

Undergraduate Scholarly Showcase 2024

Guide to Morning Posters

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MORNING POSTER SESSION

Category A: Mental Health and Human Behavior

A-01: Examining Burnout Levels among Elementary School Teachers Educating Foster Children
 Atrium

Ariel Dodd, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

This research examines the level of burnout among elementary school teachers, with an emphasis on those teaching foster children. Research examining burnout in teachers at all education levels is abundant and has a clear trend: teachers are burned out. Teachers' work demands are increasing while pay is stagnant. What is not abundant is research examining the effect of educating foster children on burnout levels among elementary school teachers. Children in foster care often have higher support needs than those who are not. In this study, data on burnout levels among elementary school teachers will be collected using the Maslach Burnout Inventory. The results of the inventories will be analyzed for differences between teachers who educate foster children and those who do not. The outcome of the research will contribute to our understanding of the effects of placing a school-aged child in foster care on those around the child.

A-02: Do Hospice Professionals Experience Burnout?

Atrium

Evan Hendrickson, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

My proposal will seek to better understand if hospice professionals experience burnout in their line of work. The nature of their profession is emotionally demanding and requires passionate individuals who aim to provide quality care for those who are nearing the end of life. My study provides ways to combat burnout symptoms, along with a sample of hospice employees and their perceptions of burnout in the workplace. The outcome of my proposal will reveal if hospice employees do experience burnout, and what those stressors may stem from. Is it due to high caseload numbers, or if dealing with dying individuals leads to more emotional exhaustion than other professions? The proposal also aims to understand if self-care routines are successful in combating burnout symptoms, if the professionals do in fact experience them.

A-03: Residential Treatment and Improved Psychosocial Functioning in Youth

Atrium

Carissa Clark, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

Approximately 6% of foster care youth nationally are placed in institutions such as residential treatment facilities (Children's Bureau, 2022). The overall effectiveness of residential treatment is widely debated and seems to be dependent on a variety of factors. The purpose of this research is to determine if residential is equally effective for various demographics or if adaptations need to be considered to best meet the needs of certain populations. Additionally, this research strives to bring awareness to any population of youth within residential that seem to be underserved or tend to deteriorate in functioning within the residential treatment setting. It is important to ensure the effectiveness of residential treatment due to its intensive, restrictive, and costly nature. This study explores the change in psychosocial functioning of youth in one local residential treatment program. Using secondary data analysis, the study will highlight any instances in which one's age, gender, or race, may be impacting the level of improvement in a youth's psychosocial functioning as a result of residential treatment. An increased understanding of this field would be helpful for social workers as well as other professionals within human services, to implement evidence-based practices to best meet the needs of foster youth experiencing mental health issues, as well as for other populations that may utilize residential treatment.

A-04: The Negative Effects of the COVID-19 Pandemic on the Physical and Emotional Well-Being of Older Adults in Long-Term Care

Atrium

Madison Huber, Social work

Project Advisor: Dr. Georgia Anderson

Abstract

This research project explores the negative effects that the Covid-19 pandemic has had on the physical and emotional well-being of older adults living in long-term care facilities. The outcome of this work will allow people in helping professions to better serve older adults in the future should there be another pandemic, and understand why long-term care facilities can create strong feelings of loneliness and isolation.

A-05: Postvention Effort: Bereavement of Suicide

Atrium

Victoria Schwegmann, Social Work

Project Advisor: Prof. Karen Rumsey

Abstract

There is a clear rise in suicide rates leaving more and more individuals left behind in bereavement. Postvention treatment and resources for these individuals left behind are not as well developed leaving these individuals with little to help them walk through this life-altering experience. Within the Cincinnati Police Department in the Victim's Assistance Liaison Unit (VALU) there is a developing system in place to try to meet the needs of these individuals. However, it is a social worker's job to evaluate the best practice models utilized when working with populations and see if there are any more resources or updated models of service that could lead to better outcomes for the population. By understanding the experiences and various struggles within the client population that are served through VALU, there can be a refinement of what would be the best evidence-based model to lead to optimal outcomes for individuals bereaved by suicide.

A-06: The Correlation between Foster Youth and Biological Parents with Substance Abuse

Atrium

Kathryn Walters, Social Work

Project Advisor: Dr. Gary Dick

Abstract

Substance abuse is an issue that affects many people and even their loved ones. People abuse different substances like alcohol, meth, heroin, and many others. There are children in the foster care system due to their parents abusing substances and couldn't safely take care of their child(ren). Children see their parents abusing the substances and will think it's okay to do it as well, abuse a different substance, or nothing at all. This research will look at the correlation between children in foster care and their biological parents with substance abuse.

A-07: A Literature Review: Alcohol and Its Impact on Creativity in Undergraduate Students

Atrium

Eli Salem, Biological Sciences

Project Advisor: Dr. Rose Marie Ward

Abstract

Alcohol seems to have been woven through our culture; in fact, according to the National Survey on Drug Use and Health, 49 percent of college students have consumed alcohol in the past month (NSDUH, 2022). Despite more recent interventions and research on the detrimental effects of drinking, alcohol-related consequences still persist in society. One important aspect to look at in relation to alcohol use is creativity, which is key for problem solving and brainstorming; it is so complex and multifaceted that it is hard to get a concrete measurement. This project presents a holistic review of the differing methods used to measure creativity, and how the usage of alcohol impacts creativity, including across different measurements of creativity. These methods range from looking at the concept of divergent thinking, to looking at the creative process (preparation, incubation, illumination, verification, restitution), and how alcohol inhibits and disinhibits varying parts of the creative process. Preliminary findings suggest that divergent thinking has shown to be minimally affected by alcohol; while the creative process was shown to be inhibited by alcohol at the illumination phase and facilitated at the verification phase. These inconsistent and complex findings from the literature review demonstrate the need for future studies to look at the drinking behavior of college students and how that has impacted their ability to creatively think.

A-08: Disclosing Mental Health Concerns at Work: Relationships Matter More than Policy

Atrium

Nyla Rallings, Interdisciplinary Studies

Project Advisor: Dr. Stacie Furst-Holloway

Abstract

The purpose of this study is to assess the relationship between the climate for mental health in organizations and whether employees disclose their mental health concerns. We hypothesized that when employees perceive a positive mental health climate (as measured through organizational practices and policies, perceived organizational support, and psychological safety), they will be more likely to disclose. We also hypothesized that this relationship would be moderated by the strength of the relationship between employees and their supervisors (LMX) and whether they were members of a marginalized group. To test these hypotheses, we gathered survey data from 236 full- and part-time employees from across the U.S. We did not find a significant relationship between climate and disclosure. However, LMX is positively related to disclosure and demonstrates a significant interaction effect with perceived organizational support and psychological safety, such that when LMX is low, employees are more likely to disclose with support and safety are higher. We also found that being a member of a marginalized group (race, sexual orientation) is inversely related to disclosure.

A-09: Avoiding Alarm Fatigue in Bedside Nursing

Atrium

Samantha Rost, Nursing

Addie Masters, Nursing

Katie Riggle, Nursing

Project Advisor: Dr. Mohammad Othman

Abstract

In bedside nursing, nurses are experiencing an all-time high of burnout from alarm fatigue. The constant beeping and ringing of alarms is causing distress in bedside nurses and imposing a risk to patient safety. There is a strong consensus among bedside nurses that the constant beeping of alarms is causing feelings of burnout and frustration. The purpose of our project is to increase the bedside nurses' knowledge level of changing alarm parameters to decrease alarm fatigue, nursing burnout, clinical workload, and patient harm. Altering alarm parameters specific to each patient will decrease the number of unnecessary alarms, eliminating alarm fatigue and helping maintain patient safety. We gave a few select registered nurses at the University of Cincinnati Medical Center Medical Intensive Care Unit an educated lecture on alarm fatigue, its effects, causes, and strategies on how to avoid it, such as changing alarm parameters. A pre and post-test consisting of 10 questions each was administered and allowed us to view if any knowledge was gained from the presentation. We also used a visibly appealing handout to aid in our education. Each nurse was given a handout and multiple were posted around the unit. Results pending. The outcome of our project will allow us to improve the well-being of bedside nurses and their patients.

A-10: Increasing Treatment Compliance of Eating Disorder Patients by Decreasing Stimulating Triggers in the Meal Room

Atrium

Kayla Crawford, Nursing

Elena Garcia, Nursing

Corinne Pletz, Nursing

Project Advisor: Dr. Paul Lewis

Abstract

Currently, patients have an increased risk of prolonged recovery as the current eating disorder protocol involves all patients eating in the same meal room. This environment negatively impacts patients by inducing stressful interactions. Purpose: The purpose of our project is to further understand as to why patients feel overstimulated during mealtimes and how the current practice doesn't meet the holistic criteria for recovery. We created a PICOT question and found evidence to support our proposal of why eating disorder patients need a therapeutic milieu during mealtime. We provided education to five nurses on the medical surgical unit at a Children's hospital. To evaluate the responses of the unit we conducted a pre and post test. Our survey included questions regarding level of comfort when caring for eating disorder patients. We also gathered the nurses' opinions on the current treatment pathway. The survey responses were measured using a 1-5 scale (0-100%), with 1 representing not having enough knowledge to answer while 5 represents strongly agreeing with the statement. The pretest questions

averaged a 70% which is a 3 on our 1-5 scale while our post test increased to 87% which is a 4. These results conclude that our presentation was well received by the nurses and that they are in support of changing the standard meal room protocol. This project provided a deeper understanding of eating disorder patients while evaluating if changes in the meal room environment could enhance recovery.

A-11: Building Confidence in Parents in the Neonatal Intensive Care Unit

Atrium

Katherine Kernan, Nursing

Kylie Morgan, Nursing

Zachary Skinner, Nursing

Project Advisor: Dr. Caroline Morrison

Abstract

For parents with a baby, or babies, in the Neonatal Intensive Care Unit (NICU), it is common to feel overwhelmed and anxious when it comes to caring for their baby. However, by including parents in the baby's day-to-day care, their length of stay can decrease and their health trajectory can increase. A literature search was conducted on best practices for educating parents with children in the NICU. The purpose of this research project was to inform NICU staff on the importance of providing formal, individualized education to parents in the NICU to increase their confidence and involvement and decrease their anxieties and length of stay. We provided an educational and informational presentation to the NICU Practice Council meeting in the format of interactive PowerPoints and videos. Some examples presented to facilitate this change are educating parents on the effects of therapeutic touch, Kangaroo care, and other helpful ways that they can be involved. A pre-test and post-test were given to the NICU staff members in attendance to assess their knowledge before and after our presentation. We assessed their knowledge on why parents are often not involved, the impact parental involvement has for their baby, and ways to increase their confidence during their babies' stay in the NICU. The results from these tests are pending. The outcome of the work will help encourage NICU staff to educate parents and help the families feel more comfortable in these, typically stressful, situations.

A-12: Do Patients with Mental Health Illnesses Require Higher Propofol Dosages?

Atrium

Anshya Tewari, Neurobiology

Project Advisor: Dr. Deepak Krishnan

Abstract

Healthcare providers often report needing to use higher doses of sedatives to achieve adequate sedation in patients with mental illnesses. This study compares the amount of propofol used and the sedation level needed during dental procedures with IV sedation between patients with and without a mental illness. A single-center, retrospective cohort study was designed. The sample comprised 428 patients aged 15 or older who were either ASA classification I or II who received a pre-sedation consultation followed by an office based IV sedation for dentoalveolar procedures in the Department of Oral and Maxillofacial Surgery at the University of Cincinnati Medical Center. In the sample 28.74% of

patients had a mental illness. A two-sample t-test was performed to calculate the test statistics. The average total dose of propofol was 129.66 mg/kg/min, and the average RASS score was -2.57. Test results showed that the propofol dose required for patients with mental illness was significantly different ($P = .002$) at over 39 mg higher than patients without a mental illness. In contrast, the average RASS score was 0.356 less for patients with a mental illness, which was also a significant difference ($P < .01$). The study of mental illness' influence on sedative drugs is necessary to ensure safe and effective treatment strategies. Further evaluation of the relation between mental illness diagnoses and sedation requirements can enhance the standard of care, mitigate potential risks, and promote the overall well-being of those living with mental health conditions.

A-13: Self-Reported Mental Health in Adults with Cerebral Palsy

Atrium

Maggie Sheridan, Medical Sciences

Project Advisor: Dr. Jensine' Clark

Abstract

Cerebral palsy (CP) is a nonprogressive, lifelong neurological disorder that causes problems with movement, posture, and balance. With the majority of cases occurring during prenatal development, CP is present in 2-3 of every 1,000 live births. Individuals with CP have a greater risk of chronic disease, including mental illness, than the general population. Most studies on mental health and CP focus on a pediatric population, and the aim of this study is to increase clinical knowledge of and sensitivity to mental health in adults with CP. The main research question was whether CP functional status was related to mental health. Other variables, including general health, physical health, and quality of life, were also measured. Data was collected through patient surveys and chart review. No correlation was found between either gross motor or communication functional status and self-reported mental health, which may indicate that relative differences in function are less important than the patient's perceived baseline. Mental health was found to be strongly correlated with general health, quality of life, and social satisfaction. When evaluating mental health in patients with CP, providers should take into account the patient's level of social integration.

A-14: Contributors to a Successful Substance Abuse Recovery Program

Atrium

Maddie Baenziger, Social Work and Spanish

Project Advisor: Dr. Gary Dick

Abstract

This study seeks to investigate and promote the integration of evidence-based practices in substance abuse recovery programs for adults, notably intensive outpatient programming, individual counseling, and peer support networks. As social workers, we strive to have a holistic view of the problem and incorporate multiple factors for clients to consider all their barriers to sobriety during treatment. Utilizing evidence of successful treatment can improve the stability of their mental health, and their sober support system, maintain their sobriety through healthy coping strategies, and allow for improved

social worker-client relationships. The study analyzed the experiences of four adult women in the Off The Streets program who have obtained safe and affordable housing but are still participating in outpatient services as needed. The women provided feedback using a Likert scale to measure each intervention's impact and answered 3 open-ended questions discussing their sobriety journey in the program.

A-15: How Do People Who Live with Mental Illness, Substance Abuse, and Trauma Experience Acceptance Commitment Therapy?

Atrium

Kristin Adriana DeWitt, Social work

Project Advisor: Dr. Georgia Anderson

Abstract

The goal of the study was to introduce a new type of treatment to a small group of participants who are at New Horizons for mental health and substance abuse and the traumas that brought them to seek treatment; this new treatment would teach skills around values, priorities, psychological flexibility, inner child work and being about to process the trauma they have experienced and to help them accept it so they can continue to grow. The participants have all agreed and completed 8 hours of ACT group therapy. The results come from interviews conducted with the participants to learn about their experience with ACT and if it has benefited them in their healing journey. They could identify what parts of ACT we discussed in the group and how they have implemented those skills into their healing recovery and everyday life. Participants have stated that they all felt that participating in ACT activities benefited them a few weeks later as they continue to do the work in the program.

A-16: Effects of Trauma Debriefing in the Critical Care Setting

Atrium

Casey Finegold, Nursing

Rylie White, Nursing

Lou Walro, Nursing

Project Advisor: Dr. Caroline Morrinson

Abstract

Registered nurses in the critical care setting often encounter traumatic events throughout their career. The literature search was conducted to find effective ways to debrief in the emergency department following a critical event and why it was important. The goal of this project is to educate emergency room nurses on the importance of a consistent debriefing process after traumatic events. We created an education session and have a handout that will include the benefits of debriefing on mental health, how it improves practice and teamwork, and how to implement debriefing tools in the workplace. A pre and post-test will be administered to assess the knowledge before and after our information is presented. Our results are pending. We anticipate that the ED staff will realize the benefits of debriefing and will be compelled to implement a consistent debriefing process in their practice.

Category B: Healing and Strengthening

B-01: Preliminary Findings: Mealtime Consumption Impact on Isotonic Lingual Endurance Atrium

Jayse Card, Speech-Language Hearing Sciences

Project Advisor: Dr. Brittany Krekeler

Abstract

Eating a meal is an essential function of daily life and the ability to eat safely and efficiently has proven implications for positive health outcomes. As individuals age, lingual function may decline and affect aspects of oropharyngeal function, including a person's ability to eat a meal. The purpose of this study is to determine if isotonic endurance is impacted by eating a meal in a cohort of healthy adults. We hypothesized that a decline would occur in lingual endurance following mealtime consumption. Isotonic lingual function was measured using the Iowa Oral Performance Instrument (IOPI®). First, Maximum Isometric Press (MIP) was measured (i.e. press as hard as possible with the tip of your tongue against the bulb). Isotonic endurance is measured as the number of repetitions a participant can complete at 50% MIP. Next, participants ate a small meal, including half of a bagel with peanut butter, 8 baby carrots, and 8 ounces of chocolate milk. After the completion of the meal, Isotonic endurance was measured again using the same target (50% pre-meal MIP). Preliminary results did not show an impact of eating a meal on isotonic endurance in either age group. For the older participants, the average mealtime was 12 minutes and 32 seconds; for the younger cohort average mealtime was 11 minutes and 46 seconds. Approximately, ½ of each cohort experienced an increase in isotonic repetitions after the meal (55% for young, 53% for old), which is contrary to the hypothesis.

B-02: The Effects of ACL Reconstruction on Performance

Atrium

Emma Wessel, Health Sciences: Pre-Physical Therapy

Jazmyn Templeton, Health Science Pre-Physical Therapy

Project Advisor: Dr. Rachel Gleason

Abstract

Anterior cruciate ligament (ACL) injuries are common in sports, often leading to functional impairment and long-term consequences. Surgical reconstruction is a standard treatment to restore knee stability, yet individuals, particularly females, face prolonged neuromuscular and biomechanical deficits, predisposing them to reinjury. Mechanoreceptor damage and muscle strength deficits post-ACL reconstruction increase the risk of diminished proprioception and coordination, raising concerns about re-injury. This study explores the impact of ACL reconstruction on performance outcomes, such as balance and long jump, in college-aged females during fatigue protocols, aiming to bridge the gap in tailored rehabilitation strategies for this demographic. Females were recruited to participate in this study. Subjects completed a consent form and questionnaire to check that they exercised two days a week minimum, had their reconstruction within the past five years but post one year, and had no physical limitations. Subjects completed a fatigue protocol, consisting of three minutes of cycling on the

Wahoo Kickr Smart Bike, ten squats, and ten step downs. After two rounds of the fatigue protocol, subjects completed the Y-Balance test and a single leg long jump test. Muscle oxygen of the quadriceps was monitored with a Moxy Monitor. All tests were analyzed using an ANOVA test, comparing intra and inter-leg differences. We expect that ACL-reconstructed legs will exhibit lower performance outcomes compared to their nonsurgical counterparts. Due to lack of understanding of performance outcomes for female athletes following ACL reconstruction, there is a need for more research on targeted interventions in female ACL rehabilitation.

B-03: Preliminary Feasibility and Efficacy of Lingual Endurance Exercise in Post-Stroke Patients

Atrium

Anna Voskoboynik, Speech-Language Hearing Sciences

Project Advisor: Dr. Brittany Krekeler

Abstract

There are limited interventions that exist for rehabilitating swallowing impairments occurring after a stroke, which affects approximately 80% of stroke survivors. Current practices focus on strengthening the tongue, however, there is not enough evidence to indicate that strength-focused training makes a significant improvement in swallow function. Endurance training may be more suitable because swallowing involves a lower threshold of tongue strength during meals. In this study, we are testing if lingual endurance exercise is feasible in the post-stroke population. Patients with post-stroke dysphagia were included in this study. Participants were given a Tonguometer device and an iPad to complete daily tongue endurance exercises, for 8 weeks. A Speech Language Pathologist prescribed tongue exercises to participants during their initial study visit. Participants met with a study team member weekly, over Zoom, and completed a round of the exercises. Every two weeks, the prescription of exercises was regenerated. Nineteen participants were enrolled in the study, but 4 did not complete the program. Of the 15 participants, the adherence rate ($n=15$) was 79% ($SD=29$). The anterior max isotonic press increased (Avg 11.5 kPa, $p<0.001$) and isotonic endurance repetitions were significantly increased (Avg increase of 63 reps, $p=0.06$), but no considerable changes were found in the isometric endurance (Avg increase of 3.7 seconds, $p=0.08$). The survey about the participant's swallowing habits scores increased by 8.3 points but there was no major distinction ($p=0.06$). There was also no considerable change in the participant's eating habits survey scores ($p=0.9$).

B-04: Lower Limb Power Output and Symmetry in a 10-week ACL Rehabilitation Program

Atrium

Maddie Gognat, Health Sciences: Pre-Physical Therapy

Anna Aquino, Health Sciences Pre-Physical Therapy

Kyle Brooks, Health Sciences: Pre-Medicine

Project Advisor: Dr. Nikita Kuznetsov

Abstract

Anterior cruciate ligament (ACL) injuries frequently result from movements inducing rotational stress such as twisting, planting, and cutting. Successful return to sport is measured by strength, power, and

symmetry measurements. It is unknown whether power-focused exercises can aid athletes to a successful recovery by decreasing the risk of a second rupture while improving lower limb stability. The purpose is to determine whether adding dynamic exercises in ACLR rehabilitation programs for adolescents increases the power output and limb symmetry throughout a ten-week exercise program. The study predicts the peak power output will increase throughout the ten-week program and limb asymmetry power will decrease. Participants include 3 males and 2 females 5-7 months post ACL reconstruction. The power assessment of a goblet squat with a kettlebell matching 30% of bodyweight was performed during weeks 7, 8, and 9. Peak power during the concentric phase will be recorded for each limb to assess symmetry. Changes in the peak power of the involved limb and ratio of peak power between limbs would be analyzed using repeated measures by ANOVA using Jasp Version 0.18.2 (Amsterdam, The Netherlands). The predicted results from the repeated measures ANOVA indicate an increase in power and decrease in lower limb asymmetry with the addition of the 10-week program. Athletes with a lower-limb ratio approaching 1 showed symmetrical and increased power output. Based on this study's results, incorporating specific power training may be a valuable form of rehabilitation for ACLR athletes.

B-05: Dominance-Related Lower Limb Force Disparities in Take-off and Landing During Trials Based Jumping on Asymmetry

Atrium

Alyssa McGuire, Health Sciences: Pre-Medicine

Lindsay Kuchmay, Health Sciences Pre-Physical Therapy

Lucas Alldaffer, Health Sciences: Pre-Medicine

Project Advisor: Dr. Zach Sievert

Abstract

Lower limb asymmetry occurs when there is a difference in the strength, power, or force between dominant and non-dominant legs. Significant asymmetries can exist between lower limb force production during the take-off and landing phases during jumping. This asymmetry can potentially lead to injuries during jumping or landing. The main purpose of this study is to compare the asymmetries measured between dominant and non-dominant legs during take-off and landing phases of jumping at peak height. The participants will be aged 18-25 and considered physically active. The participants will be asked questions about their physical background and capabilities. Each participant will jump and land on force plates under a specific condition with both dominant and non-dominant legs. This process will be repeated using three different conditions, landing on both legs, left leg, and right leg. The expected results are that there will be an asymmetry between the dominant and non-dominant leg when landing on both feet. There will be more imbalances in the non-dominant leg landing than in the dominant leg. During the trials where the participant would land on either their dominant or non-dominant leg, we often had to complete a trial rerun due to imbalances. It can be concluded that of the stable landings, the dominant leg showed less asymmetry than the non-dominant leg.

B-06: The Effects of Shoulder Position on Bicep Brachii Activation

Atrium

Jasmine Romick, Health Sciences: Pre-Physical Therapy

Cody Lockwood, Health Science: Pre-Physical Therapy

Project Advisor: Dr. Zach Sievert

Abstract

Our study aims to investigate how different shoulder positions affect the activation of the biceps brachii muscle during bicep flexion resistance exercises. Limited research shows that shoulder position from extended to neutral to flexed changes biceps activations. Here we use electromyography (EMG) to identify which shoulder position elicits the greatest relative activation (i.e., electrical activity produced by the muscle). The EMG of the biceps brachii will be measured in shoulder extension, anatomical position, and shoulder flexion. The EMG data will be derived from an elbow flexion curl exercise and a metronome will be used to keep consistent speed of repetitions. We anticipate that performing a bicep curl with the shoulder in an extended position will produce the greatest EMG activation due to the reduced force generating capabilities in an extended position. This extended position would have increased biceps activations from having to recruit more muscle fibers to complete the biceps curl with the relative external load and the induced stretch of the biceps from the initial starting position. Results of this study can be used to inform strength training and rehabilitation programs.

B-07: Body-Weight vs. Resistance-Based Grip Training Effects on Forearm Flexor Endurance in Novice Rock Climbers

Atrium

Jenna Allman, Health Sciences: Pre-Physical Therapy

Ahmet Ozer, Health Sciences Pre-Medicine

Project Advisor: Dr. Susan Kotwoski

Abstract

Rock climbing is a growing recreational and competitive sport which attracts climbers of various expertise. Performance within the sport relies on "grip strength" or endurance within the hand and forearm flexor muscles during isometric contractions of varying durations. Previous studies have relied on experienced rock-climbing athletes when assessing grip strength. We investigated two grip training regimens to determine the most efficient grip training method for beginner climbers. All participants conducted a diagnostic hang test on a rock-climbing grip until failure, then were randomly assigned into one of two groups. Group one conducted dead-hangs on a pull-up bar; group two conducted the same sets and repetitions as group one did, except they utilized a Thera-Band wrapped around nails to simulate a hand grip trainer. Group two was instructed to squeeze the Thera-Band until they reached 45-degrees of flexion at the PIP joint which would promote adequate isometric contraction of the intrinsic hand flexors. The two groups conducted four sets of five ten-second repetitions week one. During week two, another set was added for five sets total. Following the two-week training regiment, the participants conducted a final hang test. The difference between the diagnostic and final hang times between the two groups were compared using a paired t-test. We hypothesized that the overhand

dead hang training protocol will yield greater gains in muscular endurance compared to the Thera-Band training protocol due to the similarity between the training protocol and the final endurance test.

B-08: Gender Differences in Muscle Oxygenation Recovery Following Intermittent Cycling Exercise

Atrium

Zakaria Bodiford, Health Sciences: Pre-Physical Therapy

Joshua Hegemann, Health Sciences

William Rahe, Health Sciences

Project Advisor: Dr. Daniel Carl

Abstract

Differences in fatiguability between human males and females following repeated cycling power outputs has been documented. However, potential differences in muscle oxygenation recovery levels as a potential explanation has not been measured. Understanding differences between male and female muscle oxygenation recovery profiles would be beneficial in establishing both rehabilitation treatment and athletic performance protocols. We hypothesize that females will recover muscle oxygenation levels more robustly than males following 4 x 60s maximal effort cycling bouts with 30s recovery between bouts. Subjects participated in a single day session that included the following: A 4-6 minute warm up on the cycle ergometer (Wahoo KICKR). Four, one-minute maximal effort cycling bouts separated by 30s of recovery between. At the completion of the 4th bout, subjects remained seated on the cycle ergometer for 3 minutes while oxygen recovery levels (Moxy Oxygen Monitor) and blood lactate levels (Lactate Plus) were measured. Heart Rate and Power output were also recorded. Results are pending, but we expect that females will have an enhanced recovery profile compared to males participating in the same exercise.

Category C: Sensing, Perception and Sensor Technology

C-01: Impact of Hair Type and Skin Tone on Signal Quality and Setup Procedures for Functional Near Infrared Spectroscopy

Great Hall

Morgan Grawe, Speech-Language Hearing Sciences

Project Advisor: Dr. Carrie Rountrey

Abstract

Functional Near-Infrared Spectroscopy (fNIRS) is a non-invasive neuroimaging technique that detects light absorption in brain cortex areas, highlighting changes in activation. Previous studies show that fNIRS responses may differ between participants with various phenotypes (Pringle et al., 1999). This study aims to uncover how various hair types and skin tones impact data collection in fNIRS. Using the L'Oreal and Andre Walker rating systems, we collected measurements for the hair thickness and curliness of each participant (Loussouarn et al., 2017). We then rated skin tone based on the Fitzpatrick scale (Fitzpatrick, T.B., 1975, 1988). Finally, we recorded the number of adjustments to the fNIRS cap

and the participant's hair during setup, the overall length of time for setup, and the initial strength of the fNIRS optode signal.

We believe this study will find that the fNIRS setup procedure is more difficult for participants with diverse phenotypes. There may be more cap and hair adjustments, leading to a longer overall setup time. Additionally, fNIRS receptors may gain weaker responses due to the greater absorption of light by darker skin and/or hair.

Although fNIRS is a favorable tool, there are certain phenotypes that make its results less reliable given that inclusive setup methods are not standard or readily available (Kwasa et al., 2023). Due to inconsistent signal qualities, there is a higher chance of data from these individuals being discarded. By furthering our knowledge and making the fNIRS setup procedure more accessible, we can eliminate the disproportionality with which data is selectively reported.

C-02: Electrochemical Behavior of Carbon Nanotube Fiber Based Microelectrodes

Great Hall

Noah McGilton, Chemistry

Project Advisor: Dr. Noe Alvarez

Abstract

Carbon nanotubes, or CNT fibers, have many different uses and applications. CNT fibers can be studied through electrochemical characterization to learn more about their electrochemical behavior under various electrochemical conditions. The electrochemical testing done in this project consists of cyclic voltammetry and electrical impedance testing. Cyclic voltammetry testing done in this project consists of ramping up and down the voltage of the working electrode in cycles and measuring the current responses of the electrode itself. Electrical impedance testing is the testing of the resistance to changes in electrical current in the working electrode. These tests are performed after many different treatments to the CNT fibers to prepare them for functionality testing and determining their responsiveness to different electrochemical stimuli. Because of their treatments after various treatments, desired responses are variable and depend completely on the type of fiber being tested. These CNT fibers go on to be used for many different applications, specifically for neuron signal detection and creation, and detection of other biological molecules in the human brain and body. Arrays of CNT electrodes have been used successfully been used in brain implants to prevent and treat things such as epilepsy.

C-03: Roughened Graphene-based Electrodes for Improved Neurochemical Detection

Great Hall

Evan Porshinsky, Chemistry

Project Advisor: Dr. Ashley Ross

Abstract

Neurotransmitters are abundant in our body, each playing a different role in facilitating our emotions and bodily functions. One of these neurotransmitters is dopamine, which is widely known as the reward center drug in the brain. When properly released and controlled, dopamine provides us with feelings of euphoria and motivation. When improperly released, though, dopamine can have negative effects on

the human body leading to neurodegenerative diseases like Parkinsons or depression. These diseases can be better understood if we can detect dopamine in the body in real-time; however, since real-time neurotransmitter detection is notoriously difficult, we sought to fabricate an improved sensor to improve detection. With our new developments in electrode technology and materials using graphene oxide, we are now able to detect dopamine at ultra-low concentrations and in a more temporally resolved manner. Plasma treatment was used to disrupt the smooth surface of the electrode creating cracks and ridges, which, in turn, increases the ability to detect dopamine by increasing dopamine's attraction to our electrode's surface chemistry. By using our novel electrodes, we open the door to better understand dopamine neurotransmission and its role around the body, especially the brain. These electrodes can eventually be used to detect dopamine in real-time in live tissue to better understand its signaling in a biological matrix.

C-04: Developing a Fiber-Optrode SERS Sensor for In-situ Monitoring of Estradiol in City Water Great Hall

Caroline Flessner, Chemistry

Project Advisor: Dr. Dr. Pietro Strobbia

Abstract

The presence of steroid estrogens in water has raised concerns due to their harmful effects on human and animal health. Among these compounds, Estradiol is highly disruptive and harmful to the endocrine system. Current analytical practices are constrained to laboratory settings and there is a need for the development of field-deployable detection techniques for continuous monitoring. Surface-enhanced Raman scattering (SERS) is a promising technique for on-site detection without the need for sample transportation or laboratory analysis. Herein, we propose a fiber optrode SERS sensor capable of detecting small molecule targets for this application. A fiber optrode is an optical sensor integrated with an optical fiber so that the light can be transmitted through the fiber and interact with the sensor component. This sensor can detect the target molecule by immersing the optical fiber directly in liquid samples under analysis. The immersed end of the optical fiber is coated with well-dispersed gold nanostars, to create a sensing surface that amplifies laser radiation and SERS signals from molecules. We utilize a reagentless sensing mechanism based on duplex aptamer, enabling the detection of small-molecule contaminants. Our previous work established a design protocol for duplex aptamers to detect small molecules. We translate this protocol to develop fiber optrode sensors for the direct detection of estradiol, an important contaminant in wastewater samples. Our findings demonstrate the potential of fiber optrode sensors for the direct detection of estradiol and other small molecule contaminants in environmental samples, offering significant advancements in environmental monitoring and analysis.

C-05: Functional Analysis of Glutamine Synthetase in *Drosophila melanogaster* Semper Cells Great Hall

Caden Pollock, Biological Sciences

Project Advisor: Dr. Elke Buschbeck

Abstract

Glutamine Synthetase is an important protein used in metabolizing nitrogen, a natural product of protein metabolism, and also is important in glia for the metabolic support of adjacent neurons. Enhanced expression of Glutamine Synthetase also has been noted in glial support cells of both arthropod and vertebrate eyes. Here we used the Semper Cells (a type of eye glia) in *Drosophila melanogaster* to test the role of Glutamine Synthetase in these support cells. Two lines of flies were reared, a control line, and a line in which Glutamine Synthetase was knocked down specifically in Semper cells. These lines were then metabolically stressed with the use of a high-protein diet that would result in a relatively high nitrogen load and a high need for Glutamine Synthetase. To test if this treatment results in deficiencies pertaining to eye function, two lines of flies, and two types of food for each line were evaluated electrophysiologically. Specifically, electroretinography was used to test the ability of photoreceptors to respond to increasing intensities of light, a metabolically costly process. In contrast to our expectations, test flies showed no significant reduction in photoreceptor responses. This outcome could suggest that in the fly eye, the surrounding pigment cells, which also have a heightened expression of Glutamine Synthetase, may be able to compensate for the increased energy demand or that other redundant energy sources are available. Overall, this study still showed useful insight into our understanding of the roles that specific support cells play in invertebrate eyes.

C-06: Pregnancy Depends on Key Daily Rhythms in *Diploptera punctata*, the Pacific Beetle Mimic Cockroach

Great Hall

Ronja Frigard, Biological Sciences

Project Advisor: Dr. Joshua Benoit

Abstract

Diploptera punctata, the Pacific beetle mimic cockroach, are one instance of over 65 convergent evolutions of live birth in insects alone. Of interest are the common pressures which lead to shared features of live birth, such as urogenital and circulatory system remodeling, placental structures, and changes to the endocrine system. Investigated during this study were factors related to pregnancy and circadian rhythm; one arm focused on studying changes in behavior and sleep during pregnancy, and the other on the effects of chronic sleep deprivation on pregnancy, such as gestational period and milk protein transcript levels. Study of these factors has revealed that chronic disturbance of sleep during pregnancy negatively impacts embryo development, increasing gestational duration and decreasing the transcription of milk proteins. In addition, scavenging and risk taking behavior are significantly altered during pregnancy. These findings indicate that sleep is key to embryo development and that pregnancy has a significant impact on behavior and daily rhythms in *Diploptera Punctata*.

C-07: StartReact Phenomenon within Healthy Individuals

Great Hall

Em Hynes, Health Sciences: Pre-Physical Therapy

Melody Arjmandi, Health Sciences: Pre-Physical Therapy

Project Advisor: Dr. Nikita Kuznetsov

Abstract

The StartReact phenomenon is used to study the effectiveness of rehabilitation in stroke patients. There haven't been studies focusing on this phenomenon in healthy individuals. Startle reactions are expressed through contractions in the face, neck, and upper limb muscles via a protection reflex (Schmidt and Lee, 2020). It's hypothesized that when the patient startles, simple reaction time decreases in healthy individuals.

Participants were 18-30-year-olds with no auditory, visual, physical, or neurological impairments. A computer, MATLAB code, a timing device, EMG, and headphones were used. Two EMG electrodes were placed on the muscle belly of the right biceps brachii, Sternocleidomastoid, and grounding electrodes on the left ulnar styloid and olecranon process. Participants were instructed to watch the screen and perform elbow flexion as the rectangle on the screen changed from red to green, accompanied by a small sound. Participants completed fifty trials but were barred from knowing of the increase in auditory stimuli intensity from 80 decibels to 120 decibels. After data collection, participants were informed of the auditory stimuli's reasoning, the electrodes were removed, and the data was analyzed using MATLAB.

It's expected that the visual and auditory stimuli sample will exhibit decreased reaction times compared with visual-only sample reaction times.

With the expected results this research will add to the data relating to the presence of the StartReact phenomenon in healthy populations, by adding more control data for future studies done in clinical trials. Thus, allows us to study other movements and their relationship to the phenomenon.

C-08: Decreasing Pain Perception in Laboring Patients with the Use of Music Therapy

Great Hall

Naiah Mensah, Nursing

Abbey Canupp, Nursing

Gabi Iordache, Nursing

Project Advisor: Dr. Paul Lewis

Abstract

Labor pain is a high-level, long-lasting pain perceived during labor which may have an adverse effect on the delivery of a newborn. Music therapy seems to have beneficial effects on labor pain by reducing labor pain perception by 3.41 times. The purpose of this project is to implement music therapy on a Labor and delivery unit. The project will educate Labor and Delivery nurses on the beneficial effects of music therapy on laboring patients. A 10-minute presentation powerpoint will be presented along with an educational handout. A pre-test and post-test will be given to assess changes of Staff Nurse's current knowledge of and attitude towards music therapy in labor. Results pending.

C-09: The Effects of Electrical Stimulation and Perturbation on Anterior-Posterior Postural Sway

Great Hall

Greer Downing, Health Sciences: Pre-Occupational Therapy

Nicholas Bartelt, Health Sciences: Pre-Physical Therapy

Project Advisor: Dr. Rachel Gleason

Abstract

Previous research explores muscle activation during postural control^{1,2,3}. The ankle strategy is essential for static postural control, and the gastrocnemius is one of the initial muscles recruited. Improvements in postural control have been demonstrated when transcutaneous electrical nerve stimulation (TENS) was applied to the gastrocnemius during static stance³. This study investigated the influence of TENS applied to the gastrocnemius on postural sway in response to perturbation. Students from the College of Allied Health Sciences with no known conditions impacting balance were recruited. Electrodes were adhered to the medial and lateral heads of the gastrocnemius on both legs. Total center of pressure (COP) displacement values collected from AMTI force plate were measured under four conditions varying TENS stimulation and perturbations. The t-tests showed a statistically significant difference ($p=0.009$ and $p=0.003$) in postural sway between trials with TENS compared to those without TENS, indicating that the application of TENS impacted postural sway. In conditions without a perturbation, postural sway was increased with application of TENS. The increased sway demonstrated in these trials may be due to activation of the gastrocnemius inducing postural sway in the absence of a perturbation. In conditions with a perturbation, postural sway was decreased with the application of TENS. Anterior-posterior sway caused by the perturbation is dampened by the electrical stimulation of the gastrocnemius.

C-10: Assessing the Validity of Dyslexia Screeners for Spanish-speaking English Language Learners in Ohio

Great Hall

Jaiden Hilton, Speech-Language Hearing Sciences

Project Advisor: Dr. Amy Pratt

Abstract

Bilingual students (also called dual-language learners or English learners) are 50% less likely to be identified for special education services in early elementary (Morgan et al., 2018) and are identified later than their monolingual peers (Samson and Lesaux, 2009). This is troubling for learning disorders like dyslexia, that require early systematic intervention. Universal screening can help mitigate these delays. Universal screening identifies students at risk for future reading difficulties by assessing all children at the onset of formal schooling, therefore inciting consideration for early intervention or prevention services (Ohio Department of Education and Workforce, 2024). My study examines potential bias in universal screeners for dyslexia in Ohio based on the rate at which monolingual vs. bilingual children score "at risk." We also examine if and how the classification of "risk" among Spanish-English bilingual children changes when children are assessed using their home language. 288 Spanish-English bilinguals in Kindergarten and first-grade were recruited from three Ohio school districts that serve large populations of English learners. All children completed universal screening in English-only and then follow-up assessment in English and Spanish. Preliminary data suggest that universal screening in English-only over-identifies bilingual students, with over 80% of children in our sample scoring in the "risk" range. Follow-up testing including Spanish measures appears to decrease the rate of identification. Further analysis using chi-square goodness of fit test will indicate whether these

relationships reach statistical significance. We hope that the results from the study will increase awareness of possible assessment bias and improve bilingual assessment.

C-11: Does Verbal Feedback Type Impact Maximum Vertical Jump Height?

Great Hall

Sarah Watts, Health Sciences

Chris Power, Health Sciences

Project Advisor: Dr. Susan Kotowski

Abstract

Verbal feedback has been found to increase performance of tasks such as swimming, running, and walking. Verbal feedback works by mediating the effects of fatigue to achieve more optimal levels of efficiency, speed, etc. There are two types of verbal feedback: positive and negative. While there are studies that show the effectiveness of positive feedback on performance, there is not consistent data comparing the effectiveness of either positive or negative feedback. Furthermore, little data exists showing how the gender of the proctor (encourager) can affect the performance of the athlete. The purpose of the study was to see how positive feedback versus negative feedback from either the same or opposite gender proctor/encourager affected the maximal vertical jump height during repeated jumps. Twenty subjects were recruited, screened for eligibility, and, after consenting to participate, completed a questionnaire with demographic and personality-based questions. Participants then were shown a video on how to perform a vertical jump, before performing 3 sets of 15 maximum vertical jumps set to a metronome with one minute of rest between sets with no verbal feedback (baseline). The height of the jumps were measured using a digital jump mat. Participants then completed 2 additional days of testing (with at least 2 days rest in-between) where additional sets of jumps were completed with the addition of either positive or negative feedback (randomized). For half the participants, the encourager was the same gender as the participant, and for the other half the encourager was the opposite gender.

C-12: What are Perceptions of Attorneys about Peer Pressure amongst their Juvenile Clients?

Great Hall

Jaliyah Martin, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

The specific goal I would like to focus on with this presentation is the correlation between peer pressure and adolescence, and how attorneys with adolescent clients that are incarcerated and peer pressure had a roll in their crime. my strategy for achieving the goal is to interview attorneys at my internship; the Hamilton county public defenders office (Youth Defense). The outcome of my work is uncertain, but will further explain the insight, juvenile attorneys have about peer pressure and crime amongst this specific population. I would like to get attorneys insights on peer pressure amongst the adolescent group because every client that every attorney has at the public defenders office does not always involve peer pressure. I would like to see if attorneys with clients that have committed crimes around

peer pressure have the same insight or if they have different insights depending on the situation situation.

Category D: Social (In)Justice

D-01: Teen Parenting and Welfare

Great Hall

Zachary Stofel, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

The impact and effectiveness of welfare for teenage parents

D-02: Children in Foster Care and their Developmental Milestones

Great Hall

Laura Acosta, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

For this project we are looking to see if children who are in foster care meet their appropriate developmental milestone compared to children who are not in foster care. To do so there will be a survey sent out to foster parent and a survey sent out to families whose children are not in foster care. The survey consists of cognitive developmental milestone, the foster parent or parent answer these questions with a "Yes" "No" or "Does not apply". The results obtained from the foster parents and parents is compared and put into a graph. These results will give social workers/case workers an idea of the areas in which foster children need more assistance in reaching their developmental milestones.

D-03: Feminization of Homelessness: What Contributes to Women's Homelessness?

Great Hall

Kayla Allen, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

The outcome of the work will help limit the amount of homelessness in women by recognizing the precursors and providing interventions before they lead to homelessness.

D-04: Disadvantaged Circumstances from COVID-19 within the Homeless Population Regarding Food and Shelter

Great Hall

Elvis Jimenez, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

In this project, the given information is written as a qualitative study that discusses the underlying circumstances of homelessness during the COVID-19 pandemic, how things could have improved, and what information showed an example of what could have improved during the pandemic for best outcomes. I will mention the difficulties that many within the homeless population faced regarding shelter and food during the pandemic. I will also discuss the disadvantages of acquiring the needed resources during and after COVID-19. Moreover, a central question for this research abstract is: "How did the COVID-19 pandemic create an issue for the population, and circumstances were overly difficult with the challenges of the pandemic." Within this qualitative study, my internship provided an example of research questions in interviewing clients from ages 18-60 of different cultural/ethnic backgrounds facing homelessness to provide a confidential and secure answer/response in what could have improved during the pandemic and how the post-COVID some things better and did not with regards of particular demands.

D-05: Life After Life Sentences: Reentry Successes and Struggles of Children Sentenced to Life Without Parole

Great Hall

Keyona Schill, Criminal Justice

Project Advisor: Dr. J.Z. Bennett

Abstract

Following the 2016 U.S. Supreme Court's *Montgomery v. Louisiana* decision, approximately 2,500 individuals sentenced as juveniles to life without parole (JLWOP) became eligible for release. This study examines the reentry challenges and successes of these "juvenile lifers," who are re-entering society after decades of incarceration, now as older adults. Employing a secondary mixed-method approach, the study utilizes life history interviews and calendars to analyze the post-release experiences of men and women in Pennsylvania who served JLWOP sentences. The research reveals significant reentry challenges for juvenile lifers, particularly the issue of indefinite parole, often referred to as "lifetime parole" or a "life tail." These findings highlight the necessity for further research into the long-term experiences of these individuals. Understanding their unique challenges is crucial for developing more effective reentry support and policies.

D-06: Effects on Academic Success and Continuity for Teens and Adolescents in Foster Care

Great Hall

Madison Zelenka, Social Work

Project Advisor: Dr. Gary Dick

Abstract

The following contains research conducted and examined based on proposals regarding individuals within the foster care system. The research analyzes the primary barriers to academic success and continuity of adolescents in foster care. All of the scholarly articles researched contain information, theories, and studies conducted to further examine this question. Statistics can be found within this review regarding differential factors including race, gender, and the varying ages within the teen and adolescent category. Furthermore, there is credible information on differential contributing factors to academic barriers. This information includes mental health, substance abuse, and delinquency. Stemming from this is a portion that contains personal research findings based on survey results of adolescents within an independent living foster care program. Questions on the survey included barriers adolescents may be facing, such as support at home and in the classroom, ability to focus on and understand content in the classroom, mental health, transportation, and others. Also included is a section examining gaps within the research findings regarding the above primary causes. Finally, there is a conclusion that discusses recommendations, next steps, and theories for the future.

D-07: How do Child Abuse and Neglect Affect the Long-term Development of Youth?

Great Hall

Caitlyn Morrow, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

Education about child abuse and neglect is necessary to understand the severity of the problem. Every year in the U.S., there are more than 3 million referrals related to child neglect with over 6 million children being involved ((Petersen et al., 2014). When a referral is received by a child services agency, it is then their responsibility to determine if the case warrants investigation. The goal is typically to reunify the child with the parent or guardian, but when this is not possible, children are placed into temporary or permanent custody of the state.

D-08: Lived Experiences of Individuals with Mental Health Conditions in the Criminal Justice System

Great Hall

Ka'Yare Dickson, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

This study explores the critical issue of the criminalization of mental health. This research aims to increase the recognition of the disproportionate representation of individuals with mental health disorders within the criminal justice system. This phenomenon raises social, ethical, and legal concerns, requiring multi-dimensional investigation to present evidence-based interventions and policies. Examining the challenges faced by individuals with mental health illnesses in the criminal justice system from a social worker's perspective is pivotal for fostering a more compassionate, informed, and inclusive

approach to support within these systems. The insights gained from this study can empower social workers to be effective advocates, catalysts for change, and providers of crucial support for a marginalized population in dire need of understanding and assistance.

D-09: Staffing Shortages in Home Health Care

Great Hall

Amanda Senters, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

There is a major problem in the healthcare industry, and it is a shortage of home-health care workers. It is estimated that the number of individuals in need of long-term care is projected to jump from 15 million, to 27 million by the year 2050 (Landes and Weng, 2019). With that number dramatically increasing, home-health care has become an alternative to spending time in a nursing care facility. Although it is reported that a large number of individuals receive help from their family members, the demand for long term care is so high that it will be hard for some individuals to get help due to decreased family sizes and increased geographic dispersion (Landes and Weng, 2019). Due to these factors, the need for home-health aides has increased, while the supply of these workers is steadily decreasing. Workers in the health care field are subjected to increasingly high job demands and stress levels (Baumann et al., 2023).

D-10: Cultural Needs of African American Youth Within Residential Services

Great Hall

Jae'auna Felton, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

Mental healthcare access is more pronounced in adolescents belonging to minority groups. With residential care usually being the last option for those with severe emotional, social, and behavioral problems due to cost and restrictions, I wanted to take a closer look on how their cultural needs are being met. When cultural needs are met in this environment, more effective and compassionate care is provided. The outcome will help fill in the current research gaps. There is little known regarding treatment approaches in residential facilities serving adolescents.

D-11: Social Work Impact on Re-entry Post Incarceration and Recidivism

Great Hall

Addyson Taft, Social Work

Project Advisor: Dr. Gary Dick

Abstract

America is known to have the largest incarceration rate in the world. For this reason, there is a multitude of research on incarcerated populations; why they are incarcerated, what societal barriers, if any, contributed to their incarceration, disproportionate representation of those incarcerated, etc. However, much less focus has been geared towards what happens to incarcerated individuals after they have served their time. In this study, the focus is on what contributes to successful reentry into society post incarceration, and why people reoffend. This study focuses specifically on the importance of peoples access to resources post incarceration to prevent a reoffense. Data from the Hamilton County Public Defender's Office's Adult Social Services Division was used and analyzed to determine if those benefiting from services provided by social work staff contributed to curbing recidivism. The outcome of the work could be used to assist in the dismantling of mass incarceration and recidivism in the United States, not just Hamilton County, Ohio.

D-12: Correlation Between Involuntary Discharge Notices and Ratings of Long-Term Care Facilities Given by Center of Medicaid and Medicare Services

Great Hall

Dania Mousa, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

Adults that are living in long-term care facilities are often dealing with the issue of involuntary discharges. An involuntary discharge is when a facility is "evicting" a resident for reasons such as non-payment, facility can't meet residents' needs, etc. Involuntary discharges are a huge change for residents and can negatively affect their well-being as it can be an overwhelming and major change for most. The population of this study are adults that are currently living in long-term care facilities and the data used for the study is information found from the Ombudsman discharge tracker. I believe the results will show that lower rated facilities will issue more involuntary discharge notices. This study is important in order to understand who exactly is at risk for receiving a discharge notice, which can lead to the conversation of how we can begin to discover how to prevent it.

Category E: Advancing Education and Professional Practice

E-01: Parenting Prevention Programs and its Effects on Parental Stress and Confidence

Great Hall

Nia Rallings, Psychology

Project Advisor: Dr. Sarah Beal

Abstract

Evidence-based parenting programs are effective at promoting parent and child wellbeing; however, many of those programs have not been adapted or validated for non-traditional families (e.g., foster and kinship caregivers). This study describes how foster and kinship caregivers responded to an evidence-based parenting program adapted for them. It was predicted that caregivers of children in foster care aged 2-8 (N = 7) would report increased confidence and decreased negative child behavior after

completing the intervention (The Chicago Parenting Program) adapted for foster and kinship care (CCP-FC). During qualitative interviews, caregivers described the CCP-FC as effective in improving caregivers' confidence through tools and tricks to implement, and that they felt less stressed due to techniques provided throughout the program. Survey data indicated a non-significant effect on caregivers' stress, meaning caregiver stress did not decrease after the program. The survey data also indicated a non-significant effect on confidence at the end of the CCP-FC compared to baseline, meaning there was no increase in parental confidence after the program. While preliminary, these findings suggest that adapted interventions may be effective in supporting foster and kinship caregivers.

E-02: Pain Management of the Post-Operative Patient with a History of Substance Abuse Disorder

Great Hall

Grace Ospelt, Nursing

Katherine Razor, Nursing

Dorcas Sarbah, Nursing

Project Advisor: Dr. Paul Lewis

Abstract

The opioid epidemic is a very real and prevalent problem in the United States. It has been determined that opioid use following surgery has contributed greatly to the epidemic. One-third of chronic opioid users reported that they first were prescribed opioids postoperatively. This project will implement an educational session for nurses to provide information about effective non-opioid pain control options, in order to help decrease prevalence of opioid addiction. The target population for implementation is postoperative patients with substance-use disorder who are at risk for relapse. This educational session will provide the nurse's with a pamphlet with information from the presentation that they can use as a resource in their future practice. A pretest will be completed to assess the nurses' current knowledge and viewpoint on non-opioid surgical pain management. This presentation will open with a discussion of the opioid epidemic and current practice for post-op pain management. The education session will provide information on alternative post-op pain management based on research findings. The literature in this project pertains to postoperative pharmacological interventions and complementary therapies. The education session will complete with a post-test to determine the effectiveness of our educational presentation. Results are pending and to be completed by March 17th.

E-03: Residency Programs For New Graduates

Great Hall

Mia Robinson, Nursing

Elizabeth Middendorf, Nursing

Rylie Page, Nursing

Project Advisor: Dr. Paul Lewis

Abstract

New graduate nurses often feel overwhelmed and unprepared to care for patients independently after graduation. According to Becker's Hospital Review, 55 percent of hospitals state that their hospital does not currently have a residency program in place, despite numerous research articles crediting this program as a key in retention among new graduate nurses. The aim of this project is to educate staff members within the hospital, why a nurse residency program would be beneficial to the learning, clinical development, and retention of new graduate nurses. Our goal is for hospitals to switch from the traditional preceptorship to the improved residency program. A group of selected nurses and managers received an educational PowerPoint with an in-depth explanation on the benefits this system would have on new graduate nurses along with the hospital system. A pre- and post-test was given to these individuals to analyze the knowledge that they gained after viewing the PowerPoint. The outcome of the work will help allow new graduate nurses to feel more confident as they transition from nursing student to practicing registered nurse. Results are pending.

E-04: Improved Preceptor Competency with Formal Check-Ins

Great Hall

Ashley Gilliland, Nursing

Elise Baughman, Nursing

Jacqueline Dillon, Nursing

Project Advisor: Dr. Paul Lewis

Abstract

Cincinnati Children's Medical Center currently does not have a formal preceptor feedback program to further the education of their preceptors during preceptorship. The purpose of our educational project is to educate nurse educators on three check-ins that would increase preceptor competency. We created an education session which we presented to nurse educators. Our education outlined the three evidence-based check-in meetings using the Ask-Tell-Ask-Teach model. Each meeting would be fifteen minutes in length and would reinforce the topics of learning styles, situational awareness, and communication, which are key topics presented in the existing preceptor education class. Pre- and post-educational intervention quizzes assessed knowledge gained. Results pending.

E-05: Enhancing Patient Outcomes through Incorporating Continuous Monitoring in Non-Critical Units

Great Hall

Lauryn James, Nursing

Maya Anthony, Nursing

Sienna Bell, Nursing

Project Advisor: Dr. Paul Lewis

Abstract

In non-critical units, historically continuous monitoring is not required for every patient leading to many adverse events. Continuous monitoring of patients on non-critical units is an emerging strategy aimed at reducing adverse events such as cardiac arrest, Rapid Response Events, and Code Blues. Also, patients

who are continuously monitored have shown to have shorter average length of hospital stay. The purpose of this educational project is to explore the impact of implementing continuous monitoring systems in non-critical units to improve patient outcomes. We created an education session to present to a group of nurses on 5NW, Trauma and Orthopedic Unit, at University of Cincinnati Medical Center through a powerpoint presentation, pre and post tests. The session aimed to educate the nurses on the benefits of continuous monitoring and how to address the barriers that may come with monitoring every patient on the unit. It will also allow them to understand the role the nurses play such as monitoring, documenting, and delegating tasks to other healthcare workers. The outcome of the work will help to educate nurses on non critical units how continuous monitoring can help to reduce the risk of patient deterioration during hospitalized stay. Results from the presentation are pending.

E-06: Central Line-associated Bloodstream Infection Prevention

Great Hall

Katherine McCauley, Nursing

Andrea Marshall, Nursing

Shelby Hutton, Nursing

Project Advisor: Dr. Caroline Morrison

Abstract

The purpose of this education is to provide ICU nurses with the knowledge about effective use of CHG swabbing on central line hubs to prevent CLABSIs in order to improve their practice and patient outcomes. Our specific question is, among adult patients in the ICU with central lines, using CHG swabs to clean line access hubs as compared to using alcohol swabs, reduces the number of CLABSIs on the unit during a three month period. We plan to review current practices used in ICUs and compare those to the use of CHG swabs. Upon evaluating research on the topic, we will analyze the results of studies in order to determine best practices. Comparing the use of alcohol versus CHG swabs and determining infection rates, will help answer our clinical question. The new knowledge collected will ultimately improve clinical practice and patient outcomes during their stay. Nurses on the unit we plan to present to, will be given a pre and post-test in order to measure understanding and satisfaction. We do not have the results from our project yet. The outcome of the project will help nurses understand possible changes to the current procedures regarding central line care. Such procedures are time spent cleaning the central line hub, and the solution used to clean the hubs. Additionally, it is important to be aware of hospital policy and how it compares to up-to-date evidence based research, noting any differences. We hope after our teaching that patients and staff are positively impacted.

E-07: Managing Workplace Violence Through Implementation of Crisis Prevention Training

Great Hall

Megan DiSalvo, Nursing

Caleb Smearsoll, Nursing

Stefan Burnett, Nursing

Project Advisor: Dr. Mohammed Othman

Abstract

Hospital systems face a variety of challenges and one such is workplace violence. Workplace violence is defined as the following: “any act or threat of physical violence, harassment, intimidation, or other threatening disruptive behavior that occurs at the work site” (OSHA, 2017). The purpose of this project was to improve literacy of healthcare nurses in the emergency departments regarding workplace violence and crisis intervention. When encountering these situations, by implementing crisis prevention techniques through the use of academic literature and exposure or experience within local hospitals, an understanding was developed about workplace violence. Utilizing the identified literature and clinical exposure we collected appropriate data and analyzed our findings. It was found that Crisis Prevention Intervention or other similar techniques allowed providers to gain an understanding and knowledge about how to prevent these crises which can often develop into workplace violence. The education is best implemented prior to the completion of the orientation period for all healthcare providers in emergency departments. Through research it has been identified that patient communication and patient safety are one of the many challenges that new-hires face after completion of their orientation periods. While we understand that the cause of workplace violence stems from a multitude of factors, crisis prevention training is an effective means to equip healthcare providers to manage workplace violence.

E-08: Fatigue Rates and How they Differ between Day and Night Shift Nurses

Great Hall

Americus Land, Nursing

Reilly Zender, Nursing

Grayson Bell, Nursing

Project Advisor: Dr. Paul Lewis

Abstract

Night shift Registered Nurses often times experience higher levels of fatigue compared to Registered Nurses who work day shift. Studies have shown that there is a 143% increase in fatigue for those working night shifts compared to those working day shift. Research shows that this increase in fatigue is due to night shift workers not getting enough physical activity throughout the shift and spending more time sitting compared to those who work days. On average, night shift workers spend 10% more time sitting compared to colleagues who work days and day shift workers spend 7% more time standing and 2.3% more time walking compared to night shift employees. The aim of this project is to educate pediatric registered nurses on fatigue levels, how they vary throughout their shift and how they can improve fatigue levels. A group of selected nurses at Cincinnati Children's received an educational PowerPoint with the material at hand. Pre and post-tests and Karolinska Sleepiness Scale (KSS) surveys were administered to determine the outcome of knowledge gained after the educational session. Outcomes are pending.

E-09: Preventing Pressure Ulcers by the Use of Z-Flo Fluidized Positioners

Great Hall

Ally Barnett, Nursing

Jewel Troutman, Nursing

Christina Drees, Nursing

Project Advisor: Dr. Mohammad Othman

Abstract

The study of interventions to reduce pressure ulcers is important to improving patient outcomes. Pressure ulcers can interfere with patients' recovery and may contribute to longer hospital stays, pain, and increases risk of infections. The purpose of our project is to educate nurses on an orthopedic and neurology unit on how Z-Flo fluidized positioners can help prevent pressure ulcers. The specific goal of our project addresses hospital-acquired pressure ulcers. The goal of our project is to implement fluidized positioners and turning of patients instead of current practice of regular pillows/wedges to reduce the incidence of hospital-acquired pressure ulcers. Our current strategy for achieving our goal is to provide an educational course to nurses to inform them about using Z-Flo devices to prevent pressure injuries. After the course, nurses will be given a small test so their knowledge can be evaluated. After that we will also allow feedback to be given so the course can be improved. Based on research conducted by our group, the project results should reflect that using Z-Flo fluidized positioners helps reduce the risk of pressure ulcers. The necessary frequency of turns was not evident in our research, however it was clear that it should be assessed using multiple factors. The value of this information is to share the evidence of fluidized positioners to become common practice due to its prevention of developing hospital-acquired pressure injuries, which many hospitals are plagued with.

E-10: Exploring the Impact and Benefits of Simulation-Based Education and On Clinical Application and Competency in Speech-Language Pathology Graduate Programs

Great Hall

Anastasia Russell, Speech-Language Hearing Sciences

Caroline Mullen, Speech-Language Hearing Sciences

Project Advisor: Prof. Krista Beyrer

Abstract

Over the past decade, simulated learning has become more popular at the university level. Simulation especially gained popularity in clinically based programs during the pandemic, as methods were needed to assist students in reaching clinical competency in the absence of ability to attend live clinical sites. This project aimed to provide student investigators with experiences to promote a greater understanding of a variety of communication disorders and competency-based clinical application using online learning tools, particularly the navigation of a simulation-based platform, Simucase, and the creation of competency quizzes for graduate students through a university online education application, Canvas. While using SimuCase and completing these cases in learning mode, the capstone students built upon knowledge of certain communication disorders that were already known as well as form new ones. The students utilized CANVAS to create competency quizzes based off the simulation cases that were completed. After graduate students completed the assigned simulations in assessment mode and

earned a 90% cumulative competency score in 7 or less attempts, access to take the competency quizzes was granted. In total, 18 quizzes were created covering both assessment and treatment in the 9 clinical competency areas stated by ASHA. In conclusion, the students built upon their knowledge of communication sciences and disorders and a way of assessing graduate student competency was constructed.

E-11: Environmental Cleaning for Bone Marrow Transplant Patients

Great Hall

Sara Black, Nursing

Anna Tran, Nursing

Katelyn Imbrock, Nursing

Project Advisor: Dr. Caroline Morrison

Abstract

Healthcare acquired infections contribute to 99,000 deaths annually and 1.7 million infections in the United States alone. A healthcare associated infection (HAI) is any infection that is acquired from a health-care facility while a patient is receiving treatment for another diagnosis. These infections are extremely dangerous especially to immunocompromised patients such as chemotherapy and bone marrow transplants (BMT) patients. A literature search was conducted to determine best practice on environmental wipe downs to decrease surface contamination. The aim of this project is to educate nurses on an Oncology and BMT unit on environmental wipe downs to improve knowledge on decreasing rates of HAIs. We aim to answer questions regarding how to perform environmental wipe downs, what type of cleaner to use, and how hand hygiene affects infection rates. A group of selected nurses working on an oncology floor at The University of Cincinnati Medical Center will be educated on how to perform an environmental wipe down, what cleaning agent is most beneficial, hand hygiene practices, and how to decrease rates of infection through all modes of transmission. Nurses were educated through an interactive PowerPoint, handouts, and a demonstration. A pre and post-test was administered to show knowledge gained. The results are pending. The outcome of the education plan will help nurses gain further knowledge on reducing infection rates for immunocompromised patients via different interventions. The project will allow nurses on this unit to create a policy regarding environmental wipe downs, hand hygiene, and other methods to decrease infection rates.

E-12: Educating Nurses on Implementing Sleep Protocols in the Cardiac Intensive Care Unit to Prevent Delirium

Great Hall

Tatum Gibson, Nursing

Abby Arledge, Nursing

Chloe Litton, Nursing

Project Advisor: Dr. Paul Lewis

Abstract

Delirium is a common problem experienced by patients that are critically ill in the intensive care units and is associated with increased length of stay/poor health outcomes. Approximately 2 out of 3 patients in the ICU setting develop delirium. Sleep pattern and quality has been identified and researched as a contributing factor to delirium. The purpose of this educational project is to present information that demonstrates the relationship between sleep and delirium, while educating on ways to promote sleep in an ICU environment. Research was conducted with search criteria including publication date less than 5 years, peer reviewed, and full text available online. The knowledge deficits identified guiding our educational plan included the relationship between sleep and delirium, and sleep intervention options during hospitalization. An educational session was created to educate nursing students on a cardiac intensive care unit, about different sleep protocols to limit delirium. The group of students given the education were provided with a handout to assist them to increase their understanding of delirium in intensive care settings. Pre and post educational session quizzes were administered to allow for analysis of knowledge gained after the educational session. Our data showed an increase in knowledge and understanding of delirium prevention. The results of our post educational plan quizzes was 100% accuracy. More research is needed to prove the effectiveness of these protocols but this information can help nursing staff in the intensive care units, prevent delirium among their patients and improve health outcomes.

E-13: Learning Through Media: The Presence of Engineering Design Principles in Digital Games Evenhouse

Connor Engels, Chemical Engineering

Phuc Mai, Cybersecurity

Ian Giblin, Mechanical Engineering

Project Advisor: Dr. David Evenhouse

Abstract

The goal of this research project was to determine if engineering design principles can be found within the popular digital sandbox games: Minecraft and Legend of Zelda: Tears of the Kingdom. This was achieved by finding videos of people playing the games with both creative and story-driven methods and scoring them based on how many steps of the engineering design process they followed within a given time frame. Inter-rater-reliability using Cohen's Kappa was utilized to ensure accurate and precise data related to these videos. This data was paired with our own research into the realism of both games through testing of the convertible measurement systems, friction, conventional mechanics, gravity, and collisions. Together, this research allows us to have a better understanding of the teachings of engineering principles from popular media and those teachings applicability to the real world. From this understanding we have generated recommendations for future media to instill engineering principles, and education in general, into their design.

Category F: Chemical and Cellular Frontiers

F-01: Base Dependence of Aerobic Methanol Oxidation Catalyzed by Nickel (II)-TRISOX

Great Hall

Conner Pavelschak, Chemistry

Project Advisor: Dr. Michael Baldwin

Abstract

This project investigated the dehydrogenation reaction of Ni-TRISOX as a catalyst for the air oxidation of methanol to formaldehyde. It has been found that primary alcohols, specifically methanol, are catalytically oxidized in the presence of the Ni-TRISOX complex and ultimately forms formaldehyde through a reversible oxidation on the oximate nitrogen to form an iminoxyl radical. This project specifically investigated the impact that base has on the reaction and was analyzed via UV-Vis spectroscopy by recording the concentration of formaldehyde formed utilizing Hantzsch reagent.

F-02: Investigating the Catalytic Applications of Trisox when Bound to Metals: Cobalt (II), Nickel (II), Copper (II)

Great Hall

Trevor Beaulieu, Chemistry

Project Advisor: Dr. Michael Baldwin

Abstract

Trisox is a versatile ligand that could be utilized as catalysts in chemical reactions to help further the knowledge of coordination chemistry. Studying coordination chemistry can assist in showing how different molecules interact with each other to form metal complexes. Trisox ligands, as the name suggests, contain three oxygen atoms which includes monomeric, six-coordinate, pseudo-octahedral geometries. In this study, novel metal complexes of Trisox ligands with Cobalt (II), Nickel (II), and Copper (II) were synthesized and characterized to analyze oxidation reactions that use air as an oxidant. The synthesis involved the coordination of the Trisox ligand with the respective metal salts, followed by recrystallization to obtain pure crystalline products. Nuclear Magnetic Resonance (NMR) spectroscopy was utilized to confirm the structures and interpret the coordination environments of the metal complexes. Further characterization through mass spectrometry provided additional insights into the molecular composition and fragmentation patterns of these metal complexes. Further studies will involve the use of UV-Vis spectroscopy to analyze the electronic transitions within the metal complexes which could offer insight into the electronic structures and potential optical properties. Overall, this study contributes to the expanding field of coordination inorganic chemistry by introducing new Trisox metal complexes to explore further catalytic, chemical, and optical properties.

F-03: Investigating the Dynamics of Organic Azides in Crystalline Environments

Great Hall

Natalie Corrigan, Chemistry and Voice Performance

Project Advisor: Dr. Anna Gudmundsdottir

Abstract

Solid-state photochemistry is a growing field for its ability to use selective products, lack of reaction barriers, no solvent waste, and diverse applications. Within these diverse applications, we find these solid-state reactions produce dynamic crystals under the stimulus of light, heat, and pressure. By using photosensitive groups, such as azides (-N₃), we synthesized organic azides to be studied in solution and solid-state to understand their photomechanisms. Inorganic azides like NaN₃ currently reside in airbags of cars to respond to an electrical stimulus and expand the airbag with gas. Currently, organic azides are important to understand the evolution of the gas to mitigate inorganic chemical burns. The compounds synthesized- 5-methoxy-1-azidoindenone and 1-azido-indenone- were previously studied in our group to find the same reaction mechanism in solid-state but when studied as single crystals, they behave mechanically differently from light. Because single-crystals are packed and governed by their minimal energy, we can study their mechanism of movement when light irradiates the azide to produce nitrogen gas within the crystal. We studied these differences in responses to light as within their crystal lattice solved by X-Ray Crystallography. Growing crystals was a main focus in the research as to grow single-crystals with minimal to no imperfections. We studied an aryl azide- 4-azidoquinoline 1-oxide. Using the learned techniques of the vinyl azide, we elucidated the reaction progression with UV-visible and NMR monitored photolysis, laser flash photolysis (LFP), and Gaussian DFT calculations to understand the mechanism of the species.

F-04: Solvent-Free Carboxylic Acid Reduction via Mechanochemistry

Great Hall

Tom Heppler, Chemistry

Project Advisor: Dr. James Mack

Abstract

Reduction is a key chemical process that involves the saturation of previously unsaturated bonds. This is most commonly seen in carboxylic acids being reduced to aldehydes and ultimately to alcohols. Difficulties with carboxylic acid reduction is in large part due to them not being the most electrophilic nor nucleophilic of the carbonyls. This then causes difficulty in the selection of the reduction when other functional groups are present in the reaction mixture. Carboxylic acid reduction has historically been done using metal hydride reducing agents within organic solvents, some of which being dangerous to work with. In our case, the selectivity of the acid reduction was achieved via the in-situ production of Borane from the reducing agent NaBH₄, which can potentially selectively reduce carboxylic acids in the presence of more electrophilic carbonyl groups. Mechanochemistry aims to reduce the presence of organic solvent and use heat as well as the mechanical energy of mills to overcome activation energy barriers for reactions. Solvent is still used during the workup to isolate the product but the majority of the solvent waste is removed from the chemical process. Mechanochemistry also provides unique selectivity and reactivity that are not seen in traditional solvent-base methods causing the potential for the discovery of new methods of producing products we use every day.

F-05: Exploring the Photodynamics of Bromo Dimethyl Pyrazolyphenyl Azides (BDPZA)

Great Hall

Madison McDermott, Chemistry

Project Advisor: Dr. Anna Gudmundsdottir

Abstract

Here we present the photodynamic behavior of 1-(2-azido-3-bromophenyl)-3,5-dimethylpyrazole (1) in crystals. The photochemistry of 1 in solution and the solid state has been reported previously.¹ Upon irradiation in solution it forms a singlet aryl nitrene that cyclizes to form 1,3-dimethylpyrazolo[1,2-a]benzotriazole, meanwhile, some of singlet aryl nitrenes intersystem crosses to form triplet aryl nitrene that attracts a hydrogen from a methyl group and form 1-methylpyrazolo[1,2-a]quinoxaline. We are investigating the solid-state reaction mechanism of 1 by performing laser flash photolysis of the crystals to identify the intermediates formed within the crystal lattice. Using digital microscopy, we found that compound 1 when irradiated demonstrated the growth of white needles. The irradiation induced surface reactions upon the crystal exhibited epitaxial growth. We further employed force field calculations and SEM images in an effort to establish a correlation between the photodynamic behavior observed and the crystal lattice structure of compound 1. Reference Lindley, J.M.; McRobbie, M. L.; Meth-Cohn, O.; Suschitzky, H. Competitive cyclisations of singlet and triplet nitrenes. Part 8. The 1-(2-nitrenophenyl)pyrazoles and related systems. *J. Chem. Soc., Perkin Trans. 1*, 1980, 982-994

F-06: Characterization of Fluorescent Indicators in the Hydrolysis of Ammonia Borane Catalyzed by Metal Nanoparticles

Great Hall

Dillon Patel, Chemical Engineering and Chemistry

Project Advisor: Dr. Peng Zhang

Abstract

Hydrolysis of ammonia borane (NH_3BH_3) to produce hydrogen (H_2) is a key mechanism within practical uses of hydrogen storage, which has emerged as a promising renewable energy carrier. Ammonia borane has been identified as a material-based, chemical hydrogen storage compound due to its high hydrogen content, low weight, and stable features. The hydrolysis of ammonia borane requires catalytic activation to be observed at ambient conditions with noble-metal nanoparticles as a highly effective catalyst choice. An effective improvement in the hydrolysis has been demonstrated using Pt-based nanoparticles which were implemented in this study. Fluorescent indication of the hydrolysis reaction is adopted to monitor and sense the progress of the hydrolysis reaction. The fluorescent properties of the indicators change as the hydrolysis reactions proceed. This study investigates and compares two such fluorescent indicators for monitoring the hydrolysis of ammonia borane.

F-07: Reconstructing Past Climate Using Terrestrial Plant Biomarkers: A Study of n-alkanes in Sierra Nevada's, near Baboon Lake

Great Hall

Olivia Girten, Geology

Project Advisor: Dr. Aaron Diefendorf

Abstract

Terrestrial plant biomarkers play an important role in organic geochemistry, they can help with paleoenvironmental reconstruction, source rock identification and biological evolution. Plant waxes help water retention in plants and act as a barrier to ultraviolet light, and transfer of chemicals. The specific long chain leaf wax on plants, n-alkanes, along with their C and H isotopes are commonly used to reconstruct past climate by analyzing these compounds from lake sediment archives. However, it is unknown the exact reason why certain plants produce specific chain-lengths of n-alkanes. The goal of this study was to interpret data from the Sierra Nevada's Baboon Lake and add to previous knowledge about n-Alkanes. There is a lake sediment core that spans the past 15kya, this research can help expand the knowledge of the region that these plant waxes were collected. Since these samples were collected near and on Baboon Lake, it is also important to know that I am trying to differentiate alkane sourcing from terrestrial and aquatic plants, longer chain lengths >25 are typically terrestrial and shorter chains, C17 to C25, are typically aquatic. Ultimately this study will help confirm alkane sourcing, which is critical for being able to use the long chain n-alkanes and their H isotopes to reconstruct changes in water sourcing. This is important because it can give us more information about the westerlies and how they have changed over the past 15kya and will help us understand changes in atmospheric circulation and precipitation in the western United States.

F-08: Microbiome Shifts Impact the Interactions between tRNA Modification and Mosquito Biology

Great Hall

Judd Joves, Biological Sciences

Project Advisor: Dr. Joshua Benoit

Abstract

Mosquito-borne diseases pose significant global health risks, necessitating that understanding mosquito biology is critical to developing effective control strategies. *Aedes aegypti* is an important carrier of many arboviruses and requires its microbiome for development and fitness. Recent research has explored manipulating the microbiome to manage mosquito populations; however, the role of transfer RNA (tRNA) modifications in the context of mosquito-microbiome interactions remains unexplored. Changes in tRNA, which are essential for protein production, profoundly affect host health. Chemical modifications to tRNA are critical for their function, and specific modifications depend on micronutrients provided by the microbiome. This study examined the impact of limiting the mosquito microbiome to *E. coli* mutants (Δ tgt and Δ queA) that lack the necessary genes to produce the tRNA modification queuosine (Q) on mosquito growth and development. We hypothesize that changes in the microbiome through the *E. coli* variants that cannot produce Q will yield noticeable differences in larval behavior and phenotype. Our observations indicate that lower levels of Q from the mosquito's microbiome correlate with deficiencies in pigmentation during the larval stage, supported by transcriptional changes. Behavioral differences in relation to predator-prey interactions were noted in the mosquito larvae. This indicates a link between microbiome composition, tRNA modifications, and observable phenotypic traits

in *Aedes aegypti*. Altogether, these studies highlight the significance of the microbiome on mosquito biology in relation to tRNA function and suggest a novel target for mosquito control mechanisms.

F-09: Genome Sequencing and Transcriptome Analysis of the Rocky Mountain Wood Tick Great Hall

Joshua Tompkin, Biological Sciences
 Project Advisor: Dr. Joshua Benoit

Abstract

Dermacentor andersoni, the Rocky Mountain wood tick, is an important vector for Colorado tick fever and Rock Mountain spotted fever. This tick has been understudied, and a better understanding of its biology is needed for developing disease prevention and vector control strategies. A genome was assembled for *D. andersoni* from long-read PacBio sequences and annotated with the NCBI eukaryotic genome annotation pipeline. The quality and completeness of the genome were high with most scaffolds matching chromosomes and a BUSCO score of 94.0%. Following our genome sequencing, this project identified specific genes involved in blood feeding across a range of tissue types and life stages for *D. andersoni*. To accomplish this, RNA-seq analysis was used to investigate differential gene expression in several tissues of *D. andersoni* adults, nymphs, and larvae from before and after feeding. Based on this analysis, several gene groups have been identified that are involved in blood feeding. Furthermore, we establish specific transcriptional profiles associated with sex and developmental stages for this tick. This outcome will further knowledge of blood feeding in ticks and allow for the development of strategies that limit the spread of diseases transmitted by ticks.

Category G: Medical Frontiers

G-01: Improved Understanding of a Protein Complex Associated with Cancer and Other Disorders Great Hall

Jay Patel, Medical Sciences
 Project Advisor: Dr. Tom Cunningham

Abstract

Phosphoribosyl pyrophosphate synthetase (PRPS) is a molecule involved in the synthesis of purines and pyrimidines: the building blocks of DNA and RNA. Our lab investigates the various isoforms of this protein complex, particularly PRPS1 and PRPS2, and their potential role in clinical disorders. One isoform of these vital enzymes has already been discovered to play a major role in the proliferation of certain cancers. Furthermore, lab members have shown isoform specific differences in PRPS1 and PRPS2 involved in redox homeostasis. Additionally, two other proteins, Phosphoribosyl pyrophosphate synthetase associated protein 1 and 2 (PRPSAP1 and PRPSAP2), have been discovered to bind with PRPS1 and PRPS2 to act as non-enzymatic scaffolds for this complex. However, these two associated proteins are highly understudied, and the discovery of the formation of a complex is novel and much is still unknown. My project involves generating mutations within the PRPS1 and PRPS2 proteins to identify

critical amino acids and regions that are involved in the manifestation of clinical disorders, potentially giving us a glimpse into the mechanism of disease. By further understanding this complex, interactions between complex members, and its potential implications to clinical disorders such as cancer, arts syndrome, hyperuricemia, etc., better techniques can be developed to treat these conditions.

G-02: Preventing Peripheral IV Infiltration through the Use of ivWatch Devices

Great Hall

Megan Kazmierowicz, Nursing

Jillian Johnson, Nursing

Nicole Gerhart, Nursing

Project Advisor: Dr. Caroline Morrison

Abstract

It's estimated that 50% of peripheral IVs fail, and more than 20% of failures are due to infiltrations. Once an IV has infiltrated, the patient is no longer able to receive the fluid or medication, and the vein is compromised. A literature search was conducted using PubMed and CINAHL databases and "infiltration" and "ivWatch" search terms were used. Based on the literature, devices such as ivWatch may help detect and prevent infiltration. Knowledge about ivWatch was distributed to inpatient nurses at Bethesda North Hospital in an educational presentation with a purpose to inform them on the use of ivWatch devices and their effect on decreasing peripheral IV infiltration rates. ivWatch devices would be useful among inpatient adults who cannot understand or communicate pain, are under the influence of mental-status altering medication, or have developmental delays which result in a lack of expression. Included in this presentation is education on peripheral IV infiltration, the purpose of the ivWatch device, how to apply the device, and how the use of this device could decrease the rate of infiltration. A pre and post-test will be delivered to nurses to further evaluate their knowledge gained after this presentation. The results of this educational project are still pending. The intended outcome of this presentation is to enhance understanding of peripheral IV infiltration and explore the feasibility of implementing ivWatch devices.

G-03: Elucidating Skin Transcriptomic Signatures in Atopic Dermatitis

Great Hall

Richa Santhosh, Biological Sciences

Project Advisor: Dr. Latha Satish

Abstract

Atopic dermatitis (AD) is a prevalent inflammatory skin condition associated with asthma and allergic rhinitis. Despite its high prevalence, the precise mechanisms underlying disease progression, particularly its link to subsequent asthma development (the atopic march), remain elusive. The primary objective of this study is to standardize the protocols for isolating high-quality and quantity of RNA from skin tape strips (STS) to perform RNA-seq and identify differentially expressed genes. D-squame tapes obtained from participants in The Mechanisms of Progression of Atopic Dermatitis to Asthma in Children (MPAACH) cohort was designed to fill this gap and delineate the mechanistic underpinnings of allergic

disease progression. MPAACH is the first US-based early-life longitudinal prospective cohort of children with AD. We have tested numerous tapes and STS approaches, and based on our findings, we propose using D-squame skin tapes to collect skin cells from AD and non-AD children. STS is well suited for childhood AD studies, providing a simple and noninvasive method to obtain samples from young children.. Norgen BioTech Single Cell RNA isolation kit and the Revelo RNA-Seq High Sensitivity Kit, were used, respectively, for RNA isolation and cDNA library preparation. Our pilot sequencing results generated high-quality reads indicating successful RNA extraction and library preparation. Our primary goal is to capture the skin transcriptomic in AD to identify distinct molecular signatures associated with disease progression. Utilizing the bioinformatic tools, we will dissect the biological pathways implicated in childhood AD, shedding light on its underlying mechanisms.

G-04: Expression of Chimeric Protein, CD-19, on the Surface of Probiotic Bacteria to Mimic CAR-T Cell Therapy for Cancer Treatment

Great Hall

Nupur Mallick, Biological Sciences

Project Advisor: Dr. Nalinikanth Kotagiri

Abstract

Cancer is a term used for a group of collective diseases identified with abnormal growth of cells. Immunotherapy has been confirmed as the "fifth pillar" of cancer treatment, that works by boosting the immune system eventually leading to destruction of the cancer cells. One of the examples of immunotherapy is CAR T-cell therapy. Here, T cells are extracted and engineered by inserting a chimeric protein, which is infused with the patients' blood. However, due to several limitations of constant supply of T-cells, error-prone blood infusion, and treatment lasting for years, there's an unmet need for a novel immunotherapy with sustained release of chimeric antigen. Therefore, we developed a novel treatment strategy by engineering a probiotic bacterium to express a chimeric antigen receptor (CAR) protein-CD 19 onto the cell surface of the bacterium which mimics the CAR-T cell therapy. It would impart a function of chimeric CAR-T to a bacterium enabling the identification of tumor cells. Chimeric protein CD19 attachment with tumor cells sends a signal to the body's immune system to release cytokines resulting in the destruction of cancer cells. We successfully expressed CD 19 on the cell surface of the bacterium and confirmed with Colony PCR and Sanger Sequencing. Protein expression is also confirmed with Western immunoanalysis, Coomassie staining. Following confirmation of CD19 with a bioassay, we would plan animal experiments using C57BL6J and BALBc mice models. By the end of this project, we anticipate developing a successful working model of a probiotic based novel bacteriotherapy for cancer treatment.

G-05: Impact of a Novel Synthetic Amniotic Fluid on Fetal Lung Development

Great Hall

Stephanie Finoti, Biomedical Science and Public Health

Project Advisor: Dr. Braxton Forde

Abstract

Fetal surgery aims to offer life-saving measures while a child is still in the womb. During fetal surgery, instillation of fluid into the uterus (termed amnioinfusion) is required. The fluids used are Normal Saline (NS) and Lactated Ringer's (LR). However, prior work from our lab has shown NS and LR cause reactive-oxygen species mediated damage to the amniotic membranes. This led to the development of a novel synthetic amniotic fluid (Amnio-well) to reduce intrauterine inflammation. The impact of these fluids upon the fetal lungs remains unknown. The purpose of this project was to determine the changes in fetal lung development after amniotic fluid exchange with either NS, LR, or Amnio-well. At 17.5 days of embryonic development, pregnant rats underwent amniotic fluid replacement with either NS, LR, or Amnio-well, with sham as a control. At 20.5 days, fetal lungs were harvested for microscopic examination and evaluation of known inflammatory pathways. Results indicate fetal lungs are negatively affected by NS and LR, a finding not seen with Amnio-well. Investigation into the mechanism of this injury, to better tailor Amnio-well's formulation to protect lung development, is ongoing.

G-06: A Scoping Review in Speech Pathology and Applications to Future Health Disparity Research Questions

Great Hall

Lydia Erwin, Speech-Language Hearing Sciences

Project Advisor: Mr. Collin Brice

Abstract

How do you know when a scoping review is a good fit for your literature review? As an undergraduate student, I participated in a project where our goal was to analyze commonly employed methodologies used to assess gender perception in speech, demographic characteristics of listeners that have been recorded, and the types of speech samples being utilized to investigate gender perception for speech pathology. However, there are many literature review styles to choose from before moving forward with a project or idea. We found that a scoping review would be the most appropriate tool to meet our goals because it highlights literature in emerging areas of science that have not been reviewed. A scoping review assesses the potential scope of research done about a certain topic in hopes of retrieving evidence on the team's research topics. To conduct our scoping review, we used the software, Covidence, which allows reviewers to complete article screening and data extraction quickly and flexibly. Articles went through multiple stages, abstract and title screening, full-text screening, and data extraction, to be filtered and eventually included in our findings. Through this experience in reviewing literature, I have gained knowledge on the benefits and disadvantages of scoping reviews, how to navigate through research article sections, and how to create a thought pattern that seeks out information for future research questions related to health disparities.

G-07: Speech Sound Disorders in Children with ASD: A Comparison of SLP vs. ABA Approaches

Great Hall

Kathryn Schreiber, Speech-Language Hearing Sciences

Project Advisor: Dr. Nancy Creaghead

Abstract

Children with Autism Spectrum Disorder (ASD) are more likely to have higher rates of articulation and phonological disorders typically developing children. Speech-language pathologists (SLP) are the professionals who diagnose and treat speech sound disorders (SSD). The professionals who work with children with ASD include therapists from the field of Applied Behavioral Analysis (ABA). ABA is an interpersonal therapy in which a child works with a practitioner one-on-one. The goal is to improve social skills by using interventions that are based on principles of learning theory. They may address speech sound disorders using a variety of methods that are congruent with ABA learning theory. This literature review describes and compares the methods used by SLP and ABA professionals in the treatment of speech sound disorders. Included is a list of recommendations from the American Speech and Hearing Association (ASHA) with tips for parents and other professionals who work with children who have SSD.

G-08: Graphic Stories to Promote Research Readiness Among South Asian Community: A Focus on Purpose, Protection, and Participation

Great Hall

Riya Patel, Medical Sciences

Yatra Patel, Medical Sciences

Project Advisor: Dr. Melinda Butsch-Kovacic

Abstract

South Asians living in the US are frequently underrepresented in health research. Their lack of participation limits research's generalizability to them and keeps them from receiving the high-quality care and innovation that some studies may offer. "Research Ready" is a 5-panel, community co-created comic-style story that encourages discussion around the purpose of research, safety while participating, and why diverse participation, including South Asians, improves study results and leads to more effective interventions/treatments. This study leveraged trained young adults "cultural insiders" to invite attendees of a Midwestern South Asian Cultural Festival to read the story aloud together as the characters in either English or Hindi and used a decision guide to invite discussion. Post-discussion surveys (N=104) were analyzed using descriptive statistics. Participants spanned from 10-79 years with 42% <18 years and more females (61%). Only 18.3% indicated having prior research participation. Adults 40+ years (60%) requested the story/discussion in Hindi, compared to 2.3% of adolescents and 6.7% of younger adults. Post discussion, more participants were willing to consider participation with most open to participating in surveys/interviews (95.2%); only 52.9% would consider studies requiring the taking of medicines. Adolescents and adults with higher education were more willing to participate in medication studies. Nearly all (97.1%) said they would feel safe participating in research and 88.5% shared that the discussion would help them better decide about future participation. In conclusion, "Research Ready" discussions shared by cultural insiders is an effective way to encourage South Asians to consider future research participation.

Category H: Cincinnati Matters

H-01: Factors Influencing the Increase in Youths Sent to Therapy-Based Day Treatment

Great Hall

Kindra Mollaun, Social Work

Project Advisor: Dr. Gary Dick

Abstract

This study was conducted to see why there is an increase in youths going to therapy-based day treatment schooling and the factors behind it at Newpath Child and Family Solutions school. Youths can struggle behaviorally at schools and the schools will not know what more they can offer the student after so many instances, so they get sent to this school. The participants in this study are youths who are in the NewPath therapy-based day treatment schooling and are in the transition part of school to go back to regular school. The study shows that most youths feel more comfortable at the NewPath day treatment school. The factors of resources the support in their old schools could be an effect of the increase.

H-02: Safe Sex within the Foster Care System: Are Foster Parents Having Conversations about Safe Sex Practices with the Youth Placed in their Homes?

Great Hall

Shannah Swinehart, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

Foster care youth have been shown to have higher rates of sexually transmitted diseases and infections and teen pregnancy. This project looks into whether or not they are obtaining conversations about safe sex practices from the foster parents they are placed with and if not, what barriers are preventing foster parents from engaging in these conversations with the adolescents placed in their homes. A quantitative study will be done to see what percent of foster parents (of adolescents 12-18) in the Cincinnati area are providing these conversations and a qualitative aspect will be provided to gain further insight if they are not discussing these topics with foster youth. This will form a better understanding for social workers and other providers to help foster parents engage with their youth on topics such as using protection, getting tested regularly if sexually active, and etc., and to hopefully improve the outcomes for adolescents in the foster care system.

H-03: Abuse Patterns in Single-Mother Households with Live-In Paramours

Great Hall

Hayley Gross, Social Work

Project Advisor: Dr. Gary Dick

Abstract

Throughout the 2023-2024 school year I have researched abuse patterns in single-mother households with live-in paramours. I have included data from substantiated physical and sexual abuse cases in Clermont County, Ohio. The outcome of the data will further be released later in the semester at the Showcase.

H-04: How Individuals with Developmental Disabilities Experience Healthcare

Great Hall

Kylie Belt, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

Individuals with developmental disabilities are often overlooked and underappreciated. Knowing this information, I wanted to dive deeper into the satisfaction individuals with developmental disabilities had regarding their healthcare. The project has both scientific and ethical goals. The scientific goal was to understand not only individuals' satisfaction with previous healthcare providers but also look at whether individuals with guardians believe having a guardian plays a role in higher satisfaction of healthcare services. Ethically, however, the project raises serious questions about the overall care of individuals when seeking medical assistance when sick or injured. To answer these questions, We surveyed individuals with developmental disabilities who receive services from the Clermont County Board of Developmental Disabilities. Through our interview questions, we could see the satisfaction divide between individuals who have a caregiver attend doctor appointments with them and those who are their own guardians. We also determined if they felt they had the opportunity to self-advocate when they were at medical appointments. The outcome of the work will help understand where healthcare services still need to be updated to make seeking assistance more accessible to individuals with disabilities.

H-05: Benefits of Support Group for Survivors of Violent Crime

Great Hall

Danielle Fisher, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

This Study aims to discover if survivors of violent crime believe a support group would be beneficial to them in their healing process. The value of this project is to better help the Cincinnati Police Department's Victims Assistance Liaison Unit and other organizations working with survivors of violent crime understand how to better aid these survivors in the most effective and ethical way possible.

H-06: Stigma and Neglect of Mental Health and its Effects on the Family Structure

Great Hall

Shalaun House, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

The purpose of this project is to gain a deeper understanding of some issues faced at Hamilton County CPS. This project's specific goal is to understand the stigma and neglect in relation to mental health of families involved with the agency and in what ways it can disrupt or influence family structures. Specific Question: Stigma and Neglect of Mental Health and what are its effects on the family structure. The outcome of the work is allow others to understand and gain knowledge on the severity of stigma and mental health neglect, what effects it has on families', and in what ways the agency and workers can advocate to ensure it is not a barrier to families involvement and success in Hamilton County.

H-07: A Two-Group Comparison Study: Infants Who are Screened for Abuse and Neglect Great Hall

McKenna Collins, Social Work

Project Advisor: Dr. Gary Dick

Abstract

In my project, I am researching the number of infants reported for abuse and neglect to Hamilton County Job and Family Services and which priority level they are placed in. Hamilton County has new goals for the Child Protective Services team, one being that any infant called in for abuse and neglect are put in the first priority at intake. Infants are one of the most vulnerable populations because they cannot speak for themselves or ask anyone for help. The goal of this study is to ensure Hamilton County is keeping with their promises and protecting all infants from abuser or neglect. The outcome of this study will help future social workers and other professionals to see the reasonings for why infants are or aren't place in first priority as intake services.

H-08: The Impact of Exposure to Domestic Violence on Academics of Students in Hamilton County Jobs and Family Services Custody Great Hall

Megan Hursey, Social Work

Project Advisor: Dr. Georgia Anderson

Abstract

Does exposure to Domestic Violence among students in Hamilton Country Jobs and Family Services Custody affect their academic functioning? Through this study, we explore the effect that exposure to domestic violence has on students' academic functioning. Studies have shown that being exposed to domestic violence does not only affect subjects of academics but every part of their academic outcomes. With limited studies done on students' exposure affecting just academic functioning, this study helps us to find new ways to intervene with adolescents struggling with academic success while in custody. Through gathering data on students' GPAs before and after custody, it will help to give information on the most efficient ways Social Workers can intervene to give students the best chance of academic success. The outcome of the study will hope to help all current and future Social Workers to have

information on best practices for intervening when dealing with a student struggling academically while in custody.

H-09: Geriatric Behavioral Health Unit: Descriptive Analysis of Inpatient Assessment and the Treatment

Great Hall

Jordee Harper, Social Work

Project Advisor: Dr. Gary Dick

Abstract

The upsurge in the geriatric population, 65 years and older, has been discussed in the health care provided to patients. With the increased population, there has been a correlating increase in the number of geriatric psychiatric patients. Research has shown that demographic and epidemiological characteristics can provide crucial information to treatment planning for behavioral health geriatric patients. A secondary analysis of medical records with a specific look at the assessments will show that demographic and epidemiological factors are fundamental in creating a better-individualized treatment plan. The study is a descriptive analysis of the geriatric patients at Mercy Health - Clermont in the Senior Behavioral Health Unit.

H-10: Demographics of Individuals Charged with Domestic Violence

Great Hall

Connor McGlinchey, Social Work

Project Advisor: Dr. Gary Dick

Abstract

This study aims to discover the most prevalent demographics of individuals charged with domestic violence in the greater Cincinnati area. This study answers the question, "What are the common demographics associated with individuals charged with domestic violence?" The strategy behind this study is to pull a sample of individuals charged with domestic violence from the court management system at pre-trial services to document then and analyze the demographics of those individuals. From this study, people will have a greater understanding of these demographics and hopefully use that data to target those specific individuals associated with domestic violence and create preventative programs and systems in hopes of a reduction in cases. The value of this outcome will allow others the opportunity to aid/ prevent future domestic violence cases.

H-11: Systemic Racism and its Effects on Black People in the Criminal Justice System

Great Hall

Ahliya Brown, Social Work

Project Advisor: Dr. Gary Dick

Abstract

Systematic disparities impact Black people and have been since the onset of the trans-Atlantic Slave trade in 1619. The Criminal Justice system continues to wrongfully convict, or harshly convict Black men at rates much higher than any other race. It is widely known that racism has been the root of all success in the United States. The patriarchal remains slavery has bestowed upon this country have only left us wondering...Is slavery really “emancipated” -- or is it just disguised as something embedded in governmental systems? In the year 1860 slavery had an economic revenue of \$4 billion. We can attribute the racial wealth gap to this fact, today (Saraiva 2021). We must ask ourselves – As American citizens or otherwise...Is it okay to force labor from humans for below minimum wage? Well, one could argue that is precisely what the American incarceration system allows. This research synopsis will unveil how the history of America and the soil she still stands on, encapsulates racist roots. The research will delve into how racism has redefined bounds into institutions that garner the same oppressive principles as slavery. But this modern-day slavery is now masked. This research study will focus on plea deals, evidence, sentencing, and jail time – thrust upon one of the United States most vulnerable populations...Black Americans. This study will lead to newfound understandings of how Hamilton County has contributed to systematic inequities in the criminal justice system, and how Black individuals suffer from it.

H-12: Why a Veteran Treatment Court is Needed for Successful Treatment

Great Hall

Tim Fancote, Social Work

Project Advisor: Dr. Gary Dick

Abstract

This study was conducted to measure the experience and effectiveness of the military Veterans attending the Veteran Treatment Court program in Hamilton County, Ohio. After their military service, Veterans can struggle with mental health conditions connected to their time in the military that often go undiagnosed and are potentially worsened by self-medicating. For non-veterans, their intervention can be their arrest and potential incarceration for crimes they committed and laws they broke because Veterans have access to healthcare provided by the Veteran Health Administration, which Veterans are unaware of the resources they are qualified for and how to access these services. Most participants believed they would not be successful without the intervention of the Veterans Treatment Court. The Veterans receive the treatment from the healthcare system they are entitled to because of their military service, but it is the intangible factors of the Veteran Treatment Court that have assisted its members with reaching their potential and success; that is due to the genuineness of care and compassion the judge and the treatment team members have for the Veterans in the program and wanting the Veterans not only to graduate from the program successfully but to succeed in life long after their criminal proceedings have concluded and to become contributing members of society after their military service and legal trouble.

Category I: Green Cincinnati

I-01: Anaerobic Digestion Implementation for Organic Waste Diversion: Cincinnati's Zero-Waste Priority Action

Great Hall

Elle Faris, Environmental Studies

Cierra Clark, Environmental Studies

Ali Whitaker, Environmental Studies

Project Advisor: Dr. Amy Townsend-Small

Abstract

Organic materials are responsible for over 30% of municipal solid waste and has created a need for sustainable waste practices, especially in urban settings. A potential solution to divert increased food waste from landfills is by implementing an anaerobic digestion system in the city of Cincinnati.

Anaerobic digesters utilize microorganisms to break down organic waste into biogas and soil additives, which can be harnessed as a source of renewable energy and fertilizer products. This Zero Waste initiative of the Green Cincinnati Plan is a potential program and we hope this research will aid its implementation. By researching other cities where anaerobic digesters have been successfully applied, we were able to identify base-load materials, select a location near material sources, and determine potential applications in Cincinnati for the resulting product. Our results will help the city of Cincinnati go forward in developing an anaerobic digester system within the city given the guidance and research provided in this paper.

I-02: The Possibility of Expanding Curbside Recycling in Cincinnati to Include Hard-to-Recycle Materials

Great Hall

Emme Thomas, Environmental Studies

Gabrielle Ackemyer, Environmental Studies

Project Advisor: Dr. Amy Townsend-Small

Abstract

As consumption increases, safe disposal of materials is becoming challenging. Mismanagement of trash harms air and water quality and contributes to greenhouse gas emissions. The new production of plastic is also more harmful than recycling used plastics. Cincinnati currently has a standard curbside recycling program. This project investigates how the city can expand its recycling program. This project is working in accordance with the goals of the Green Cincinnati Plan to include e-waste, textiles, and other hard to recycle materials in curbside recycling. We have reviewed literature and investigated how other cities recycle. Additionally, we surveyed Cincinnati residents to gain a better understanding of how knowledgeable Cincinnati is on recycling. We expect to find that the best way to improve the recycling program is to start small and to first expand the current system to areas where recycling is unavailable. It is important to involve the community when changing a familiar system. Education will be crucial since there is a lot of confusion about what can be recycled curbside. Residents also need to be informed about the current state of resource degradation for them to care about reusing materials. The outcome

of our research will inform the best ways to educate the community and implement more recycling options. Our next steps include sending our research to the city of Cincinnati so they can implement it when moving forward with their zero-waste initiative.

I-03: Supporting Natural Corridors for Air Quality and Resiliency

Great Hall

Jake Berry, Environmental Studies

Project Advisor: Dr. Amy Townsend-Small

Abstract

The Green Cincinnati Plan has been working towards climate resiliency and sustainability for the past fifteen years through a plethora of different focus areas. Currently, Cincinnati spends roughly half the year suffering from average to poor air quality which can lead to adverse public health effects. Therefore, the purpose of this research is to find ways to support and fund natural corridors around streams/rivers and interstates/highways to better preserve our air quality. Primarily, research is focused on finding previous examples of cities/local areas that have already set precedence in this area or to find new practical strategies. The main strategies for accomplishing this task are finding ways to work with local government agencies, local communities, or partnering with local non-profits. The target outcome is that this task and others related to it, will improve air quality in Cincinnati by 30% before the next Green Cincinnati Plan in 2028. Other side outcomes of this research include promoting ecosystems and the natural environment, preventing ground pollution entering waterways, limiting the urban heat island effect, and promoting psychological well-being.

I-04: How Much Change is there in Aquatic Habitat of an Ohio Reservoir?

Great Hall

Zachary Gunnell, Biological Sciences

Project Advisor: Dr. Michael Booth

Abstract

Climate change trends and anthropogenic factors have caused there to be a change in the environments around us. One specific habitat that has been affected is aquatic habitat. The way that I did this was by viewing two important characteristics that make up aquatic habitat: woody debris and aquatic vegetation. These two characteristics help provide fish with essential habitat to be used for refuge and reproduction. I looked at these two different variables by examining side scan sonar data collected from 2021-2023. I then used ARCGIS to quantify woody debris and vegetation for each year. I analyzed the data that I collected and looked for trends to see if the aquatic habitat was changing over time. The outcome of this data and data like this will help understand how much variation and change is occurring in Ohio Reservoirs. This can be helpful to organizations that are managing and protecting aquatic habitat to plan accordingly to change.

I-05: Impacts of Hydrological Conditions on Fish Diversity and Populations in a Small Urban Stream

Great Hall

Caitlin Black, Biological Sciences

Project Advisor: Dr. Michael Booth

Abstract

The characteristics of urban streams create stressors for fish that cause dramatic shifts in population dynamics. These characteristics include, a flashy hydrograph, increased nutrient input, loss of biodiversity, and channelization. Hydrology is a major factor that impacts fish compositions because it determines habitat availability in streams. Hydrology is especially important in urban streams, as urban fish communities already face habitat degradation compared to natural streams. Urban streams are populated by fewer species that are more tolerant to changes caused by urbanization, but these species are still affected by changing hydrology. Using a five-year dataset collected in four sites within Cooper Creek, an urban headwater stream in Cincinnati, OH, we analyze variations in fish population and community structure in response to habitat availability in wet and dry years in an urban stream. The two focuses of this study are understanding (1) how fish community composition and (2) population characteristics (e.g., size distribution, body condition) change in wet versus dry years. Cooper Creek is inhabited by tolerant pioneer species like Creek Chub, Western Black nose Dace, Central Stoneroller, and a few more species present in the lower reaches of the creek. In this study we hypothesize that there is a correlation between fish community composition/population characteristics and the amount of rainfall in a year. We predict that in wetter years with more rainfall there will be greater habitat availability. This will result in better population numbers, larger fish, and more well rounded size distributions. In dryer years there will be

I-06: Do Overall Land Management Practices Positively Contribute to Fledgling Success in Bluebirds, Tree Swallows, Carolina Chickadees, and House Wrens? (1996-2022)

Great Hall

Elise Brown, Biological Sciences

Project Advisor: Dr. Danielle Winget

Abstract

The effect of land management practices contribution to fledgling success in Bluebirds, Tree Swallows, Carolina Chickadees and House Wrens was studied at the Cincinnati Nature Center Rowe Woods location as well as the Long Branch Farm location. The study consisted of three parts. Firstly, data collected by staff and volunteers from 2012-2022 was compiled and organized into data tables. This collected data occurred weekly with trained staff and volunteers observing birdbox inhabitants as well as their life cycle stage and health condition. Next, both maps and ArcGIS were used to determine which areas had undergone land management practices. Finally, analysis of data was completed comparing presence to absence of land management practices. Since none of the data yielded statistically significant results, land management practices contribution alone to fledgling success cannot be determined. However, the presence of land management practices is clearly one factor in determining

condition of habitat as well as food and health. Further experimentation is warranted, especially on the prevalence and diversity of birds at the Cincinnati Nature Center.

I-07: Cincinnati's Urban Agriculture Job Market: A Current Analysis and Plan for Growth

Great Hall

Annabel Stanley, Environmental Studies

Project Advisor: Dr. Amy Townsend-Small

Abstract

Urban farming is becoming more popular in American cities due to its environmental, social, and economic benefits. Following this trend, the City of Cincinnati's Office of Environment and Sustainability (OES) has set a goal in the Green Cincinnati Plan to increase the quantity of jobs in the city's food and agriculture sector by 20% by 2028. The following project provides an analysis of Cincinnati's current agriculture job market and recommended steps for OES to take to reach the above goal. I look at Cincinnati Public School's current educational opportunities focused on agriculture, higher educational programs focused on agriculture, and current farm training programs in the Cincinnati area and give feedback about how they can grow. I identify local for-profit and not-for-profit farms already employing Cincinnatians and look at how the city can increase their market. I also collect resources and provide tips for Cincinnatians wanting to start farming in the city. Finally, by looking at other cities with successful urban agriculture programs, I give OES recommended next steps for increasing the quantity of jobs in Cincinnati's food and agriculture sector. This project synthesizes vital information on Cincinnati's farming and agriculture job sectors while providing feedback for improving job quantity, which will help grow urban agriculture in Cincinnati and provide its residents with its many benefits.

I-08: Planting Native Trees Along Interstates and Highways Can Reduce Air Pollution In Cincinnati

Great Hall

Kelly Helton, Environmental Studies

Project Advisor: Dr. Amy Townsend-Small

Abstract

Air pollution in Cincinnati is an alarming problem in the city. The Air Quality Index has ranked the quality of the air in Cincinnati as "unhealthy" for most days of the year. This is a serious concern as bad air quality can lead to asthma, lung disease, and other health consequences. The Green Cincinnati Plan aims to try and resolve this problem through a variety of means. One way we can significantly reduce air pollution is by planting trees and bushes along Interstates and highways. Doing so will alleviate the pollution caused by vehicle emissions along the roadways, create a more scenic visual appeal for drivers, create more natural habitats for species, and even decrease noise pollution as well. Trees naturally filter our air through the pores in their leaves. These natural corridors must be planted appropriately in order to maximize the benefits, which is what this research aims to achieve. This project looks at other cities that have planted trees to alleviate air pollution and applies those results to a plan for Cincinnati. It is also important to consider what species of trees would best support the wildlife of the Cincinnati area and prevent invasive species. This project is also taking into consideration what highways and Interstates we

should address first through a lens of equity. These findings outlined in this project are extremely important for the people living in the city so that everyone can have healthy, clean air to breathe, live, work, and play in.

I-09: Green Cincinnati Plan: Addressing Environmental Issues through Support of Business Owners and Start-ups in Cincinnati

Great Hall

Anna Campbell, Environmental Studies

Project Advisor: Dr. Amy Townsend-Small

Abstract

The business market is one of the largest contributors to environmental problems, but many organizations are unsure of how to change their practices to become a "green" business. The city of Cincinnati has adopted the quinquennial Green Cincinnati Plan (GCP) in order to address the various environmental problems plaguing our city, including market issues. This raises the questions of: How can the Green Cincinnati Plan and its partners aid in supporting local businesses, specifically minority and woman owned, in enacting green practices to address environmental issues? Is this even a feasible goal in the city of Cincinnati? Through research of the current state of this GCP goal, it has been found out that there are attempts at supporting small businesses in becoming a green business through organizations such as 513 Green and 2030 District. There is little to no attempt yet in the city of Cincinnati to offer incentives for sustainable businesses practices, nor any solutions targeted specifically at minority or woman owned businesses. It is evidenced that there is a demand for green businesses from consumers, but what is the benefit for business owners? Have other cities adopted incentive programs for small businesses to enact sustainability plans, and would they be a model for Cincinnati? The outcome of the work will further help Cincinnati and other cities to adopt solutions to aid business owners in implementing sustainable practices. Supporting businesses in adopting sustainable practices is beneficial for addressing pressing environmental concerns that threaten the preservation of our natural environment.

I-10: What Are the Differences in Size Between Urban Butterflies and Rural Butterflies?

Great Hall

Dade Kelly, Biological Sciences

Project Advisor: Dr. Patrick Guerra

Abstract

I tested the hypothesis that butterflies will not be same size and have different wing sizes and overall area between urban and non-urban/ rural environments. I hypothesized that butterflies in urban environments won't be as big as the butterflies in non-urban environments. This could be for multiple different reasons. Including less resources compared to rural areas. To test this hypothesis, I measured the different species that Samuel had collected for samples. The samples that were collected are orange sulfur butterflies (*Colias eurytheme*) caught in an urban environment (Burnet Woods, Cincinnati, OH) versus those caught in a rural environment (University of Cincinnati Center for Field Studies, Harrison,

OH). Evidence shows that the butterflies collected in urban environments were smaller in both male and females. Making the hypothesis correct.