



**14th Annual  
Malone University**

Student  
***RESEARCH  
SYMPOSIUM***

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***THE MALONE UNIVERSITY  
STUDENT RESEARCH SYMPOSIUM***

showcases student scholarship across schools and departments. Excellent projects from such programs as Chemistry, Computer Science, English, History, Mathematics, Nursing, Political Science, Psychology, Social Work, and Zoo & Wildlife Biology are part of this celebration of student achievement. Please, join us in congratulating student participants and their faculty mentors as we come together in community to honor graduate and undergraduate research and creativity.

**SAVANNAH PEW, MARKI FISHER, ALEXIS BLACK**  
**Faculty Mentors: Deb Lee, Carrie Stroup**

### ***Spiritual Care Competency for End-of-Life Nursing Care***

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Nurses who make spiritual care a key component of their practice can assist terminally ill patients who are struggling with questions of existentialism and faith. However, evidence suggests that many patients at end-of-life deny ever receiving spiritual care from nurses while many nurses who care for terminally ill patients report feelings of inadequacy when faced with a spiritual care opportunity. Our exploration of evidence for best practice was guided by this question: In end-of-life nursing care (P), are nurses equipped (I) to provide sufficient spiritual care (O) to terminally ill patients? The explored evidence suggests that while nurses respond well to education about providing spiritual care, there are not enough resources available to consider such interventions feasible and readily accessible. In addition, further research is needed to understand what resources are consistently effective in increasing nurse's sense of adequacy when providing spiritual care to their terminally ill patients. Our research recommendation is to evaluate various resources and methods for educating nurses about providing spiritual care for terminally ill patients. Our prioritized outcome would be nurses' enhanced knowledge and perceived competency for providing spiritual care for end-of-life patients within a hospital setting.

**DEONTE CARTER, SKYLER SHANNON**  
**Faculty Mentor: Lauren Seifert**

### ***Diversity Issues, Anti-Racism, and Technological Improvements***

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Our study about events in the Greenwood District in Tulsa, Oklahoma, in 1921 is part of a larger endeavor at Malone University called the DIARA (Diversity Issues & Anti-Racism Application) Project. The goal of DIARA is to foster dialogs that lead to improved understandings across individuals and social groups. In addition, we aim to scrutinize historical and/or contemporary events using inductive, thematic analysis. This is a type of qualitative research, and through our inquiry we found key themes through perusal of online artifacts, books, and audio/video about an event. Then, we engaged in independent and group inspection of said artifacts in order to shed light on the psychological and social challenges linked to incidents with significant impacts on minority persons. Some key themes in artifacts about Tulsa-1921 are: violence, racial segregation, differential impacts on Blacks and Whites (e.g., financially), suffering, fear, trauma, family legacies (of shame, fear, power), and an absence of understanding between the majority race (Whites) and the minority race (Blacks). Our qualitative analysis led us to further study race relations in contemporary society, and we have found the following themes in materials related to racial healing: needs for seeking understanding, keeping an open mind, suspending one's perspective/judgment, and humility. One lesson that we have learned is that one person cannot force another to engage in a healing dialog; both parties must be willing in order for the dialog to occur.

**ASHTEN LORTON**  
**Faculty Mentor: Lauren Seifert**

### ***Live Music and Emotions***

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I am interested in seeing if the presence of live music affects one's mood. To test this idea, I decided to create a research project in which I partner with the Malone Worship Team. We will partner together during this year's "Fireside" SFO event and afterwards, a survey will be sent out to all Malone students, asking that if they attended the event, they would be willing to fill out a short survey about their experience both before and after listening to the live music. From there, I will interpret my results. I expect to see a lower number rated for overall mood before the event and a higher mood-associated number after the event.

**CATHERINE PETTICORD, CHRIS CANNON, ALEXIS HUSCROFT, LEAH KEIM**  
**Faculty Mentor: Kathryn Husinga**

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***Investigation of the Role of PEPCK-Interaction Mutants on MDH1 Activity***

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Malate dehydrogenase (MDH) is the enzyme that catalyzes the interconversion of malate to oxaloacetate within several metabolic pathways important for life. These pathways include the Krebs cycle, gluconeogenesis, and the malate-aspartate shuttle. MDH is widely-conserved across eukaryotes and prokaryotes and is able to deprotonate malate as NAD<sup>+</sup> becomes NADH. Phosphoenolpyruvate carboxykinase (PEPCK) is an enzyme used in the metabolic pathway of gluconeogenesis. It converts oxaloacetate to phosphoenolpyruvate and carbon dioxide, a major step in the gluconeogenesis pathway. We have hypothesized that PEPCK may interact with MDH to shuttle oxaloacetate directly from MDH into PEPCK, but very little data is available on this interaction. It is thought that this interaction works as a cohesive subunit and as a class we have mutated the human MDH protein found in one of the regions where MDH and PEPCK are predicted to interact. Our group then investigated how these mutations affect the enzyme activity of MDH. We will present this data and the results of our mutagenesis and protein purification procedure with the goal of investigating the impact of mutations in the recognized PEPCK-MDH1 interaction interface on MDH1 activity to either confirm or contradict the hypothetical findings presented through study over the duration of the semester.

**HUNTER SWARTZ**  
**Faculty Mentor: Lauren Seifert**

***A Lexical-Semantic Predictor of Psychosis:  
Using Natural Language Processing to Highlight Semantic Similarity  
Disturbances in People Diagnosed With Schizophrenia***

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Emerging research has highlighted the importance of specific regions in the hippocampus for structuring associative memory (such as the relationship between words and their mental representations). Lesions in the hippocampus have therefore been associated with symptoms such as hyperassociational psychosis. The aim of this research project is to examine how a broadened lexical-semantic network can be used to predict the onset of the positive symptoms of schizophrenia. I will be utilizing the Word2Vec vector mapping algorithm to contrast the word to word associations of people with schizophrenia with those of a 'normal' control group. After scoring semantic associations from subjects' narratives as "loose", "hyperassociational" or "cohesive", I will be able to run a t-test for group differences. A significant t-value might suggest that the utterances of persons with schizophrenia reveal underlying qualities of associative memory that are not present in persons without schizophrenia.

**FAITH BRENNEMAN, AMBER ROBINSON, HANNAH MOOTS, EMMA LABELLE**  
**Faculty Mentor: Kathryn Huisinga**

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***Investigation the Protein Interaction between hMDH1 and PEPCK***

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Malate Dehydrogenase (MDH) is an enzyme important for metabolism in many organisms, including humans. This enzyme helps catalyze the conversion of one molecule (malate) to another molecule (oxaloacetate) using NADH as a cofactor. Humans have two different versions of MDH, one found in the mitochondria and one in the cytoplasm. Our research is focused on the cytoplasmic version of MDH which plays an important role in supplying oxaloacetate to phosphoenolpyruvate carboxykinase (PEPCK) for the synthesis of glucose, a process called gluconeogenesis. Because many metabolic enzymes interact with each other, we are interested in investigating if cytoplasmic MDH directly interacts with PEPCK. We will present the progress we have made in investigating the potential interaction between MDH1 and PEPCK proteins including a model of where the two proteins may interact, generation of MDH1 mutants in the interaction interface, protein purification, and development of a PEPCK-MDH1 protein-protein interaction assay.

**CATHERINE PETTICORD**  
**Faculty Mentor: Jason Courter**

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***Burnout Within Veterinary Medicine: Bridging the Mental Health Support Gap from Student to Practice Owner***

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Recent research has indicated that those within the veterinary profession are considerably more prone to severe health complications stemming from burnout, including suicidal thoughts and tendencies. Burnout is a job-related phenomenon that is characterized by exhaustion and depersonalizations and is found predominantly in caring professions. The aim of this study is to better understand burnout at each stage of the professional veterinary journey from undergraduate pre-vet student to veterinary practice owner and to generate useful recommendations for combating burnout at each stage. We sought to survey Y5 professionals in each of five job categories (i.e., undergraduate pre-vet student, veterinary graduate student, veterinary assistant/technician, associate veterinarian, and veterinary practice owner) using questions that specifically applied to veterinary medicine. Our preliminary data indicate that our respondents, and particularly undergraduate students, view burnout among themselves and their peers as much less of a problem than what has previously been reported. This may be because undergraduate students poorly understand the work/life/stress dynamic that comes once a person has become a part of a practice. Based on these findings we recommend and advocate for early education surrounding the topic of burnout to improve future for the sake of both mental health and long-term career fulfillment.

**MADISON BLYER**  
**Faculty Mentor: Lauren Seifert**

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***A Mixed Methods Study of Dialectical Thinking and Grit in Collegiate Athletes***

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Dialectical thinking (DT) has been defined in different ways but can be understood as a mode of cognition that attempts to comprehend two or more different points of view both/and rather than either/or. Grit, on the other hand, is defined as passion and perseverance for long-term goals. The aim of the current study was to investigate dialectical thinking in relation to self-reported grit in collegiate basketball players. In this mixed-methods study, a survey was sent via email to gatekeepers (coaches) of collegiate basketball players, who were asked to send a survey link to their players. I assessed a possible correlation between grit and dialectical thinking, and I conducted qualitative analyses of narrative (in open-ended items) for integrative complexity. To my knowledge, no studies have examined DT in relation to grit (or resilience). I believe this research can contribute to the conversation about mental health in collegiate athletes.

**LAURA YOUNG**  
**Faculty Mentor: Lauren Seifert**

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***Do Animals Affect the Human Mind?***

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Research indicates that animals can be an important source of stress relief and comfort. For instance, emotional support animals (ESA) are increasing in popularity. In order to investigate stress relieving activities, I invited Malone University students to take part in playing with animals (rats or goldfish) or coloring/drawing. I hypothesized that participants would report stress relief from the animal interactions and conducted a comparison of stress relief scores across groups. In addition, I computed overall stress relief for all subjects. One-hundred percent (N = 7) of subjects reported feeling better/good after their participation in the stress relief study activity. However, my hypothesis that animals would be superior as stress relieving was not supported,  $t(6) = -0.23, p = .41$ . It appears that coloring/drawing and interacting with animals were both stress-relieving for the students who selected them. Based on my findings, I would recommend one day per month on campus where stress-relieving activities (like animals to interact with and/or coloring.drawing) are available to students (e.g., in the Quad or Barn).

**MATTHEW KUYKEN**  
**Faculty Mentor: Jason Courter**

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***Amphibian Abundance Survey in Stark County, Ohio***

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Due to the recent declining populations of amphibians across the United States, species abundance surveys have been conducted to determine the status of local populations. Northeast Ohio is an area with high amphibian biodiversity however few studies have been conducted here. These studies are often conducted at seasonal vernal pools where amphibians congregate to breed. The objective of this study was to identify the species richness and abundance in Stark County vernal pools. Sampling techniques included hand sampling, dipnetting, audible sampling, and the use of coverboards around vernal pools. The study ranged from late March to mid-May 2021 and we used 4 vernal pools for our study sites. We documented 554 individuals among 9 total species. We compared our results to a previous study conducted in Killbuck Marsh Wildlife Area (Wicknick et al., 2007) and found that we identified fewer species but had a higher abundance of Wood Frogs and Leopard Frogs. Our results provide one of the first estimates of amphibian diversity on Stark Parks properties and direction for future Malone students who we hope will continue our work.

**EMILY HUMMEL, BRITTANY SCHOTT**  
**Faculty Mentor: Sheri Hartman**

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***Incident Reporting: A Quality Improvement Project***

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Medical errors, defined as any intended action not implemented as planned, are a reality in healthcare. When an error occurs, staff are expected to document them on incident reports (IR). Evidence suggests that IRs lead to changes that improve patient and staff safety; however, a reluctance to reporting incidents has been noted in the literature. At University Hospitals Geauga Medical Center, a policy exists for reporting incidents, but staff are disinclined to report them. The aim of this quality improvement project was to increase the knowledge of nurses and patient care nursing assistants (PCNAs) about the purpose and procedures of IRs. Nineteen nurses and PCNAs attended a 10-minute education session about the purpose and process for completing IRs. Results demonstrated that although the majority (89%) of nurses and PCNAs knew an IR policy existed; only 47% were likely to file an IR prior to this education session. Although 95% of the participants stated they were likely to file an IR after attending this education session, barriers such as undervaluing IRs, shame, guilt, and/or time constraints were expressed. Although this education session was effective in increasing knowledge about IRs, barriers remain and ongoing education about IRs is recommended in health care facilities.

**JUSTINA FABICH, BROOKE KLING**  
**Faculty Mentor: Debra Lee**

### ***Changing the Mindset on Surgical Smoke Safety***

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Background: Today's surgical centers utilize electrosurgery during surgical procedures for tissue hemostasis, but a hazardous smoke is created in the process. Many hospitals have policies in place requiring use of an electrosurgical smoke evacuation device, but compliance remains an issue. Purpose: This process improvement project was conducted to assess and identify barriers to electrosurgery smoke evacuation policy compliance within the operating room, create awareness of the hazards of surgical smoke, and take steps to increase policy compliance. Methods: Utilizing Lewin's Three Step Model of Change as a guide, a process improvement project was implemented using a Key Process Improvement (KPI) Board, Pareto Chart, and Gemba Rounding. If 100% compliance was not achieved, barriers to smoke evacuation compliance were listed on the Pareto Chart. Results: Compliance at 100% was reported just 6 of 27 audit days (22%). Barriers cited were that the instrument was too bulky and blocked the surgeon's view, the smoke evacuation equipment was too loud, and that there was no smoke evacuation equipment available for use. Conclusion: Noncompliance remains a problem despite the policy in place. The combination of managerial support and action to address barriers holds promise for 100% compliance and the safety of patients and personnel.

**KIRK LARSON**  
**Faculty Mentor: Sheri Hartman**

### ***Propofol Versus Dexmedetomidine in Postoperative Cardiothoracic Patients***

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Propofol has demonstrated considerable negative patient outcomes in cardiothoracic patients. The literature notes that dexmedetomidine has resulted in fewer negative patient outcomes when compared to propofol. The aim of this study was to educate the cardiothoracic team on the Heart Lung Unit at Summa Hospital about the patient outcomes associated with the use of dexmedetomidine over propofol, promoting a change to dexmedetomidine as the sedative of choice. A 10-minute verbal educational session was provided about patient outcomes associated with dexmedetomidine and propofol for Surgical Cardiovascular Intensive Care Unit (SCVICU) registered nurses (n=26) and Cardiothoracic surgeons (n=3). A post-education evaluation form was distributed to the participants to assess their perceptions on the use of dexmedetomidine and the barriers that may inhibit a change in practice. Results demonstrated that the education was effective among Registered Nurses with 100% (n=26) supporting the use of dexmedetomidine in postoperative cardiothoracic patients. However, feedback from the cardiothoracic surgeons demonstrated more education is necessary. Therefore, it is recommended that additional education be provided to the cardiothoracic surgical team in an effort to promote the use of dexmedetomidine, ultimately limiting negative patient adverse events and promoting positive patient outcomes.

**CYDNEY WASHINGTON, BLAIR COLTER, PHEBE SWYM, BRIANNA LUCAS,  
CYDNEY WASHINGTON**  
**Faculty Mentor: Debra Lee, Jen Hallock**

### ***Prenatal Care in Minorities***

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Minority women experience worse outcomes in pregnancy than those of native women. Negative outcomes such as low birth weights, premature births, depression, and increased maternal morbidity are found with increased incidence among minority populations. A major theme of lack of ability to access prenatal care was found in research of this issue.

Our exploration of evidence for best practice was guided by this question: What factors are influencing minority women to access prenatal care? The evidence revealed that despite scenarios creating equal ability access to prenatal care, outcome disparities still existed. Evidence pointed to other cultural factors influencing minority women's decisions to utilize prenatal care, such as turning to matriarchs of their culture for care instead of formal medical treatment.

These cultural practices are found to be important factors in the determination of minority women to access formal prenatal care. While significant evidence was found to lead to the understanding that culture influences the outcome disparities, further research is needed to understand the factors more completely. Ultimately this research should influence nursing care by raising awareness of the issue and instigating continued research to deepen understanding of the factors which influence minority women accessing prenatal care.

**ALEXIS ELAINE MILLER, JANELLE HEISER, SHARONA SWEAT**  
**Faculty Mentor: Sheri Hartman**

### ***A Call to Increase Knowledge Among Nurses Caring for Patients at the End-of Life***

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Pain at end-of-life can be a constant sensory and emotional experience, often faced by patients with end-stage chronic disease and cancer. The objective of this evidence-based project was to educate nurses and state-tested nursing assistants (STNAs) about assessment strategies and interventions to improve management of patients' end-of-life pain. Education was provided via an educational booklet, which was given to 29 nurses and STNAs at a local long-term care facility. The participants were asked to complete a post-education survey to determine the effectiveness of the education. Seven participants completed the post-education survey. Results demonstrated that 86% of the participants indicated that the content presented in this education session increased their knowledge. This was particularly evident with information regarding Kolcaba's Comfort Grid to assess pain, demonstrating that 71% of participants were unaware of Kolcaba's Comfort Grid prior to this education session, while 86% stated they now intend to use Kolcaba's Comfort Grid always or frequently after receiving this education. Although the sample was extremely small, findings demonstrate that education is important to enhance understanding of assessment strategies and interventions to be used for end-of-life patient care. Therefore, it is recommended that continuing education about end-of-life care be provided to staff annually.