means of familiarity. These strategies benefit residents significantly, though there are still limitations. When residences begin to make these changes to incorporate the extent of what is discussed in this research, that redefinition will likely bring about a change to the requirements of administration practices. Older adults need advocates for these changes; all designers, residence staff, and policy makers should be a part of this movement.

OPTIMAL SIZING OF PHOTOVOLTAIC-BATTERY SYSTEM FOR PEAK DEMAND REDUCTION USING STATISTICAL MODELS: A CASE STUDY IN GREENSBURG, KANSAS, US

Reza Nematirad, Anil Pahwa, and Balasubramaniam Natarajan
Department of Electrical and Computer Engineering

This research designs a photovoltaic (PV) system for Greensburg, Kansas. The challenge is determining optimal PV size, requiring technical and financial evaluations. Often, customers are charged for energy and peak demand. Thus, PV installations should decrease energy costs and peak demand. We observed peak loads in Greensburg typically arise in winter mornings and partially in spring and fall when there is little to no PV generation. While PV can reduce energy costs anytime during its operation, peak demand reduction is more complex. To tackle this problem, excess energy can be stored in batteries to address peak demands during low PV generation. Traditional methods, relying on historical data, don't consider uncertainties. We introduce a unique method to determine optimal PV-battery sizes, focusing on peak demand reduction, especially tailored for small electricity distributors or rural areas. The strategy seeks to identify a peak threshold where further expansion of battery capacity no longer delivers significant peak reduction or financial benefits. The outcomes of this research have been rigorously verified using real-world data from the case study, leading to a system design of 1200 kW PV and 3600 kWh battery. The findings demonstrate that the designed model can flatten the peak loads up to 2078 kW with 95% probability. The designed PV-battery system yields a benefit of $820,373 over two decades and recoups its installation cost within six years. This represents a pioneering advancement, offering a practical alternative to conventional methods and facilitating informed decision-making in real-world scenarios.

URANIUM IN GROUNDWATER AND ITS POTENTIALS AS A NATURAL CONTAMINANT IN THE CHEROKEE BASIN, SOUTHEASTERN KANSAS

Fidelis Onwuagba[1], Karin Goldberg[1], Matthew Kirk[1], Behzad Ghanbarian[1], Walter Dodds[2], and Sam Galliardt[3]

[1]Department of Geology; [2]Division of Biology; [3]Environmental Science Program

The ingestion of radioactive nuclides such as uranium has been associated with renal and cancer-related issues in humans. Many previous studies have focused on anthropogenic uranium contamination in groundwater. Here, we examine the potential for natural uranium contamination resulting from rock-water interaction. After uranium ores, black shales are the second most important uranium host. Immobile uranium can be mobilized into groundwater under ideal geochemical circumstances, controlled by factors such as redox status, carbonate speciation, and alkalinity. The sedimentary succession in the Cherokee Basin in southeastern Kansas includes several black shales interbedded with limestones. We collected and analyzed the chemistry of groundwater samples from domestic wells screened in the Ozark aquifer to investigate whether these black shales were sources of groundwater uranium contamination. Uranium concentration is low in the area, showing that this element remains trapped in the rock. However, some wells had high Hg, Fe, Mn, NO3-, NH4, and K2+ concentrations. Potential health effects of these contaminants through ingestion in drinking water are: Hg - damage to the eyes, skin, respiratory, digestive, neural, immune, and renal systems; Iron - iron overload in individuals prone to hemochromatosis; Mn - toxicity can adversely affect the nervous system and cause neurological and developmental effects in children.; NO3- - methemoglobinemia in infants; NH4+ - potential formation of disinfecting by-products, associated with increased risk of certain cancers.; K+ - can lead to a condition known as Hyperkalemia, which may cause disruptions in muscle and nerve functions, gastrointestinal irritation, and impairment of heart and kidney functions.

EFFECTS OF PH AND WET COOKING ON SORGHUM STARCH DIGESTIBILITY, PHENOLIC PROFILE, AND CELL BIOACTIVITY

Jaymi Peterson[1], Ádina L. Santana[3], Sarah Cox[1], Mayra Perez-Fajardo[1], José Covarrubias[1], Shawn Wu1, Scott Bean[1], Ramasamy Perumal[4], Weiqun Wang[2], and Dmitriy Smolensky[1]

[1]Grain Quality and Structure Research Unit, Agricultural Research Service, U.S. Department of Agriculture; [2]Department of Food Nutrition and Dietetics and Health; [3]Department of Grain Science and Industry; [4]Department of Agronomy

Kansas is the top producer of sorghum grain. Some varieties contain high levels of health promoting phenolics that have shown anticancer properties in laboratory studies. However, the presence of phenolics is known to decrease digestible starch. To examine the effect pH and wet cooking times on sorghum by evaluating starch digestibility, phenolic profile, and cell bioactivity. Brown, whole grain sorghum flour was combined with buffers at various pH levels (3, 4, 5, 7, & 8), heated in a 100°C water bath for 0, 10, 30, 60, and 120 minutes and then freeze dried for 36 hours before analysis. Starch digestibility of sorghum was determined using the K-DSTRS kit from Megazyme. Changes in phenolic profile was measured using the total phenolic content (TPC) and condensed tannin content (CTC) assays combined with reverse phase high performance liquid chromatography (RP-HPLC). Cell bioactivity was determined using the cell inhibition assay in human colon cancer cells. Digestible starch increased after wet cooking. Cooking samples for 10 minutes did not reduce TPC of samples. CTC of samples decreased after cooking while pH had no affect. All 3-deoxyanthocyanidins decreased after 10 minutes of cooking. However, select flavanoids of interest either did not change or increased after cooking. Bioactivity was diminished by cooking for longer than 10 minutes. The bioactivity of sorghum polyphenols was more effective by cooking at lower pH levels. Cooking samples for 10 minutes improved starch digestibility without decreasing potential health benefits. This shows potential for polyphenol-containing sorghum to be used for health food applications.

REDUCING TICK POPULATIONS THROUGH PRESCRIBED BURNING

Andrea Salazar, Herman Griese, Victoria Pickens, and Cassandra Olds

Department of Entomology

Ticks are one of the most important obligatory blood-feeding ectoparasites of livestock and humans. High tick burdens on cattle can result in decreased production and the transmission of a wide variety of pathogens. Tick control is difficult to achieve because a large proportion of the tick's life is spent off the animal host. Intentional burning of vegetation (prescribed burning) has been suggested as a potential method to reduce tick abundance; however, the efficacy of prescribed burning as a mechanism for tick control needs to be further evaluated. This study aimed to explore the effect of seasonal prescribed burning on the tick population in the Kansas Flint Hills. Study areas have been burned annually in either the spring, summer, or fall for four consecutive years. Cattle are grazed on burn-treated pastures at an equal stocking density from early May to August. Ticks were collected from three pastures of each prescribed burn treatment while an unburned pasture served as the no-treatment control. Ticks were collected every other week from March to August and identified morphologically utilizing a microscope and published keys. Significantly fewer ticks were collected from fire-treated areas compared to unburned areas ($P<0.0001$). Additionally, the season of the burn can potentially further impact tick populations with significantly lower tick populations observed in spring burned vs. fall

burned areas (P= 0.0403). This study suggests that repeated annual burning of grazing areas could be an effective method to effectively reduce tick abundance in cattle pastures.

SILICA DUSTS FOR GRAIN PROTECTION: A SUSTAINABLE ALTERNATIVE TO CHEMICAL INSECTICIDES

Manivannan Selladurai and Bhadriraju Subramanyam
Department of Grain Science and Industry

Silica dusts have emerged as promising solutions for managing insect pests that infest stored food grains, particularly in the context of organic production. Nevertheless, the current silica dusts employed for grain protection tend to exhibit their effectiveness at higher application rates, a factor known to potentially alter the physical attributes of the treated grains. In this research, two novel amorphous silica powders were tested for their efficacy to control rice weevils, which are significant pests affecting wheat grains. The silica powders were applied to wheat at five different concentrations (0, 0.05, 0.10, 0.20 and 0.25 g/kg) and assessed for their efficacy to control rice weevil after 14 days. Additionally, investigations were conducted on progeny count after 42 days to determine how the silica treatments might impact the reproductive capabilities of the treated insects. The findings revealed that silica powder 2 displayed remarkable effectiveness even at lower concentrations of 0.20 g/m2 when compared to silica powder 1, surpassing the industry recommended dosage. This variance in efficacy between the two powders was attributed to the high oil absorption capacity of silica powder 2. Consequently, these results suggest that both silica powders, especially silica 1 powder can be employed for rice weevil control in wheat storage systems at significantly reduced application rates compared to industry standards.

DEMOGRAPHIC PREDICTORS AND MENTAL HEALTH OUTCOMES OF THERAPY ATTENDANCE

Adi M. Siegmann, Brecken Wilkinson, and Chelsea Spencer
Department of Applied Human Sciences

Therapy is a service which may not be equitably accessible to marginalized groups (Aratani, 2011). To better understand which populations may need more equitable care, this study will investigate gender, race, ethnicity, sexual orientation, income, and level of education as predictive factors of therapy attendance. Measured mental health outcomes are depression, anxiety, and resilience. The study was guided by biopsychosocial theory, as we examine social, biological, and psychological factors and their association with participation in therapy. A series of logistic regressions were run from online survey data to examine psychological, social, and biological factors and their association with attending

therapy in one's lifetime. Being a female (OR = 2.64, p < .001), being LGBTQ+ (OR = 2.47, p < .001), and being white (OR = 2.12, p = .021) were all significantly related to therapy attendance. Higher levels of anxiety (OR = 1.06, p = .002) and higher levels of depression (OR = 1.04, p = .033) were both associated with an increase in the likelihood of ever going to therapy. Higher levels of resilience was associated with a decrease in ever going to therapy (OR = 0.74, p < .001). Employment, age, education level, income, IPV perpetration and IPV victimization were not significantly related to ever attending therapy. These results provide information on which populations may benefit from an increase in mental health care through policy and resource allocation. The results also emphasize a need for further investigation into potential barriers of attendance, such as stigma and treatment tailoring.

EFFICACY OF COMMERCIALLY AVALIABLE SANITIZERS ON EXPERIMENTALLY INOCULATED HIGH-DENSITY POLYETHYLENE (HDPE) WITH *SALMONELLA* AND *ESCHERICHIA COLI (E. COLI)* BIOFILMS

Savannah Stewart, Colton Ivers, and Valentina Trinetta

Food Science Institute

Salmonella and *E. coli* are pathogens of concern for the rendering and pet food industry. Both microorganisms can form biofilms on surfaces found within rendering plants, pet food manufacturing facilities, and transportation vehicles. Because biofilms are difficult to mitigate, it is important to find sanitizers that can effectively reduce levels of bacteria present at facilities within the pet food supply chain. Some research has been done to demonstrate sanitizer efficacy on stainless steel: little data is available for more porous surfaces like high-density polyethylene (HDPE). Mature multi-strain biofilms of either *Salmonella* or *E. coli* were grown on HDPE coupons using a CDC Biofilm Reactor. Coupons were then exposed to different antimicrobial agents; silver dihydrogen citrate (SDC), chlorine, peracetic acid (PAA), steam, and chlorine dioxide (ClO_2). Exposure time was 1- or 2-minutes except ClO_2, which was applied for 24-hours. Surviving cells were enumerated post-exposure. Each treatment was tested 6 times. For both biofilms, all treatments significantly impacted populations when compared to controls. In *Salmonella* biofilms, there was a difference between application times (1- or 2-min) for chlorine (4.14 vs. 3.18 log CFU/coupon) and SDC (5.96 vs. 4.82 log CFU/coupon) ($P<0.05$). In *E. coli* biofilms, there was a difference between application times for steam (3.60 vs 2.53 log CFU/coupon). ClO_2 treatment resulted in no detectable viable cells (<2.40 log CFU/coupon) for either biofilm. Understanding the efficacy of antimicrobials against biofilms can help improve pet food safety by increasing the treatment strategies available to facilities.

EFFECT OF DIETARY NITRATE SUPPLEMENTATION ON TUMOR OXYGENATION

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1 in 8 women will be diagnosed with breast cancer (BC) during their lifetime. Hypoxia (low oxygen pressure, PO2) is a characteristic feature of BC and is associated with a more aggressive phenotype, increased risk of metastasis, and resistance to anti-cancer treatment. Thus, increasing tumor PO2 is integral to advance treatment outcomes for BC patients. Dietary nitrate supplementation via beetroot juice (BRJ) has been demonstrated to increase PO2 and improve metabolic function in skeletal muscle, however little is known on its effects within a tumor. We tested the hypothesis that 5 days of BRJ supplementation would decrease tumor growth and increase tumor PO2 in a BC model. MAT B-III cells were injected into the mammary gland of aged female Fischer-344 rats (n=6). Rats were randomized into BRJ supplementation (BRJ, n=3) or water (CON, n=3) groups. Following tumor palpation and 5 days of BRJ/water consumption, phosphorescence quenching determined the PO2 within the tumor during normoxia (21% O2) and hyperoxia (100% O2). The BRJ rats had decreased tumor size versus CON rats (BRJ, 13±1mm; CON, 23±4mm; $P<0.05$). During normoxia and hyperoxia, BRJ rats displayed increased tumor PO2 compared to the CON group ($P<0.05$). Blood gas analyses revealed a decreased lactate production in BRJ versus CON rats (BRJ; 0.5±0.1 mmol/L, CON; 1.18±0.12 mmol/L, $P<0.05$). This study suggests that BRJ supplementation can decrease tumor growth and increase tumor PO2 in BC. These findings hold significant promise for enhancing treatment results and quality of life in individuals battling BC.

STUDY OF CROSS-LINKERS ON THE BOND STRENGTH OF POLYURETHANE ADHESIVES DERIVED FROM CASTOR OIL

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Adhesives play a crucial role in holding materials together for a wide range of everyday uses, ensuring they stay strong and adaptable. A major challenge in developing polyurethane (PU) adhesives is achieving excellent bonding strength. It is crucial to design chain extenders with suitable molecular structures to enhance the bonding strength of polyurethane-based adhesives. In this study, a polyurethane-based adhesive was formulated using castor oil-based polyol and diisocyanate. The addition of chain extenders such as N, N-bis(2-hydroxyethyl) thiophene-2,5-dicarboxamide (ETP) and N, N-Bis(2-hydroxyethyl)-terephthalamide (ETAM) significantly improved the bonding strength of the adhesive. This improvement was attributed to the presence of the dicarboxamide group in the chain extenders, which facilitated hydrogen bonding. The bonding strength of the PU adhesive increased from 5.0 MPa to 7.22 MPa and 9.68 MPa with the addition of 7.5 wt.% of ETP and 5.0 wt.% of ETAM, respectively. The adhesive's bonding strength was evaluated on both wood (oak) and metal (stainless steel) substrates, demonstrating a high bonding strength of 9.68 MPa on oak wood and 6.73 MPa on stainless steel with the 5.0 wt.% ETAM-based PU adhesive. The adhesive's strong bonding performance was attributed to the formation of multiple noncovalent bonds between the PU molecular chains and the substrate surface. Furthermore, no significant changes in the adhesive's Fourier-transform infrared (FT-IR) spectra were observed after exposure to various solvents, indicating good crosslinking. The adhesive's crosslinking efficiency was further confirmed by studying its gelation and swelling behavior.

ENHANCING NICKEL HYDROXIDE EFFICIENCY FOR COMPLETE WATER SPLITTING THROUGH INNOVATIVE SYNTHESIS PROTOCOL

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Water splitting signifies a breakthrough in the realm of renewable energy, facilitating the production of hydrogen (H_2) and oxygen (O_2). In this process, the oxygen evolution reaction (OER) plays a vital role in the process of energy production, which exhibits higher

overpotential than the Hydrogen evolution reaction (HER). Therefore, it necessitates the advancement of electrocatalysts that are more active, durable, and stable. Transition metal oxides and hydroxides are promising materials for water splitting, in which nickel hydroxide ($Ni(OH)_2$) acts as an essential catalyst in electrochemical water splitting for both HER and OER. Herein, $Ni(OH)_2$ samples were prepared via three different methods which are aerogel, hydrothermal, and microwave respectively, and those materials were tested by using 1M KOH as an electrolyzer in an electrode system. Where the results were evaluated for both HER and OER at the current density of 10 mA/cm^2, OER overpotential for aerogel shows 266 mV, which is comparatively lower than hydrothermal 311 mV and microwave 321 mV. Similarly, for HER, ($Ni(OH)_2$) aerogel at the same current density shows 224 mV of overpotential, indicating superior performance compared to hydrothermal and microwave methods. Electrochemical impedance spectroscopy (EIS) revealed excellent results for all samples, indicating favorable charge transfer kinetics. Additionally, analysis of the electrochemical surface area, roughness factor, and turn-on frequency showed that aerogel-synthesized nickel hydroxide exhibited superior properties, further enhancing its water-splitting performance. These findings underscore the importance of synthesis method selection in optimizing the water-splitting performance of nickel hydroxide materials for sustainable energy applications.

A SOLVENT AND CATALYST-FREE APPROACH FOR SYNTHESIZING BIO-BASED ADHESIVES

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The development of low-cost bio-based formaldehyde-free adhesives has aroused widespread interest in the wood adhesive industry. The usage of adhesives that contain urea-formaldehyde or phenol formaldehyde leads to environmental issues. Therefore, bio-based renewable resources are a better option to use for polyol (a starting material for making adhesives) instead of petroleum-based polyols. Among all renewable resources, plant oils are the most popular biobased resource for replacing such polyols. In this research, soybean oil polyol was used to prepare a polyurethane (PU)-based adhesive. For studying adhesion strength, three different aliphatic diols (EDO, BDO, and HDO) with increasing chain length were used as a crosslinking reagent. For studying mechanical strength, different wt.% of diols were used in adhesives. Oakwood and stainless steel were used to study adhesive strength. On oakwood, the mechanical strength was increased from 3 MPa to 6.36 MPa after incorporating BDO which showed the highest adhesive strength among all the other samples. After being immersed in different solvents for 24 hours, no notable changes were observed in the FT-IR spectra of these PU materials. This work

provides a sustainable alternative to petroleum-based adhesives with good mechanical and physical properties.

HYDROPHOBIC POLYMER COATINGS FROM SOYBEAN OIL POLYOL AND SILICONE-DIOL: SYNTHESIS, CHARACTERIZATION, AND ENHANCED PROTECTIVE PROPERTIES FOR WOOD AND METAL SURFACES

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This study explores an eco-friendly option for traditional coatings, focusing on a bio-based polyurethane coating made from soybean oil polyol and a silicone-containing diol. The goal is to create a protective coating for wood and metal surfaces that is less harmful to the environment. The coating takes advantage of the hydrophobic properties of silicones, which are resistant to chemicals and have nonstick abilities. Samples of oak wood and stainless steel were coated with the new material to see how well they resisted solvents and ink. The coated metal samples could withstand more than 50 drops of water and solvent without any major damage. Even after being written on and erased 1000 times, the coating still repelled ink and could be easily wiped with a dry paper napkin. In a burning test, the time it took for the coated material to ignite increased as the amount of silicone in the diol increased. For instance, the sample with 40% silicone took 11 seconds to ignite, more than double the time compared to the control sample. This sample also only lost 1% of its weight during the test. The PU coating showed it was hydrophobic, meaning it repelled water, with a water contact angle of 95°. After being immersed in water for 24 hours, the coating showed no significant effects. Overall, these findings suggest that the PU coatings made from SOP and silicone-containing diol could be a good eco-friendly option for protective coatings against environmental damage.

WASTE-TO-WEALTH: RECYCLING OF POLYMER FOR CIRCULAR ECONOMY

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The quest for sustainable and renewable materials is driving a paradigm shift towards a bio-based economy, propelled particularly by the imperatives of the Sustainable

Pittsburg State University (continued)

Development Goals (SDGs). The increased use of bio-based polyurethane foams (bio-PUFs) in industrial applications presents a challenge for researchers to develop innovative recycling methodologies conforming to evolving sustainability standards. This research represents an innovative approach to the recycling of bio-PUFs through depolymerization via Glycolysis, employing commercially available bio-based solvent. The degradation and recovery of polyol were validated through FTIR and NMR analysis, confirming the presence of amine groups, urethane linkages, and other byproducts. High yields (over 93%) of recovered polyol were achieved within comparable timeframes using both bio-based and traditional petroleum-based glycolysis agents. Comparative analyses revealed superior physical and chemical properties of bio-based recovered polyol over its petroleum-based counterpart. The resulting recovered polyol (RP) was utilized to fabricate new PUFs replacing up to 20% w/w of the virgin polyol, exhibiting physical characteristics akin to virgin PUFs with negligible deviations. Finally, this study underscores the enhanced circularity within the value chain by closing the loop of bio-PUFs through sustainable glycolysis processes, thus contributing to the advancement of circular economy principles.

COMPARING THE USE OF BAYESIAN NETWORK ANALYSIS AND SPATIAL ANALYSIS TO IDENTIFY THE SOCIAL DETERMINANTS OF HEALTH AND EDUCATION IN KANSAS COUNTIES

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This study explores the intricate relationship between social determinants of health and education across Kansas counties and school districts through a comprehensive spatial and Bayesian Network Analysis. Utilizing over 4 million data values from the MySideWalk (https://www.mysidewalk.com/) community data library, this research aims to visualize, analyze, and model the spatial patterns and interdependencies of health and education indicators including housing, public health, demographics, poverty, education, and community development. By analyzing these determinants, the study identifies geographic areas where social factors significantly influence health and educational outcomes. The application of advanced statistical and spatial analyses uncovers specific Kansas regions where social determinants markedly affect community well-being. The goal is to use this information to make Kansas a better place to live. The findings from this large-scale investigation are expected to offer critical guidance for decision-making processes, inform community development strategies, and influence the effective dissemination of state funding. We use a vast amount of data to look at these factors across different areas of the state. By examining things like housing, access to food, schools, and healthcare, we get a clearer picture of what life is like for Kansas residents. What makes this study special is its scale and depth. We are not just looking at a few places but across the entire state, identifying where people might be facing tougher challenges because of their environment. In short, this research is a tool for making informed decisions that can lead to a healthier, more educated, and economically vibrant Kansas.

RATES OF FOOD INSECURITY INFLUENCE MENTAL HEALTH AND WEIGHT FOR PARENTS & CHILDREN IN RURAL KANSAS

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Approximately 14% of children in Kansas have obesity, ranking 10th in the nation. This issue also affects 1 in 3 adults in our state (36%; 12th in nation). It is important to understand what factors may be causing weight issues or making life more difficult for those who have obesity so local/state resources can be tailored to help families. Household

food insecurity is one risk factor for obesity that is also linked to depression/anxiety. This study is the first to examine rates of household food insecurity in a rural, family-based obesity intervention in Kansas. We also test how household food insecurity might be related to body mass index (BMI) and mental health in parents/children. Children (6-10 years) with obesity and their parents (148 pairs) from 18 rural Kansas elementary schools completed height/weight measurement and surveys about food insecurity, eligibility for free/reduced-price school lunch, weight-related quality of life, depression, and anxiety. Results showed this sample had significantly higher rates of food insecurity (25% vs. 10.2% national average) and eligibility for free lunch (50% vs. 34% Kansas average). Results also indicated food insecure parents had higher BMI, depression, and anxiety compared to other parents in the study, but there were no differences in children's scores. When comparing free lunch eligibility groups, eligible parents and children had significantly higher BMI, and parents had higher depression. These results highlight the need to assess and address food insecurity, and the depressive symptoms it causes for parents in rural Kansas especially among families with obesity.

INNOVATIVE FLOOD MANAGEMENT: ROLE OF MUNICIPAL GOVERNMENT TRANSFORMATIVE CAPACITY

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Climate-fueled hazards already affect human health, public services, critical infrastructure, and livelihoods. Flooding is a particularly widespread challenge affecting US states and cities, including Kansas. As an illustration, 59% of respondents to a nationwide survey we administered to US cities in 2021 identified floods as having significantly impacted their jurisdiction in the past five years. Also, the FEMA National Risk Index predicts the expected annual loss in Kansas due to flooding to be over $42 million. This project specifically investigates the relationship between municipal governments' transformative capacity and their likelihood of enacting innovative policy solutions for flood prevention and mitigation. Building from the literature on transformative urban governance, we develop an original index of transformative capacity to capture the cities' ability to progress purposefully toward a more sustainable state. We hypothesize that higher transformative capacity— measured by the extent a city is proactive, risk-accepting, and learning-focused—is systematically associated with greater policy innovation. To measure policy innovation, we use FEMA's Community Rating System (CRS), which indicates floodplain management practices that exceed the minimum requirements of the National Flood Insurance Program (NFIP). In addition to transformative capacity, we regress this measure

of policy innovation against flood loss, flood risk, population, educational attainment, and home ownership. Our analysis of 386 survey responses suggests a positive association between higher transformative capacity and the level of policy innovation in municipal governments in the context of flood prevention. The findings have important implications for policymakers and practitioners promoting climate governance innovation and development in their communities.

PREVENTION OF ORTHOPEDIC INFECTION VIA ANTIMICROBIAL BONE CEMENT

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Knee replacement surgeries occur at a higher rate in Kansas compared to the national average. Joint infection is the number one cause of failure in these surgeries and are physically, mentally, and economically burdensome to Kansans. Bone cement is one of the components used in a knee or hip implant and it lays at the interface of the patient's natural bone. Bone cement has great mechanical strength, but its rough surface leaves it prone to bacterial attachment. Once attached, these bacteria continue to grow until the whole implant becomes infected. Currently, infection is prevented by incorporating antibiotics into this bone cement, however, bacteria are developing resistance to these medications and therefore new preventative measures are needed. My research utilizes borate bioactive glass to incorporate into the cement and prevent infection from establishing. Bioactive glass has the ability to release particles out of the cement to kill bacteria in the surrounding area. This glass also then converts into a layer over the cement once submerged into fluid. By engineering this glass in a specific manner, we can leverage the particles it releases and the layer it forms to not only encourage integration with our natural tissue, but also prevent bacterial attachment and thus decrease the rate of infection that occurs. This research provides insight into an alternative form of antimicrobial implant to help Kansans have successful joint replacements and prevent them from suffering through joint infection.

SUPPORTING RURAL SPEECH-LANGUAGE PATHOLOGISTS IN AAC: TIERED VIRTUAL COACHING AS PROFESSIONAL DEVELOPMENT

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This project analyzes the efficacy of a new form of professional development, virtual skills-based coaching, to improve rural school-based speech language pathologists' (SLPs) use of evidence based Augmentative and Alternative Communication (AAC) teaching strategies during shared book reading experiences. Results hope to support approximately 1600 SLPs in Kansas provide the best services to nonspeaking students. A nonconcurrent multiple baseline across participants study design was used. Three SLPs were recruited from rural areas across the United States to participate in this study. Weekly virtual coaching occurred via Zoom either with delayed feedback (Tier 1) or immediate feedback (Tier 2). The aim of the study was to increase SLPs' use of the Model, Wait Respond (MWR) teaching strategy to 80% of two-page spreads in a shared reading experience. At the end of the study, participants were surveyed in order to determine if they found this model of professional development to be time effective and worthwhile. Results indicate this model of coaching produced a change in SLPs implementation of the MWR teaching strategy sequence within shared reading. While there were no measures for child communication, every student participant increased communication through the study. SLPs responded favorably to coaching within coaching conversations. The results of this research demonstrate an effective way for content area experts to build capacity in rural educators and health care professionals in rural areas. This will improve health care provision to students and patients in rural areas, decrease cost, and time spent in health care.

URANIUM CATCH AND RELEASE AS A STRATEGY FOR NUCLEAR FUEL RECYCLING

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To curb carbon emissions in energy production, nuclear energy represents an important opportunity for the future. In the 1980's Kansas took the initiative to participate in cleaner power generation by supporting the construction of the Wolf Creek Nuclear Power Plant located in Burlington, KS. This plant generates 1200 megawatts of carbon-free energy annually, providing sufficient power for 800,000 Kansas residents. In addition to cleaner energy production, this facility contributes $165 million to Kansas' economy through

employment, commerce, and taxes. Despite the advantages of nuclear energy, management, and recycling of used nuclear fuel at Wolf Creek remains an unsolved challenge. With nearly 95% of spent nuclear fuel remaining viable, there is a demand for strategies for reprocessing and recycling the spent fuel to reduce the burden of nuclear power on the environment. We have developed a low-cost “catch and release” approach to recover uranium from solutions that model key features of those used for nuclear fuel separations. Our approach utilizes electrochemical deposition (catch) to remove uranium from the solution and re-stripping (release) of uranium from a graphite surface. This method shows promise for industrial-scale bulk electrolysis due to the recyclability and low-cost of graphite electrodes and the operational simplicity of our experimental approach. Our work investigates the composition of deposited uranium species and the deposition method to determine optimal conditions for uranium recovery. This technique could directly benefit Wolf Creek by reducing the volume of nuclear material for disposal and providing a new stream of uranium fuel for power generation.

ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION: WILL IT REVOLUTIONIZE EDUCATION OR BE A PASSING FAD?

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Artificial Intelligence (AI) is poised to reshape education, heralding a new era of personalized learning and enhanced educator work-life balance. With projections valuing the AI industry at $407 billion by 2027 and anticipating creating 97 million new jobs, its integration into educational frameworks appears indispensable. Yet, the advent of AI is accompanied by significant ethical dilemmas, from academic integrity and privacy concerns to biases and potential job displacement. This comprehensive study at the University of Kansas, involving over 1,000 participants—spanning undergraduates, graduates, staff, and faculty—aims to investigate AI's multifaceted role in higher education. This study's findings reveal strong engagement with AI among undergraduates, with 57% utilizing it for assignments and AI surpassing student performance in 8 out of 11 undergraduate classes. Although 35% of the broader university community sees AI as advantageous for learning, more than half consider themselves novices or beginners in its application. Though overall apprehension is low, 30% of staff and faculty voice concerns over AI's long-term impact on job security in higher education. 60% back the creation of university-wide AI usage policies, highlighting the necessity for detailed guidelines to steer AI's role in education ethically, a sentiment echoed by ethical concerns throughout the study. This study explores AI's potential influence on academic instruction and career training, aligning with the Kansas State Board of Education's vision to cater to Kansas students' varied talents and aspirations. It emphasizes the need for research on AI's role in ensuring students are prepared for lifelong success in an ever-changing global environment.

ULTRA-PROCESSED, HYPER-PALATABLE, AND ENERGY DENSE FOODS IN THE US FOOD SUPPLY: PREVALENCE ACROSS 30 YEARS

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The US food environment has substantially changed since the 1980s, with three types of obesity-promoting foods emerging: ultra-processed foods (UPF), hyper-palatable foods (HPF), and high energy density (HED) foods. These foods have distinct definitions related to the degree of industrialized processing, palatability-inducing nutrient combinations, and caloric density, respectively. All are strategically designed and marketed to be relatively affordable, convenient to consume, shelf-stable, and widely available. These foods, however, may be key contributors to the rising rates of obesity in Kansas and the US. Our findings demonstrated that UPF, HPF, and HED foods made up a substantial portion of the US food environment, such that 58-65% of foods met classification for UPF, 55-69% for HPF, and 37-47% for HED from 1988 to 2018. UPF were 4% higher in 2018 compared to 1988, whereas HPF were 14% higher and HED were 10%, indicating a growing prevalence of these obesogenic foods in the US food system. Findings capture the US food system nationally, which also includes food available in the state of Kansas, which may contribute to rising rates of obesity across the state. Findings may inform policy related to the food supply in Kansas to increase the availability, affordability, and convenience of fresh, raw, and minimally processed foods throughout Kansas. Findings further support initiatives promoting local food suppliers in Kansas to increase availability and affordability of minimally processed foods. Addressing the wide-spread availability of obesity-promoting foods, such as UPF, HPF, and HED, may reduce obesity throughout Kansas as well as the US. Changes to the food supply may reduce healthcare costs related to obesity and obesity-related health concerns (i.e., heart disease, diabetes) throughout the state of Kansas.

ENERGY METABOLISM IMPACTS ALZHEIMER'S DISEASE PATHOLOGY

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Alzheimer's Disease (AD) is the leading form of dementia and a main cause of death in older adults, imposing heavy emotional burden, and extreme strain on the healthcare system. AD is diagnosed by signature protein deposits in the brain; diseases that affect energy metabolism (such as diabetes and cardiovascular disease) can increase AD risk. Mitochondria are the organelles in human cells that generate energy and may modulate risk for AD. Mitochondria are unique from other organelles as they have their own genetic component called mitochondrial DNA (mtDNA), which is essential for cellular metabolism. However, it is not well understood how this might affect AD pathology. To understand the relationship between energy metabolism and AD, we used "cytoplasmic hybrid" (cybrid) cells, which are neuronal cell lines generated using mtDNA from cognitively healthy older adults (n=18) or individuals with AD (n=17) recruited through the KU Alzheimer's Disease Research Center. We show mtDNA has significant impact on mitochondrial function in individuals with AD. Additionally, we show mtDNA impacts the expression of amyloid-beta and hyperphosphorylated tau, which are the hallmark biomarkers of AD pathology. Our preliminary studies indicate changes in energy metabolism, driven by mtDNA, track with clinically relevant cognitive-, brain imaging-, and biomarker-related outcomes. This suggests a potential key role of mitochondria in the development of AD. We hope to uncover underlying mechanisms driving AD pathology, and to understand how mtDNA affects this process. Closing this knowledge gap would offer new approaches for AD therapies, impacting the lives of millions each year.

SUPPORTING READING THROUGH DEVELOPING AN ASSESSMENT OF MEANINGFUL WORD PARTS

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The ability to read is essential to navigate our society. Good reading skills are strongly linked to lifelong academic, personal, and occupational successes. Yet, in 2022, the National Assessment of Educational Progress (NAEP) noted that 40% of students in the state of Kansas were not able to read at a basic proficiency level. If not resolved, these

pervasive reading difficulties will have detrimental effects on our state's future social and economic outcomes. As such, there is a great deal of interest surrounding how to help students become better readers. One often-overlooked skill that consistently correlates with better reading is the ability to recognize and understand meaningful word parts (e.g., past tense -ed in walked, or the suffix -ment in government). This skill starts to develop in spoken language in young children but becomes critical to reading and comprehending written texts in the elementary school years. Despite its important relationship to reading, many educators do not have access to assessments designed to measure students' knowledge and use of meaningful word parts. My research directly addresses this problem by developing two versions of a measure that educators can use to directly assess this skill in their elementary students. In addition, my dynamic measure supports educators in efficiently developing appropriate instructional targets on meaningful word parts to support their students' reading skills. The positive impacts of this instruction on students' reading will be felt well beyond our Kansas classrooms.

A NEW FACTOR INVOLVED IN AUTOSOMAL DOMINANT POLYCYSTIC KIDNEY DISEASE PROGRESSION

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Autosomal dominant polycystic kidney disease (ADPKD) is an inherited kidney condition, affecting roughly 500 thousand people in the US. The disease is characterized by the growth of fluid-filled cysts in the kidneys of affected patients, which gradually compromises the structure and function of the organ. ADPKD causes approximately 10% of kidney failure cases with an economic burden of over $10 billion annually. Interestingly, the severity of the disease can vary greatly, even within families, suggesting that ADPKD is influenced by compounds circulating in the blood of patients. We have shown that a factor that promotes ADPKD severity is ouabain, a hormone synthesized in the body and a natural product which can be consumed from plants. Previously, we have found that circulating amounts of ouabain can increase events associated with ADPKD, including cell proliferation, fluid secretion, and cell de-differentiation. These data were obtained using cell models. Recently, we have expanded our study working with a mouse model of ADPKD. After daily injections of a low dose of ouabain, we found that the kidneys of mice with ADPKD had exacerbated cyst growth, kidney size, and fibrosis, all markers that show disease progression in the whole animal. The results of this study demonstrate that substances circulating in blood, such as the novel factor ouabain, can influence disease severity. A better understanding of the mechanisms of action of ouabain in ADPKD will be important to advance our knowledge of ADPKD cyst development and to design new approaches for the treatment of this life-threatening disease.

LONGITUDINAL EVALUATION OF PRACTICE READINESS FOR A RURAL NURSE RESIDENCY PROGRAM USING AN INTERACTIVE COMPUTERIZED DECISION TOOL

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Background: The nursing workforce crisis has highlighted the need for effective approaches for improving the transition to practice (TTP) for new graduate nurses (NGNs). In 2021, only 20% of NGNs in the US were considered practice-ready. The use of Nurse Residency Programs (NRP) was highlighted as the best approach to improve competencies and practice readiness. The assessments of NRP effectiveness are limited, particularly for rural hospitals.

Purpose: Determine practice readiness for NGNs in a rural hospital.

Theoretical Framework: Duchscher's *Stages of Transition Theory* focuses on how confidence and competency impact practice readiness.

Methods: The study utilized a prospective, repeated measures design. All NGNs accepting a nursing position at the participating Regional Hospital were invited to participate. Confidence was measured with the *Casey-Fink Readiness to Practice Survey* at entry into the program, 3 months, and 6. Competency was measured using the Jane™ Competency System at identical time points.

Results: NGN confidence decreased from baseline to six months, and their overall competency was below the expected benchmark of .62 for NGNs despite attending an NRP. At six months, two NGNs indicated disappointment in their career choice.

Conclusions: Nursing workforce issues are tied directly to practice readiness and TTP. The findings reflect inflated confidence at baseline, which decreases during the residency program, which aligns with the theory of transition. The lack of growth in competence further substantiates the issues of practice readiness and what seems to be a disconnect between education, licensure, and practice readiness.

MEDIA FRAMING OF MENTAL HEALTH IN LATINXS IN THE UNITED STATES: A CONTENT ANALYSIS FROM CONSERVATIVE AND LIBERAL PERSPECTIVES

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This study delves into the portrayal of mental health issues in the media within the Latinx community in the United States, with a distinctive focus on the influence of conservative and liberal perspectives. The significance of this research lies in unraveling the complexities of media narratives and their impact on shaping perceptions of mental health in a community that is often underrepresented in scholarly discussions. By exploring the interplay of ideologies in framing this critical topic, the study aims to contribute important insights into the role of media in influencing public understanding of mental health within the Latinx community. The selection criteria were based on the categorization provided by mediabias.com, which identifies sources as either right or left-leaning. The analysis was conducted through two coding phases: an initial "Exploratory Coding" phase, followed by a "Pattern Coding" phase. These methodologies facilitated the identification and grouping of overarching themes and explanations, shedding light on the differing interpretations, solutions, and interventions proposed by conservative and liberal perspectives on mental health. The preliminary findings reveal that both conservative and liberal perspectives acknowledge structural, cultural, and environmental barriers to mental health, sharing a common approach in utilizing evidence. However, disparities emerge in the interpretation of symptoms and causes, as well as in proposed solutions. This research suggests that media plays a crucial role in shaping public perceptions of mental health within the Latinx community, and by extension, influences societal attitudes and behaviors.

SPANISH HERITAGE LEARNERS IN KANSAS: STUDENTS NEGLECTED BY THE EDUCATION SYSTEM

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Heritage Language Learners (HLLs) are individuals who have familial or ancestral ties to a particular language that is not English, and who exert their agency in determining whether or not they are HLLs of that Heritage Language. Therefore, based on this definition, Spanish HLLs include students who speak English predominantly, but that have families that speak Spanish at home. It also includes students who speak both English and Spanish at home, as well as immigrant-students who mainly speak Spanish and wish to be identified as an HLL. While differences exist amongst HLLs, they all hold Spanish in common, and

in the Spanish classroom, are frequently faced with the same stifling language ideologies. Language ideologies are bigger than opinions and directly involve social and political factors that begin with allowing for judgment to be passed on linguistic matters. In the context of the Spanish classroom and HLLs, language ideologies often question the validity and correctness of their language use, typically comparing HLL's Spanish to more "standard" varieties, and at times, attempting to erase the linguistic knowledge that HLLs have, rather than celebrating their abilities. In the current study, we aim to address the specific needs of Spanish HLLs. We intend to analyse the linguistic situation of Spanish HLLs in the state of Kansas and propose an adaptation of the existing curricula and training in higher education institutions. Our ideal curriculum and training are based on effective programs implemented in other states, as well as on the goals of Hispanic Serving Institutions.

THE REVERSE FUNDAMENTAL ATTRIBUTION ERROR FOR AUTOMATED SYSTEMS: IMPLICATIONS FOR KANSAS AGRICULTURAL OPERATIONS

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Consider a situation that most drivers have encountered: being cut off on the interstate by another driver. Well-established social psychology phenomena such as the Fundamental Attribution Error predict blaming the driver for the behavior (internal factor) instead of the situation (external factor). These attributions often reverse when making attributions for one's own behavior. This common misalignment in attributions for our own behavior and the behavior of others, often occurs in response to negative outcomes.

As automation (e.g., auto-steer guidance systems) continues to grow in use in agricultural settings in Kansas, it is important for researchers to understand how farmers might make attributions to explain the behavior of the automation that supports their work. While automated systems in agriculture promise benefits of labor savings and increased crop yields, these benefits can only be realized through research seeking to understand how humans view automation.

To understand the attributions that humans make for automation, relative to those made for themselves, sixty participants completed a visual search task. Participants alternated between performing the task and observing an imperfect automated system perform the task. Causal attributions were measured for oneself and for the system.

A linear regression revealed significant differences in attributions for oneself and for the system. Participants attributed the cause of their own performance to internal factors and the cause of automated system's performance to external factors, reversing the predictions

of the Fundamental Attribution Error. These results suggest that when performing a task and observing imperfect automation, humans make different attributions for performance.

SIMULATING DETECTOR FLIGHTS OF THE NASA NIAC NSOL SOLAR ORBITING NEUTRINO DETECTOR TO CONSTRAIN SOLAR MODELS

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The νSOL project is working towards building a space-based neutrino detector orbiting close to the sun. Neutrinos are sub-atomic particles that are the product of fusion inside the sun. Unlike the helium, light, and other particles produced during fusion, neutrinos are very weakly-interacting. Neutrinos directly escape the sun without interacting, unlike photons which can take thousands of years to escape the sun's core. By studying neutrinos, we can explore fundamental physics and unanswered questions about the universe. The weakly-interacting nature of neutrinos provides a unique window into the sun's core. Through this window is the largest fusion reactor in the solar system. Studying the sun's fusion could provide insights into fusion reactors here.

This work focuses on simulating the signals that the spacecraft might be able to measure during its solar orbit. I use the results from the Standard Solar Model (SSM), and from those I calculate the number of neutrinos from each of the neutrino-producing fusion processes in the sun. I put a simulated detector in an orbit around the sun, and at each time step I calculate the fraction of a neutrino that could be measured. Using random number generation to simulate real detection, I determine if a neutrino has been measured at that point in the orbit. I take the results from a simulated mission to calculate how many total neutrinos there were, and use that to calculate the luminosity of the sun. This luminosity constraint can then be input to a modified version of the SSM.

EXPLORING NONLINEAR OPTICAL MATERIALS: SYNTHESIS, ENHANCEMENT, AND COMPARATIVE ANALYSIS OF NONCENTROSYMMETRIC STRUCTURES

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Nonlinear optical (NLO) materials play a critical role in various technological applications owing to their unique optical properties. For practical applications, several basic conditions

should be satisfied for the NLO materials, including suitable bandgap, large NLO coefficient, high LDT, and moderate birefringence, as well as good crystal growth habits. A critical aspect of synthesizing IR NLO materials lies in achieving a noncentrosymmetric crystal structure. A case study of two compounds with high structural similarity emphasizes the significance of noncentrosymmetric structures. The enhancement of second harmonic generation (SHG) in NLO materials through a case study of isostructural compounds with different transition metals will be discussed. Furthermore, in a comparative analysis of isostructural compounds, variations in these properties emerge. This investigation elucidates the intricate relationship between doped compounds based on parent NLO compound $Ba_6Cu_4Sn_4S_{16}$ and their physical properties, providing valuable insights into optimizing the performance of NLO materials.

BRAIN TUMOR SEGMENTATION USING DEEP LEARNING

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Brain tumor segmentation is crucial in healthcare, and vital for accurately diagnosing and treating brain illnesses. With advancing medical imaging, accurate tumor identification and analysis are increasingly important, enabling professionals to see tumor details for better treatment planning.

The purpose of this research is to identify the detailed process for the segmentation of brain tumors, intending to address the urgent health challenges facing the diverse population in Kansas. Brain tumors pose a significant health challenge, so by using image-processing techniques and deep learning, we are working on improving the accuracy of the detection of brain tumors and developing tools to find them early.

We're using special magnetic resonance imaging (Brats MRI) as the dataset, and then we're using deep learning models to learn and identify brain tumors automatically. In other words, it would be like teaching a computer to be very good at spotting these types of threats.

Kansans will benefit from this research since it aims to make sure we have better tools for detecting and treating brain tumors. The faster and more precise we can find tumors, the sooner people can receive the appropriate treatment, and that is good for the health of everyone. To improve healthcare in Kansas, we aim to share what we learn.

APPLICATION OF POLYMER DERIVED CERAMICS FOR 3D PRINTING THERMAL MANAGEMENT SYSTEMS

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Manufacturing parts with complex geometry which are mechanically stable at high temperatures for different applications is challenging problem in the aerospace industry. A class of materials which has potential in this application are called Polymer Derived Ceramics (PDCs). These PDCs are made by heat treatment of silicon-based polymers such as polysiloxanes which produce Silicon OxyCarbides. These ceramics can be tuned to have specific mechanical, thermal or electrical properties along with good shape fidelity based on formulation of the polymer and the filler material used.

Additive manufacturing or 3D printing the complex structures using Direct Ink Writing allows us to print parts with tuneable properties based on the fillers used in the feedstock, using equipment and methods that differ only a little from the more established Fused Deposition Modelling (FDM) printers that people are more familiar with. To establish predictive models on the printability of the feedstock and it's accuracy in generating the desired structure, our work currently focuses on developing relationships between printing parameters and the resulting printed object.

ULTRASONIC GUIDED ELECTROSPUN CONDUCTIVE NANOFIBERS FOR BIOENGINEERING AND ADVANCED MANUFACTURING

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Electrospinning is an effective method to produce nanoscale fibers used in biomedical devices, filters, water treatment, electronics, and composites. Current technology cannot effectively control the trajectory and spin of fibers as they are formed between the polymer source and collection plate. Moreover, the fibers spun must be non-conductive, which severely limits the number of potential applications. This research focused on overcoming these limitations and developing an innovative approach to the fabrication of conductive nanofibers through the integration of electrospinning and novel ultrasonic phased arrays. A phased array of ultrasonic transducers produces acoustic holograms to precisely guide electrospun fibers toward the collection plate. A prototype ultrasonic assisted electrospinning device has been assembled and tested. The device guided fibers by acoustic

forces and deposited them in specified locations on the collection plate. Ongoing research involves the introduction of higher frequency transducers, larger acoustic arrays with various geometries, and innovative collection plate designs. Test results have laid the foundation for future work, with a clear trajectory toward creating multifunctional conductive nanofibers. This work represents a significant advancement in nanofiber fabrication techniques, opening avenues for continued research and innovation into tissue engineering and sensors for biomedical applications, aircraft lightning protection and stealth, and terahertz antennas for 6G communication technologies.

BLOOD SUPPLY CHAIN SIMULATION: AN INVESTIGATORY ANALYSIS

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In this study, we investigate the efficiency of blood donation processes, emphasizing Red Blood Cells (RBCs) in line with International Blood Banking Standards. Utilizing simulations, we assess donor wait times and resource management, aiming to enhance the donation experience and the efficiency of blood collection.

Our analysis emphasizes the importance of managing queues and resources effectively to reduce wait times and improve donor satisfaction. Identifying discrepancies between expected and actual resource use, we find opportunities to decrease downtime and streamline the donation process. Crucially, we recommend implementing donor incentives inspired by successful global case studies to boost repeat donations. These enhancements are particularly relevant to Kansas, where optimizing blood donation processes could significantly improve healthcare outcomes and foster greater community engagement. By ensuring a steady supply of RBCs, our suggested strategies aim to strengthen the resilience of Kansas's healthcare system, highlighting the state's commitment to leading in healthcare delivery and community health initiatives. Incorporating globally inspired donor incentives into our approach not only aligns with International Blood Banking Standards but also underscores Kansas's role in pioneering efficient and community-focused healthcare solutions.

BLOOD GLUCOSE REGULATION USING TYPE 1 FUZZY CONTROLLER

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Maintaining blood glucose levels (BGL) within a safe range is vital for optimal health, directly affecting energy production and cellular function. Stable levels support cognitive function, and sustained energy, as well as prevent cardiovascular and neurological issues. Understanding blood glucose control is important, especially for diabetic patients who cannot naturally maintain stable glucose levels to stay healthy. In Kansas, where diabetes ranks as the 7th leading cause of death and approximately 1 in 9 adults have the condition, along with 11.7% diagnosed with prediabetes, blood glucose regulation is paramount. This study focuses on regulating blood glucose levels and maintaining it in the safe range of 70 to 180 mg/dL, using a closed-loop control strategy with a Mamdani Type-1 fuzzy logic controller. The effectiveness of the proposed controller was tested for three test scenarios. The first test case investigated the performance of the controller on a severe case of a hyperglycemic Type-1 diabetic patient (BGL > 180 mg/dL). The second test case examined how well the controller performed on a diabetic patient with normal blood glucose levels while being subjected to a very high meal disturbance i.e., a high carbohydrate meal. The third test case explored the functioning of the controller where a Type-1 diabetic patient experiencing hyperglycemia (BGL > 180 mg/dL) is subjected to a heightened meal disturbance. The simulation results demonstrated consistent effectiveness across all scenarios. The simulated results are presented and discussed.

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