



**Graduate Showcase 2021:  
Tomorrow's Innovators Today**

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## **Welcome to the Graduate Showcase 2021:**

It is with great pride that we welcome you to Grand Valley State University's 11th annual Graduate Showcase. The theme "Tomorrow's Innovators Today," reflects Grand Valley's commitment to the success of our students and our belief in graduate education as key to the future of our region, state, and country.

This showcase offers graduate students a unique opportunity to present their research, scholarship, and professional experiences in a virtual format. Each of the graduate programs at GVSU were invited to nominate students to take part in this event, representing the breadth, variety, and rigor of graduate study available at GVSU.

To those who may be considering enrollment in a graduate program, we invite you to tour the poster presentation videos and contact the Graduate School with questions about graduate study, scholarship and research, and professional opportunities.

We appreciate the time and energy devoted to this event by our participating students, as well as by their graduate faculty mentors and program directors. We also extend our thank you to the many people who contributed to the success of this event: including: Mark Luttenton, Jennifer Palm, Irene Fountain, Robert Smart, Amanda Filkins and Maggie Scannell.

As GVSU continues to create a lasting legacy, we look forward to the future success of our institution and our graduate students. We hope you enjoy the Graduate Showcase. Thank you for participating in this virtual event!

Sincerely,



Jeffrey A. Potteiger  
Dean of The Graduate School

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## **Biology**

**ESTIMATING TUNDRA VEGETATION COVER USING NEAR-SURFACE REPEAT FIELD PHOTOGRAPHS.** Christoffersen, H. L.; Department of Biology, College of Liberal Arts and Sciences.

**PURPOSE:** Quick, robust methods to measure vegetation are preferred in polar environments. The success and widespread adoption of plot-level photography in the Arctic is contingent upon the accuracy of image analysis. Geographic Object-Based Image Analysis (GEOBIA or OBIA) may effectively classify images of tundra vegetation, but it has not been thoroughly tested at fine-scales in the Arctic. This study investigates the accuracy of an object-based approach in quantifying vegetation cover from near-surface digital images at Utqiagvik, Alaska. **SUBJECTS, METHODS AND MATERIALS:** We tested our approach on twelve images with three bands (red, green, blue). We estimated the cover of six plant functional groups using nearest neighbor classification. **ANALYSES:** We compared our digital estimates to field-based estimates using paired t-tests. We also generated confusion matrices to assess the performance of our classification. **RESULTS:** We detected significant differences in estimates of bryophyte ( $p < 0.005$ ) and graminoid cover ( $p < 0.005$ ). There were no significant differences in estimates of dead plant material, deciduous shrub, forb or lichen cover. Between 0.004% to 14.2% of the images were indecipherable due to shadow. Kappa values ranged from 41 – 48%. Overall accuracy ranged from 49 – 55%. **CONCLUSIONS:** We can use OBIA to partially automate classification of tundra vegetation from digital images. This technique is limited to the estimation of dead plant material, deciduous shrub, forb and lichen cover. We recommend a larger sample size and an investigation of different classifiers for future studies. Plot-level photography maximizes our time, funding and technology in order to monitor terrestrial change in the Arctic.

## **Biology (Annis Water Resources Institute)**

**WATER QUALITY AND LAND COVER IN LAKE MICHIGAN DROWNED RIVER MOUTHS.** Mader, M. M., Ruetz, C. R., Woznicki, S; Annis Water Resources Institution, College of Liberal Arts and Sciences.

**PURPOSE:** Lake Michigan's drowned river mouth (DRM) systems are hydrologically unique due to their riverine and large-lake influences that create biologically diverse ecosystems. DRMs serve as focal points for human development and the confluence of watershed impacts, which can have substantial impacts on DRM ecosystems. We hypothesized that greater anthropogenic development in southern DRM watersheds would be reflected in poorer water quality indicators than less developed northern DRM watersheds. **SUBJECTS:** We sampled 12 DRMs along a latitudinal gradient in eastern Lake Michigan. **METHODS:** We used standard methods to measure water quality, and we used publicly available data to characterize land cover. **ANALYSES:** We then used a combination of univariate (simple linear regression and ANOVA) and multivariate (PCA) statistical tests to examine the significance of spatial patterns. **RESULTS:** We found that watershed human population density and agriculture were strong drivers of chlorophyll-*a* and TP – indicators of poorer water quality – and that these measures increase in southern DRMs. Within DRMs, we found that TP concentrations were typically greatest near the river mouth and decreased closer to the outflow into Lake Michigan. **CONCLUSIONS:** Our results suggest that land use drives chlorophyll-*a* and TP (i.e., indicators of ecosystem productivity) and will be used to better understand the effects of human development on DRMs.

## Biostatistics

**MONTCALM CARE NETWORK BIOSTATISTICS INTERNSHIP: HEALTH STATUS PROJECT.** Dorn, E.; Department of Statistics, College of Liberal Arts and Sciences.

**PURPOSE:** Internship experiences are a foundational part of the Professional Science Master's programs as they give work experience to students looking to further their careers in industry. Montcalm Care Network (MCN) is one of the sites that hosted an internship experience and is the community mental health provider for Montcalm County. **CHALLENGE:** The main challenge was to build upon the previous biostatistics intern's project by dividing data based on demographic information to find influential factors on individuals' health statuses. Other challenges included extensive exploratory data analysis to narrow down variables and utilizing techniques to impute missing values. **EXPERIENCE:** More experience was gained in pulling data using the SQL programming

language. RStudio was used extensively to manipulate and impute data as well as for exploratory analysis and running ordinal logistic regression models. MS Power BI was learned and utilized to create graphics for reporting results. **OUTCOME:** Data was divided by age group and gender. Ordinal logistic regressions were run with backward selection to determine significant variables in impacting individuals' health statuses. Six models were fitted for a combination of 3 age groups and gender. **IMPACT:** Results were presented to managers at MCN. Information gained from analysis was utilized by case workers at MCN to understand how to better advise and aid their clients in improving their health statuses. Real world work experiences help us gain a better understanding of how to apply the skills and knowledge gained from our coursework.

## Biostatistics

**DATA SCIENCE INTERNSHIP: SPECTRUM HEALTH HEALTHIER COMMUNITIES.** Johnson, N.; Department of Statistics, College of Liberal Arts and Sciences.

**PURPOSE:** Healthier Communities works to improve health equity in the local community and improve health outcomes through several internal programs. The internship experience has given me the confidence to know that the Biostatistics program has prepared me for my future career.

**CHALLENGE:** Learning the workflow of a large company and how to communicate while working from home was challenging at times. I had to quickly pick up the application of technology I had never used before.

**EXPERIENCE:** As part of the Shared Services team, I worked on projects that helped the Healthier Communities programs effectively visualize their data through Tableau. I helped create dashboards that require little maintenance and can be updated monthly with ease. Throughout my internship, I worked alongside the Psychiatric department to help evaluate suicides in the Spectrum Health Region. **OUTCOME:** The Healthier Communities internship has helped me grow as a young professional and provided me with essential skills to excel as a Biostatistician. I gained extensive experience in Tableau, SAS, and Excel. **IMPACT:** The internship experience has been extremely valuable to my graduate education. I know what to expect in my first job and feel prepared because of my internship. Throughout my career, I will be able to apply the knowledge I gained through Graduate school and my internship experience.

## Biostatistics

**HEAVY METAL EXPOSURES, C-REACTIVE PROTEIN, AND DIETARY INFLAMMATORY INDEX: NHANES 2007-2010.** Thompson, R. L. Glazier-Essalmi, A.; Department of Cell and Molecular Biology, College of Liberal Arts and Sciences.

**PURPOSE:** This study utilized data from National Health and Nutrition Examination Survey 2007-2010 to investigate the relationship between heavy metal exposures (lead (Pb), cadmium (Cd), and mercury (Hg)), dietary inflammatory index (DII), and C-reactive protein (CRP) as a biomarker for inflammation. **SUBJECTS:** The study comprised a nationally representative sample of  $n = 7,407$  adults age 20+, excluding pregnant women and participants with CRP values  $\geq 10$  mg/dL. **METHODS AND MATERIALS:** Data was utilized from continuous NHANES cycles 2007 to 2008 and 2009 to 2010, harmonized according to procedures outlined by the NCHS. **ANALYSES:** Survey-weighted, covariate-adjusted linear regression models were produced to assess the relationship between heavy metal exposures, DII, and natural log-transformed CRP. **RESULTS:** We found significant positive association between heavy metals and CRP only in specific subgroups of the population after additionally adjusting for age, annual household income, and history of inflammatory disease. Pb was only significantly positively associated with CRP in individuals of normal weight, and Cd was only significantly positively associated with CRP in non-Hispanic white males ( $p < 0.05$ ). Hg was not significantly positively associated with CRP in any subgroup; however, the effect of Hg on CRP was found to be dependent on DII, with higher DII levels associated with increasing positivity of the association between Hg and CRP (never achieving statistical significance). **CONCLUSIONS:** The results of this study highlight the complexity of the relationships between heavy metal exposures, diet, and inflammatory processes, and underscore the need for further research to elucidate the mechanisms behind these relationships.

## Cell and Molecular Biology

**WASTEWATER DETECTION OF SARS-COV2 OUTBREAKS VIA DIGITAL DROPLET PCR IN CAMPUS DORMITORIES.** Babu A., Pingle G., Rahman S., Porter A., Schian A., O'Dea G., Moore C., Siddiqui F., Pokhrel N., Goralski T.,

Lane M.; Rediske R., Tsou P., Blackman S.; Department of Cell and Molecular Biology, College of Liberal Arts and Sciences.

**PURPOSE:** We wished to determine whether the level of SARS-CoV-2 in wastewater (measured by digital droplet polymerase chain reaction (ddPCR)) was sufficiently reflective of virus circulation amongst residents that it could be used as a cost-effective and reliable method to monitor future outbreaks. **CHALLENGE:** As one of many “pilot teams” on this state-wide initiative, our main challenge was to develop, optimize and standardize work-flow, protocols and data analysis while faced with stochastic variation because of a small number of sites, sometimes each with only a few individuals. **EXPERIENCE:** Our lab was involved with accepting and processing 22 wastewater samples per week. Some of the work took place in a Biosafety Level Two laboratory and necessitated use of protective equipment while all of it required technical expertise and knowledge of and skill with molecular techniques. Downstream of the ddPCR step, we were required to carry out data analysis. **OUTCOME:** We were able to track and, in some cases, predict the presence of circulating virus. Our results suggest that wastewater-based epidemiology can be developed as a valuable tool in surveillance of SARS-CoV-2 and potentially other disease-causing viruses. Further sampling and analysis would lend higher confidence for this emerging and promising technology. **IMPACT:** This pilot study provided experience into *quasi* production-level environmental and health molecular surveillance technologies. We learned the importance of standardization even in complicated technical routines, gained insight into the quality control that is necessary for results to guide public policy and learned to work as a collaborative team both at the local and state level.

### **Cell and Molecular Biology**

#### **BIOTECHNOLOGY INTERNSHIP WITH EMPIRICAL BIOSCIENCE.**

Thompson, A. T., Pokhrel, N. P.; Department of Cell and Molecular Biology, College of Liberal Arts and Sciences.

Internships at certain research institutes or industries is an integral part of the Cell and Molecular Biology Professional Science Master's (PSM) program. It is important to achieve hands-on experience in professional lab settings to gain cell and molecular biology techniques as well as develop



professional relationships, effective and efficient leadership abilities, and communication skills. Our internship at Empirical Bioscience, a biotechnology company based in Grand Rapids, offered the opportunity to gain all the skills above by assisting with manufacturing and quality control of their products. More specifically, they manufacture reagents for commercial, research and educational use and most recently, a COVID-19 assay kit that detects Sars-CoV-2. The challenges posed during our internship included a fast-pace environment, learning to work independently and proactively, ability to multitask, and demonstrate critical thinking and troubleshooting skills to meet the demands of the high rate of COVID-19 cases. During our experience we gained skills in micro-pipetting, aseptic technique, large scale cell culture, protein production and purification, PCR, qPCR, RT-qPCR, spectrophotometry, and gel electrophoresis. Beyond the cell and molecular biology skills we learned how to navigate through the ever-changing and unpredictable workplace during the COVID-19 pandemic. From this we were able to assist the company in providing assays globally to detect Sars-CoV-2. The skills learned throughout our internship allows us to not only *know* information learned in the PSM program but be able to *execute* it comfortably in a professional laboratory environment.

## Clinical Dietetics

### EATING PATTERN DISPARITIES AMONG SEXUAL AND GENDER

**MINORITIES (SGMs).** Patrick, C.; Department of Allied Health Sciences, College of Health Professions.

**PURPOSE:** The purpose of this research is to investigate variables that have a consequential effect on eating patterns in the context of the SGM population. The objectives addressed in this research include the following: Determining attraction towards men and/or women; Determining gender expression; Presence of disordered eating history; Severity of symptomology related to disordered eating (DE). **METHODS/MATERIALS:** This was a quantitative study that used a nine-question online survey via Qualtrics for data collection. The study was conducted during a two-week period on a Facebook group entitled “LGBTQ of Michigan Support.” The study included 20 SGMs. **ANALYSES:** The data from the survey responses were analyzed via SPSS using descriptive statistics which produced frequencies and cross-tabulations between survey questions. **RESULTS:**

The higher rates of DE for feminine individuals and the experience of severe symptomology in only a feminine individual is concurrent with literature stating that femininity predicts eating pathology in men and women irrespective of sexual orientation. Androgynous individuals in the study were the group that had the highest rate of moderate severity in symptomology. More individuals felt pressure to meet body standards from men than from women out of the group attracted to both. **CONCLUSIONS:** SGMs are shown to experience a higher prevalence of EDs secondary to body dissatisfaction, stigma-based discrimination, mental health issues and weight control practices. With this knowledge, RDNs can tailor their nutrition interventions to include these factors in helping individuals overcome disordered eating.

## Communications

**“IT’S NOT EASY TO DO A WIKILEAKS”: A CYPHERPUNK APPROACH TO GLOBAL MEDIA ETHICS.** Anderson, P.; School of Communications, College of Liberal Arts and Sciences.

**PURPOSE:** This project studies the moral philosophy of WikiLeaks founder Julian Assange to determine the extent to which WikiLeaks is informed by a conception of global media ethics. **SUBJECTS:** The study draws on extensive written and spoken primary sources authored by Assange, using textual analysis to interpret his writings and interviews. **METHODS AND MATERIALS:** This study draws upon Clifford Christians’ theory of communication ethics to provide a model for how a theorist might organize their global media ethics. **ANALYSES:** Using the categories from Christians’ ethics, the study organizes the ethical reflections found in the disparate writings of Assange into four categories: basic ethical presuppositions, critiques of nationalism, critiques of professional journalism, and analyses of communication technologies. **RESULTS:** The study finds that Assange offers a well-developed theory of global media ethics, which includes the assertion of basic moral axioms alongside the application of those axioms to political, professional, and technological issues in communication ethics. **CONCLUSIONS:** The study concludes that WikiLeaks is best understood as being informed by cypherpunk ethics, a form of global media ethics that posits justice as its basic principle and that uses cryptography to pursue privacy for the weak and transparency for the powerful.

## Criminal Justice

**GAINING A VICTIM-CENTERED APPROACH TO POLICING.** McCord, A.;  
School of Criminal Justice, College of Community and Public Service.

**PURPOSE:** Practical work experience is invaluable when obtaining a degree in a community and public service field such as criminal justice. My work with the Grand Rapids Police Department's Victim Services Unit has helped me understand the social work facet of criminal justice, which I feel is difficult to be taught within a classroom. **CHALLENGE:** The most challenging aspect of my internship experience was getting pushed out of my comfort zone and interacting with people in a completely new way, with the focus being on victims' feelings and well-being rather than fact-finding. **EXPERIENCE:** This internship forced me to shift my focus from the offender to the victim and learn to connect with clients to gauge their well-being rather than taking an investigative role and asking who/what/where/when/why questions. **OUTCOME:** As a student with aspirations to go into law enforcement, this experience taught me how to look at the entire picture within the realm of crime and law enforcement, giving me the ability to recognize victims' traumatic experiences and the ways in which I can respond to address their needs and minimize secondary victimization. **IMPACT:** Working within the Victim Services Unit gave me the unique experience of working directly with victims following traumatic events. I gained knowledge on trauma responses and saw firsthand the range of reactions victims may exhibit after being impacted by crime. I believe this has helped me develop a greater sense of empathy and understanding of victims' needs that will benefit me immensely in a career in law enforcement.

## Criminal Justice

**GENDERED PRONOUNS AND RAPE MYTH ACCEPTANCE.** Merritt, C.;  
School of Criminal Justice, College of Community and Public Service.

**PURPOSE:** Rape myths, and the factors that influence these levels of rape myth acceptance, have been studied extensively for the last several decades. The purpose of this study is to examine the influence of gendered pronouns (he, she, his, her, etc.) on the levels of rape myth acceptance. It was

hypothesized that individuals presented with the Revised Updated Illinois Rape Myth Acceptance (IRMA) scale would be less accepting (demonstrating a higher rape myth acceptance score) than those presented with the Updated IRMA (McMahon & Farmer, 2011). **SUBJECTS:** 3,500 undergraduate students from Grand Valley State University were recruited and a total of 728 students responded. 569 students provided useable data. **METHODS AND MATERIALS:** A set of three demographic questions (what is your gender, what is your age, and how many years of Title IX Training have you received), the Updated IRMA survey (McMahon & Farmer, 2011), and the Revised Updated IRMA that was developed for the purpose of this study were utilized to collect the data. **ANALYSES:** Data were analyzed utilizing a Kruskal-Wallis H test and Chi-Square analyses. **RESULTS:** Two questions provided statistical significance ( $p \leq .05$ ). **CONCLUSIONS:** Despite only two questions demonstrating statistically significant data, this research still raises questions concerning the continued use of gendered pronouns in rape myth acceptance.

### **Education-Literacy Studies: Reading**

**WRITING AS A VESSEL FOR THINKING: INCORPORATING SELF-REGULATION, METACOGNITION, AND FORMATIVE ASSESSMENT IN THE MIDDLE SCHOOL ELA CLASSROOM.** Ginzel, A.; Teaching and Learning, College of Education.

Writing is not only a means of demonstrating what one knows, it is a vessel to knowing. Thus, secondary writing curricula should support students' learning and knowing. Evidence from meta-analyses suggests that an emphasis on self-regulated instruction to teaching writing (Graham, 2018a; Graham, 2020; Graham & Perin, 2007), metacognitive strategies (Hacker, 2018; Madison et al., 2019), and an emphasis on formative assessment and feedback throughout the writing process (Black & Wiliam, 1998; Fleischer, 2013; Madison et al., 2019) are among the practices with the highest effect sizes on students' thinking and writing. When purposefully integrating these approaches and practices, secondary-level writing teachers empower and support adolescents' learning, including their thinking and sense making. Moreover, these approaches and strategies may also help students demonstrate a knowledge of the processes they implement as writers as well as increase their motivation for writing and thinking that are not solely

linked to extrinsic factors like grades. To support such approaches, this project presents curricular resources that will enable secondary teachers to support adolescents' thinking behind their own and others' writing, including connections to genres such as narratives, explanatory/informative, and arguments. These curricular resources are intended to be used by secondary English Language Arts teachers so that they can readily integrate self-regulated instruction, metacognitive strategies, and formative assessment into their writing-based pedagogy and practice.

### **Education-Literacy Studies: Reading**

#### **READING ENJOYMENT AND MOTIVATION IN GRADES 3-5: ENCOURAGING AN INCREASE IN READING FOR PLEASURE. Lotterman, G.; Literacy and Technology, College of Education.**

Research shows that time spent engaged in recreational (i.e., pleasure) reading is important for elementary students' growth in literacy. Students who spend time reading outside of school are more likely to succeed in school, and there are also benefits beyond their K-12 education. However, student engagement in pleasure reading has declined in the past few decades. This project argues that teachers in grades 3-5 have the responsibility and opportunity to encourage their students to read outside of school by seeking to improve their students' attitudes and motivation towards reading while in school. Fostering students' intrinsic motivation for reading, including pleasure reading, is imperative for teachers to see lasting results. Therefore, teachers must employ teaching practices which promote autonomy, competence, and relatedness when teaching reading, as they encourage students to read for learning and pleasure purposes. To accomplish this goal, educators must reevaluate their current teaching practices and examine the ways in which they can facilitate changes in students' attitudes toward reading and increase students' motivation to read. This project introduces a tool (i.e., guidebook) for teachers' use which will enable grade 3-5 teachers to support students' reading for academic and pleasure purposes. This guidebook provides them with ideas to increase their students' engagement in and enjoyment of reading at school. This guidebook serves as an important supplement to teachers' already existing reading curriculum, in which they are presented with strategies and classroom practices which have been proven to increase students'

motivation towards reading at school. When implementing the pedagogies and practices contained in this guidebook, teachers will have opportunities to address students' literacy needs both in school and, hopefully, beyond school.

### **Education-Literacy Studies: Reading**

**UNDERSTANDING THE NEED FOR RTI AT THE SECONDARY LEVEL, AND PROVIDING RESEARCH-BASED LITERACY INSTRUCTION FOR ADOLESCENTS.** Tuinstra, L.; Literacy and Technology, College of Education.

Adolescents at the middle and high school level are being left behind when it comes to reading development. At the elementary level, students are equipped with the foundational skills for reading and provided support when their reading skills do not develop alongside grade level peers. Even if students are at grade level with their reading in elementary school this does not mean that they will continue to develop the skills needed to read complex text as they progress through secondary education. Unfortunately, there is limited research on providing support for adolescents who struggle with reading. However, one concept is certain, reading instruction at the secondary level is needed in order for students to be successful in middle school, high school, and beyond. The intent of this project is to provide educators with the understanding of the urgent need for literacy instruction at the middle school level. Additionally, this project sets out to explain the components of high-quality literacy instruction and how those are related to daily classroom teaching.

### **Education-Literacy Studies: Teaching English to Speakers of Other Languages**

**EFFECTIVE STRATEGIES FOR WORKING WITH REFUGEE STUDENTS.** Bordeaux, R. K.; Literacy and Technology, College of Education.

Creating trust with refugee students and building trusting relationships with refugee students is critical to refugee students' success in the classroom. Refugee students come to the United States to flee traumatic situations in their homeland. Because of the trauma that they have suffered, refugee students lack the ability to trust adults and struggle to build trusting relationships with adults. These same students enter

classrooms not feeling that they are safe and welcomed. Teachers are faced with the task to create safe and welcoming classrooms for the students. Not only do students lack the ability to trust, but parents of refugee students lack the ability to trust as well. As a consequence, parental engagement and involvement is low. Schools need to build a trusting relationship with the parents as well, in order to increase engagement. This project focuses on a strategy handbook to assist staff members at Burton Middle School while working with refugee students in building trust, building trusting relationships, creating safe and welcoming classrooms, building community within the classroom, and creating parent involvement and engagement.

**PURPOSE:** The purpose of this project is to create a strategy handbook for the staff at Burton Middle School to refer to and use when working with refugee students in the building. Staff members are not trained to handle trauma and do not have the strategies that are needed to establish trust and relationships with refugee students. Through the development of this handbook, staff members are given a plethora of strategies to refer to and use/adapt for use with students in the classroom. **PROCEDURES:** In order to develop a handbook of effective strategies to use when working with refugee students, particular areas of concern needed to be identified.

Through my experiences in working with refugee students, the following areas were identified: creating a safe and welcoming classroom, building trust and building trusting relationships, building community and the use of Restorative Justice, and encouraging parent engagement and involvement. Using these areas, I then researched strategies that are being used elsewhere and considered how those strategies could be implemented at Burton Middle School. I read several articles and publications in regards to strategies that are being successfully implemented and considered how those would fit into the culture of Burton Middle School. I then organized the strategies into the proper categories and developed the strategy handbook. My plan is to present this strategy handbook as part of the staff PD that is held at the beginning of the 2010-2022 school year, as well as offering my support to any staff members that would like assistance and support. **OUTCOME:** The outcome of this project is a detailed handbook of strategies that staff members can use when working with refugee students. This handbook provides staff members a variety of strategies to use, as well as examples and resources where staff can go and read more about each strategy. Staff members can use any of the strategies in the handbook and adapt to the needs of the individual classrooms and students. This

handbook also provides strategies to involve parents in school functions and to encourage parent engagement in the classroom and within the school community. Through this project, I offer staff members my support and assistance with the use of strategies by opening my classroom for observations. **IMPACT:** Refugee students come to the United States dealing with trauma. Refugee students enter our classrooms and bring this trauma with them. Staff members need the resources to be able to effectively work with those students. Many times, these resources are lacking due to the overload of duties that staff members already have. This handbook will provide staff members the strategies and resources that are needed to effectively work with refugee students in the areas of building trust, building trusting relationships, creating safe and welcoming classrooms, building community within the classroom, and creating parent involvement and engagement. This handbook will also help to lessen the stress and the load of work that teachers deal with when attempting to figure out how to work with refugee students in the classroom.

### **Education-Literacy Studies: Teaching English to Speakers of Other Languages**

#### **LEADING THE WAY TOWARD CULTURALLY RESPONSIVE NGSS**

**INSTRUCTION.** Durso, N.; Literacy and Technology, College of Education.

In order to engage and develop culturally and linguistically diverse learners in a way that supports the vision of the Next Generation Science Standards (NGSS), school leaders must be aware of the tenets of Culturally Responsive Teaching (CRT) and provide teachers with the knowledge and skills to integrate CRT into science education. As students that are of the global majority continue to demonstrate levels of proficiency that do not mirror the rates of their global minority peers in the United States, failing to view science education as a cultural endeavor has further widened the equity gap between subgroups of students. In a science classroom, the Science and Engineering Practices offer a lever for enacting culturally responsive pedagogies to allow students to use culture and native languages in sense-making practices. Moving beyond surface-culture level diversity practices, students should be empowered to use the linguistic and cultural resources that they possess to explore relevant phenomena and develop literacy skills



that allow them to be change agents in their communities. This project is derived from the foundational work of Gloria Ladson-Billings and Geneva Gay, and seeks to develop the capacity of an educational leader to support and ensure culturally responsive teaching practices in an NGSS classroom. Using a digital handbook that includes teacher and student surveys, an observation checklist, and slideshow with further resources for consideration, educational leaders can guide teaching staff to examine their own critical consciousness and develop cultural competence with a focus on literacy.

### **Health Informatics and Bioinformatics: Multidisciplinary Project with Health Administration and Nursing**

#### **PHYSICIAN OFFICE EHR USEABILITY AND PATIENT SAFETY STUDY.**

Galloway, E., Strutz, S.; School of Computing and Information Systems, Padnos College of Engineering and Computing with Doctor of Nursing Practice, Kirkof College of Nursing.

**PURPOSE:** Healthcare organizations may reap substantial benefits when transitioning to electronic health records (EHRs), such as decreased healthcare costs and better care. However, severe unintended consequences from implementation and design of these systems have emerged. Poorly implemented EHR systems may endanger the integrity of clinical or administrative data. That in turn can lead to errors that may jeopardize patient safety or decrease quality of care. In addition, poor design quality of EHRs can significantly increase the mental workload of clinicians, thereby increasing frustration, reducing user satisfaction, and causing unproductive workarounds. **PROCEDURES:** Our literature review identified how EHR implementation and design, especially in the hospital setting, can impact clinical use, workload, patient safety, and quality. EHR reviews have primarily focused on hospital settings although most patient interactions take place in physician offices. Therefore, our study focuses on ambulatory and outpatient settings. From our review we developed a survey addressed to providers and support staff. We first administered the electronic survey that was followed by physician office focus group interviews to assess the benefits and shortcomings of current EHR implementation on EHR useability and patient safety. **OUTCOME:** Preliminary results indicate that similar issues as found in the hospital

environment are pertinent in private practices as well. The study has been interrupted by the COVID-19 pandemic. **IMPACT:** Assessing the implementation of these EHR has the potential to greatly improve population health.

### **Nursing-Doctorate**

**MICHIGAN PHYSICIAN ORDERS FOR SCOPE OF TREATMENT (MI-POST): DEVELOPMENT OF A NATIONALLY RECOGNIZED PROGRAM.** Owens, M.; Doctor of Nursing Practice, Kirkof College of Nursing.

**PURPOSE:** Patients with comfort-oriented advance directives (AD) are hospitalized at similar rates when compared to patients with full treatment ADs. Portable medical orders are associated with care that is better aligned with patient preferences by preventing unwanted transitions of care and improving quality of life. Despite these benefits, portable medical orders are not utilized in Michigan. The purpose of this project is to design a toolkit aimed at developing a sustainable portable medical order program in the state of Michigan. **PROCEDURES:** A comprehensive literature review and in-depth policy analysis were conducted to guide program development. This project sought to engage stakeholders at the state level by identifying opportunities to advocate for portable medical order use in Michigan. To describe the program to appropriate stakeholders, educational materials were developed in the form of a policy brief and user guide for healthcare professionals. Interviews were conducted with content experts to further develop evidence-based strategies for fund development, quality monitoring, and development of an electronic form registry; these were specific barriers identified in the state of Michigan. **OUTCOME:** Findings were shared with the MI POST state coordinator at the conclusion of the project. The final toolkit offers a formal blueprint for stakeholders when it is time for statewide implementation. **IMPACT:** The evidence-based toolkit may be beneficial in developing a sustainable portable medical order program in the state of Michigan.

### **Nursing-Doctorate**

**ENHANCING MEDICATION ADHERENCE BEHAVIORS AMONG AMBULATORY PEDIATRIC HEMATOLOGY AND ONCOLOGY PATIENTS.** Palmer, D., Conrad, D., & Schwalm, C.; Doctor of Nursing Practice, Kirkhof College of Nursing.

**PURPOSE:** The purpose of this quality improvement project was to enhance medication adherence behaviors among pediatric hematology and oncology patients and their families within an ambulatory West Michigan hematology and oncology clinic. **CHALLENGE:** Treatment guidelines for pediatric patients with acute lymphoblastic leukemia, the most common pediatric malignancy, dictate daily administration of 6-mercaptopurine for two years (Cooper & Brown, 2015). However, for these patients, adherence rates < 90% have been found to have a 3.9-fold increased risk for relapse (Bhatia et al., 2014). Furthermore, adolescent sickle cell patients have been found to have adherence rates merely as high as 40% (Pernell et al., 2017). Due to the potential consequences of medication errors and nonadherence, these statistics represent a clear necessity to address this component of care delivery. **EXPERIENCE:** This project included a systematic literature review to identify evidence-based interventions, an organizational assessment, and a three-phase multifaceted quality improvement process. **OUTCOME:** To increase patients bringing medications to appointments, 32 medication transportation bags were distributed. Descriptive statistics were used to analyze trends in patient medication behaviors, and staff perceptions of interventions. **IMPACT:** This project greatly enhanced my understanding of clinical outcome and quality improvement processes. Furthermore, adjusting to real-time clinical barriers and navigating virtual engagement greatly enhanced my ability to provide clinical leadership, create realistic engagement among clinical staff, and influence improvements in patient care delivery.

## Occupational Therapy

**HEALTH LITERACY IN OCCUPATIONAL THERAPY RESEARCH: A SCOPING REVIEW.** Attard, E., Vaas, K., Musallam, A., and Chaney, T.; Department of Occupational Science and Therapy, College of Health Professions.

**PURPOSE:** Low health literacy is a significant problem in the United States. Patient education is a key component of occupational therapy intervention. Occupational therapists have the skills to develop patient education materials (PEMs) that are easy to access and understand. Few studies on health literacy exist in occupational therapy research. The purpose of this study is to summarize the breadth of literature on health literacy in

occupational therapy research and identify existing knowledge gaps.

**SUBJECTS:** The inclusion criteria were peer-reviewed studies, published in English, focused on health literacy, and within the context of occupational therapy practice. Exclusion criteria were reports, editorials, opinion pieces, dissertations, theses, and conference abstracts. **METHODS AND**

**MATERIALS:** A scoping review methodological framework (Arksey and O'Malley, 2005; Levac et al., 2010) was used to search five databases. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist (Tricco et al., 2018) was also applied. **ANALYSES:** Descriptive statistics and qualitative thematic analysis were used to summarize the results. **RESULTS:** Eighteen articles met the inclusion criteria. Key concepts and common themes from the literature were identified and summarized. Knowledge gaps include the impact of low health literacy on patient outcomes, guidelines for appraising and modifying PEMs, and the effectiveness of modified PEMs.

**CONCLUSION:** Health outcomes are negatively impacted by a mismatch between patient reading ability and the readability (i.e., grade level) of PEMs. There is a need to establish evidence-based guidelines and a standard of care for patients with low health literacy.

## Occupational Therapy

**IMMERSIVE VIRTUAL REALITY IN HEALTHCARE: A SYSTEMATIC MAPPING REVIEW.** Tonkavich, M., Sheaffer, J., Oliver, J., Pabich, V., and Gomez, J.; Department of Occupational Science and Therapy, College of Health Professions.

**OBJECTIVE:** The purpose of this study was to conduct systematic mapping review of available research regarding the utilization of immersive virtual reality (VR) within distinct populations across various practice settings.

**METHODS:** After utilizing a systematic method for article selection, duplicate articles were deleted, and 408 articles were identified that met the inclusion and exclusion criteria. The title and abstract of each article were then sorted by population and setting for further data analysis.

**RESULTS:** A diverse collection of settings and populations were identified. The settings were divided into the following categories: community, general, inpatient, mental health, older adult, outpatient, pediatrics, rehabilitation, skilled nursing facilities (SNFs), and unknown. The populations were labeled as: neurological, pain, vision, psychological,

physical rehabilitation, behavioral, and mixed. Researchers then generated a visualization bubble map to illustrate the distribution of current literature related to immersive VR. **CONCLUSION:** The goal was to thoroughly gather, sort, and categorize current research related to the therapeutic use of immersive VR in healthcare. This review synthesizes the research, which assists healthcare providers in discovering new interventions techniques supported by evidence-based research. The results provide a comprehensive perspective on available research and implications for occupational therapy practice. Additionally, authors identified gaps in published literature to give researchers a foundation for systematic reviews or research studies.

### **Physical Therapy**

**DYNAMIC FACTOR ANALYSIS OF SEASONAL VARIATION IN DAILY PHYSICAL ACTIVITY IN INDIVIDUALS WITH HEART FAILURE AND IMPLANTED CARDIAC DEVICES.** Shoemaker, M. J., Kampfschulte, A., Rustmann S., and Dickinson, M.G.; Department of Physical Therapy, College of Health Professions.

**PURPOSE:** Improving daily physical activity (PA) is an important clinical outcome in individuals with heart failure (HF) in regard to prognosis and mortality. Seasonal variation may confound studies investigating interventions to improve daily PA, although the presence and magnitude of seasonal variation has yet to be established in this population. The purpose of the present study was to determine the presence and magnitude of seasonal variation in daily physical activity (PA) in those with heart failure.

**SUBJECTS:** 435 patients managed by Spectrum Health Cardiac Device Clinic in West Michigan with HF and Medtronic implanted cardioverter defibrillator and cardiac resynchronization devices (ICD/CRTs) with daily PA data between November 1, 2016-October 31, 2017 were included.

**METHODS AND MATERIALS:** The present study was retrospective. Medtronic ICD/CRT devices with a single-axis accelerometer recorded daily PA. Local/in-system electronic health record data was utilized for inclusion and exclusion of patients. Meteorological data was obtained from the Local Climate Dataset. **ANALYSES:** Dynamic factor analysis (DFA) of Patient Activity data from Medtronic ICD/CRTs was utilized to identify common states/trends in multivariate PA time series data, while accounting for clinical characteristics/explanatory covariates and meteorological

data/covariates. Univariate analyses were used to compare patient groups based upon relevant clinical characteristics identified by the DFA.

**RESULTS:** In the data set of 435 patients, distinct states/trends were identified by DFA, which were associated with specific clinical characteristics. These trends included both a classic, sinusoidal pattern of seasonal variation for some patients, and a pattern of decline over the course of the year for others. **CONCLUSIONS:** Those with HF and Medtronic ICD/CRTs with low comorbidities, better NYHA Class, higher BMI, no hospitalization, and male sex demonstrated greater seasonal variation of at least 40 minutes per day. Those with HF and Medtronic ICD/CRTs with female sex and hospitalization demonstrated overall downward trajectories of approximately 40 and 80 minutes, respectively, over the course of the year.

## Public Health

**ABO BLOOD GROUP AND IMPACTS ON SARS-CoV-2 INFECTION AND ANTI-SARS-CoV-2 ANTIBODY PRODUCTION.** Doran, E., Niemchick, K.; Department of Public Health, College of Health Professions.

**PURPOSE:** Recently, blood group's role in SARS-CoV-2 infection has been researched. Studies theorize that blood group A individuals are more susceptible to infection due to A blood antigen lining the respiratory epithelium, allowing for viral entry. The purpose of this study was to analyze whether blood group affected SARS-CoV-2 antibody production or infection among blood donors. **SUBJECTS:** This study utilized information from blood donors who donated a blood product at a Versiti Blood Center between December 14, 2020 and February 6, 2021. This study consisted of 12,925 donors over age 18 who tested positive for anti-SARS-CoV-2 antibody. **METHODS AND MATERIALS:** Donors were analyzed based on blood group, anti-SARS-CoV-2 immunoglobulin G (IgG) antibody production, age, gender, and whether they donated convalescent plasma (CCP), indicating previous SARS-CoV-2 infection. **RESULTS:** A relationship was found between blood group and CCP donation through chi-square analysis. Blood group O was less likely than blood group A to donate CCP (AOR = 0.810, 95% CI 0.708, 0.928;  $p < 0.0001$ ). Odds doubled for developing high positive levels of anti-SARS-CoV-2 IgG antibody in donors over age 50 (95% CI 1.826, 2.858;  $p < 0.0001$ ). Multinomial logistic regression did not indicate that blood group was a significant predictor of

IgG production. **CONCLUSIONS:** The findings of this study show that blood group O individuals may have decreased susceptibility to SARS-CoV-2 infection as they were less likely to donate CCP. Furthermore, previous infection with SARS-CoV-2 may not provide long-lasting immunity in younger populations due to their increased likelihood of mild SARS-CoV-2 infection.

## Public Health

**THE EFFECTIVENESS OF WELLNESS PROGRAMS WITHIN POLICE DEPARTMENTS AT ADDRESSING POLICE OFFICER HEALTH.** Filkins, A., Wallace, H., Dornbos, N.; Department of Public Health, College of Health Professions.

**PURPOSE:** This study identifies the wellness services offered through various West Michigan police departments and the extent to which they meet the needs of police department staff. **SUBJECTS:** Eight different departments across two counties in West Michigan, Kent and Ottawa, were the study participants. **METHODS AND MATERIALS:** A 33-question survey was administered and asked questions related to physical fitness, stress management, mental health, nutrition and diet, alcohol and substance use, and overall wellness. **ANALYSES:** The data from the surveys was analyzed using descriptive statistics. Percentages were used to summarize the data. **RESULTS:** Results indicated that police departments offer services in stress management and mental health, but physical fitness, nutrition and diet, and alcohol and substance use services/programs are not as prevalent. Results also showed that most departments do not have a comprehensive wellness program that offers service in five major areas of health: physical fitness, stress management, mental health, alcohol and drug use, and nutrition and diet. **CONCLUSIONS:** The role of public health is to create local awareness in the areas that are currently lacking in West Michigan police departments: physical fitness, nutrition and diet, and alcohol and substance use. Future research should focus on the impacts of implementing services/programs in the five areas of health that were assessed in this study. Results could increase the understanding and importance of the impact of implementing comprehensive wellness programs among a population that desperately needs support in multiple areas of health.

## Public Health

**SARS-COV-2 WASTEWATER SURVEILLANCE EVALUATION OF PILOT METHOD IN WEST MICHIGAN AREAS.** Porter, A., Molla, A., Rediske, R.; Department of Public Health, College of Health Professions.

**PURPOSE:** Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the etiologic agent of the ongoing pandemic of coronavirus disease 2019 (COVID-19). Wastewater-based epidemiology (WBE) has been used to analyze markers in wastewater influent characterizing emerging chemicals, drug use patterns, or disease spread within communities. WBE could be used as a pre-screening tool for COVID-19 to better target clinical testing needs in communities with limited resources. **SUBJECTS:** Samples were taken from 22 sites within Muskegon and Ottawa County as well as Grand Valley State University in Allendale and downtown Grand Rapids, Michigan. **METHODS AND MATERIALS:** Evaluation of the pilot method drafted by Michigan State University has been seen as a reliable approach to population-based detection of SARS-CoV-2. Three RT-ddPCR assays (N1, N2, E) were used to detect SARS-CoV-2 RNA in twice-weekly sample events. Samples taken assessed viral proteins and attributed the viral load associated with a geographic location within the waterways in the area. **ANALYSES:** Sample site locations saw fluctuations in presence of viral RNA that agreed with current clinical outbreak data when compared using R software. **RESULTS:** Frequency of detections and overall concentrations of RNA within samples increased from early November-December then began to plateau as interventions and lock-down measures increased. **CONCLUSION:** As the COVID-19 pandemic wanes and vaccine distribution increases, it is likely that communities will see increased incidence of localized outbreaks. Outcomes seen in this and other research studies suggest that WBE is a valuable early warning alert and a helpful complementary surveillance tool to public health responses.

## Public Health

**FEMALE INFERTILITY TREATMENT, MATERNAL CHARACTERISTICS, AND ADVERSE BIRTH OUTCOMES.** Uribe, D., Haak, P., Nechuta, S.; Department of Public Health, College of Health Professions.



**PURPOSE:** As the popularity of fertility treatment use has risen, the potential health risks of these treatments for both mother and child are not fully known. Our objective was to determine the association between fertility treatments and adverse birth outcomes of intended pregnancies using the Pregnancy Risk Assessment Monitoring System (PRAMS) data. **SUBJECTS:** Data from 29,917 intended pregnancies, collected from 2009 – 2018 in the United States, were included in our analysis. **METHODS AND MATERIALS:** PRAMS data consisted of questionnaire and birth certificate data. SAS 9.4 was used for statistical analyses. **ANALYSES:** Logistic regression was used to determine the odds ratios (OR) and 95% confidence intervals (CIs) of an adverse birth outcome of fertility treatment use. ORs were also calculated to determine the relationship between maternal demographic, health, and lifestyle factors on these outcomes following fertility treatment. **RESULTS:** Use of any type of fertility treatment for singleton births was significantly associated with higher odds of a cesarean delivery (OR: 1.3, 95% CI: 1.2-1.5), preterm birth (OR: 1.4, 95% CI: 1.2-1.6), and an infant hospital stay over 5 days (OR: 1.3, 95% CI: 1.1-1.6). Black race, age >40 years, pre-pregnancy obesity, tobacco use, high blood pressure, and depression were also associated with increased odds of multiple adverse birth outcomes. **CONCLUSIONS:** Patients seeking fertility treatment should be appropriately counseled on the risks of adverse health outcomes for themselves and their child, and be given the resources to address lifestyle factors that could affect their risk prior to treatment.

## Social Work

**THE ASSOCIATION BETWEEN RELIGIOSITY AND PSYCHOLOGICAL WELL-BEING OF MASTER OF SOCIAL WORK STUDENTS.** Bishop, J., Barone, M.; Social of Social Work. College of Community and Public Service.

The purpose of this study is to examine religiosity, psychological well-being, and the correlation between the two constructs for Master of Social Work students. This study examines the relationship between six subscales of psychological well-being and three subscales of religiosity using a sample of 84 MSW students from two large universities in the Midwest. Psychological well-being was conceptualized by The Psychological Well-Being Scale (Ryff & Keyes, 1995), religion was conceptualized by the Duke University Religion Index (DUREL) (Koenig & Bussing, 2010), and psychical health was conceptualized by the Physical Health Index (Shavitt et al. 2016). Results

show half of the participants in the study do not engage in religious activity and on all but Self-Acceptance, participants responded by having normal or above-normal scores of psychological well-being. Bivariate analyses demonstrate that there is a significant relationship between Self-Acceptance and organized religious activity as well as intrinsic religiosity, but not with non-organized religious activity. Personal Growth is significantly correlated with non-organized religious activity, but only when non-organized religious activity is simplified into two categorical variables. Multiple demographic variables were related to each of the subscales. Because this study used scales with multiple subscales that cannot be combined to encompass the entire construct of psychological well-being or religiosity, the conclusion is that it depends on which subscale is being measured.

### **Social Work**

**PERCEPTIONS OF PROFESSIONALS ON SCHOOL-BASED INTERVENTIONS FOR STUDENTS WITH MENTAL HEALTH PROBLEMS IN GHANA.** Cobbina, M; Social of Social Work. College of Community and Public Service.

**PURPOSE:** Studies show a 7.25% prevalence rate of mental health problems (MHP) among basic school students in Ghana. Though evidence worldwide reveals that school-based interventions are effective, accessible, and feasible for such students, there is no research on these interventions in Ghana. Hence this qualitative research sought professionals' perceptions on the various interventions made available in both the private and public basic schools of Ghana. **SUBJECTS:** Six professionals who work with students with mental health problems were selected for the study. All the chosen professionals performed guidance and counseling (though others had additional duties) in their respective basic schools in the Greater Accra Region. Two participants worked in private school settings, and the remaining four worked in public schools. **METHODS AND**

**MATERIALS:** Participants were selected through convenience and snowball sampling techniques and interviewed with a semi-structured interview guide. **ANALYSIS:** The interview sessions (which lasted between 28 minutes to 1 hour 18 minutes) were transcribed and edited on Otter.ai technology. During the thematic analysis of the transcripts, color codes and memos were used to develop the preliminary themes for the study.

**RESULTS:** The preliminary themes drawn for the study were on mental

health interventions in Ghanaian basics schools, how they are utilized, their effectiveness, and their implications for policy and practice. **CONCLUSION:** The interventional approaches practiced in Ghanaian basic schools are inadequate, despite professionals' dedication to helping students, thus showing the need for effective implementation of educational and mental health policies.

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