# Table of Contents

- Welcome from Our Director: 3
- Conference Schedule: 4
- Keynote Speakers: 5
- Workshop Speakers: 6
- Baylor Graduate Panel: 7
- Networking: 9
- Oral Abstract Presentations: 10
- Poster Abstract Presentations: 60
- Graduate Fair Recruiters: 92
I am delighted to welcome you to the Annual McNair Scholars Research Conference hosted by Baylor University and the Baylor McNair Scholars Program. Baylor University aspires to transform lives around the world through groundbreaking research and evidence-based, capacity-building partnerships that address the critical issues of our time and create a foundation for future discoveries.

The Baylor McNair Program is part of the Paul L. Foster Success Center at Baylor University, and seeks to provide Baylor undergraduate students with a truly transformational education through undergraduate research, access and opportunities. The program aims to prepare undergraduate students specifically from low-income, first-generation and underrepresented backgrounds to acquire the knowledge and skills necessary to successfully complete a PhD program after they graduate from Baylor. I encourage all undergraduate attendees to consider Baylor University for their graduate studies.

This year’s Baylor McNair Scholars Research Conference comprises outstanding speakers, workshops, panelists and student presenters from a multiplicity of disciplines. More than 40 universities from across the country will be represented, making this a remarkable and comprehensive experience for all participants. On behalf of the Baylor McNair Scholars Program and Baylor University, I would like to once again extend our most heartfelt welcome and wish you an enjoyable and inspiring conference experience.

Sincerely,

Steven Fernandez
Ronald E. McNair Post-Baccalaureate Achievement Program, Director
Baylor University | Paul L. Foster Success Center
baylor.edu/mcnairscholars
# Conference Schedule

## Thursday, August 19

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>10 – 10:45 a.m.</td>
<td>Welcome &amp; Keynote</td>
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<tr>
<td>11 a.m. – 12 p.m.</td>
<td>Presentation Session 1</td>
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<td>12:15 – 1:15 p.m.</td>
<td>Presentation Session 2</td>
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<tr>
<td>1:30 – 2:30 p.m.</td>
<td>Virtual Lunch with Baylor Graduate Student Panel Featuring Baylor McNair Fellowship Information</td>
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<tr>
<td>2:45 – 3:45 p.m.</td>
<td>Presentation Session 3</td>
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<tr>
<td>4:00 – 5:00 p.m.</td>
<td>Workshop/Presentation Session 4</td>
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<tr>
<td>5:15 – 6:15 p.m.</td>
<td>Networking Hour/McNair Staff Networking</td>
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## Friday, August 20

<table>
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<tr>
<th>Time</th>
<th>Event</th>
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<tr>
<td>10 – 10:30 a.m.</td>
<td>Keynote</td>
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<tr>
<td>10:30 – 11:30 a.m.</td>
<td>Workshop/Presentation Session 5</td>
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<tr>
<td>11:45 a.m. – 12:45 p.m.</td>
<td>Workshop/Presentation Session 6</td>
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<tr>
<td>12:45 – 1 p.m.</td>
<td>Announcements</td>
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<tr>
<td>1 – 5 p.m.</td>
<td>Graduate School Fair</td>
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KEYNOTE SPEAKERS

Lakia M. Scott, PhD
Associate Professor and Graduate Program Director, Department of Curriculum & Instruction, Baylor University

Lakia M. Scott currently teaches sociocultural foundations courses at the undergraduate and graduate level. She has been a Waco transplant for seven years, having relocated from Charlotte, NC, where she completed her PhD program in Curriculum and Instruction at the University of North Carolina at Charlotte. However, she is a Texas native. Her undergraduate and graduate degrees are both from state, public Historically Black Universities—Texas Southern University (where she received her BA in Journalism in 2005) and Prairie View A&M University (where she graduated with a MSEd in Curriculum and Instruction in 2009). She is a first-generation college graduate.

Dr. Scott has 15 years of combined experience at the elementary, secondary, undergraduate and graduate teaching levels. She is a recognized scholar in the field of Urban Education, where, under the research trajectory of providing educational access, equity and opportunity for traditionally minoritized student populations, Dr. Scott is most widely known for her creation and implementation of the Baylor Freedom Schools program, a summer literacy enrichment initiative in partnership with Waco ISD Transformation Zone Schools and Prosper Waco.

Tamar E. Carter, PhD, MPH
Assistant Professor, Department of Biology
Baylor University

Tamar Carter is an assistant professor of tropical disease biology at Baylor University. She earned her PhD and MPH at the University of Florida, where she studied genetic variation associated with parasite antimalarial resistance and host genetic red blood cell disorders in Haiti. Her interest in bridging research and public health led her to complete an internship at the UF Public Health Laboratory in Gressier, Haiti, and serve as a James A. Ferguson Emerging Infectious Diseases Fellow at the Centers for Disease Control and Prevention in Atlanta, Georgia. During her postdoctoral fellowship at University of North Carolina, Charlotte, her interests grew to include malaria vector surveillance through collaborations with Jigjiga University in east Ethiopia. Now, at Baylor University, she applies both molecular and data science approaches to investigate vector and parasite evolution, coevolution and ecology to inform strategies for malaria control.
WORKSHOP SPEAKERS

Eric Dieter, PhD
Workshop: Practical Strategies for Writing Statements of Purpose
University of Texas

Dr. Eric Dieter is Executive Director in the Longhorn Center for Academic Equity, part of The University of Texas at Austin’s Division of Diversity and Community Engagement, where he directs College-to-Career Initiatives and co-directs McNair Scholars. Previously, he was Executive Director of Dual Enrollment Initiatives in the Longhorn Center for School Partnerships. He has a PhD in rhetoric from UT-Austin and teaches in UT’s Department of Rhetoric and Writing. He is a first-generation college student supporting first-generation students. A Midwesterner, he’s lived in Austin, Texas, since 2001. He can be reached via email at ericdieter@austin.utexas.edu and on linkedin.com/in/ericdieter.

John Lowery, PhD
Workshop: 5 Reasons Why You Should Participate in a Summer Research Experience
University of Notre Dame

John has served as the Recruitment Strategies Program Director at the University of Notre Dame’s Graduate School since 2019. He came to Notre Dame from Southern Methodist University (Dallas, TX), where he worked in enrollment management. Prior to working in higher education administration, John earned a PhD in Divinity (Theology) from the University of Aberdeen (Scotland) and worked as an adjunct faculty member.

Albert Hoyt III
Workshop: Finding Graduate Funding
Florida International University

Albert Hoyt III is the current Associate Director of Graduate Admissions for Florida International University. Albert leads the university’s graduate recruitment efforts and has worked in higher education for more than 15 years. He holds a bachelor’s degree from The Ohio State University and a master’s degree from Miami University. His research interests lie in public land management and environmental conservation.
**Emily Sperou (Moderator)** is a doctoral student at Baylor University. She earned her BS and MS degrees in biology from Sonoma State University. Emily specializes in physiological ecology of marine mammals. For her dissertation, she is comparing intraspecific variation and behavioral flexibility in the ecology and physiology of large marine vertebrates, specifically gray whales and leopard seals. In addition to conducting research, Emily is a Baylor McNair Graduate Assistant.

**Morgan Koziol** is a recent graduate of Baylor University. She completed more than six research projects while she earned a BA in Professional Writing and Rhetoric. Morgan was a member of the Baylor Honors College and Baylor Interdisciplinary Core. She also was a Ronald E. McNair Post-Baccalaureate Achievement Scholar. She will begin the sociology PhD program at University of South Carolina in August 2021. Morgan is passionate about research that can guide equitable social justice. She is currently interested in intersecting inequalities across race/ethnicity, income and education, and how these affect academic outcomes.
Jaquelin Aroujo is a McNair Scholar who earned her bachelor of arts degree from Wesleyan University in 2019. She double majored in Romance studies and Chemistry and is now at Baylor University as a graduate student in the chemistry department conducting organic synthetic research. Her ultimate goals as a chemist of color are to learn, help, teach and synthesize pathways to natural products and towards a more inclusive science community.

Saul Quintero’s main research area is cognitive psychology. During his undergraduate career, he worked on neurodevelopmental research primarily employing animal models of behavior and immune responsivity in genetic knock-out (KO) models of autism spectrum disorders. Saul now works in a laboratory that focuses on human cognition and multisensory perceptual dynamics. His research is focused on how information from different sensory modalities interacts and often how it fuses to create multisensory percepts. Given his studio art background, he is also highly interested in sensory pleasure and the modes of sensory stimulation that people tend to prefer. He is now in the second year of his PhD program in cognitive psychology with a computational minor at UCLA.

Brooke Morris is a late bloomer who started her undergraduate work in her 30s (previously working as a dental assistant). She graduated with a degree in forensic anthropology and is interested in working with large genomic data sets. She has had multiple advisor changes during her graduate career, but this has helped her shape the focus of what she now studies — genomic analysis of rare disease.
NETWORKING
5:15 - 6:15 P.M.

NETWORKING STUDENT INFORMATION

Emily Sperou: PhD student in biology at Baylor University
Sarah Hale: MA student in psychology at University at Buffalo.
Katrina Gallegos: Baylor University, Master of Arts candidate, Museum Studies, UNM McNair Alumna
Brooke Morris: PhD student in anthropology at Baylor University
Morgan Koziol: PhD student in sociology at University of South Carolina
Jaquelin Aroujo: PhD student in chemistry at Baylor University
Saul Quintero: PhD student in cognitive psychology at UCLA
Carla-Cristina Edwards: PhD student in biological sciences at Texas Tech University
Heidi Lindsley: PhD candidate in biology at Baylor University

MCNAIR STAFF NETWORKING HOUR

McNair Staff networking room to discuss pertinent issues facing our McNair community and networks with one another
Luis Abreu-Socorro, abreusocorro@wisc.edu
University of Wisconsin-Madison, with Dr. Daniel Preston, & Landon Falke
Freshwater Ecology

Assessing Benthic Macro-invertebrate Community Structure in Oregon Streams in Context of the River Continuum Concept and Other Associated Concepts

The River Continuum Concept (RCC) predicts how biotic communities change along a stream gradient in relation to changes in abiotic factors, such as stream size. One biotic factor that is predicted to vary with stream order is the abundance and composition of aquatic macro-invertebrates, including the relative amounts of organisms within different functional feeding groups. To determine whether aquatic macro-invertebrate community structure aligns with what is theorized in the RCC, we collected dip net samples from 130 sites along a gradient of first- to eighth-order streams in the Willamette River Basin, Oregon. We processed the samples by sorting out macro-invertebrates and identifying each taxonomically. Preliminary results show that changes in the composition of functional feeding groups in the Willamette River Basin coincide with the RCC predictions, including higher abundance and richness of predatory species in lower-order streams and higher abundance and richness of grazers in higher-order streams. However, one of the main RCC limitations is that it lacks to describe the community structure in the entire river network and not just the main river stem. River systems have interruptions and disturbances that can affect the community structure of macro-invertebrates at a local scale. Other concepts such as the Flood Pulse and Serial Discontinuity Concept, the Riverine Ecosystem Synthesis, and Network Position Hypothesis have been developed to predict better how biotic communities are structured in a river network. Thus, our project also looks to determine whether the community structure in the Willamette River Basin better aligns with a distinct theory.

Ariah Alba, aalba@stedwards.edu
St. Edward’s University, with Dr. Kelley Coblentz Bautch
Photography & Media Arts & Religious Studies

Technological Transformation of the Church: A Case Study of Churches in Austin during COVID-19

Principal Investigator, Ariah Alba, leads an original research project with a working title of, “Technological Transformation of the Church: A Case Study of Churches in Austin during COVID-19,” under the guidance of Dr. K. Coblentz Bautch. This research project explores how churches in the Austin metropolitan area responded to challenges of COVID-19 by drawing on technology to meet the needs of their congregation. As the majority of places of worship were unable to congregate for in-person service and fellowship, As the majority of places of worship were unable to congregate as communities for worship, fellowship and service, churches—just as occurred in other areas of society during the pandemic—turned to technology for communication and synchronous gatherings. Some churches already had some facility with and use of technology pre-pandemic but other churches had a technological learning
curve. Thus, one hypothesis explored in this study is whether in-person church gatherings transitioning online came with challenges to the church body, church leadership, and church volunteers as the need for labor, technology, and outreach towards the congregation grew. The project is rooted in case studies of three non-denominational churches in Austin, which are distinctive in terms of size; these churches range from medium (approximately 300 persons) to large (approximately 2,000+ persons) in terms of attendees. Through interviews with pastors at these churches and surveys with church leadership, the study explores what these respective churches learned about their technological needs and capabilities through the course of the pandemic in response to changing worship experiences during the pandemic.

**Raven Alcott, ravenlal@unm.edu**  
*University of New Mexico, with Peter Fawcett*  
*Environmental Science*

**Aquatic productivity during glacial period MIS 12 in the Valles Caldera sediment core**

This project conducts an in-depth analysis of organic material in a lacustrine sediment core from the Valles Caldera dating back to the middle of the Pleistocene. The mid-Pleistocene sedimentary record shows millennial-scale climate oscillations that will be analyzed using mass spectrometry, specifically paleoclimatic proxies such as Total Organic Carbon (TOC), Total Organic Nitrogen (TON), carbon isotopes, nitrogen isotopes and C/N ratios. These data will help determine the relative proportions of terrestrial (higher C/N values) to aquatic productivity (lower C/N values) contributions to the lacustrine organic matter over 14 millennial-scale climate oscillations of the Valles Caldera paleoclimate timeline. My work examines whether the warmer to colder climate oscillations during a glacial period show changes in productivity and what the relative contributions are from land plants vs. aquatic algae. I will also look at carbon isotopes of the organic matter to determine whether there are more C4 grasses (which prefer warmer and drier conditions) around the lake during the brief warmer episodes. Previously, the core sediments were looked at in low resolution (20 to 50 cm), the importance of this project provides analysis in higher resolution (2 to 5 cm) to understand the aquatic productivity variability on a millennial-scale. The sediment core analysis provides a window into the past that allows us to draw similarities and differences to the climate we live in now and the one that will be influenced heavily by anthropogenic warming.

**Michelle Alvarado, malva1865@ung.edu**  
*University of North Georgia, with Dr. Tanya Bennett*  
*Chicano/a literature, Multicultural, Borderland theory, and New Critics*

**Significance of Rudolfo Anaya’s Novel Bless Me, Ultima to Young Chicano/a Readers in the 21st Century**

The assimilation of cultures in Anaya’s Chicano novel Bless Me, Ultima has prompted multiple debates on which culture the protagonist Antonio must choose: his Mexican indigenous side or his Latin fused culture with Anglo-American. However, I argue that Anaya proposes a balance of Antonio’s two worlds. I demonstrate this balance by analyzing Anaya’s novel through a New Critical lens while at the same time trying to prove how Gloria Anzaldúa’s borderlands theory shapes the novel and Antonio’s decisions. The certain aspects that will be addressed are the overarching metaphor of the two sides, las Pasturas and the city of Guadalupe, the mythology depicting evil and good, and narrative voice. By looking at Anaya’s novel through a New Critical lens this novel’s structural merit can be observed, revealing important insights on the issue. These insights are particularly important to Chicano/a readers who struggle with an identity crisis similar to the one that Antonio faces.
Technology in the Publishing Industry

Hypothesis: Technology has impacted all areas of the publishing industry from communication to distribution. There is still more advancement to be seen in the near future. Summary of Content: Since the technology boom, many industries have adapted to the modern world. For some, this means creating various social media profiles advertising their business. For others, this could include designing unique websites for their audiences to peruse at their leisure. The publishing industry, however, has undergone extensive reconstruction. Hardcover books have been reformatted into digital media. Amateur authors can publish their stories to their online platforms without professional guidance. This paper will discuss the effects digital media has on the publishing industry while illustrating how online reading, including fanfiction and apps, has infiltrated publishing houses. Conclusion: The publishing industry has undergone extensive change in the past year and a half. While these developments would have likely occurred without prompting, the coronavirus pandemic facilitated true technological advancements.

Buñuel, Fernandez, and de Fuentes: Filmmaking and the Mexican State, 1935-1950

During and in the aftermath of World War II, Mexico entered an era of unprecedented economic growth. Often referred to as the Mexican Miracle, this growth manifested in multiple industries, one of the most notable being motion pictures. This “Golden Age of Mexican Cinema,” beginning with the election of Manuel Avila Camacho in 1940 and lasting until the mid-1950s, witnessed the creation of many films that enjoyed both critical and commercial success. Although it is well known that the Mexican state had long supported film productions and happily reaped the financial reward, the governmental role in the content and messaging of these films is not fully understood. This paper explores this relationship, analyzing how three of the most famous directors of the time (Fernando de Fuentes, Emilio “El Indio” Fernandez and Luis Buñuel) operated in the Mexican film industry and its interactions with Mexican state. Using archived interviews and current literature on the subject will give more insight on the subject. This unexplored relationship between the directors, the studio system, and the government is what ultimately effected the messages and meanings of the films these directors made. All these forces worked together to create film’s whose messages and ideas ultimately shaped Mexico during this period and for years afterwards, creating an environment post-World War II where art and commerce could thrive together.

Metabolic syndrome in the in vitro neurons of the hippocampus, hypothalamus, and raphe

Brain metabolic syndrome (Bmets) is a group of risk factors that are associated with type II diabetes mellitus, central obesity, and brain abnormalities that increase the risk for dementia. Metabolic syndrome is considered a global epidemic, and by understanding the physiological mechanisms involved in Bmets, the development of interventions
becomes possible. The objective of this research is to investigate brain metabolic dysfunction in neurons from distinct brain areas that are known to be associated with obesity (hypothalamus), depression (raphe), and dementia (hippocampus). We hypothesize that neurons treated with sodium palmitate and challenged with high glucose will exhibit a phenotype characterized by metabolic dysfunction. We investigated in vitro metabolic changes in embryonic neuronal cell models – 1. HT22 (hippocampal neurons), 2. mHypo (hypothalamic neurons), 3. RN46A-B14 (serotonergic neurons) treated with 100 μM sodium palmitate, 4% glucose, and 25 μM citalopram for 24 hours. We used QRT-PCR based low-density array and western blot to evaluate metabolic dysfunction. Preliminary results indicate metabolic dysfunction in treatment groups, and continued research will reveal the effects of citalopram on metabolic dysfunction.

Michael Boulis, mboulis@yahoo.com
University of North Texas, with Dr. Ehab Saad
Biological Sciences

Investigations into a Peculiar Presentation of COVID-19: Persistent Hiccups

Coronavirus disease 2019 (COVID-19) has surprised us with a growing list of atypical presentations, one of which is persistent hiccups (last >48 hours). This literature review study investigates the characteristics of COVID-19 patients presenting with persistent hiccups. PubMed search was performed using the terms: COVID-19; SARS-CoV-2; coronavirus; singultus; hiccups. Twelve COVID-19 case reports presenting with persistent hiccups were found. All cases were males, ages ranging between 48 and 72 years old. Common pre-existing comorbidities included hypertension (7 cases, 58%), diabetes mellitus (4 cases, 33%), and obesity (2 cases, 17%). Five cases (42%) denied systemic symptoms of COVID-19 and localizing symptoms of an infection. All cases had a positive SARS-CoV-2 reverse transcriptase-polymerase chain reaction (SARS-CoV-2 RT-PCR). Chest imaging revealed lung involvement in all cases. This work increases the awareness of such misleading presentation in COVID-19 patients, which will aid in early diagnosis and better outcomes for these patients. This study’s findings alert clinicians to consider COVID-19 in the differential of patients presenting with persistent hiccups during this pandemic even in those lacking systemic manifestations of COVID-19 or localizing symptoms of pneumonia. Commonly associated pre-existing comorbidities in such cases are hypertension and diabetes. As all case reports in this study were found to have a positive SARS-CoV-2 RT-PCR and an abnormal chest imaging, clinicians should consider checking both in cases with such atypical presentation. Interestingly, all case reports found in this study were males. This further supports prior literature that demonstrated male predominance in hiccup patients.

Mary Boulis, boulismary@gmail.com
University of North Texas, with Dr. Ehab Saad
Biological Sciences

Insights on Treatment Options for Persistent Hiccups in COVID-19 Patients

Persistent hiccups (last >48 hours) can be debilitating causing not only sleeping and eating difficulties but also oxygen desaturations especially in Coronavirus disease 2019 (COVID-19) patients with lung involvement. This literature review study investigates treatments used to control persistent hiccups in COVID-19 patients. PubMed search was performed using the terms: COVID-19; SARS-CoV-2; coronavirus; singultus; hiccups. Twelve COVID-19 case reports presenting with persistent hiccups were found, all of which had lung involvement. Metoclopramide, used in five cases, failed to control the hiccups in all five. Chlorpromazine, used in five cases, succeeded to control
the hiccups in four; two of which had previously failed metoclopramide. Baclofen, used in three cases, succeeded to control the hiccups in all three. Furthermore, hiccups were controlled in one case by levosulpiride and in another case by clonazepam along with haloperidol. In two other cases, hiccups improved as they recovered from COVID-19 rather than with the use of specific treatment for hiccups. One case refused admission and lost follow up. The findings of this study grant insights into treatments for persistent hiccups in COVID-19 cases. Based on the findings of this study, the use of metoclopramide in such cases is disadvantageous as it failed to control the hiccups in all cases in which it was used (100% failure). On the other hand, the results of this study suggest that chlorpromazine as well as baclofen have favorable outcomes with controlling persistent hiccups in COVID-19 patients. Sometimes hiccups improve mostly with recovery from COVID-19.

Ronni Brent, rbrent2@wisc.edu
University of Wisconsin-Madison, with Shaneda Warren Andersen, Lisa Parlato
Microbiology

Evaluating the association between biomarkers that characterize obesity and colorectal cancer risk

Colorectal cancer (CRC) is the third most common form of cancer in the U.S. and is burdensome on U.S. morbidity and mortality rates. African Americans are at higher risk for both colorectal cancer and obesity than any other demographic in the U.S. Adiposity, a measure of obesity, has a well-documented link with increased colorectal cancer risk but the association by which it influences risk is poorly characterized. It is hypothesized that adiposity contributes to high CRC risk, measured through various adiposity blood biomarkers. This study evaluated three prominent adiposity biomarkers (albumin, adiponectin, and c-peptide) and their associations with CRC risk. The study utilized data from the Southern Community Cohort Study (SCCS), the largest cohort that includes African American and low SES participants. The SCCS was primarily designed to investigate disparities in health outcomes. Conditional logistic regressions were used to calculate odds ratios (ORs) and 95% confidence intervals (CIs). Overall, an inverse association was found between each biomarker and colorectal cancer risk. Majority of the associations were nonsignificant potentially due to the sample size and statistical power. Future studies will need to examine larger cohort sizes to strengthen the statistical power.

Andre Chavez, Andre_Chavez1@baylor.edu
Baylor University, with James A. Marcum
Medical Humanities, Philosophy

Constructing a Phenomenological Account of Illness: Revisiting Sartre's Constitutional Progression of Illness

During the latter half of the twentieth century, the dominant biomedical model of disease led to an acute devaluation of the lived illness experience. In response, a phenomenological model of illness was proposed to resolve the problems in treating patients that arose with the biomedical model, by revaluing the experience of illness rather than physiologically objectifying disease—especially with respect to healing persons, not curing diseases, as its goal. In this paper, I articulate Sartre's constitutional progression of illness through the triad of maladies—disease, sickness, and illness—to make it more compatible with contemporary philosophy of medicine and explore its relevance for medical practice. To accomplish this, I discuss the Sartrean levels of pre-reflective pain; lived, bodily discomfort; suffered illness; disease pondering; and disease state, as delineated by Toombs and as extended by Svenaeus. Then,
I examine incongruencies between Sartre’s constitutional progression and recent philosophy of medicine. Afterward, I apply Hofmann’s revision of Twaddle’s triad to address term ambiguities that emerge in Sartre’s progression, as read with current understandings of ‘illness’ and ‘disease.’ Having made a dialectical clarification, I then discuss the scope and limitations of a constructing a phenomenological account of illness. I conclude by discussing the implications of these associations for the phenomenology of illness and its relevance for epistemic justice, holistic healing, person-centered care, and systems medicine.

Angelique Compton, comptonan16@uww.edu
University of Wisconsin/ Whitewater, with Dr. Luke J. Mortensen lab; Kejie Rui
Biology

Single Cell IDO Expression To Study Mesenchymal Stromal Cells (MSCS) Potency Levels

Single cell IDO expression among Mesenchymal Stromal Cells (MSCs) potency levels were analyzed. FDA approved MSCs clinical therapies which have been elusive despite strong evidence of their potential to modulate immune response in preclinical models. This failure is due in part to the loss of immune modulatory activity after the high degree of expansion required to make an adequate dose of MSCs for clinical use, and an inability to monitor MSC immunomodulatory potential during the expansion process. Findings have shown that MSCs are efficient in reducing inflammation and secreting reparative factors in response to inflammatory stimuli allowing it to become one of the promising sources for cell-based therapies. The objective of this project is to investigate morphological and nuclear features of subpopulations identified within the heterogeneous MSCs cultures that were observed to express IDO at different levels. IDO integrated, mean, and standard deviation intensities were deemed most significant among IDO intensities. These cells were analyzed through a dimensionality reduction technique known as Principal Component Analysis (PCA). IDO integrated intensity features among cell morphological features were expressed more than IDO mean and standard deviation intensities. Furthering this analysis could be a promising future work and success of this could provide key insights into potency metrics that would allow for monitoring and selection of high immune potency MSCs. This would greatly increase the efficacy of MSC therapies and provide relief to patients suffering with immune diseases.

Gloria Conatser, gloria_conatser1@baylor.edu
Baylor University, with Dr. Kevin Magill
Secondary Social Studies

Education and Efficacy: Returning to Public Education’s Revolutionary Roots

Democracy is predicated on participation. Those whose voices are heard will be protected, often at the expense of those lacking visibility and volume. Public education was introduced to the United States as a tool for transformation and social mobility. Today, the structure of schools works to enforce the status quo. American schools tend to explicitly and implicitly reward repetition and compliance, rather than fostering inquiry and creative problem solving, and our system is often criticized for poorly preparing children for the “real world”. Education is regarded as the primary socioeconomic factor driving voter turnout. In the voter-turnout context, education is measured using formal education in terms of diplomas held, but how do aforementioned implicit and explicit messages influence the very sense of efficacy which drives voting? What other forms of civic participation are favored? Why, and by whom? I hypothesize that meaningful experiences with structures of power help create active participants. This article explores the relationship between one’s educational experiences and their identity as a civic actor. Through
biographical interviews, I seek to understand what conditions help shape people into civically efficacious individuals. Using the data collected from eight interviews with civically active people I ask: How can we use these findings to structurally transform our schools and the ecology that they operate within? How does education as a perpetuator of the norms reflect and enforce the political barriers preventing reform?

Catlin Corrales, cmcorr2832@ung.edu
University of North Georgia, with Dr. Yu Sun
Enviro Spatial Analysis

Access to Greenspace: A Preliminary Analysis of the Hispanic Population’s Accessibility to Urban Greenspace in Hall County, Georgia

The EPA defines environmental justice (EJ) as the equal treatment and involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental policies. The study of EJ became prevalent in the 1980’s, when historically underrepresented communities began to speak out about the inequalities that they were being disproportionately burdened with. This disproportionate burdening is still existent today and is caused by factors such as prejudiced siting and unequal political power. Therefore, to advance equity in urban communities, city planners should consider EJ when planning for future growth and development. Hall County, Georgia is undergoing rapid urbanization and so the equal accessibility of urban greenspaces (UGS) to all racial and ethnic groups in the county should be a priority consideration moving forward. Thus, the focus of this study was to explore the availability and accessibility of UGS for the Hispanic population as this ethnic group comprises the second largest in Hall County. This was done by identifying and mapping the distribution of existing UGS in the county and mapping racial distributions per census tract using GIS software. A network analysis was performed using public road systems and bivariate Pearson correlation coefficients were calculated to quantify linear correlation between the ethnic percent composition per census tract and the number of UGS per tract. The resulting trends indicate that the Hispanic population has less access to UGS than the White population. Further research should be conducted to solidify this finding.

Angelina Craig, aacraig@udel.edu
University of Delaware, with Dr. Theodore Davis Jr.
Political Science

Suppression of the Black Vote, Jim Crow 2.0

After the 2020 election, there was a surge in states changing their voting laws. These changes could be considered restrictive, such as voter purging, voter id requirements, modifying mail-in dates, and reducing early voting. Many people feel this legislative action, largely driven by Republican legislatures, is an effort to diminish Black electoral participation and weaken Blacks as a political unit. These voter suppression laws are Jim Crow-like in nature, and they are inconsistent with the democratic principle of protecting minority rights. The goal of this research is to examine current voter suppression efforts. The central argument is that recent attempts to change voting laws are part of Black voter suppression efforts that have occurred over three time periods. Thus, the first objective is to discuss how party politics was previously used to control Blacks’ political participation. The second objective is to examine how election processes and procedures were used to suppress the Black vote. The final objective discusses recent state legislative election reform as an attempt to suppress Black voter participation. Thus, we are entering into the third phase of resistance to the Black vote. I will use case studies of Florida, Georgia, Texas, and Arizona as evidence of election reform restricting voter participation to weaken the Black vote.
Valerie Davila, valerie_davila1@baylor.edu  
Baylor University, with Dr. Lara Hwa  
Neuroscience

**Stress Reactivity in Alcohol-Drinking Mice**

Brain circuitry is significantly affected by chronic alcohol use, but many stress-related brain projections are still unknown. Clinical research has shown poor stress coping in people with alcohol-use problems, but research in Hwa Lab studies examine stress reactivity in mice that have a history of heavy alcohol drinking. The lab has previously confirmed that the bed nucleus of the stria terminalis (BNST) is a regulator of alcohol-impaired stress reactions to the predator odor (TMT). The proposed studies will explore novel neural circuits that underlie alcohol-stress interactions. Both male and female mice will be given either alcohol or water for 6 weeks. Choleratoxin B (CTB), a retrograde-traveling fluorescent dye, will be injected into the BNST using stereotaxic surgery to trace projections. After a TMT stress test, brains will be collected, sliced, and co-stained for c-Fos, a neuronal marker of activity. Out of several possible networks, we hypothesize that labeling of non-cortical projections of the BNST may be reduced after alcohol and stress. Projections may include the basolateral amygdala, insular cortex, paraventricular thalamus, periaqueductal grey, or the ventral hippocampus, which are stress- and fear-related brain regions. Mapping new anterograde projections to the BNST can help describe which areas in the brain are affected after alcohol drinking, stress, and after a combination of both. This emphasizes the need for future studies focusing on whether particular outcomes are unique to chronic alcohol use, and whether certain stress-coping mechanisms can help revert any affected areas after drinking.

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Philosophy

**We are not Going Back to Normal: SARS-CoV-2 is Not a Thing of the Past**

Since Early Civilization, the world has continually been threatened by viral diseases, and today with the current novel coronavirus disease 19 (COVID-19), the gap of cooperation among different countries has resulted in great suffering worldwide. The world needs to continue monitoring the dangerous mutated COVID-19 strains, to resolve the patchy genomic surveillance coverage in certain countries, and to come together in order to improve the operations of organizations that handle viral diseases around the globe to prevent future pandemics. However, like many other global issues, like recycling, global warming, and overpopulation, the improvements to the management of viral diseases suffer from similar restraints, such as funding, technology, and political hurdles. This study aims to identify ways in which the world can prevent a local epidemic from evolving into a worldwide pandemic, like the one caused by the virus responsible for COVID-19. To that end, I examine several data bases for consolidating genomic information concerning viruses and their variants responsible for possible pandemics. For example, the Global Initiative on Sharing Avian Influenza Data contains global data on variants responsible for COVID-19, which have helped scientists to learn more about the implications and dangers of mutated strains. Since no country can handle a pandemic on its own, utilization of these data bases is critical for countries globally not only to manage the current COVID-19 pandemic but also to prevent pandemics in the future by consolidating and curating genomic information, which is discussed in the concluding section.
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Tourism is one of the most dynamic and ever-growing sectors of the global economy. Tourism is interconnected with many other economic sectors and if it is properly addressed in the region’s strategic planning, it could contribute to positive economic growth (Fahim et al., 2018). The purpose of this research project is to analyze the financial impact of COVID-19 on businesses in further investment decision making in the tourism industry in Southeast Texas (SETX). The COVID-19 pandemic created significant risks to the financial health of businesses in the tourism industry of SETX and will have an impact on future investment intentions. The business environment is constantly changing, and this changing environment brings unprecedented risk and challenges for an investment decision. I used the PARM methodology and the 5-point Likert scale to measure business performance and the impact of attitude and investment decisions behavioral control on investment intentions. I sent surveys through emails and collected responses in person in Lumberton, Vidor, Beaumont, Silsbee, Orange, Bridge City, Nederland, Port Neches, Port Arthur, and other towns as well. I contacted a total of 289 businesses in this area and collected 31 responses. Results are forthcoming as responses continue to come in.

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Accounting


As financial instruments and intangible assets have increased their prevalence on financial statements, cryptocurrency has emerged as a new type of asset with the characteristics of both. With increased acceptance of cryptocurrency as an investment vehicle and as a form of exchange, governments are paying more attention on setting policy, including banning. Prominent companies such as Hut Mining, Coinbase, Tesla, and Galaxy Holdings differ in their financial reporting of this digital asset, which poses a challenge. With no specific rulesets from FASB and IASB, companies are exercising significant judgement about how to record cryptocurrency and communicate their value to investors. The objective of this paper is to analyze how different companies report cryptocurrency in their financial statements. Without clear reporting rules for cryptocurrency, FASB and IASB need to add this topic to their agenda and present cryptocurrency as a financial instrument. This lack of reporting rulesets under IASB and FASB, comparability between companies may confuse investor.

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Political Science

**Explaining Queer Minority Group Targeting: Variation in U.S. Anti-LGBT+ Hate Incidents**

Prejudice against the LGBTQ+ Community has existed in the United States throughout its history, but it has regularly erupted into violence in recent decades. While hate crimes have received considerable scholarly attention, research
has yet to explain what events drive variation in anti-LGBTQ+ bias incidents. I propose that events that increase minority group visibility and distinguishability will significantly increase the number of reported hate crimes targeting that group. Utilizing the FBI Uniform Crime Report’s anti-LGBTQ+ hate crime data from 2015-2017 along with an original dataset of pride celebrations in America’s 100 largest cities, I find considerable evidence that in the month during and immediately following a pride event, anti-LGBTQ+ bias incidents significantly increase. Of additional importance to scholars and practitioners alike, I show that pride event motivated hate crimes are particularly violent and that the Transgender community faces the most sizeable increase in attacks.

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Environmental Science

Assessments of streamflow and flooding along the Pere Marquette River, west Michigan

Understanding how stream flow in rivers across Michigan is responding to climate change is important because they are used for hydroelectricity, recreation, fisheries, and many people own property along them. Michigan’s annual rainfall has increased by 3 inches since 1940 and is expected to increase by 0.036 inches/year through the 21st century due to climate change. In this study, I test the hypothesis that increased rainfall will lead to more-frequent flooding along Michigan’s rivers. I do so by analyzing river discharge data and flow-duration curves from a stream gaging station on the Pere Marquette River, the largest undammed river in Michigan. Results from this study show that the discharge on the Pere Marquette River was ≥1,643 cfs for 27 days and increased 6-fold to 164 days in the 1990s and 2000s. It is likely that other natural rivers in Michigan might also show increases in the historical 1.5-year discharge associated with them and that discharge with the 1% exceedance probability might also increase.

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Ethnic Studies

Colorism & Dating Preferences Among Black People in the U.S.

The question that is being researched focuses on how age, gender, and sexual orientation impact the experiences and understandings of colorism in dating for Black Americans. Since there is limited research relating to this topic, a survey consisting of open ended and Likert scale questions was conducted for Black & mixed-race identifying individuals between the ages of 18-40 in the United States to gather and analyze anecdotal experiences of the participants when it comes to their dating practices. Further understandings of the intersection between skin tone and sexual orientation help explain to what extent LGTBQ+ identifying individuals are more open to dating outside their race in terms of colorist views within this community. Understanding the historical context of colorism in the United States is imperative in this study because these ideologies shape the way in which Black Americans view themselves and others in terms of desirability. Theoretical approaches include critical race theory and critical feminist theory with an intersectional lens. To fully understand participants’ responses, analysis used a mixed methods approach with quantitative and qualitative data. While the responses and data are still being analyzed, three hypotheses that have been formed around the research are: 1. LGBTQ+ identifying participants will be more open to dating outside their race. 2. Light skinned identifying participants will have more favorable experiences in dating. 3. Black & mixed-race woman identifying participants’ experiences on dating will have familial influence from their upbringing.
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Political Science

Underrepresentation of the Hispanic/Latinx Community in Congressional Office: The Impact of Educational Attainment

Numerous studies have found that the Hispanic/Latinx community in the United States is widely underrepresented. With a focus on the federal level of government, recent Congresses have gradually increased in racial and ethnic diversity, however, they remain disproportionately white compared to the U.S. population. According to the U.S. Census Bureau, the Hispanic/Latinx community makes up 18.5% of the country’s population, the largest percentage out of all other racial minorities. With the second fastest annual growth rate of 3.8%, second to Asian Americans according to the Pew Research Center, the political participation of the Hispanic/Latinx community has been coined a sleeping giant. Yet only 9% of the House of Representatives in Congress is Hispanic/Latinx, less than half of the percentage they make up of the U.S. population. To explore whether educational attainment has an impact on the amount of representation Hispanic/Latinx representation in Congress, a quantitative approach with analysis of statistical data will be utilized. This study has implications to raise awareness of the gap in educational attainment and the obstacle it creates for Hispanic/Latinx representation. Building on a plethora of research, the findings of this study will challenge and analyze previous research and current statistics to seek further understanding of the lack of educational attainment as a cause for underrepresentation of Hispanic/Latinx people at the federal level. In a comparison of states, those with higher percentages of Hispanic/Latinx college graduates will be more likely to have more successful Hispanic/Latinx congressional candidates than those having lower percentages of Hispanic/Latinx college graduates.

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Kinesiology and Sports Science

A Longitudinal Study of Stress Recovery Indices and Heart Rate Variability in Full-Time Firefighters

Background: Firefighters are at risk from sleep deprivation as a result of prolonged work in the heat and continual 24-hour shifts (MaCartney, 2020). Autonomic nervous system disturbances can affect how firefighters recover. Heart Rate Variability (HRV) is an indicator of recovery. Vagal tone can be impacted by excessive exposure to heat and poor sleep, which can further diminish firefighters’ daily functions and physical performance (ASA, 2021; Lyytikäinen, 2017). The purpose of this study is to investigate how firefighters recover from on shift versus off shift days. Methods: Full-time male firefighters (n = 8) from a small city fire department, age 21- 65yrs, participated in the 6-month study. Participants work 24 hours on duty (OD) followed by 48 hours of recovery (RD1 and RD2). Participants wore WHOOP photoplethysmography devices to measure continual heart rate. Repeated measures ANOVA (p < 0.05) were conducted to determine differences between OD, RD1, and RD1 for HRV. Results: Percent change from OD to RD1 (M = 44.56, SD = 5.2) was a 19.20% increase, and RD2 to OD (M = 45.88, SD = 5.6) had a 14.12%, whereas RD1 to RD2 (M = 40.62, SD = 4.0) had a 5.93% decrease, however the differences between the three measures was not significantly different (p = 0.156). Conclusions: Although HRV score data were not significant, there was a difference in HRV between RD1 and RD2. This may mean that firefighters endure strenuous physical activities during their off-shift recovery days, while recovering from on duty days.
The Impact of Hyperstimulation on Nerve Density in The Uterus

According to the CDC, approximately 1 in 10 women struggle with infertility and as a result many have to seek out medical intervention such as In Vitro Fertilization (IVF). In response to hyperstimulation that occurs during IVF due to use of gonadotropins, the uterus experiences an increase in estrogen and progesterone levels. Previous studies have shown estrogen to have a degenerative effect on nerves, while progesterone exhibits a regenerative ability. To determine if there is a change in nerve abundance in response to hyperstimulation of the uterus gestational day 3 pregnancy stage samples of mice uterine images of two types will be assessed. These two categories will include: (1) normal pregnant samples and (2) hyperstimulated pregnant samples. These pre-captured β-tublin stained nerve images will be obtained for segmentation and a 3D surface will be created and segmented using Imaris software. Three portions of each uterine horn will be segmented: (1) near the ovary, (2) near the cervix, (3) in the middle of the horn. Nerve density will be quantified per unit length assessing variables such as thickness, diameter, and etc. Statistical analysis of the quantified data will be done to address differences between the normal and hyperstimulated samples. We anticipate a change in nerve density as a result of elevated hormone levels, though at the moment we are uncertain of what direction the change will occur. With an increase in nerve density, we expect the innervated uterus to produce more contractions and thus be able to space the embryos successfully resulting in more successful outcomes. Whereas, with a decrease in innervations present in the uterus, we can anticipated difficulty spacing the embryos and thus leading to more unsuccessful pregnancies.

Variance-based sensitivity analysis applied to continuous models of ion dynamics

Since the later 20th century, the complexity and sophistication of mathematical models used to represent biological systems has increased in large part thanks to the expanding power of computational tools. However, increased complexity tends to bring uncertainty with it because the number of parameters for some mathematical models is large. In the field of biology, the challenges associated with uncertainty are nearly universal, but systematically quantifying its effects will allow for a more nuanced approach to the interpretation of model outputs and parameter estimates. This research will analyze the dependence of spiking frequency on variations in parameters describing the response of voltage dependent ion channels in the nerve axon as described by the classical Hodgkin-Huxley differential equation model. After utilizing the Sobol’ sequencing algorithm to draw samples over the parameter space, Monte Carlo Integration will be used to numerically estimate the value of Sobol’ indices. Important and unimportant parameters will be identified using the generated data, and the implications of these results will be systematically investigated. A reduced model can then be constructed by fixing parameters with low Sobol’ indices. The relationship between the significant parameter can be used to make claims about its effect on the model and make connections to its biological implications.
International Students at Risk: Basic Needs Insecurity and Environmental Justice

This research examines the prevalence and factors of basic needs insecurity among international students attending the University of New Mexico. It proposes a novel theoretical framework of environmental justice as a sustainable lens to analyze food and housing insecurity among college students. It applies three specific principles from The Principles of Environmental Justice created in 1991 by delegates of the First National People of Color Environmental Leadership Summit. It draws on principles 2, 5, and 7, which grant self-determination, equal representation, and freedom from discrimination and bias, and applies them to food and housing systems. It utilizes a mixed methods approach using secondary survey data and transcriptions of focus groups to conduct a thematic analysis to understand instances of basic needs insecurity. With this, it highlights the unique experiences of international students, who are at significantly higher risk of experiencing food and housing insecurity. There were three main themes of experience from the international student focus group transcriptions regarding access to basic needs, including alienation, financial distress, and lack of resources. Using the environmental justice framework, this paper concludes that international students experience discrimination and bias that create a lack of self-determination and unequal representation that ultimately contribute to the greater vulnerability of basic needs insecurity. Special acknowledgements to the UNM McNair/ROP Program staff, Dr. Marygold Walsh-Dilley, the Basic Needs Project, and the Sustainability Studies Program for the incredible support.

The Philosophy of Life

What is the meaning of life? This question is one that cannot be answered by a single person rather the question we ask instead is when. When does life begin, the question here is not one of moral or ethical opinion regarding the controversial topic of life via conception. Instead the focus of this paper will be directed at the concept of life and the classification of alive. This determination shall be established through the use of linguistical, biological and chemical analysis. The Oxford English Dictionary is used as a means to set up and organize the defining terms of the word alive, this is in conjunction with an article by Bartlett, Stuart, and Michael L. Wong titled “Defining Lyfe in the Universe: From Three Privileged Functions to Four Pillars”. By definition for an animal, person or plant to be alive is to be considered living and therefore not dead. In addition to this criteria, to be alive is to have the ability to keep something alive or in existence, it is this constant energy that as Bartlett, Stuart, and Michael L. Wong has described as “Lyfe”, is capable of “dissipation, autocatalysis, homeostasis, and learning”. These processes create a connection from the etymology of alive to the biological concept of organization which describes the order of development leading to life. From this biological series, molecular development is the stage that connects biology with chemical concepts. Through laying the foundation linguistically and building upon this scientifically, we can than define life.
Surveillance through Technology: Understanding Underrepresented Students’ Experiences with Surveillance Technologies during the COVID-19 Pandemic

In its early stages, this project will examine the different ways in which students are monitored or surveilled through technology and software while completing schoolwork, in school, and/or during extracurricular activities during the COVID-19 pandemic. This is to better understand the attitudes of students and their schooling experiences navigating their identities in schooling through different technologies and programs. I argue that students with marginalized identities are surveilled more heavily through technology when completing schoolwork assignments than their counterparts and peers in class. The data collection will consist of semi-structured interviews with recent college and high school students to understand their experiences with surveillance technologies and to compare their experiences across different identities, such as race, gender identity, sexuality, socioeconomic status, etc. Through the review of interactions of students with surveillance technology, recommendations can be made of the next steps in engagement with online schooling and surveillance software to follow. This research is in its early stages and will aid in recording and investigating factors that contribute to different learning environments and experiences of students, and in this case, amidst a global pandemic.

COVID-19 and the Upper Midwest Company Stocks

In 2020 COVID-19 emerged as the global pandemic and impacted human lives and economies. With COVID-19 ravaging humans, as reflected by the number of cases and deaths, the federal and state governments of the United States responded by locking down economies and movement of people and implementing three stimulus packages to cushion the slowdown of economic activities and loss of jobs. With vaccinations against the virus, economies have started reopening and reestablishing jobs. It is extremely important to study how economies reacted to events related to the pandemic. This paper provides analysis on how the financial indicators, stock and commodity returns, reacted in real time to different stages of COVID-19. This study collected data on COVID-19 related major event dates and returns of certain stocks and commodities on those dates to study responses of the U.S. and three upper Midwest states. Through empirical analysis we find that returns on financial/industrial stocks reacted more than the returns on agricultural commodities. Overall, the US stocks had more negative responses while stocks related to Minnesota had positive responses. The results show that initially market over-reacted and as more information became available, people started adjusting their expectations to pandemic related events and market started correcting itself. Further, we find that pandemic related lockdown caused downturn in almost all stock returns while stimulus packages and vaccination improved reactions of the financial indicators.
Optimizations to the Synthesis of a Selective, Pyrophosphate Sensor Scaffold

Pyrophosphate anions (PPI) are important biomolecules and are extensively investigated in biotechnology and medical research. Until recently, the selective quantification of PPI has proven difficult due to the ion’s close relationship to other phosphate species. In 2008, Nonaka et al reported one selective fluorescent sensor system. However, the reductive amination synthetic step proved to be ineffective (low yield) which limited the system’s applicability. This study furthers, synthetic optimizations to the pyrophosphate (PPI) sensor scaffold through screening reactions to determine optimal solvent choice and the need for an acid catalyst. Product identification, relative yield comparisons, and facile isolation were effectively determined and improved through Reverse-Phase, High Performance Liquid Chromatography (RP-HPLC). It was determined that the reactions proceeded effectively in ethanol, methanol, or 1,2 dichlorehane when in the presence of 4 Å molecular sieves, over a 24-hour period, and followed by a quick reduction by sodium borohydride. However, it was found that the addition of acid catalyst lowered yields. Alpha picoline borane (α pic-BH3) was also utilized as an uncommon reducing agent to analyze a greener, one-pot reductive amination method. It was determined that acid catalyst improves the synthesis and the reaction performed effectively in minimal MeOH for a greener synthetic procedure. Through this research, effective improvements to the synthetic conditions and purification method were performed. These optimizations will facilitate future research into analytical quantification applications of the reported sensor system.

Alpine based Adaptations Within the Caryophyllaceae Family

With the turn of the 20th century new technology and applications for DNA/RNA analysis are perpetually explored. In 2015, Dr. Ya Yang and Stephen Smith from the University of Michigan outlined steps to clean up field DNA/RNA samples and provide a method for their organization into a phylogenetic tree. Alpine climates across the globe give a difficult staging ground for life to prosper; often times, plants need to deal with a mix of difficult surroundings from poor soil to low oxygen content to survive. In the Caryophyllaceae family, there are multiple examples of sister species that are closely related but are observational different due to one of the two growing in this extreme alpine climate. Since alpine species in the Caryophyllaceae have adapted to their climate, is there sufficient proof of this in their RNA Transcriptomes? After analysis of the transcriptomes have been completed there should be repeatable evidence of common adaptations in the Caryophyllaceae family. If sufficient evidence of evolution is found, it would then be possible to provide the function RNA segments in question and even a rough timeline of when these adaptations took place. This study is also hoping to add a new use of the data analysis pipeline detailed by Dr. Ya Yang and Stephen Smith and provide a backbone for future studies to employ the pipeline in new and innovative ways.
Simulating Long-Term Mitigation Efforts Through COVID-19 CO2 Emissions and Thermosteric Sea Level Rise Projections

Within climate research, socioeconomic factors have been compiled into pathways that represent long-term human activity and emissions. Based on these scenarios, climate models and projections can be used to predict environmental response. While this approach has proven to be effective in demonstrating the influence of human activity on climate change and its associated impacts, it is often difficult to convey this information in a manner that can be easily understood by the general public. With the COVID-19 pandemic bringing forth a new sense of lifestyle and reduced human activity, this global event can be utilized as a tangible reference for scientific data and projections. This study proposes a series of translated emission pathways (TEPs) that relate COVID-19 CO2 emissions to the forcing scenarios often used in climate modeling. The CO2 data of each scenario is parameterized by incorporating carbon budgeting models and determining radiative forcing. Thermosteric sea level rise is used as a form of data output that effectively demonstrates the effects of human activity on the environment. In addition to providing feasibility for the emission pathways utilized within climate research, this study emphasizes the importance of collaboration between the general public and scientific community in order to mitigate the damaging effects of climate change.

Rewriting the Undergraduate Narrative: Investigating Non-traditional Transfer Students

Collectively, we need to re-examine our views on the undergraduate student experience. Our society often has a tired view that college Bachelor's programs comprise young adults who recently completed high school. The non-traditional student's pathway is often overlooked. In this qualitative research study, an undergraduate student researcher is contextualizing the experiences of non-traditional students who transfer to a flagship state university. The transition from a two-year college or a smaller state school to a four-year flagship university presents unique challenges for non-traditional students. Using semi-structured interviews as a primary method, this study explores the barriers that nontraditional transfer students experience, the challenges they overcome, and the facilitators that aided their success. We hope that a better understanding of the non-traditional undergraduate experience will create more equity and inclusion in higher education.
The Well of Tears: Margery Kempe and the Spiritual Power of Non-Verbal Communication

The Middle Ages in Europe found some women developing and navigating different forms of agency within the Church, in particular female mystics who received visions from Christ and were models of devout faith and behavior. The case of Margery Kempe, a Fifteenth Century Englishwoman, is especially interesting because she was forced to navigate a difficult religious and political environment that included many accusations of heresy. Although she was illiterate, she dictated her visions and experiences in her Book. Her intense and exemplary modes of devotion and faith ultimately brought her harsh forms of social rejection, mostly because of her fits of sobbing and writhing that often-disrupted mass. Margery explained her behavior as emotional reactions to Christ’s passion. However, there is a social component connected to Margery’s spirituality. The more severely that she is accused of heresy, the more members of the clergy and her society are impacted by her behavior, and the stronger her relationship with Christ becomes. This research aims to analyze how her feminine stereotypical behaviors created her social identity and how these behaviors were a form of non-verbal communication that, while disruptive, could not ultimately be judged as heretical by inquisitors.

Barriers First Generation College Students Face

A first-generation college student is defined as a student whose parents did not complete a four-year college degree (What Does Being a First-Generation Student Mean? // First-Generation College Students // Marquette University, n.d.). The goal of the current study was to hear the opinions and thoughts of first-generation college students on how social, racial, and financial barriers affect them and their transition into college. All interviews were audio recorded and transcribed. Transcripts were analyzed by using thematic content analysis using excel spreadsheets to document and compare each interviewee’s answer to every interview question. The participants of this study really take a dive into their lives at home, transition into college, financial support systems, social support systems and connections at college, and their lives on campus to give readers a better understanding of the barriers first-generation college students face but rarely speak about. Major findings in the study show first-generation students who are athletes have an easier time transitioning to college; minority first-generation students were afraid to attend a predominantly white institution away from home, and; building connections with faculty does help the social, and financial barrier first-generation college students face.

Abiotic Reactions in Low pH

Nitrification is an essential process in biological wastewater treatment systems. The significance of nitrification involves the transformation of ammonium to nitrate ions and the byproducts which end up being released into the
solution and atmosphere. Wastewater can reach low pH values due to high initial ammonium concentration in solution and AOB, ammonia oxidizing bacteria, releasing protons as a result of consuming ammonium. Typically, nitrification is inhibited at low pH values around 2.5–4.5, but instead it has been discovered that abiotic, or chemical, reactions occur in place of NOB, nitrite oxidizing bacteria. The study will consist of monitoring the byproducts of the abiotic reactions that occur in low pH wastewater by performing batch experiments at various pHs. By determining the abundance of harmful gas byproducts and the rate at which they exist, the data collected will determine a partial rate limiting reaction, if any, which can later be considered for studies in our environment on Earth or in regard to space travel. The experiments were designed based on previous literature on low pH nitrification, and this research will expand and reveal information on abiotic reactions and their harmful, volatile gas and/or aqueous byproducts.

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English

Being “American”: How Filipinos Constructed and Were Constructed by America

How is rhetoric used to construct migrant identity? More specifically, how did Filipino migrants construct, or have their identities constructed and racialized on their behalf in the United States? Our understanding of the rhetorical tactics that constructed migrant identity is essential to our deconstruction of these myths, and is of particular modern relevance due to the recent rise in Anti-Asian rhetoric. This research performs an analysis of the immigrant narratives of Filipino American labor icons, Carlos Bulosan and Philip Vera Cruz, from the United States’ colonization of the Philippines through the Delano Grape Strikes. These texts serve as indices to apply a rhetorical heuristic design to triangulate colonial Spanish ideology, Pacific Island epistemology, and United States colonialism. This design utilizes Chaïm Perelman’s seminal work in The Realm of Rhetoric as its framework, interpreting selected texts through data collection and the coding of particular rhetorical devices related to citizenship and identification. The research has shown Bulosan and Vera Cruz significantly enacting rhetorical strategies, through their narratives and texts, as they argue in favor of equality for the Filipino in America during their respective eras. This research is intended to instigate more literature on the topic of migrant identity construction, especially as it relates to Filipino Americans. Additionally, further research is necessary on the unique role of the Filipino American in the United States’ labor movement, especially during the Delano Grape Strikes.

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Writing

Social Media and Disinformation: Digital Critical Thinking

Disinformation has come to public attention in the last decade, with the rise of social media and targeted, political advertisements. As computer technologies rapidly evolve, humans have struggled to develop methods to combat the effects of disinformation and have even struggled to understand how disinformation spreads. Despite this, very little conclusive data on how people interact with disinformation on social media in their daily lives exists. This study aims to look at how disinformation manifests itself on social media as perceived by those individual users. This study will examine some of the causes and effects of disinformation on today’s world and begin to pose some solutions to fighting back against these technological actors. The study explored digital literacy and disinformation across various generations using 30–45-minute qualitative interviews with participants across five different
states. Respondents were asked about their social media use and digital critical thinking. Using inductive coding and analysis, the results show the impact of digital apathy across multiple generation as well as a lack of digital critical thinking when it comes to news stories. The results suggest that digital apathy and a lack of digital critical thinking are fundamental elements in disinformation spread. Fearful of retaliation for going against the curated crowd, respondents would rather not waste their time or energy to correct false information. Digital sympathy and rhetorical thinking are crucial to fight back against rampant disinformation campaigns to protect the future generations of social media.

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Special Education All Level

Supporting Culturally and Linguistically Diverse Learners: Implementing Culturally Relevant Pedagogy and Response to Intervention

Identifying a student as culturally and linguistically diverse (CLD) is to categorize them under an umbrella term that encompasses students from a variety of backgrounds. Culturally, this can include students who practice unique customs and traditions that distinguish them as a minority from their peers. Linguistically, this can include those who are raised in non-English or limited-English speaking households. The students that are identified as CLD are disproportionately represented in the population of students receiving special education services in the U.S. public education system. The disproportional representation has many contributing factors; each will be analyzed and addressed in this paper. In consideration of this disproportionality, practices such as the implementation of Response to Intervention (RTI) and culturally relevant pedagogy (CRP) may prove to be most effective when used in conjunction with one another. In this review, I will examine relevant literature involving RTI and CRP within the realm of special education in order to investigate the adequate level of support that is needed to provide special education services to a CLD student. I hypothesize that the results from this review will prove the necessity of providing each student with a free appropriate public education (FAPE) through the use of RTI and CRP.

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Genetics

Genetic diversity and pattern of infection of Spiroplasma in the alpine ground beetle, Nebria ingens species complex

Insect endosymbionts have been found in more than half of insect species. The roles these microorganisms play in their host could vary from parasitism to mutualism, but have not been well explored due to the high diversity of insects and their extremely heterogeneous life histories. In general, common endosymbionts, such as Wolbachia and Spiroplasma, could be beneficial to their host by increasing their longevity and the number of offspring, or by increasing the resistance of their hosts against other parasites such as nematodes. On the other hand, these endosymbionts could also cause male killing processes or post-mating cytoplasmic incompatibility in offspring, which could negatively impact the host population. Alpine environments are thought to be relatively harsh to resident species, with low temperatures and oxygen concentrations, limited resources, and high solar radiation. The adaptations of alpine insect species, and the nature of their ecological interactions with microbes, is therefore quite interesting. In this study, we aim to understand the role of Spiroplasma sp. NR, in their host, the Nebria ingens
species complex, by scanning the prevalence of infection, genetic diversity, and associating the infection rate with environmental factors and physiological, morphological, and molecular characteristics of the beetles. The preliminary results show a relatively high (57%) and geographically widespread infection rate of Spiroplasma throughout the Nebria ingens species complex.

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Political Science

Obama and the Administrative State

Presidents often cast themselves as visionaries ready to work with Congress to produce legislation. However, when Congress is not on the same page as the president, pushing legislation through becomes a difficult feat. This leaves the president to either bargain with Congress or use other measures to accomplish their policy goals. In the last century, presidents began to use the bureaucracy to initiate new or adapted policy. Presidents are able to direct agency leaders and other top level bureaucrats on rules and decisions coming from those agencies, allowing them to seemingly be in control. With the president in control of new policy, there is little room left for congress to legislate or block policies as defined by the constitutional separation of powers. In modern times, Barack Obama is known to have used his position as the head of the Administrative State to enact policy during his tenure in office. In this paper I utilize a qualitative study of rhetoric to suggest that Obama viewed the president as the leader of the Administrative State, and the Administrative State as a fusion of the executive, legislative, and judicial branches of government. Moving forward, I plan to comparatively study FDR and Obama to assess the shift between the New Deal and modern theories of the Administrative State.

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International Business and Marketing

Immigration Trends, Foreign Language Education Policy, and Society’s Attitudes and Perspectives

Foreign language education policy has been a topic of concern in the USA dating back to the time of the founding fathers. Throughout history, these policies have largely been influenced by immigration trends and society’s perspectives on immigrants. A paradox of American society is that it is a nation made from a “melting pot” of immigrants while the pressure on those to assimilate has resulted in a dominantly monolingual population. With changes in immigration rates and shifts in the national origins of immigrants throughout the ages, the attitudes and perspectives of the general public toward foreigners and foreign languages have also adjusted over time. This presentation will show how policy and public opinion have been tied over the past century by mapping how foreign languages have been taught and viewed in the USA, from the early waves of immigration to the present day.
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Chemistry

Identification of neutralizing antibodies response in early human immunodeficiency virus-1 infection

Human immunodeficiency virus-1 (HIV-1) is a retrovirus that targets CD4+ T cells, using its envelope (Env) glycoproteins to bind to the CD4 receptor. Once inside the body, Transmitter/Founder (T/F) viruses establish infection and can elicit neutralizing antibodies. Overtime, these antibodies could serve as precursors to broadly neutralizing antibodies (bnAbs) that target global neutralizing epitopes within HIV-1 Env. Previously, monoclonal antibodies (mAbs) from two HIV-1 individuals were isolated 7.5 months after infection: Z1047M (n=5) and Z1800M (n=3). These mAbs exhibit neutralizing activity against their autologous HIV-1 T/F virus but have unknown binding sites. Our aim is determining which Env epitopes are targeted by these mAbs. Using Enzyme-Linked Immunosorbent Assays (ELISAs), we characterized binding to their autologous HIV-1 T/F Env, measuring competition against well-known bnAbs and non-neutralizing mAbs: VRC01, B6, F105 (CD4bs), PGT121 and 447-52D (V3-glycan), and A32 (CD4 induced). We hypothesized that mAbs from both individuals will target at least one known HIV-1 Env neutralizing epitope.

For both Z1047M and Z1800M Env gp120 proteins, binding of B6, PGT121, 447-52D, and A32 reached an optical density of 1. In addition, F105 and VRC01 also reached the threshold against Z1047M gp120. Results showed mAbs competing with B6 binding to the Z1800M gp120 Env. All Z1047M mAbs achieved slight competition against VRC01, F105, and PGT121. The results indicate that these neutralizing mAbs from early HIV-1 infection recognized epitopes directly or near the CD4bs. Future studies will confirm the epitopes targeted, and also compare binding affinity and neutralization potency between the mAbs and well-known bnAbs.

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Entrepreneurship

Consumption During the Pandemic

While there has been plenty of attention given to conspicuous consumption, there has not been much research done from a different perspective beyond the materialistic status symbols that come along with conspicuous consumption, in this case, the COVID-19 vaccine. This research looks at the relationship between conspicuous consumption, education attainment and early access to the COVID-19 vaccine. According to the online survey conducted, consumers who scored above average in conspicuous consumption and higher than average in education attainment pursued earlier access to the vaccine. However, it is noteworthy to consider that there is an interaction effect between conspicuous consumption and educational attainment. In this instance, it is possible that healthcare access—in particular the COVID-19 vaccine—can be used as a status symbol for those who are highly educated. This research has implications for a further understanding of conspicuous consumption beyond the traditional sense.
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Family and Child Studies

Language Brokering Stressors and Its Impact on Academic Outcomes for Latino College Students

Being bilingual is often viewed as beneficial in terms of future job opportunities and cultural awareness. However, for children of immigrant parents who translate for their non-English speaking parents, it becomes an added stress. This study investigates the responsibilities and stressors of being a language broker and its impact on academic outcomes for Latino college students. The primary question that this research aims to answer is: To what extent is language brokering related to academic outcomes? The research hypothesis predicts that brokering can impact the academic dedication of college brokers on top of the already stressful college life particularly because, brokers perform service through pressure, not choice. Brokers may feel caught between the obligations of their adult lives and their family role. Additionally, there is difficulty translating specific jargon. A mixed methods approach is used for this study, which includes qualitative interviews and a quantitative survey. Result so far have demonstrated that all the interviewed participants were the main language broker of multiple siblings, who had a range of feelings when brokering in certain situations and experienced that brokering deviated their time from their academic responsibilities. The quantitative portion indicated that brokers translated once or more on a weekly basis for parents, frequently at doctor’s offices and that they translated emails. Being a Latino college age language broker has demonstrated that they translate for family members that are facing a language barrier, but it comes at the cost of taking time away from their school responsibilities.

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Anthropology

Color Evaluation of Human Cremated Remains From an Etruscan Urn

The goal of this study is to determine the temperature used to cremate the remains found in an Etruscan urn that was recovered in situ from the site of San Giuliano, Italy. A total of 190g of cremains were found in the urn. A set of 200 bone fragments (131.1g) from this were labeled, weighed individually, and examined to determine the bone fragment color, and also to look for bone fractures and percussion marks. The Munsell soil chart was used to standardize the assessment of bone color. Seventy-five percent of the bones were determined to be white in color indicating that they were burned at a temperature above 1000°C. The transverse fractures observed across 19.5% of the fragments suggest that the bone was still green when burned indicating that the individual was cremated soon after death. This means that the person was not first interred in a tomb but was immediately cremated after death. In addition, there were no percussion marks seen on the fragments. This is interesting because the fragments are very small in size, which typically takes extra processing after cremation in order to achieve this level of fragmentation. The average weight of cremated remains of a modern Italian adult is around 1.8-2.7kg depending on sex, so there are not enough cremains to represent an entire person in the urn. In the future using technology like X-ray fluorescence and X-Ray diffraction, will help learn more about Etruscan cremation practices.
Mentorship For Neurodivergent Undergraduate Students

Neurodiversity is an emerging term to describe neurological diagnoses including Autism Spectrum Disorder, ADHD, and learning disabilities. This literature review is an overview of information from various articles regarding mentoring programs and relationships for neurodivergent undergraduate students whose needs are not being met in today’s academia. It also examines the strengths of neurodivergent students in an undergraduate institution and the barriers faced by neurodivergent students in post-secondary education including transition, mental health concerns, social and communication struggles, accommodation barriers, and academic concerns. Current literature related to strategies for supporting neurodivergent students is reviewed, including the Holistic Critical Mentoring model, which aims to create a network of inclusive reciprocal relationships between mentees and mentors that centers the voices of and values mentees' whole beings. Finally, recommendations are given for supporting neurodivergent students in the post-secondary educational environment.

Elk Survival and Habitat Selection in Northern Hardwood Forests

Eastern elk (Cervus canadensis) were extirpated from Wisconsin (WI) in 1867. Reintroduction efforts began in 1995 and since then WI elk populations have been growing slowly. The key factors contributing to elk population growth include predator-prey dynamics, predator densities, habitat availability, and disease. This study aims to build off of previous research collected to further understand how various habitats are suitable for elk survival and reproductive success. We completed vegetation surveys in the Northern Hardwood Forests by randomly selecting locations, running parallel transects in one plot, identifying species of plants elk consume, and quantifying plant species diversity. Given the reintroduction of the species to new habitats in WI, it is not fully understood what may be hindering their growth and thus how biologists may effectively manage the species. Nutritional analysis of the vegetation collected will be completed in the near future and combined with previous research to build a more comprehensive data set.

Thermal Expansion of Cocrystals

In an environment where near everything undergoes thermal expansion, it is important for us to investigate and understand how those properties can be manipulated and controlled. In order for us to better understand these properties, our group has focused on co-crystals synthesized from organic materials, commonly using hydrogen and halogen bonds to control thermal expansion. After developing and verifying the formation of new co-crystals from various derivatives, mostly anthracenes and [4+2] cycloaddition reactions, our product would run through a
variable-temperature single-crystal X-ray diffractometer. Using our given data points, we are able to create a crystal lattice that shows us how components within the crystal are stacking and reacting with one another. When looking at the crystal lattice at various temperature, we are able to see where the thermal expansion is occurring, at what rate, and to what magnitude. Our experiments yield products classified as either positive, negative, or zero, and could occur along an axis or volumetrically. Most commonly, results will yield a positive thermal expansion meaning an increase in size upon heating. The experimental data we gather rarely produce a negative thermal expansion and even more rarely produce a near-zero or zero thermal expansion. While this study is still in the theoretical phase, we plan to explore wider varieties of organic compounds and derivatives as well as use various solutions in our co-crystal synthesis.

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Music Education

Musical Expression Abstract

The purpose of this project is to show how the music production creative process is conducted. We will categorize and examine the steps of composing music with a keyboard to having it recorded with live orchestra. This research is conducted via the use of a digital audio workstation (DAW). The main use of the digital audio workstation (DAW) is for its capability for sound manipulation. The DAW can be used to record, edit, and/or produce sounds. DAW’s give users access to a vast audio sample library that can be manipulated with or without visual component. DAW’s also allow third-party audio samples to be downloaded and utilized in projects. With the use of Logic Pro X, I have captured musical ideas and composed several musical compositions. Within my musical compositions I explain my creative processes, such as the idea of ‘groove exercises. The creative processes vary with each composer, so as the process of creating music has no strict methods. However, in my creative endeavors the feel of the music itself correlates with my own internal emotions. Different experiences shape the magnitude of emotional diversity within each musician. Henceforth, the unique background of individual artists determines the outcome of their imaginative creations. In conclusion, this project will explain how music can be conjured by using Apple’s industry standard DAW; “Logic Pro X”.

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Chemical Engineering

Investigating Poly (butylene fumarate) for 3D Bioprinting Application

This research investigates two forms of a fumarate-based biopolymer, poly (1,2-butylene fumarate) (1,2-PBF) and poly (1,3-butylene fumarate) (1,3-PBF), to create bioinks for 3D bioprinting of bone scaffolds. Unlike the traditional methods of bone tissue replacement, the 3D bioprinting of synthetic biopolymers allows for the creation of bone scaffolds which degrade and encourage regeneration of new bone tissue. A common biopolymer for bone tissue engineering poly (propylene fumarate) (PPF) has been found to have mechanical properties similar to that of native bone; however, it has a slow degradation rate. Former research has found that one form, 1,3 PBF was also found to have similar mechanical properties related to native bone but has a faster degradation rate than PPF. The process for this investigation includes a synthesis reaction of fumaryl chloride and 1,2-butanediol or 1,3-butanediol combined with a method of nitrogen sparging to remove the byproduct hydrochloric acid (HCl). This is a polycondensation
reaction in which the carbonyl end groups of the fumaryl monomer reacts with the hydroxyl end groups of the 1,2-butanediol or 1,3-butanediol. After the polymer is formed, proton NMR spectroscopy was used to analyze molecular structure of the synthetic biopolymers. Bioinks were then created using a method of UV crosslinking. The results from the crosslinked bioinks gives a promising outlook to further research into what parameters and geometric shapes are suitable for 3D bioprinting 1,2-PBF and 1,3 PBF into bone scaffolds.

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Sociology

How the New Media Environment Promotes Sexism Affecting Ideology and Trends in the United States

This study investigated sexism in the new media environment and how that caused and affected ideology and trends in the United States. This qualitative research focused on the contemporary video games industry and how it has promoted and advertised sexism in the United States. This study selected five popular games played in 2020. The video games were played and commented on by commentary youtube channel MessYourself Gaming. The video games included: Assassin's Creed: Valhalla, Call of Duty: Black Ops Cold War, Final Fantasy VII: Remake II, Animal Crossing: New Horizons, and GTA 4. Using thematic analysis, videos were analyzed using the following deductive codes: verbal abuse towards women, physical abuse towards women, unrealistic body image of women, revealing clothing on women, damsels in distress and finally underrepresented female characters. Following themes also emerged during the thematic analysis: inappropriate exaggeration commentary about women from the gamer. It was predicted that video games have a contribution towards sexism in the United States affecting ideology and trends such as treatment of women, rape culture, well-being of women, etc. Findings showed an extreme lack of women representation in video games. When women were shown, they were represented as background characters unlike male characters who were the main spotlight. This article also includes possible solutions when it comes to video gaming and also recommendations for future research. Solutions include eliminating bias, being inclusive and making women look like women in video games. For future research, pornography and women in male dominated workplaces should be further analyzed when looking at treatment and perception of women from men.

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Nursing

Preventing SIDS: knowledge and Awareness

This research study aims to evaluate and compare sudden infant death syndrome (SIDS) prevention knowledge of local students in southeast Texas and understand any gaps of knowledge that may be present. Research on SIDS prevention is important because SIDS is the fourth most common cause of death in infants. Prevention measures are simple; all families should be informed and understand how to keep their newborns safe from SIDS. To evaluate the knowledge of local southeast Texas college students, the researcher developed and distributed an online, 18 question survey about SIDS prevention via Qualtrics. Criteria for inclusion in this study were as follows: 18 years or older, and a Lamar University student completing a “summer 1 semester” course. Excluded were those less than 18 years of age, and those who did not attend Lamar University during a summer 1 course. 106 participants met
criteria and completed the survey. Analysis is still being completed on this study, but so far, results have shown that although participants displayed a basic understanding of SIDS prevention measures, additional education is needed regarding specific preventative interventions. Further evaluation of the research findings will aid in focused efforts to increase SIDS prevention education. In conclusion, there is an apparent need for increased awareness and focused education geared at specific SIDS prevention strategies to decrease the rates of this fatal condition.

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International Studies, Human Rights

The Role of Counter-Spaces in Addressing Microaggressions in Higher Education

This project used oral history to study the experiences of students of color at Southern Methodist University (SMU), a Predominately White Institution in Texas. Researchers interviewed Black, Latinx, and Southeast Asian SMU alumni to create digital videos for the SMU archives and study how the school can best attract and retain minority students. By interviewing members of these communities, this historical method of storytelling allows interviewees to share their experiences on their own terms. The interviewees were graduate and undergraduate students, and their graduation years ranged from the 1960s to the present day. This presentation will particularly focus on oral history data that showed how students of color have used counter-spaces to challenge the effects of microaggressions and address life at a PWI. The impact of these counter-spaces will be divided into two categories: promoting inclusivity and standing up for students of color. The research showed that, while the organizations played an essential role in the university, they faced their fair share of challenges, some of which were caused by the university itself. This project was completed thanks to Southern Methodist University, the SMU Clements History Department, faculty mentor Dr. Jill Kelly and fellow research assistants Sriya Reddy, India Simmons, and Carson Dudick.

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Chemical Engineering

Development of a Microwave-Assisted Air-Flotation Crude-Water Demulsifier

Water-in-oil and oil-in-water emulsions are stable blends of water and oil frequently formed by the high shear mixing of process water and product petroleum during operations such as extraction, pumping or desalting. Breaking emulsions into their separate water and oil phases is costly, but necessary. This demulsification process is typically achieved using thermal energy plus costly chemical demulsifiers. However, the PI's lab has made significant progress toward developing a chemical-free, microwave demulsification process with economic promise. This process is able to demulsify most crude:water emulsions, but further increasing the demulsification rate would be economically beneficial. Gas flotation is another tool to separate oil:water emulsions, and in combination with a microwave separation, we hypothesize that separation rates could be increased. This project will develop a combined microwave-gas flotation demulsification prototype to exploit both methods for faster separation. This process is completely new, and validation of the prototype could be of high commercial value.
Understanding Energy Across Disciplines: Insights from Cognitive Neuroscience

Energy is a universal scientific concept taught to students in various educational contexts (e.g., chemistry, physics, and biology). Recent research suggests that learning about energy in these separate contexts can lead students to compartmentalize their knowledge. They often understand domain-specific energy characteristics rather than thinking about energy as a unified concept present across domains, leading to a struggle to unify these concepts across fields and making it more difficult for students to find mastery in STEM subjects (French, Sanchez, Macur Brousil, & Balison, 2015). Previous studies (e.g., French et al., 2015) have used qualitative, self-report methods such as interviews to investigate how students and faculty define and conceptualize energy, such as the ability to do work, act as a causal agent or to measure a physical change in a system. The current project pilot emphasizes the investigation of student processes for concepts related to energy in chemistry and physics through the evaluation of surveys and word association tasks. This research should aid in determining what mental representations can be primed by activating context-specific modes of thought while aiding in the understanding of how each cerebral hemisphere contributes to compartmentalization and language processing. Ultimately, the project will explore the usage of metaphors that could aid students in understanding complex scientific concepts such as energy in different educational contexts.

The Challenges of Suicide Protocols in Texas Rural Jails

Jail suicides are a prevalent issue in America, as those suicide rates have progressed over time. This increase could be for multiple reasons, such as a lack of funding for jails leading to overcrowding, or due to limited access to mental health resources in these facilities. Generally, jails have a higher mortality rate compared to prisons. The purpose of this study is identifying challenges and areas of improvement regarding suicide protocols, including access to mental health services, in rural Texas jails. Rural is defined as a population of less than 10,000 residents. Applying this definition, 88 of the 247 jails in Texas are rural. The study involves a two-part process gathering quantitative and qualitative data. Part-one includes completion of an online survey by jail administrators. Part-two includes interviews with participants from part one. Both parts include questions regarding perceived effectiveness of training for suicide prevention and what access jail inmates have to mental health resources. Data collection will be completed by the end of Summer 2021. Anticipated findings include limited trainings done beyond the state-mandated protocol, limited access to inmate mental health services, and a need for access to mental health professionals and increased funding for treatment. A strength is that collected data will raise awareness of the lack of resources and funding of rural jails. A limitation includes jail administrators may not be forthcoming about their procedures and resources. Also, the number of participants is limited as many counties rely on other counties due to not having a jail.
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Biology

**The Effect of Polyphenols on Oviposition Responses in Aedes aegypti**

The invasive species Aedes aegypti (Linnaeus) is a competent vector of several arthropod-borne viral diseases that cause life-threatening pathologies when transmitted to humans. The importance of controlling the population of this globally invasive vector has been of special significance as their geographical distribution continues to expand. A method of mosquito control prevention exploits the mosquito’s sensory perception of olfactory clues in their ecological niches to reduce the success of oviposition rates and overall vector competence. Early stages of Ae. aegypti rely on vegetal fluids enriched with phytochemical compounds such as polyphenols which may influence preference of oviposition sites in adult gravid females. Recent research on the physiological effects of a polyphenol-rich diet demonstrates an influence on vector lifespan by triggering an autophagy pathway through the activation of AMPK, causing a reduction in the midgut microbiota in the early adult stage. However, the olfactory perception of polyphenols, specifically on plant phenolic acids, has been unobserved in Ae. aegypti. This investigation observed a negative behavioral response towards two hydroxycinnamic acids commonly found in vegetation and the direct metabolite, 4-ethylphenol. We demonstrated significant variation in oviposition behavior between the three chemicals in higher concentrations by setting up multiple dual-choice assays measuring egg-laying preference. The influence of dietary polyphenols on egg-laying can help understand the range of behavioral effects in an environment where phenolic dietary antioxidants are present, especially if polyphenols benefit vector populations.

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Middle-Grade Math and Science Education

**Mentoring Female Latinx Students: A Support for Identity Development**

In this study, mentoring relationships and dimensions of identity were explored among Latinx cisgender female students in higher education, a population that is often left unconsidered in mentorship research. Mainly, this project sought to examine the role of on-campus mentors and off-campus mentors in identity processes for these students, of which were 162 colleges students at private institutions. Primarily looking at identity, participants reported whether they had mentors, both on-campus and off-campus. Students also responded to questions rating their dimensions of identity, which were compiled into five subscales: commitment making, exploration in breadth, ruminative exploration, identification with commitments exploration in depth (Luyckx, 2007) on a Likert scale. Based on Rhodes’ (2005) conceptual model of youth mentoring, it was expected that having an on-campus or off-campus mentor would be significantly related to the previous identity dimensions. Ultimately, it was found that there were significant correlations between having an on-campus mentor and having strong identity development but only within the exploration of breadth and exploration of depth subscales. There were no significant correlations between having an off-campus mentor and identity dimensions. These findings suggest that these students were provided with the resources and opportunities to explore various identity pathways, likely because on-campus mentors have more access to such resources than off-campus mentors, which tend to be family and community members.
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Anthropology  

Data Analytics at Work

New data analytics tools shift how people make decisions and relate to one another within the information economy. By understanding how organizations use people analytics tools to inform decision-making in an organizational context, firms will identify and observe mechanisms and trends relating to management and human behavior. They will also have the unique opportunity to quantify the impact of specific management practices on individuals throughout a period. Our previous work has shown that firms are quickly adopting this technology for the management of their employees. But how exactly does the use of analytics shape and change management practices? That is still largely unknown, and a gap in the literature we aim to fill through this inductive, mixed-methods research project. A means towards answering the question is understanding and contextualizing the literature and data at a high level. To this end, we conducted a literature search on how managers use data analytics in the workplace. This review of the literature will serve as a foundation for a multi-year study currently in the design stage with a multinational energy company. The findings of this project will shed light on how access to data analytics tools can influence managers’ behaviors and the environments in which they work.

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Mathematics  

Counting exact 2-Tiered Parking Functions.

Motivated by the open questions proposed by Mark Dukes in 2021, consider $M = m_1 + m_2$ total cars with $m_1$ red cars and $m_2$ blue cars which will park on a street in a straight line. To describe the way they park, we let the entries of the tuple $\alpha = (m_1; (a_1, \ldots, a_{m_2}))$ describe a parking rule for these $M$ cars. We begin the parking rule by allowing all $m_1$ red cars to enter the street and park in a straight line without restriction. Then the blue cars park as follows: the first blue car must park exactly after $a_1$ red cars, the second blue car must park after exactly $a_2$ red cars, and so on, until the last blue car parks exactly after $a_{m_2}$ red cars, assuming there are enough red cars for this to be possible. In this setup we imagine that regardless of where the red cars park there are always spaces available for the blue cars to park between the red. Every possible such $\alpha$ which allows the cars to park as described is called an exact 2-tiered parking function of length $M$. In this talk, we establish that $(m_1 + 1)m_2$ gives the total number of exact 2-tiered parking functions of length $M$. Our argument relies on a constructive proof related to a classical result on the cardinality of the power set of a finite set. We remark that when $m_1 = n$ and $m_2 = n - 1$, our result recovers the enumeration of classical parking functions in which all cars are the same color.
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Biology

Aedes Evolution Experiment

The Aedes Evolution Experiment is investigating the use of Hv1a, a spider toxin, as a mosquito-specific insecticide. The amount of Hv1a guided spider toxin (gHv1a) that will kill either 50% or 90% of a mosquito population (LD50 or LD90 (LD = “lethal dose”)) will first be determined. After, further research will be conducted to passage the Aedes mosquitoes at either LD50 or LD90. The goal of this project is to demonstrate that any mosquito population that becomes resistant to the guided spider toxin will lose the capacity to bind and vector dengue virus. Thus, any “insecticide resistance” that develops will be a benefit in terms of disease control which is unlike chemical insecticides. This work is part of the Kearney Lab’s Aedes Evolution Project which will work on developing an Aedes mosquito population that is resistant to our targeted insecticide, Hv1a. Dr. Kearney’s lab focuses on the development of specialty peptides to selectively knock down pathogens and insect pests without affecting off targets. Dr. Kearney’s lab is interested in large scale, low-cost delivery systems that can solve third-world problems. I would like to thank Dr. Kearney, all the members of the Kearney Lab, and the Baylor McNair Scholars Program, without them I would not have been able to participate in such an amazing lab experience. I would also like to acknowledge and thank Baylor University and its Biology department.

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Biology

Investigating the role of UNC-33 in aging and age-related markers in C. elegans

Aging is characterized by the decline and deterioration of cells and organs due to accumulation of macromolecular and organelle damage. There is an increase in intralysosomal concentration of free radicals, age pigment lipofuscin, and a deficiency of lysosomal protein degradation as aging progresses. The ortholog of gene collapsin response mediator protein -2(CRMP-2) in C. elegans is UNC-33. UNC-33 acts as an important modulator of neurite outgrowth and axonal guidance, membrane protein trafficking, and neuronal excitability. There are three isoforms of the UNC-33: small, medium, and large. However, only UNC-33L(large) acts to promote trafficking of axonal proteins. In this study, we hypothesize that nematodes lacking all three isoforms will exhibit premature death, reduced locomotion, and defective pharyngeal pumping. Additionally, we hypothesize that the expression of the isoform UNC-33L will be sufficient to rescue the shorter lifespan, defective pharyngeal pumping, and reduced locomotion found in unc-33(mn407) mutants. To analyze the role of UNC-33 in aging, we used unc-33(mn407), unc-33(mn407) with the unc-33L transgene, and N2 strains. To test the hypotheses, the lifespan of 20 synchronized young adults per strain was assessed by looking at survival every 24 hours until death. To test age-related markers, liquid locomotion and pharyngeal pumping of each strain was assessed in four-day increments, for a total of 12 days. Based on our predictions, we expect to see decreased lifespan, locomotion, and pharyngeal pumping in unc-33(mn407). Additionally, we predict a rescue of these three different phenotypes when the isoform UNC-33L is present.
Metals and fibrin polymerization in blood clotting

The formation of blood clots is a complex process involving a cascade of reactions, where in the final stages, the protein fibrinogen is cleaved to form fibrin. Fibrin (and fibrinogen) bind to blood platelets and red blood cells at the site of an injury, and the metal ions, calcium from the blood and zinc from platelets induce fibrin to polymerize as fibrous strands of the blood clot. Other metals that with similar chemical properties to zinc, (in particular, the transition metals copper, nickel, and cobalt) are essential in physiology, but if present in excess they affect clotting. This study investigated these metals for their effects on fibrin polymerization in vitro. Fibrin polymer formation was detected with a spectrophotometer over a concentration range of the metals, and the results were compared to zinc and calcium. The rate and extent of fibrin formation with copper was statistically equivalent to zinc. The concentration the metals required to reach a maximum was equivalent for each metal while extent of polymerization decreased with nickel and cobalt. The metals were maximally effective at 40 micromolar, while calcium differed in that millimolar concentrations were required.

What Words are Important When Children Talk?

Children with developmental disabilities, such as autism spectrum disorder, tend to have little or no functional speech. They typically convey their message using communication aids, also known as augmentative and alternative communication (AAC). Two types of vocabulary are used in AAC to make the selection process easier for both the child and their communication partners, such as parents or teachers. Core vocabulary is applied across different settings and groups and emphasized in the AAC field. While fringe vocabulary differs across context and groups and is not frequently utilized. When core words are used exclusively, it limits the child to communicate clearly because this approach does not fully incorporate some of the basic principles of child language development. To broaden the research on core vocabulary, this study uses descriptive statistics to examine secondary language samples from typically developing children 2 ½ years old to determine the proportions of utterances containing core only, fringe only, and a combination of the two. Our hypothesis of the study is the majority of the children's utterances will contain both core and fringe vocabulary. After acquiring the results, this study suggests that although core vocabulary is found to make up half of the children's utterances, fringe vocabulary is still being used and is vital for clear communication in AAC. Further research needs to be done to address the gap in knowledge between core and fringe vocabulary, mainly because this research impacts communication development in children with severe developmental disabilities.
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Biology

**Mycobacteriophage XianYue uses temporal gene expression to maximize host infection cycles.**

Bacteria are capable of being infected by their own family of viruses known as bacteriophage. Bacteriophage (phage) tailor their genomes and cycles of infection to be most compatible with their current host, as was seen with the mycobacteriophage Marvin. This phage infects the bacterium Mycobacterium smagmatis and shares genome similarities with its host. Much can be learned about bacteria and their viruses by studying the genomes and gene expression of bacteriophage. It has been shown previously in the literature that many phage will utilize different genes at different time points during their infection cycle of the host. However, is this the case in some mycobacteriophage? Previous research with the mycobacteriophage XianYue has indicated that only portions of it genes are used at 30 minutes post infection. In the current research we will use RT-PCR with quantification by imageJ to determine which genes XianYue utilizes at 60 minutes post-infection. We hypothesize that different regions of the XianYue genome are utilized at different times during infection of its host, Mycobacterium smagmatis mc122 and that these changes occur in a temporal fashion.

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Global Health; Botany BMAJ; Environmental Studies

**Human-Environment Interactions and Mental Health Outcomes in the Age of COVID-19**

Our concept of perceived mental wellbeing and how we use the built environment has been shaped by the COVID-19 pandemic in the past year. This research will investigate how humans in the city of Madison, WI have been using green spaces in the area and if these places have correlated with better perceived mental wellbeing in the age of COVID-19. The study will utilize a variety of quantitative and qualitative research methods and analyses in order to develop a well-rounded theory that will form our understanding of the relationship between mental health and our built environment. Additionally, demographic information will be investigated as well to understand how these data may influence use of greenspaces and possible mental health outcomes.

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Environmental Science

**Response of Nutrient Cycling to Ecological Remediation at Valle de Oro Urban Wildlife Refuge, Middle Rio Grande Valley**

How are legacy nutrients affected by ecologic remediation in the riparian environment? And, to what degree will ecological health of the riparian environment be altered by the remobilization of legacy nutrients? This research will determine a baseline of nitrite (NO2), nitrate (NO3), ammonia (NH3), and phosphate (PO4) concentrations by sampling and administering geochemical lab analysis on waters from three on-site wells and five soil locations at Valle de Oro Urban Wildlife Refuge (VDO). As ecological remediation efforts at VDO commence, these baseline data will be compared to continued on-site geochemical research with the goal of determining to what extent
remobilized nutrients will pose a risk of pollution and or eutrophication in the wetland playas, once constructed. The current stage of research is characterized by continuous sample gathering, preparation, and analysis, as well as the interpretation of the interpretation of results. We have found groundwater concentrations of NO3 ranging from 0.8 – 2.6 mg/L and PO4 concentrations ranging from 1.5 – 2.3 mg/L. We have also found soil concentrations of NO2 ranging 0 – 2.9 mg/L, NO3 ranging 1.5 – 3.3, and PO4 ranging 4.5 – 70.0 mg/L. These preliminary results do not suggest that the analytes are significantly leaching into groundwater. However, this may not hold true in the future if rates of nutrient cycling increase substantially. The next stages of research include an ICP-OES analysis which will be the precursor to a column leaching experiment.

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Texas Tech University, with Dr. Keyel, Minal Engavale
Immunology and Infectious Diseases

Distinguishing Conditional Knockout mice that develop Systemic Lupus Erythematosus manifestations such as phenotypes of glomerulonephritis and immune complex deposition.

Approximately 1.5 million Americans have a form of lupus, and SLE makes up around 70 percent of the lupus cases. Systemic lupus erythematosus (SLE) is one of the many chronic autoimmune diseases and causes inflammation in connective tissues. The production of anti-nuclear autoantibodies can characterize SLE pathogenesis. Autoantibodies are antibodies that mistakenly target and attack a person’s own organs or tissues. This occurs when the person’s immune system fails to distinguish between self and non-self, leading to inflammation. DNASE deficiency can lead to SLE and autoimmunity. The deletion of the DNASE1L3 in mice via conditional knockout mouse using the technique Cre-loxP shows similar SLE-like autoimmunity. DNASE1L3 is shown to digest chromatin, which is a potential self-antigen and lowers the number of autoantibodies. Furthermore, ELISA is used to determine the autoantibodies levels of the conditional knockout mouse that had DNASE1L3 removed from the macrophages. The mouse serum contains Anti-dsDNA IgG followed by immune activation, and so a sandwich Elisa is used with anti-mouse IgG to determine the concentration of the antibodies. Collectively, data is still being gathered from Elisa.

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St. Edward’s University, with Dr. Christie Wilson
History and Economics

Austin’s focus on Youth Homelessness from 2015-2019

From 2015-2019 homeless youth were placed as a priority for the Austin community and in turn a priority for local organizations, advocacy groups and city leaders. Through partnerships between grassroots organizations and local government, and public input youth homelessness was seen as a sympathetic cause while adult homelessness was seen as a crime. This led to legislation and local initiatives to reduce youth homelessness to the exclusion of other homeless populations. The actions taken have led to Austin setting a goal for themselves to be the first city in the country to end youth homelessness by 2020. This essay explores how this special population was able to have this concrete and attainable goal by looking at primary sources like the Austin Statesman, other local news outlets and local advocacy research materials. As new homeless ordinances are being introduced in Austin it is important to look at what has worked in reducing the homelessness and how Austin can use the strategies for one special needs group and apply it to the broader homeless population.
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Texas Tech University, with Dr. Brandy Dr. Brandy Piña-Watson
Psychology

Ethnic Identity & Acculturation Gaps on the Mental Health & Academics of Mexican Descent College Students

Larger acculturation gaps between caregivers and their children have been associated with poorer relationship quality between caregiver and their young adult children. The present study will focus on ethnic identity acculturation gaps and how these gaps may be associated with poorer parent-youth relationship quality and in turn, various mental health and academic outcomes for Mexican descent college students. Specifically, we hypothesized that larger ethnic identity acculturation gaps will be associated with increased intergenerational conflict which will then increase depressive symptoms in the student, lower their self-esteem and lower their academic motivation. Data will be conducted by snowball sampling methods recruiting emerging adult Mexican descent college students across the nation to take an online survey through Qualtrics. They will be compensated using a $5 Amazon gift card for their anonymous and voluntary participation. The survey is comprised of scales that have been validated for use with this population. As we study this phenomenon, we can identify the type of struggle that is unique to Mexican descent students growing up in the United States. It’s evident that the LatinX population is rapidly growing, therefore it is our duty to find the root of this problem and provide a plan of action to fix it before it negatively affects our society.

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University of Wisconsin-Madison, with Dr. David Andes, Dr. Joseph McBride
Nursing

Bacterial Identification by 16S rRNA Gene Sequence Analysis and Its Effect on Antimicrobial Use

16S ribosomal RNA are nucleic acids found in ribosomes of prokaryotic bacteria. 16S rRNA gene sequencing can identify and classify bacteria more definitively based on genotypic methods rather than phenotypic characteristics. This molecular diagnostic test can help identify poorly defined bacteria, differentiate between closely related species, isolate infectious bacteria, and more. The use of this analysis can be beneficial in clinical care settings in identifying both infectious microorganisms which can in turn help medical professionals properly prescribe the correct antibiotics. By eliminating antibiotics that may not pertain or effectively target the infection, it can reduce the cases of antibiotic resistance and eradicate further health complications. The goal is to analyze whether 16S rRNA gene sequencing can de-escalate the antibiotic stewardship in the number of anti-pseudomonal, anti-MRSA, and the total number of antibiotics prescribed. Currently, the population of interest are orthopedic patients but we hope to initiate further research on other populations of interest as well.
Alexander Neiman, neimaa432@myemail.northland.edu
Northland College, with Dr. Andrew Jensen
Mathematical Science; Physics

Renormalization Groups Method on Reaction-Diffusion Partial Differential Equations

In order to find solutions to a set of reaction-diffusion PDEs, it will be shown that using the renormalization groups method specific kinds of PDEs can immediately be reduced to a form of the complex Ginzburg-Landau equation (CGLE). After some short matrix calculations, any reaction-diffusion equation of similar form can be reduced to an equation with known wave solutions. A wave solution for a specific set of PDEs is found, along with discussion about the stability of it’s solution.

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Visual Arts

Barriers to Sustaining the Artistic Identity Through Adulthood

This is primarily a qualitative study where content analysis will be used to explore the effects of societal standards and perspectives towards artists on the development and sustainability of the artistic identity into adulthood. Within this research, artistic identity refers to one’s personal relation with the arts and one’s perception of oneself as an artist. After a literature review and consultation with various experts in the field, an outline will be created for semi structured interviews. The sample study will include individual interviews with high school art students, college art students, art professors, and local artists. Each will be asked about the barriers they have faced within their artistic journey, with a focus on societal beliefs and practices. All questions will be open-ended to expand the range of data collected and to limit potential bias. Interviews will be audio recorded and transcribed with the participants’ consent. All participants will reside within Wisconsin or Illinois to allow face to face interviews. The analysis of these interviews will allow me to explore the impediments affecting artists, as well as what factors support artists. The results will serve as means to formulate a product of support for those who desire to pursue the arts, whether in personal or professional life.

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Psychology

College Adjustment of Black, Indigenous, and Students of Color

Adjusting to college life can present academic, psychological, and interpersonal stressors that adversely affect students. This period may be particularly stressful for Black, Indigenous, and People of Color (BIPOC), but BIPOC students' experiences are understudied. We will recruit a group of 100 incoming UW-Madison freshmen; 50 of whom will be BIPOC and 50 of whom will be white. Before arriving on campus in the summer before freshman year, we will administer an online survey to assess stress and well-being. One month into the semester, we will assess engagement in extracurricular activities, use of campus resources, and their sense of belonging. At the end of the Fall semester, we will re-assess all baseline and one-month measures. We will also acquire end of year academic transcripts. Through random sampling of the BIPOC group, we will conduct three focus groups at post-testing; these
focus groups will serve to contextualize quantitative data on college adjustment. This study will provide insight into how the college experience affects college freshmen in general, and BIPOC in particular, we will examine whether early engagement in extracurriculars and campus resources differentially mediate BIPOC healthy adjustment to college life.

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Baylor University, with Johsua Keene
Anthropology

Hall's Cave Study

The contents in Hall's Cave have been remarkably well-preserved due to conducive environmental conditions. Previous research efforts determined that humans occupied the cave for short periods of time, episodes between occupancies were due to inclement weather which prevented conventional residency. The artifacts that have been found in and around the cave indicate heavy and consistent, paleoindian traffic. Radiocarbon dated sediment from inside the cave extends as far back as the Last Glacial Maximum. The various shifting properties of the sediment matched regional climatological records, to help determine a more accurate age range. My research was conducted through Baylor's Summer field school and will revolve around the anthropological analysis of the Hall's Cave archaeological and paleontological site in central Texas. This research consists of two goals, the first of these objectives will be to look at the geochronology of surface middens to determine context. By carefully excavating the site, we hope to learn more about regional human settlement patterns from up to 12,000 years ago. What were people in this region consuming? How did they come to procure these ingredients and how exactly were these meals cooked? Lithic tools found in varying stratigraphic layers will help us understand more about how different groups subsisted. By studying hot rock cooking, we can understand more about ancient sedentary lifestyles. Think about how drastically our access to food has changed. Why grind up seeds with stones for a meal, when you can go to the McDonald's drive-thru and order a Big Mac?

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Bowling Green State University, with Dr. Conor McLaughlin
Psychology

Effects of the COVID-19 Pandemic: Student's Mental Health

The objective of this research paper is to inform readers of the heavy impact that the COVID-19 pandemic and its restrictions have had on the mental health of all students. This subject is important because mental health is often disregarded in our daily lives and with the restrictions regarding the recent pandemic, there are many predictions involving the effects it may have on mental health, in general. The research was conducted through a metasynthesis of three similar qualitative studies in regard to students and their reactions to the COVID-19 pandemic. The research is expected to show lots of similarities between articles, that includes mental health. Each article is based in a different location around the world because it is important to understand many different perspectives of students affected by this global pandemic. The purpose of the metasynthesis is to synthesize and interpret the three qualitative articles in order to construct a greater finding within all three articles. In a broader perspective, research shows that students were heavily affected by the global COVID-19 pandemic. Students, of all ages around the world, shared very similar responses in regards to their mental health. Answers involving technology, social life and health were recurring themes throughout the qualitative studies. Overall, there were distinct effects regarding these students' mental
health from the pandemic based on the studies. The study reveals the importance behind mental health specifically
during/after undergoing the stresses of the pandemic and its restrictions and also understanding our next steps.

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Sonoma State University, with Dr. Wenwen Ni
Psychology & Philosophy

Effects of the Perceived Controllability of Social Class

The objective of this research is to examine whether the framing of social class as being either a controllable or
uncontrollable social identity affects how people from different social class backgrounds are perceived. Our study
randomly divided participants into two groups: one in which participants wrote about ways in which people can
control their social class (controllable identity condition), and one in which participants wrote about how social
class is outside of a person’s control (uncontrollable identity condition). Results showed that participants who wrote
about how social class is uncontrollable held marginally more positive perceptions and significantly less negative
perceptions about people from lower social class backgrounds compared to participants who wrote about ways
in which social class is controllable. They were also less likely to say that people should be judged based on their
social class. This study helps us understand how attitudes towards those from different social class backgrounds
can change depending on whether social class is seen as a controllable identity or not.

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Eastern Michigan University, with Dr. Ellen Koch
Psychology

Fear Acceptance Versus Fear Reduction for Proper Extinction Learning in Augmented Reality Exposure Therapy

Emotional processing theory is the underlying model for traditional exposure therapy. This approach to exposure
presumes that the amount to which fear reduces from peak fear levels within an exposure session predicts successful
treatment of specific phobias such as arachnophobia. Inhibitory learning theory (ILT) offers a different approach to
exposure centered around forming new non-threat associations (i.e., memories) by way of fear acceptance rather
than attempts to focus on reducing fear levels (i.e., fear reduction). ILT may be more effective for helping phobic
populations because the model promotes the learning of non-fear associations in the presence of the feared stimuli.

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University of New Mexico, with Dr. Peter Vorobieff
Mechanical Engineering

Instabilities of Massive Particle Curtain

What is the relation between two separate matters and their mixture in a high-pressure environment? How do we
account for perturbations created at the interface of massive particle curtain due to an impulsively accelerated mixed
gas? This research seeks to understand the formation and time evolution of shock driven multi-phase instabilities
(SDMI) developed at the interface of a massive particle curtain. The deviations for perturbation amplitude and
generated vortices will be measured and tracked from the initial conditions at each instant in time. This research
will also include and improve on tracking the post shock particle velocity and reflected shock velocity to compare with numerical solutions. This research will contribute to the field of Mechanical Engineering more specifically to the field of High Energy Density Physics (HEDP). In March 2004 NASA launched a successful X-43A hypersonic propulsion system that used oxygen from the atmosphere passing through the vehicle to produce combustion instead of a tank onboard. Although this is a smaller, lighter, and faster spacecraft but the rate of mixing fuel and air is still affected by instabilities due to the presents of shock waves on the vehicle. Experts in the field of HEDP responded to the question regarding the instabilities and vortex generation at the interface of two accelerated fluids of various densities by visual, mathematical, and experimental analysis. Three of the studies that has advanced the thinking in resolving this issue are the RTI (Raleigh-Taylor instability) and RMI (Richtmyer Meshkov Instability) and SDMI (Shock Driven Multiphase Instability). Where RMI is the shock induced form of RTI and SDMI is analog of RMI. CFDs and Image processing have conventionally been used to describe generated interface instabilities between two accelerated fluids of different densities. This research will intervene by further understanding how SDMI instabilities are related to the mixing of multiple matters. Even though this research has been done before, but not with the same volume fraction and arrangement of particles. This research will perform a series of flow visualization lab experiments in five stages. The first stage reviews the shock tube experiments done by Peter Vorobieff. The second stage will collect certain theoretical values, equations for the behavior of shock and particle curtain. The third stage will produce a series of Flow Visualization experiments of perturbed particle curtain where the result is a series of images showing how the instabilities of particles has evolved in time. The fourth stage analyzes and measures the massive particle curtain instabilities through development of Mat-lab code and Image J. The fifth stage is about the new findings, refinements, contributions, limitations, and overall conclusion of the experiment.

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*The University of Texas at Austin, with Chiu-Mi Lai*  
**Humanities Honors (Asian Studies)**

**The Hybridity of Tradition and Modernity in Khmer Storytelling**

Storytelling can be a conversation among people of different generations, a conversation that helps them negotiate shared cultural identities based on both the past and the present. As Khmer stories are adapted into different genres and media, including feature films, television dramas, and performance arts, the social messages that different writers communicate shift and evolve. Yet, these desperate modes of storytelling retain their powerful affect as embodied ways of sharing and reshaping cultural identity between generations from past to the present. My research, which centers on modern and contemporary adaptations of “traditional” Khmer storytelling, moves beyond the conventional imperialist paradigm that posits a dichotomy between modernity as enlightened and progressive, and tradition as conservative and backward, arguing for a more nuanced conception of the dynamic relationship between the two. These kinds of cultural artifacts are not produced purely for entertainment, nor solely as vehicles for nostalgia. Moreover, I argue, these adaptations play a productive role in the ongoing negotiation and construction of identity in Cambodia and among Cambodian diasporic communities.
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University of North Texas, with Daphne Harris  
Psychology

Adverse Childhood Experiences and Socioemotional Well-being

Jeanette-Marie Reynoso, j.m.reynoso@knights.ucf.edu  
University of Central Florida, with Dr. Kelly Slay  
Elementary Education

The perspectives of black students who attended PWI high schools on college choice

College choice research has long explored the relationship between students’ high school context and college going behavior and enrollment decisions, yet few studies examine the implications of the school racial composition. This study looks at the college choice decisions of Black students who attended a predominantly white high school and were admitted to the University of Michigan, a predominantly white institution (PWI) that has struggled to recruit Black students since the implementation of a statewide ban on race-conscious affirmative action. Using qualitative methods and informed by college choice models and social identity theories, this study answers the following question: how does the racial make-up of students’ high school shape where they choose to enroll in college? Students’ perceptions and experiences of race-related cues in high school and during the college admissions process shed light on their decisions of whether or not to attend the University of Michigan.

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St. Edward’s University, with Dr. Emily Bernate and Dr. Adam McCormick  
Global Studies & Spanish

Major League Soccer as an Expression of Local and Transnational Latinx Identities

The purpose of this study is to explore ways that the Latinx community in the southwest region of the United States expresses belonging to local communities through soccer. This research study seeks to discover how overtime migration affects the cultural identity of the Latinx community living in the United States. Transnationalism, globalization, and social identity theory were used as theoretical foundations for this research study. The study’s methodology included a brief survey given to several Latinx Austin FC fans at local parks and watch parties. The survey was followed by a short interview that seeks to learn about the experiences of Latinx individuals living in the Austin, Texas. This study will allow individuals to understand how soccer serves to be a marker of cultural identity for the Latinx community in the United States.
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Women & Gender Studies + Government

**Can Secondary English and U.S. History Teachers Understand Ethnic Studies as a way to Combat Curriculum Violence Towards Students of Color?**

Previous literature proves the curriculum in our K-12 classrooms teaches a set of ideals and principles that centers a white majority, enacting violence through acts of erasure. As a result, this research will survey the range of literature that shows white-majority curriculum enacting violence, suggesting Ethnic Studies as an intervention to this violence. The central question of my research asks, “How can secondary English and U.S. History teachers understand Ethnic Studies as a way to combat curriculum violence towards students of color?” This project will first define curricular violence, as it has not been defined in the context of academia/curriculum, and second leverage interviews from secondary English and U.S. History teachers to speak to curriculum violence towards students of color. I will generate various questions, gauging whether the participants’ understand the curriculum as violent, and if so, what they think of Ethnic Studies as an intervention. I anticipate that my results could inform curricular development by providing a solution to the violent curriculum, and offer support for an Ethnic Studies centered curriculum in the classroom. The implications of my research look to give credence to the incorporation of Ethnic Studies into K-12 curricula.

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Lamar University  
Sociology

**Attitudes of LU Students Towards Black Lives Matter.**

The Black Lives Matter (BLM) movement has been a national headline for the past 8 years. The movement has sparked controversy, political pressure, and regenerated a Civil Rights movement. With controversial opinions on the BLM movement, it is important to gain a basic understanding of how people view this new movement. Previous scholars and academic literature have focused on social media’s contribution to the movement and observed protest. The goal of this research is to measure the perceived effectiveness and support for the Black Lives Matter movement, while gauging how far the fight for racial equality has progressed from the Civil Rights movement. In this study, we conducted a survey of Lamar University students, through a Qualtrics questionnaire. We used nearly identical questions from a study conducted in the 1960s by Samuel Stouffer, on the Civil Rights movement. Specifically, we substituted questions on the “Civil Rights movement” for the “Black Lives Matter movement”. By doing this, researchers were able to compare the attitudes toward two movements promoting racial justice over time.

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Biology

**The Role of ASIC1a Channels in Blood Vessel Function**

The endothelium is a single layer of cells lining the inside of blood vessels, controlling blood flow in the body, and providing a chemical and physical barrier for the vasculature. Impaired endothelial cell (EC) function is associated with many cardiovascular diseases, including hypertension, atherosclerosis, stroke, and heart disease. ECs produce
compounds such as hydrogen sulfide (H2S) that protect and regulate the vasculature. H2S acts on the endothelium to induce vasodilation (the widening of blood vessels). However, the mechanism of H2S dilation has yet to be determined. Although recent studies found that H2S stimulates acid sensing ion channels (ASICs) on mouse neurons, a role for ASIC channels in H2S-mediated vasodilation has not been investigated. Given that ASIC1a channels are present in the endothelium, we hypothesize that endothelial ASIC1a channels contribute to H2S-induced vasodilation. These experiments will be performed using mesenteric arteries from male Wistar rat to assess the role of endothelial ASIC1a channels in H2S-induced vasodilation. This work will involve the isolation and pressurization of small arteries that are placed in a heated (37°C) glass-bottomed chamber. Changes in artery inner diameter in response to H2S, +/- channel inhibitors and/or removal of the endothelium will be measured. We anticipate that inhibition of ASIC1a will reduce H2S dilation in endothelium intact arteries. This work will characterize a mechanism of action of H2S, filling a knowledge gap, and may identify pharmacological targets for the treatment of cardiovascular disease. Future work will investigate the specific mechanisms by which H2S activates ASIC channels.

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Physical Therapy

Total steps rather than stepping intensity is more strongly associated with cognitive performance in middle-aged to older adults

Objectives: To determine whether daily walking intensity would hold a stronger relationship with cognitive performance as compared to the volume of walking or total daily steps. Design: Cross-sectional study Methods: Eighteen middle-aged to older adults (42-86 years, 13 women and 5 men) wore a triaxial accelerometer at the right hip for thirteen consecutive days to objectively measure daily steps and average steps per minute for the 30 highest minutes in a day (peak cadence). Basic computational skills, concentration, and working memory were assessed with a math processing task. Math throughput score was recorded from participant’s second or third exposure to the test. Pearson and partial correlations were performed during analysis. Results: Average daily steps and peak stepping cadence were 6288 ± 2535 steps per day and 73 ± 23 steps per min, respectively. Age was not correlated with cognitive performance (r=-0.06, p=0.79), but higher daily steps (r=0.69, p<0.01) and faster peak cadence (r=0.57, p=0.01) showed positive relationships with cognitive performance. After adjusting for steps per day, peak cadence was no longer associated with cognitive performance (r=0.09, p=0.73). However, after adjusting for peak cadence, steps per day remained significantly related with cognitive performance although the correlation was diminished (r=0.48, p=0.05). Conclusion: Our results suggest that the volume of daily walking has a stronger, independent relationship with cognitive performance than the intensity of daily walking in middle-aged to older adults.

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Communication Arts; Radio-Television-Film; Afro-American Studies

Understanding the Incel Community as Antifandom; Comprehending Virtual Hate Groups

The Incel (Involuntarily Celibate) community is the most violent sector of the manosphere—digital spaces in which exclusively men’s rights activism, social grievances, and anti-feminist rhetoric permeate. These men subscribe to a redpill ideology— in reference to the Matrix—where the “pill” (i.e., perusing forums, engaging men’s right media, etc.) awakens one from the lies of modern feminist rhetoric. For our project, we’ve researched an even more radical and
nihilistic version of this ideology known as “black pill” in which evolutionary psychology takes hold as its theoretical foundation. In short, the belief system that men’s sexual marketplace value to women is biologically determined by tenants like height, jawline, and race and is socially inescapable. We studied the forum incel.is looking at threads centered around community to better understand how Incels structure/discuss themselves as a group-- theorizing that they function more as an antifandom of post-feminist rhetoric than any other organizational framework. Moreover, we argue that by framing incels as an antifandom, existing literature can provide insight into not only the technology affordances and semiotics practices of the group but can help further glean an understanding of how hate groups can form and propel themselves in digital spaces.

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Microbiology

Prodigiosin isolated from Serratia marcescens enhanced at various concentrations with ethanol, citric acid or coconut water to inhibit Staphylococcus aureus, Klebsiella pneumoniae Acinetobacter baumannii, and Escherichia coli.

Antibiotic resistance is becoming more common with the overuse of antimicrobial products. Prodigiosin extracted from the cell wall of Serratia marcescens is showing promising advancements due to its anti-tumor, ant-malaria, anti-cancer, and anti-biotic characteristics. It has been identified that certain compounds can enhance production of the pigment. The enhancer used in this experiment are ethanol, citric acid, and coconut water. Blank 6mm disk were impregnated with vary concentrations of the enhancer and pigment. K.pneumoniae, S.aureus, A.baumunnii, E.coli were inoculated onto Miller Hilton Plates and a Kirby-Bauer test was performed to determine how each organism would react when exposed to the antimicrobial compounds being tested.

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Physics, Mathematics

ACh regulates the differential role of sleep stages in sleep dependent memory consolidation

The transition of behavioral states from wake to non-rapid eye movement (NREM) sleep to REM is observed across vertebrate species. Critically, NREM and REM sleep states are associated with dramatically different physiological features, including characteristic differences in neuronal firing patterns and rates, network oscillations, neuromodulation, and even gene expression. The functional significance of this state ordering, however, (with NREM preceding REM during sleep cycles) is unknown. To investigate the role of REM and NREM sleep states in memory consolidation, we have built a computational model to simulate the interactions between excitatory and inhibitory neural networks. We used this model to probe how state-specific changes in ACh alter network dynamics and consequently engram consolidation via synaptic, spike timing dependent plasticity (STDP). We show that the sequential, bidirectional changes in ACh neuromodulation during NREM and REM sleep may play a vital role in consolidation, particularly when more than one memory trace is being stored simultaneously in a neural network. During the NREM-like state (when ACh is low), synapses from neurons activated by learning (i.e., engram neurons) to other neurons in the network are primarily strengthened through STDP. In the subsequent REM-like state (when ACh is high), the recruitment of GABAergic neurotransmission in the network suppresses activity among neurons not actively recruited into expanded memory traces by engram neurons during the prior NREM state.
**Effect of Essential Oils on the Canine Pathogen, Malassezia pachydermatis.**

Malassezia pachydermatis is a common fungal pathogen that infects dogs and resides in their ears. This pathogen is becoming resistant to commonly used antifungal treatments and new alternative treatments are needed. Essential oils are known to have antifungal properties and could potentially be used to treat Malassezia. This project focuses on testing over 60 different essential oils on Malassezia pachydermatis and another fungal pathogen, Candida albicans (used for comparisons). The cultures for both pathogens were grown from glycerol stocks on Sabouraud agar petri plates. Population density was assessed using spectrophotometer readings and 100 µL of fungal cultures diluted in sodium chloride at OD600 of 0.1 were spread onto agar plates. Sterile blank paper discs were placed in the middle and 10 µL of the essential oil was pipetted onto each disc. Petri plates were incubated for four days at 37°C. Experiments were repeated two times, and zone of inhibitions were measured. The essential oils that exhibited antifungal activity were further analyzed using dilutions of 10% and 20% to determine the lowest concentration which inhibited fungal growth. Results from the dilution tests suggests that ginger grass essential oil can be used at a 20% dilution. Additional experiments are planned using ginger grass oil on a fresh clinical isolate obtained from an infected dog provided by a local veterinarian. Results indicate that some of the essential oils tested exhibit antifungal activity, and to our knowledge this is the first time some of these essential oils have been tested on this fungus.

**Cognitive Health of Ovary-Intact Postmenopausal Mice Fed High Fat Diets**

In menopause, the decrease in estrogen production along with the metabolism of estrogens in the gut may impact cognitive health. 17β-estradiol (E2) is an estrogen that is plentiful during reproductive ages while estrone (E1) is the prominent estrogen found in post-menopausal people. Due to the large amount of research in mice studying menopause through the surgical ovariectomy method, we will be using a chemical-induced, ovarian-intact menopause model by injecting 4-vinylcyclohexene diepoxide (VCD) which is a selective toxicant for primordial and primary follicles inducing atresia (degeneration of follicles) at that stage while our control mice were injected with oil. Five months after the oil and VCD injections when estrous cyclicity was disrupted in the VCD-treated females, half of each injection group were fed one of two high-fat diets for 9 weeks. We hypothesized that the coconut saturated fatty acid diet would increase cognitive health while the omega-6 polyunsaturated fatty acid diet would result in a cognitive decline. Cognitive function was assessed using three behavioral tests: the Y-Maze, spatial object recognition, and novel object recognition. Results from the y-maze test indicate that the coconut oil diet had no effect on cognitive health, while the spatial object recognition test showed cognitive health increased within the coconut oil diet within the oil-injected mice. The novel object recognition test results showed no significance.
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Texas Tech University, with Dr. Qingwang Yuan  
Petroleum Engineering

Enhanced Oil Recovery & CO2 Sequestration

Viscous fingering in an immiscible Hele-Shaw Cell was studied to observe the behavior of the instability that is created when a less viscous fluid is displaced by a lesser viscous fluid. For our study we used the parameters of a horizontal Hele-Shaw cell with the size of 20 cm*20 cm*0.1 cm. In observing the instability with respect to time, there were five regions that appeared as fluid was injected and produced from the cell. In the Hele-Shaw cell there are two main wells, a production well and an injection well which are 9.43cm apart. During each experiment, six flow rates were tested (0.1ml/min, 0.2ml/min, 0.5ml/min, 1ml/min, 2ml/min, and 5ml/min) to observe the behavior of viscous fingering. After analyzing the results from using six different injection rates, it has been observed that there are five different flow regions that occurred for each experiment with different flow rates. These new five flow regions have shown the behavior of how fluid behaves at different time intervals. In observing these five regions it has been concluded that higher flowrates would display these five regions in a short amount of time, and that the lower flowrates would display these five regions in a longer amount of time.

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Psychology

Emotional Broadcasting in High Functioning Autism

The ability to broadcast our emotions allows individuals to be successful in social situations but there is a breakdown in Autism Spectrum Disorder (ASD). Individuals on the Autism Spectrum display unusual facial expressions. Historically it has been assumed they have restricted normal range of emotional expression or perception. Current research has focused on the benefits of teaching these individuals how to correctly identify universal microexpressions in order to alleviate suffering from social deficits. While expression training has been moderately helpful there are still discrepancies in social outcomes. This study compared the Autism and neurotypical population and found a deviation from universal microexpressions in the FACS Emotion Code. Participants were shown a slideshow of images designed to illicit the emotions of happiness or sadness. A discrepancy between the verbal report of emotion and the resultant displayed micro-expression was identified and analyzed for duration, type, and intensity, looking for any novel patterns unique to ASD. Two sample chi-square with cross tabulation followed by a multivariate Kruskal Wallis H-Test and a Mann Whitney U-Test corrected with Bonferroni were run. Statistical Analysis showed a discrepancy between the verbal report and the expression of happiness, showing a deviation in perception. A unique pattern of micro-expressions in the neurodiverse participants was identified which leads us to recommend the need for further research in this area to alleviate social and emotional pain for individuals with ASD.
The Effectiveness of Personalized Advertisement: The Concern of Users' Privacy

There are 4.48 billion people worldwide that use social media (data portal, 2021). Many people use social media as a major source for news, communication and entertainment. Advertisers have taken advantage of this mass use of social media and have created different advertising strategies to not only attract potential customers but to also persuade them to make online purchases. Some of those strategies consist of collecting personal data from users to create personalized ads. By completing a meta-analysis, I examine literature trends regarding the effectiveness of personalized advertisement and concern of user privacy on social media. Advertisers have reported financial success from launching personalized advertisements, but many users find this strategy to be invasive. For example, in the article Too Close for Comfort: A Study of the Effectiveness and Acceptability of Rich-Media Personalized Advertising, “the findings described in this paper suggest that users’ perceptions of targeted ads using rich-media vary depending on the type of data used to create the ads” (Malheiros et al., 2012). In the article ‘Hello, Mrs. Sarah Jones! We recommend this product!’ Consumers’ perceptions about personalized advertising: comparisons across advertisements delivered via three different types of media, the findings in this paper described that “consumers generally have negative perceptions of personalized advertising, regardless of how it is delivered, with the strongest negative reaction to telephone calls.” (Yu & Cude, 2009). Research has shown that while personalized advertisement is effective, the more personalized an ad is, the more users react negatively.

Computed Grain Boundaries: Hexagonal Closed Packed Magnesium

Grain boundaries are defects within crystal structures and the grain boundary influences a wide range of materials mechanical properties such as strength, corrosion resistance, and toughness. Therefore, understanding the differences in magnesium grain boundaries in hexagonal closed packed structures would yield the ability to predict the properties of the polycrystalline magnesium. However, past research has largely employed experimental techniques to investigate grain boundary structures, and these have been limited due to difficulties in accurately measuring grain boundary energy. Results have come with a lot of uncertainty, creating data that becomes unreliable. In order to address these challenges and maintain accuracy within our research, magnesium grain boundaries were created using information from the grain boundary database (GBDB), which utilized density functional theory calculations. The information provided from the GBDB has been integrated into python codes that can then be used to generate simulated magnesium grain boundaries. To run these codes, applications including Ovito, Atomsk, Lammmps, and Jupyter Notebook were used. Currently, more than 100 grain boundaries have been generated, but a large set of grain boundary energies is needed in order to make predictions on the properties of the polycrystalline magnesium with high accuracy. In the future, I hope to create linear regression models using the grain boundary energies of magnesium.
Deaf Native Americans Current Acquisition of the Language

Plains Indian Sign Language (PISL) is an endangered language due to language oppression during the twentieth century and a lack of accessibility. Historically, this language was widely used within Native American tribes. Unlike American Sign Language (ASL), PISL includes more gestures. Currently, there are not many Native Americans who are fluent in this language due to language discrimination. This study aims to analyze Deaf Native Americans’ acquisition of their language in order to determine the current view of PISL. In order to study language acquisition of PISL, snowball sampling was used to find willing participants through networking. Participants were asked to complete a demographics survey along with the consent form. Individual interviews were held with four participants where they were asked 12 pre-developed questions. The results found several themes including, that their first language was ASL, that most experienced some kind of trauma including abuse and being removed from their families, and that they discovered PISL later in life. These results show that Deaf Native Americans did not have access to PISL while growing up due to lack of resources or awareness. Like many Indigenous peoples, these individuals were working to revitalize PISL in the hope that it would not become language death.

Determining the Degradation Rate and Soil Partitioning Coefficient of N-Nitrosodimethylamine

N-Nitrosodimethylamine (NDMA) can occur as a byproduct of human activities, such as the burning of rocket fuel, as it is a hydrazine oxidation product. NDMA is suspected to be a human carcinogen and, as such, it would be beneficial to accurately measure levels of NDMA present in the environment and model how the quantities are affected under different conditions. Two important characteristics necessary in modeling NDMA concentrations in the environment are its degradation rate and partitioning coefficients. This research has been focused on the aqueous to soil partitioning coefficient of NDMA. Concentrations of NDMA present in the samples are analyzed using the method of gas chromatography flame ionization detection (GC.FID). Once these coefficients are determined for NDMA, they will be used to model how much is being produced from a source in question and whether they are within acceptable ranges. Preliminary results have shown that linear detection is achievable on the GC.FID for NDMA, and that two extractions of an organic layer per sample guarantees a minimum of 98% of the NDMA transferring to the analyzable organic layer. Adsorption isotherms have been tested on NDMA and it has been found that the aqueous to soil partitioning coefficient is imperceptible using current instrumentation and processes. NDMA reflux and kinetics experiments are ongoing. I want to acknowledge my faculty mentor Dr. John Hearn and the Lee University McNair Scholars Program for their support and guidance on this research project.
Remote sensing analysis of vegetation response to varying precipitation, Central Great Plains

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The Central Great Plains is a premier site of potentially mobile loess (wind-blown dust deposit) and dune landscapes. The maintenance of these landscapes is potentially important for long-term storage of organic carbon and dust. As climate quickly changes, these landscapes are vulnerable to destabilization and movement as the likelihood of droughts increases. In order to predict their response to changing climates in the future, it is important to understand how loess and dune landscapes have responded to changing climate in the past. The objective of the study is to determine how vegetation in these landscapes responded to years with high and low precipitation. Vegetation is a potential factor in susceptibility to erosion and thus landscape stability. Using various normalized difference vegetation index (NDVI) data, the study aims to determine how vegetation responds to unusually dry and wet years in different parts of the loess and dune landscape. For example, how the vegetation response on different parts of the dunes vary and how the response on dunes differ from the response on loess tablelands.

Envisioning Equity: An Assessment of the Utilization of Technology in Mathematics Classrooms

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Middle Grades Mathematics

Technology plays a vital role in developed education systems of the 21st century, yet opportunities to engage with technology varies across racial and economic groups of students (Warschauer et al., 2004, Warschauer & Matuchniak, 2010, Bray, 2017). The digital divide defines the gap between racial and socio-economic groups regarding access and engagement with technology. High socio-economic status (SES) schools are more likely to have access to higher quality technology and administration support to aid teachers in their usage and implementation of technology (Warschauer, et al., 2004). Research suggests that technology utilization in mathematics classrooms can have a positive impact on students learning (Mouza & Barret-Greenly, 2015). The value of technology in the classroom depends not just on the presence of technology in the classroom, but on how students use these technologies (Leinwand et al., 2014) to engage with mathematics. My research extends to focus on how technological programs and resources were utilized during the COVID-19 pandemic school year. A survey addressed to mathematics teachers at any public school district will be sent using snowball sampling. I will analyze how teachers utilized technology in their classrooms and the factors included, such as the use of mathematical applications and student satisfaction with technology. The equitable usage of technology will continue to be an important topic of discussion to leaders in education.
Neurophenomenology; Applied Phenomenology within the Cognitive Sciences

The hard problem of consciousness, a phrase coined by David Chalmers, indicates the landmark obstacle for a scientific understanding of the mind ever since the advent of science as such. How do physical processes give rise to subjectivity? The methodological commitments of the empirical sciences have no way to address the problem, and by virtue of those commitments, even reinforces the difficulty in many ways. Phenomenology, on the other hand, is a discipline founded by Edmund Husserl in the early 20th century that endeavors to ground scientific knowledge via rigorous, descriptive analysis of phenomena as it appears in human subjectivity. Given the progress of contemporary cognitive science, alongside the insight that phenomenology has regarding the structures of human experience, and the emergence of the Enactivist cognition position, the opportunity to confront the limits of natural science with respect to human subjectivity has presented itself. If experience is resistant to empirical inquiry due to the innate character of both, then a reimagining of the approach is required. Neurophenomenology is the ambitious project to integrate descriptive phenomenological analysis into the methodologies of enactive approaches to cognitive sciences with the intent to make headway against the explanatory gap between brain and mind.

Trouble In Paradise: A Meta-Analysis of the Relationship Between Annual Rainfall & Amphibian Diversity in Brazilian Amazonia

This meta-analysis seeks to understand the relationship between patterns of amphibian diversity and rainfall, a cycle being affected by human activity and climate change. The hypothesis states that if annual rainfall in Brazil is altered by deforestation, then recent increases in amphibian extinction rate are the result of anthropogenic climate change. The overarching problem addressed is the relationship of human population and activity to global mass extinction and how more detailed study of groups outside of birds and mammals need to be done. This research adds to the greater body of knowledge on developing modern conservation theory to combat accelerated rates of extinction. The data and literature compiled observes annual rainfall in Brazil, threats posed by different forms of human activity, the fragility of biodiversity hot spots, and Brazilian Amazonia amphibian species richness, threat of extinction, biodiversity and population. Results determine a negative trend in Brazilian deforestation, the absence of a relationship between species richness and regional rainfall, a lack of overall data for the group amphibia and a significant threat posed to endemic species. Regarding future directions the literature has created interest in performing a comparative study on the relationship of plant extinction to amphibian diversity in global hot spots as they are impacted by deforestation and climate change. In conclusion there is not enough evidence to support the hypothesis.
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Ethnic Studies/Pre-Law

Black Women Identified Administrators Experiences of Microaggressions at Institutions of Higher Education and their Various Coping Styles

The purpose of this study is to understand how Black women identified administrators at institutions of higher education describe the experiences of encountering microaggressions within the university and how they navigate these experiences. Over the years, more and more Black women have gained access to high-ranking positions on university campuses. Still, the question is, what are some of the challenges that arise within these positions, and how do they handle them? The challenge that the research centers around are microaggressions. This research is necessary because it can paint a better picture of the obstacles that Black women have to overcome within these positions, as well as coping strategies for other Black women who may be experiencing the same issues and provides institutions of higher education the lived experiences of the women in these positions. In this qualitative study, four Black women identified administrators will be interviewed; methods of phenomenology will be used to uncover similar themes amongst these women's experiences. The findings of this study will hopefully show the types of microaggressions that Black women identified administrators to experience and the factors that impact their coping styles.

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Women’s Perceptions of Traumatic Childbirth: A metasynthesis

This article is a meta-synthesis designed to review the experiences of women who have lived through a traumatic childbirth. This study compares four different articles published in the last four years (2017-2021), all of which were qualitative studies related to women’s perceptions of traumatic childbirth. The results of this meta-synthesis found four general themes that are factors of traumatic childbirth: emotional experiences, obstetric problems, misinformation and not being heard, and issues with healthcare staff. The actions of health care providers can heavily influence the childbirth experience, and as a result their policies, actions, and interactions should be closely reviewed and examined. Future research can be conducted on preventative measures to reduce the possibility of a traumatic childbirth, and factors that contribute to a positive childbirth experience.
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Atmospheric & Oceanic Science

Vertical Motion Profiles Over Land Compared to Ocean

Convection and vertical motion in the atmosphere are important to understand weather and climate. The purpose of the research project is to study convection by examining vertical motion profiles over land in the Intertropical Convergence Zone (ITCZ). This is done using principal component analysis on reanalysis data from ERA-5 to create vertical motion profiles displaying empirical orthogonal functions (EOFs). The ratio of EOFs with the two largest variances are converted to an angle system and translated to a map showing vertical motion top-heaviness in the Tropics. Top-heaviness describes the location of where vertical motion peaks in the atmosphere. Top-heaviness maps were compared to low-level air temperature, specific humidity, and topographic maps to deduce land-ocean vertical motion similarities. Regions where there is positive top-heaviness over land and ocean have similar low-level temperatures and specific humidity. Land regions that have more bottom-heavy vertical motion tend to have warmer temperatures, lower specific humidity, and topographic relevance.
Predictors of a biomarker of Environmental Enteric Dysfunction and its relationship to linear growth among Amazonian children

Childhood growth faltering has been linked to poor cognitive development, oral vaccine failure, and increased susceptibility to infectious and chronic diseases. In low- and middle-income countries (LMICs), recent studies suggest that Environmental Enteric Dysfunction (EED), a subclinical condition of the small intestine linked to poor sanitation, is a leading cause of poor infant growth. However, EED’s environmental predictors and its relationship to growth has never been investigated among children over the age of 5. Capitalizing on a unique dataset from 86 rural and peri-urban living Amazonian Shuar children (ages 4-12; 49% female), this study aims to define the relationships between environmental conditions, Endotoxin Core Antibodies (EndoCAb, a biomarker of EED measured in finger-prick dried blood spots), and linear growth among school-age children. As predicted, children from households with lower incomes and less modernized homes had greater EndoCAb levels (both p < 0.05). When more specific household variables were examined, dirt floors were strongly associated with elevated EED levels (p = 0.017). Surprisingly, urban-living children had higher EndoCAb than their rural counterparts (p = 0.010), potentially indicating greater overall pathogen exposure among urban children, due to greater population density. Sample-wide, 24% of participants were classified as growth stunted using international standards. While EndoCAb did not directly predict stunting or children’s height-for-age, there appear to be complex relationships linking EndoCAb and children’s growth. Our findings point to the importance of understanding gut function for understanding child development and health in LMICs.

Cardiac Disease Modeling Using Miniaturized Engineered Heart Tissue

Diabetic conditions cause cardiac fibrosis and contractile dysfunctions, but the effects of diabetic conditions on cardiomyocytes and cardiac fibroblasts have not been thoroughly explored. In this regard, the application of the engineered heart tissue (EHT) platform presents an opportunity to address this issue. In the heart, cardiomyocytes generate the contractile force, while cardiac fibroblasts compose the structural framework and act as connective tissue. In this study, we attempted to use both cardiomyocytes and cardiac fibroblasts derived from human induced-pluripotent stem cells (hi-PSCs) to create a miniaturized cardiac organoid with a fiber structure that can then be used for contractility measurement. We designed EHT molds with two distinct shapes: a 6-well-dogbone shape and a 4-well-donut shape. Using 3D printing technology, we created 6-well-dogbone shaped molds with
Polydimethylsiloxane (PDMS), and 4-donut shaped stamps with resin to generate agarose molds. We differentiated the hi-PSCs into cardiomyocytes and cardiac fibroblasts, which were then pipetted into the EHT molds for self-assembly for 14 days. Once the EHTs are formed, we will treat them with high glucose to mimic diabetic environment and measure their contractility. We will gain significance insights into the application of this in-vitro cardiac model to study the acquired form of heart disease. Eventually, by examining various aspects of cardiac dysfunction with this miniaturized EHT platform, novel druggable targets may be identified that can lead to new therapeutics for cardiac fibrosis treatment.

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*Mechanical Engineering*

**Mechanical Steer**

Team roping is a rodeo sport in which horseback riders compete in pairs to rope a steer's horns and back legs in as fast a time as possible. For years ropers have used static, steer shaped dummies for practice, and more recently, dummies have come out with legs that simply move up and down. The purpose of this project is to design a mechanical steer with hind legs that move akin to that of an actual steer. By using motion capture data of a steer’s movement, multiple computer model dummies were made. From the models made the one whose movement most closely matched the movement data of the actual steer was chose. From there, a prototype was CAD modeled and built. This project is not complete, but the prototype built will be tested with actual team ropers to tests its effectiveness as a training dummy. Changes will be made to the prototype to fit the ropers' critiques.

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**Developing a Kinetic Model for the CD-200 Checkpoint That Controls Dendritic Cell Activation**

It is estimated that less than 5% of oncology therapies that enter Phase 1 clinical trials will receive FDA approval. Many in the field have attributed this to the lack of prior proof-of-concept testing in humans. This leaves many patients with ineffective treatment and creates a heavy financial burden for health systems. In our project, we aim to relive these pressures by developing a biophysics based mathematical model to enhance the therapeutic effect of a Novel CD200 Immunotherapy for the treatment of Glioblastoma. Through sensitivity analysis, we aim to identify the key factors that limit the therapy’s efficacy.

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*Human Development & Family Science*

**Understanding Academic Adversity: Familial Stressors and Academic Achievement Amongst Various Undergraduate Racial Minority Students**

This study aims to discover if a relationship exists between the academic achievement of racial-ethnic minority, first-generation, and low-income students and adverse familial experiences. More specifically, it seeks to unpack the
ways adverse familial issues may compound with students’ social identity markers, such as racial minority status, and students’ academic achievement. It measures academic achievement through The University of Texas at Austin's grade point average (GPA) scale. The learning environment at UT Austin, a 4-year research intensive institution, will be incorporated to determine any relation to academic achievement. The study uses students’ reported racial minority status, first-generation status, socioeconomic status, familial issues, and academic achievement to determine the extent of adversity they face. Participants include 10 students who are currently enrolled at The University of Texas at Austin. Data sources include surveys and interviews followed by an analysis with the best method for this purpose, topic, and interview material collected. Inductive, descriptive coding will be used along with the in vivo approach to ensure that the conclusions drawn are a direct result of the data collected. Ideally, categories of interviewees will be compared against each other to conclude on a result that is verifiable. I hypothesize that adverse familial issues coupled with first-generation status and socioeconomic status will negatively impact academic achievement. My research project is scheduled to be completed between late August and early September.

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Biology and Psychology

Attentional biases toward internal and external threat in anxiety: Insights from the stimulus-preceding negativity

Generalized Anxiety Disorder (GAD) is characterized by excessive and uncontrollable worry. Individuals who experience high levels of worry have unconscious attentional biases toward threatening stimuli and display a higher amount of anticipatory processing immediately prior to the onset of threat cues. The current study examined event-related brain potentials, particularly the stimulus-preceding negativity, to evaluate if attention to an internal source of threat, such as elevated heart rate, can act as a distraction from a subsequent external source of threat. Participants were placed into high and low worry groups and engaged in an S1/S2 task, in which 25% of S1 stimuli were designed to draw attention toward an internal threat (elevated heart rate), before exposure to either an emotional or neutral S2. Results found that those who viewed the S1 distractor heart rate cue showed less anticipatory processing for the following S2, as indexed by a less negative amplitude of the stimulus-preceding negativity. A moderately significant relationship was also found between group and cue, indicating that these results may be applicable to other populations, such as individuals with social anxiety. These findings are in line with the existing literature regarding attentional biases and anticipatory processing in anxiety disorders. Implications and limitations of the present results, as well as suggestions for future studies, are discussed.

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Psychology

An Examination of Bereavement and Posttraumatic Growth among Urban Adolescents

Along with the well documented challenges of bereavement within younger populations, there is the potential for loss to be associated with growth, development, and positive psychological changes within this stage of life. To explore this issue, 408 adolescents (46.6% male; 53.4% female) in grades 6-12 from three urban schools were surveyed at two time points, six months apart, using the Post Traumatic Growth measure for the growth outcome variable and Losing People in the Past measure to assess students’ experiences of loss. The researcher applied a
moderated regression analysis to investigate the moderating effects of bereavement type and their relationship with the deceased. The results indicated a statistically significant relationship between bereavement and PTG, while revealing no support for the hypothesized moderators to this relationship. Specifically, bereavement type and relationship with the deceased, did not interact with bereavement to account for additional PTG outcomes. Future research should incorporate PTG ratings from other individuals within an adolescents' environment. This may help provide additional evidence and/or support toward their reported growth outcomes following trauma and loss. Follow-up studies should also aim to delve into the PTG subscales (i.e., Relating to Others, New Possibilities, Personal Strength, Spiritual Change, and Appreciation of Life) in relation to bereavement as only PTG total scores were used in the present study.

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Biology

Do atropine and diphenhydramine, two anti-cholinergic drugs, interact to affect *Daphnia magna* heart rate?

*Daphnia magna* are a type of water flea that are commonly utilized to test pharmacological and physiological responses. In this project, two common pharmaceuticals, atropine and diphenhydramine, are being utilized to test the effects these drugs have on the heart rate of the *Daphnia*. Atropine and diphenhydramine are classified as anticholinergic drugs, meaning they act on the parasympathetic nervous system to block the effects that the parasympathetic nervous system exhibit. The parasympathetic nervous system slows heart rate, so utilizing an anticholinergic drug would result in the opposite response to occur, thus leading to increased heart rate. The studies that have investigated the effects of atropine on *Daphnia* heart rate have been contradictory, and the effects of diphenhydramine on the *Daphnia* heart are not well-known. According to Drugs.com, it is considered a hazard to take more than one anti-cholinergic drug concurrently. Given this, I am monitoring heart rate in beats per minute while exposing *Daphnia* to increasing concentrations of atropine and diphenhydramine independently and when administered together. Results to date show that atropine alone increases *Daphnia* heart rate even at lower doses. The goals of this project are to shed light upon the effects these two drugs have on the *Daphnia* heart, to decipher whether an interaction occurs between the drugs when administered together, and to ultimately discover whether the *Daphnia* are prime subjects for anticholinergic drug testing.

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Neuroscience

Prospective Memory and Task-Load Differences Across COVID-19

Prospective Memory (PM) has been shown to be used differently between males and females and that females in romantic relationships are often responsible for both their own PM tasks as well as those of their male partner, which can place additional mental burden on females. COVID-19 may have disrupted typical relationship dynamics in ways that may have made PM distribution differences larger or, as we expected, smaller between partners due to individuals spending more time at home with their partners during quarantine. Additionally, other factors such as switching children to homeschooling and working from home would be expected to disrupt any gender-based trends
in relationships to allow for a more equal relationship. To analyze how PM task differences between couples have changed in couples from before and after the COVID-19 pandemic, we used survey results from 219 participants from 2017 (pre-pandemic) and 195 participants from 2020 (pandemic) covering the participants' to-do lists, participants' estimations of their partners' and boss' to-do lists, demographics, and relationship satisfaction/length. Our results showed that males and females were aware of the PM task-load discrepancy between them, both in household tasks and work tasks. The differences in perception between partners were smaller after COVID-19, indicating that couples either had more similar task-loads or that they were more accurate in their estimations of their partners tasks due to increased proximity. Before the pandemic, both sexes believed females worked more in the household, whereas during the pandemic, there was a more egalitarian view of PM task distribution.

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Anthropology

An Analysis of the COVID-19 Pandemic through an Anthropological Lens

The significance of individual and perceived liberties, rights, and freedoms among many (particularly Anglo-American) citizens within the United States has become exacerbated during the COVID-19 pandemic. A growing number of US citizens are openly expressing egocentric points of view regarding knowledge, attitudes, and practices in relation to disease avoidance and public health recommendations. These attitudes and subsequent behaviors have arguably contributed to significant epidemiological events (e.g., refusal to wear masks and vaccine hesitancy being associated with sustained morbidity and mortality) in the US relative to many other countries. In other countries and cultures, there is prioritization of communal needs and more confidence in government responses based on science literacy. This trend in the US may be associated with general political attitudes, in particular interpretation of the US constitution (i.e., the 1st Amendment). This polarization and its impacts will be investigated. Behavior and scientific literacy will be compared among several countries to understand the correlation between resistance to COVID-19 restrictions and previous knowledge of disease susceptibility. Analyses of data from the Waco COVID Survey will be combined with constitutional examination and other holistic anthropological approaches to understand this growing phenomenon.

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Health, Kinesiology, Leisure Studies

Balance, Brain, Speech, Movement, and Behavioral Effects of a Mechanical Horse Device on Children with Autism Spectrum Disorder.

Hippotherapy is the use of a horse’s movements, oftentimes in combination with a mixture of physical, occupational, and speech therapy, to improve both gross and fine motor skills for many individuals with disabilities. Autism is known to impact behavior, movement, and postural control issues. Years of evidence supports the benefits of hippotherapy, but the mechanism that drives the health improvement is unknown. The purpose of this study is to investigate the use of a mechanical horse-riding simulator and how it benefits children with autism. Behavior, speech, brain, muscle, gait, balance, and riding mechanics were quantified as part of the study. Each participant had an initial, middle, and final assessment along with 10 sessions of treatment where data was extracted. For the riding mechanics portion of
the analysis, a marker-based motion capture system (Vicon Vantage) with processing software (Nexus 2) was used to track the frontal plane motion of the rider's pelvis and the movement of the mechanical horse. Synchronization of the rider's pelvis to horse motion was compared across the duration of the riding interventions to test the hypothesis that the rider would become more in-sync with the motion of the mechanical horse as they learn over time, how to respond to the imparted movement more efficiently. Early evidence supports the rider becoming more in-sync with the horse motion over the duration of the therapy. This riding motion will be compared with other outcomes related to movement and postural control in the next phase of data analysis for this study.

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Geology

Horseshoe Canyon

Horseshoe Canyon in Big Bend National Park consists primarily of a lava dome of Burro Mesa Rhyolite that is more than 100 feet tall. This is theorized to have been the effect of multiple vents, with only one being confirmed in the heart of the dome. The dome is accompanied by other structures including steeply dipped normal faults that are the result of basin and range tectonics. These normal faults form many horsts and grabens in various different rock units that serve to deform the land resulting in intervals of high structural relief as well as the juxtaposition of rock units of different ages. Some prominent rock units include the Wasp Springs formation, Burro Mesa Rhyolite, as well as Chisos formation. The majority of this area, however, is mostly tertiary in age and was all subjected to basin and range extensional stresses. Another prominent structure includes ramp structures formed from vent eruptions and lava flows. In addition to the confirmed location of the one vent in the dome, the location of another vent is not confirmed but theorized to be in the west side of the mapping area. This suspected vent would provide an answer to the anomalous interval layering of Burro Mesa Rhyolite and Wasp Springs. Its these hypothesized multiple vents in tandem with basin and range tectonics, as well as alluvial deposits that make this mapping area a difficult but interesting geological story to unravel.

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Criminal Justice

The Effect of Openly LGBTQ+ Faculty on LGBTQ+ Students at East Tennessee State University

Openly LGBTQ+ Faculty have a positive effect on LGBTQ+ students. LGBTQ+ students are often highly stigmatized, especially within STEM focused academic programs and universities, (Cooper, K.M., et al, 2020). This is seen through the ways LGBTQ+ students are treated, excluded and the fear of coming out, or letting someone in on their sexuality. This study uses Queer Theory. Queer Theory is a sociological look at how examining and representing gender and sexuality in media, entertainment and daily life affects the interpretation of LGBTQ+ individuals, (Valocchi, S., 2005). Looking through the lens of queer theory, we can see that having representation makes people feel more comfortable and gives permission for authenticity. Through looking at the effects and knowledge of queer theory in correlation with this research, the connection between having openly LGBTQ+ faculty representation and the positive effect on LGBTQ+ students. Faculty includes all individuals who teach and are tenured. This may include those who serve in administrative positions such as a deanship or a directorship.
Since 2016, Wayne State University (WSU) has utilized a tiered, culturally competent approach to support Black male students. WSU is the nation’s fastest-improving university for graduation rates from 27% to 47%. This movement sprouted the commencement of programs and organizations focused on narrowing the student population achievement gap including men of color. The approach highlighted here is THE BROTHERHOOD, a student-led organization geared towards undergraduate Black men. This tier of the larger initiative concentrates on social action and student engagement while encompassing facets of academic, social, and emotional wellness. We conducted a study to obtain quantitative and qualitative data about the potential impact this organization had on Black male undergraduate students. Our results suggest that WSU Black males participating in THE BROTHERHOOD have performed better academically than the other Black WSU students in their cohort. Additionally, we found that these members received important transferable skills applicable to their career fields through THE BROTHERHOOD. Here we describe the fundamental components of THE BROTHERHOOD that are attributed to these findings.

First-Gen Students

The term “first-generation” seems to be used often in higher education. First generation college students are students who are enrolling into a higher education institution and whose parents have not attended college, have attended college but did not complete a 4-year degree, or have received a degree from an institution from outside of the U.S. In order for colleges to ensure success for all students, they must offer an option for students who are first-generation to self-report. This allows colleges to track their students’ academic journey and implement support services where needed. Because these students come from backgrounds with a lack of knowledge about college, enrolling and navigating through college can seem like uncharted waters. In order to increase confidence, sense of belonging, and academic success amongst first-generation college students, colleges must take the initiative of being precise on how they communicate to this demographic. By creating specific programming and support services, colleges give first-generation college students the same opportunity to succeed alongside their peers. Colleges that do not learn to effectively communicate to their first-generation students ultimately lead to higher dropout rates and poor academic progress. In this project we are interested in how colleges and universities communicate resources and support services to their First-generation students. A total of 5 private colleges and 5 catholic colleges and universities were examined in this study (n=10). These colleges and universities were compared to DePaul University in order to assess the strengths and weaknesses of how DePaul communicates to its First-generation student demographic.
**The Investigation of Mycosporine-Like Amino Acids in Fungi**

Mycosporines and mycosporine-like amino acids (MAAs) are secondary metabolite molecules commonly produced by marine organisms that have an increased propensity to absorb ultraviolet (UV) A/B radiation. Exclusively present in high UV radiation (UVR) environments, these metabolites allow cyanobacteria and micro and macroalgae to absorb UVR at such amplified rates that they may be extracted as a natural photoprotector (sunscreen). To elucidate the extraction of MAAs, I plan to first isolate their genetic information, then, using methanol and HPLC extraction methods, the genetic solutions will be collected and furthermore tested for their UVR absorption. Due to the highly unstable polar nature of porphyra-334 (P-334) and other MAAs, stable temperature as well as polar organic solvent will be utilised to garner the greatest yield of absorbance. Upon the successful isolation of MAA genetic material, I will be able to induce the production of MAAs in other fungi, and further purify and study pathways for novel MAA production.

**Creating mutations in zebrafish using CRISPR/Cas9 reagents to investigate methylmercury toxicity during development.**

Methylmercury (MeHg) is a common environmental contaminant in Wisconsin, and prenatal or early exposure to MeHg can cause developmental abnormalities. My research involves investigating gene-environment interactions of MeHg metabolism in embryonic development. MeHg is cleared from the body via oxidative stress metabolism pathways involving glutathione (GSH). The amount of time MeHg stays in the body varies across individuals. This diversity may be due to genetic polymorphisms in genes involved in MeHg metabolism. Certain alleles of GSH-related genes relate to elevated blood MeHg levels in adult humans; how these alleles affect MeHg metabolism in development is not well understood. This project aims to produce and validate mutant zebrafish lines with homozygous loss-of-function mutations in the gclm gene, a GSH-related gene associated with MeHg metabolism, using CRISPR-Cas9 reagents and high-resolution melt analysis genotyping (HRMA). The methods for this project were confirmed using CRISPR reagents targeting tyrosinase (tyr), a gene involved in pigment production. These results enable future experiments to characterize genetic influence on MeHg toxicity during development.

**Solar Metallicity in M82 Starburst with Far-Infrared Spectroscopy**

The starburst galaxy M82 has been frequently studied due to its high star formation rate as well as its closeness to Milky Way. Though observation for M82 have been popular there has not been any indication that a measure of metallicity has been accurate. Utilizing far-infrared(far-IR) structure lines for [OIII] 52 and 88um and [NIII] 57um taken from SOFIA/FIFI-LS and PACS/Herschel we applied a known ratio between these far-IR lines and from this
find solar metallicity in the ionized gas of the central starburst region of M82, using far-infrared fine structure lines, is ~3x higher than previous X-ray estimates. We also see that our method is robust against the very high dust obscuration in the starburst.

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Zoology

Does phosphorus content of diet impact phototaxis in Daphnia?

Zooplankton migrate daily to avoid predation, and access better foraging areas. Anthropogenic activities have altered both predation and food availability. While we know that changes to the environment have driven evolutionary changes in the physiology of zooplankton, comparatively little is known about behavioral responses. This study tested two predictions using the freshwater zooplankter Daphnia: (i) nutrient-limited daphniids will exhibit more migratory behavior than nutrient-replete counterparts, and (ii) daphniid genotypes that are efficient at utilizing nutrients will exhibit more migratory behavior than genotypes that are inefficient at utilizing nutrients. To measure migratory behavior, a tube will represent a water column with three different levels; upper compartment, intermediate compartment, and lower compartment. The number of individuals in each column will be counted to measure the vertical distribution index of the Daphnia. The results of this study will contribute toward deciphering the responses of Daphnia to environmental change (e.g., nutrient pollution) and better understand/manage freshwater ecosystems.

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Microbiology/Cell & Molecular Biology

A Study of G Proteins and their Role in Cell Signaling

Dictyostelium is a soil amoeba that classifies as a slime mold. The chemotaxis signaling process within these cells is similar to that within human cells, making it an ideal model organism to study how chemoattractants regulate signaling proteins such as G protein, protein kinases, and transcription factors. Previous studies have centered on the phenotypes that result from changes in protein kinases and G proteins. We have studied chemotaxis, the movement of cells towards stimuli. My study has included the proteins Ga1, Ga2, Ga4, and Ga5. I explore the possibility of redundant functions within the cell, alongside the purpose of each protein. Tests include the study of mutant strains lacking Ga1, Ga2 or both proteins, and mutant strains lacking Ga4, Ga5, or both. I focus on the chemoattractant stimulated shuttling of a transcription factor, GtaC. Besides analyzing these mutants, I will add back genes that encode these proteins and re-analyze the shuttling in the complemented strains. This will show if any phenotypes are associated with unexpected genetics changes in other genes. To quantify the movement of the transcription factor in these strains we will tag the transcription factor with the green fluorescent protein (GFP) and record the distribution of the fluorescence using time-lapse imaging. I will be measuring the ratio of the fluorescence in the cytoplasm to the nucleus of cells to assess the change in distribution of the GFP-GtaC protein. This ratio will be monitored over time after the cells have been stimulated with a chemoattractant. I will also be analyzing wild-type cells that overexpress the Ga2 or Ga1 protein and so I may see the effect of the protein when it is overexpressed. In regards to the translocation of the GFP-GtaC reporter, the ga4- mutant does not respond to folate but ga2- mutant does. Conversely, ga2- mutant does not respond to cAMP but ga4- mutant does. When the mutants respond to the
stimuli, the fluorescence is shown to move from the nucleus to the cytoplasm. These results align with previous knowledge. We would like to test the hypothesis that Ga1 and Ga2 may have redundant functions with respect to the GFP-GtaC translocation. It has also been noted that Ga4 and Ga5 are closely related so we are exploring the possibility of redundant functions within the pair as well. ga2- mutants do not respond chemotactically to cAMP but Ga1 mutants do, so this suggests Ga2 is most important for cAMP responses. The Ga4 is required for folate chemotaxis while Ga5 is not.

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Neuroscience

Trauma and executive function deficits in adolescents: A literature review.

Adolescence is a period of time where the prefrontal cortex faces its greatest development. This area of the brain is essential for skills related to inhibition, working memory, attention, and mental flexibility. Individuals who were maltreated as children tend to experience poorer executive function abilities during adolescence. This review will highlight retrospective cross-sectional and longitudinal studies concerning executive function and trauma among adolescents. Through analyses of previous research, this review seeks to understand the ways in which childhood trauma predicts weaker cognitive abilities in adolescence. Self-reports and models of stress have suggested that greater levels of stress predict poorer working memory, selective attention, and self-regulatory behavior. When stress is a result of childhood trauma, traumatic experiences that occurred earlier in childhood predicted worse youth outcomes in adolescence, such as poorer quality of life and substance abuse. Researchers have agreed that experiences of trauma during childhood often predict weaker cognitive abilities during adolescence. In addition, the type and severity of trauma may predict which areas of executive function are weakened. Physical abuse was linked to greater sensitivity of the hypothalamic-pituitary-adrenal axis. Neglect was associated with lessened cognitive flexibility. Exposure to domestic violence predicted increased displays of internalizing and externalizing behaviors. Further research is needed to understand how specific cognitive deficits may uniquely correlate with subtypes of childhood trauma. Understanding these relationships may allow for targeted screening measures for adolescents at risk of developing post-traumatic stress disorder.

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Psychology

UWEC-Mayo Drivers of Burnout

There are many obstacles healthcare leaders face, including price competition, clerical demands, a shortage of labor, and increasing use of quality-control metrics; however, most importantly, they also face a high level of burnout in the physicians and nurses on whom we rely on for quality patient care. Physician burnout is negatively correlated with quality of care, patient safety, and patient satisfaction, and it is positively correlated with medical errors. Thus, it is important that health care leaders work to address the problem of burnout among their health care providers. Although we have identified seven drivers of burnout, there is no existing measure specifically designed to assess all seven dimensions in tandem. We hope to shed some light on the importance of preventing burnout as well as designing a tool that provides a brief but reliable assessment of where employees stand. We hypothesized, UWEC
faculty and in a sample of Mayo physicians and nurses, responses to items within each of the seven dimensions will show above-threshold internal reliability (Cronbach’s $\alpha > .70$). We also hypothesize, in the sample of UWEC faculty and in a sample of Mayo physicians and nurses, favorable responses to the items comprising each dimension will be negatively correlated with level of burnout and positively correlated with level of engagement and joy at work.

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Spanish

Transcending beyond HIV: From a death sentence to a metaphor of life in Marta Dillon’s *Vivir con virus* (2016)

The experiences of women living with HIV (WLHIV) have historically been understudied in medicine and underrepresented in literature due to medical bias and a lack of access to literary resources. Subsequently, during the first decades of the pandemic (1980s-1990s), autobiographies written by WLHIV were scarce and hence the existing literature did not suffice to give a broad overview of what it was like to be a WLHIV. As a result, women did not have the opportunity to read, and learn from, their peers’ life stories. This research focuses on the literary analysis of Marta Dillon’s *Vivir con virus* (2016), which is a collection of newspaper articles published in Argentina between 1995 and 2016. Therefore, it is one of the first autobiographies written in Spanish by an HIV-positive woman. I argue that Dillon is turning around the social perception of HIV, which, as Susan Sontag studied, was commonly used as a metaphor of death. Instead, Dillon captivates her audience by conceiving HIV as a metaphor of life, gratitude, and self-appraisal.

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Psychology; Human Development & Family

Children of Incarcerated Parents and the Role of Caregiver Well-Being

In 2019, about 4 million children were living with at least one undocumented parent (American Immigration Council, 2019), many of whom are at risk for deportation or immigration detention. Deportation or detention of a parent is a form of forced parent-child separation; although the literature on children of deported parents is sparse, there are lessons to be learned from studying other types of forced parent-child separation, such as parental incarceration. When a father is incarcerated, children typically live with their mothers, and when a mother is incarcerated, children often live with grandparents or in foster care (Glaze & Maruschak, 2008). Caregivers of children with an incarcerated parent accept new responsibilities and face a variety of accompanying challenges. Along with emotional distress and economic instability, caregivers struggle with their own coping mechanisms and with helping children understand incarceration (Turanovic, Rodriguez, & Pratt, 2012). The present study examines the association between caregivers’ well-being and children’s well-being when a parent is incarcerated. The study includes caregiver and parent reported data from families of children who are between 2-6 years of age who have an incarcerated mother or father (e.g., Poehlmann-Tynan et al., 2019), focusing on caregiver economic well-being and mental health in relation to children’s behavior problems. The study has implications for needs for support in caregivers, as they provide direct care for children impacted by a parent’s incarceration, and it may spark ideas for investigating other forms of forced parent-child separation in vulnerable families.
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*Chemical Engineering*

**Testing Incorporation of Extended Side Chain and β-Hydroxy-α-Amino Acids**

The catechol group in 3,4-Dihydroxyphenylalanine (DOPA) allows mussels to adhere to underwater surfaces, prompting exploration of catechol-containing non-standard amino acids (nsAAs) for bioconjugation applications in therapeutics and adhesive biomaterials. Although a proven candidate for ribosomal incorporation, DOPA is mistakenly accepted by endogenous E. coli tyrosyl-tRNA synthetases for its similarity to tyrosine. To avoid toxic DOPA misincorporation while maintaining catechol incorporation, we propose an extended side chain analog of DOPA (C5-DOPA). We also propose a biosynthetic pathway from 3,4-Dihydroxyhydrocinamic acid (DHCA) to the β-Hydroxy-α-Amino Acid (HAA) analog of C5-DOPA for single-strain production and incorporation. This research further aims to investigate the incorporation of HAAs, which could introduce the functional group without additional conversion to the nsAA. We reassigned the amber stop codon (UAG) to incorporate a nsAA using an orthogonal aminocoyl-tRNA synthetase/tRNA pair. The fluorescence of a UAG-integrated protein indicated quantifiable incorporation at that codon. We purified the nsAA-incorporated protein and performed a dot blot using nitroblue tetrazolium dye to qualitatively detect catechol-containing proteins. From our initial library, the best performing synthetase for C5-DOPA incorporation was DOPARS, previously engineered to incorporate DOPA. We also tested the conversion of DHCA using an enzyme assay and found a new peak likely corresponding to the C5-DOPA HAA analog after testing with High Performance Liquid Chromatography. To increase substrate specificity for C5-DOPA and reduce the background incorporation, we will perform enzyme design from DOPARS. We will also confirm the presence of the C5-DOPA HAA analog and test HAA incorporation.

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*Criminal Justice*

**Forged In Fire: Rehabilitation on the Fireline**

This research seeks to achieve several goals, mainly to draw attention to a specific and unfrequented area of corrections—Carceral Firefighting programs. This study will achieve the above goal through a comparative analysis of Carceral Firefighting programs from the Western region of the United States, where such programs are most common. The analysis will focus on several key items, including, but not limited to: the number of program participants, level of training, whether they live in camps or stay in the prison, and so on. Additionally, the study will endeavor to highlight relevant legislation that impacts one’s ability to serve as a firefighter following their term of incarceration; one example is California’s recently passed Assembly Bill 2147 which allows for formerly incarcerated firefighters to use their training to serve in the same capacity upon release. Lastly, this study will highlight any transitional programs, should the state allow formerly incarcerated firefighters to be firefighters after their sentence is over as well as programs that have a framework for success in place, such as Arizona’s Phoenix Crew, which is discussed below.
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Psychology

The Disproportionality of Young Children From Linguistic and Culturally Diverse Backgrounds with Autism Spectrum Disorder

Disproportionality in the research field of autism spectrum disorder (ASD) has shown to affect the diagnoses, services, and availability of resources varying by several demographic factors (e.g., race, ethnicity, socioeconomic status, gender). This research project explores the interpersonal and intrapersonal characteristics that influence the disproportionality of young children from culturally and linguistically diverse backgrounds with ASD. Specifically, parents/caregivers of young children diagnosed with ASD have shared their personal experiences detailing their confronts of disproportionality within their attainment of adequate ASD services and information, racial/ethnic representation, and financial barriers. The intrapersonal traits that are disclosed in the study are explored through a mixed method design (quantitative and qualitative) to better understand the number of traits and identities that the participants may associate with and the types of services their child receives and how these impact the diagnosis and services received.

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Geology

Sandstone Petrography of the Aguja Formation, Smallpox Well, Texas

In 1939, the American Museum of Natural History (AMNH) sent a team of paleontologists to what is now Terlingua Ranch in southern Brewster County, Texas. The group collected several vertebrate fossils, east of Terlingua Ranch Lodge near “Smallpox Well.” The fossils were collected from the Aguja Formation, one of the two dinosaur fossil-bearing formations in west Texas. This formation is exposed in the southern Big Bend Region, including adjacent northern Mexico. The Aguja Formation lies above the Pen Formation, which tongues the Aguja and stratigraphically below the Tornillo Group (Javelina Formation). During Aguja time, the Big Bend region was a lush, flat coastal plain inhabited by large vertebrates (turtles, crocodilians, and dinosaurs). The Aguja Formation is comprised of five major stratigraphic unit members. The stratigraphic order of these members reads as follows: basal sandstone member, lower shale member, Rattlesnake Mountain sandstone member, Terlingua Creek sandstone member, and the upper shale member. This study focuses on the upper shale, which is dominated by mudstone and lenticular sandstone. The lower strata of the upper shale consists of deltaic coastal plain and inland floodplain deposits. Meanwhile, the upper part is dominated by fluvial stream deposits. The “Smallpox Well” region is greatly understudied; therefore, this study is important to learn more about the exposed Aguja in this region. It is the goal of this study to construct a detailed geologic map of the “Smallpox Well” region, collect samples of three different sandstones and produce thin sections of those samples and determine the sedimentary petrography of the sandstone samples collected.
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Biology*

**Growth and mRNA Expression of Diverse Wild-type and Nonsense-mediated Saccharomyces cerevisiae in Toxic Copper and Cadmium.**

The nonsense-mediated mRNA decay pathway (NMD) is an mRNA degradation pathway observed in most eukaryotic organisms. NMD allows for the rapid recognition and degradation of mRNAs that prematurely terminate translation. This includes mRNAs containing premature termination codons alongside natural mRNAs. Natural mRNAs, regulated by NMD, encode fully functional proteins which carry out a variety of cellular processes. One of these processes includes bio-metal homeostasis. To explore the significance of NMD regulation on bio-metal homeostasis, wildtype and NMD mutant yeast strains of diverse genetic backgrounds were grown in complete minimal media containing copper and cadmium. Although copper serves an essential physiological role as a coenzyme, excessive intracellular copper concentrations can be directly linked to cell toxicity. Additionally, although cadmium ions are known carcinogens, pollutants, and teratogens, little is known surrounding cadmium’s underlying molecular mechanisms. To further understand the roles of both heavy metal ions on the NMD pathway, the growth rates of select strains of *Saccharomyces cerevisiae* were analyzed as they were cultured within a variety of environmental conditions. Along with this, the changing expression rates of PCA1, an NMD-regulated gene, were also examined. It was hypothesized that yeast cell populations would adapt differently in response to the environmental presence of copper and cadmium as the functionality of the NMD-regulation process fluctuated. Through this, the effect of the presence or absence of these metal ions in relation to a functional NMD pathway was determined. It has been discovered that *S. cerevisiae* strains from diverse genetic backgrounds respond differentially to environmental stimuli.

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Chemistry/Biology*

**New Non-Centro Symmetric Polyoxometalate (POM) Structures: Synthesis, Characterization, and Crystal Growth of Strandberg POMs**

The purpose of my research was to synthesize, characterize and grow high quality crystals with distinct physical properties; specifically Nonlinear Optics and Second Harmonic Generation. I achieved this by using hydrothermal methods by placing our compound mixtures into teflon cups and placing those into hydrothermal autoclaves. I then tightened and placed these autoclaves into an oven at 200°C. By allowing these to heat up, and cool down rather slowly, I was able to promote crystal growth. The results were promising in that the original components and centrosymmetric version of the polyoxometalate was very different (from XRD data) from the crystal structure that was synthesized. The results were consistent with a product that shared non-centro symmetrical properties, implying the characteristics of non-linear optics and second harmonic generation. After analysis at the University of Houston, we concluded that the crystal was a known compound; of course the properties of our crystal are of most significance, and we have yet to grow a crystal of significantly high quality, but that will be the goal over the next few months.
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Political Science

Mental Trauma from the Migrant Journey: Mental Health Services Available to Migrants

The journey across the U.S.-Mexico border symbolizes a transcendental rite of passage for many Latino migrants in their search for the “American Dream”. Anecdotes about these experiences reflect both the dreams and aspirations as well as the fears and dangers faced by migrants in their route north. Depression, anxiety, and stress are common mental health challenges faced by migrants due to traumatic events they encounter before they begin their journey, along the way, and after their arrival to the United States. Persistent inequities make Latino migrants a vulnerable population in this country. They also have more difficulties seeking mental health services because of language barriers, mistrust of authorities, immigration status, and cultural stigma. This research project investigates through interviews how accessible mental health services are to Latino migrants in rural communities in Colorado and how likely they are to request help from their health care providers. Through oral interviews, this study seeks to provide a platform for this marginalized group of people to express and elaborate on their experiences humanize and destigmatize mental health in Latino migrant communities.

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Political Science

African Americans in the United States endure a multitude of hardships, one being the effects of environmentalism. Since environmentalism tends to have negative effects, environmental justice, EJ, is the method used to combat it. EJ tends to not fully comprehend the complexity of the impact of environmental policies on certain communities. The goal of this study is to discover the magnitude of these harms through the lens of Intersectionality; it will be useful to understand how class and race as a combined factor contribute to discrimination towards lower income African Americans. To test the hypothesis, several physical and social vulnerabilities that hinder the resilience of the Black community will be examined and compared to other minority groups. This research will be quantitative and it will use results from the General Social Survey. This research is ongoing, and it will be carried out through the remainder of the fall year.

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Biochemistry

Ablation of Hoxa11-expressing skeletal stem cells in adult mice

Hox genes are evolutionarily conserved transcriptional regulators that are essential for proper patterning of the axial and appendicular skeleton. Posterior Hox genes (Hox 9-13) are also critical during the patterning of the proximodistal axis of the limb skeleton. Loss of Hox11 genes lead to severe skeletal malformations. Recently, it has been shown that Hox11 genes are continuously expressed from embryonic to adult mouse stages in a skeletal stem cell population. Loss-of-function of Hox11 in skeletal stem cells leads to defects in chondrogenesis and osteogenesis, but the stem
cell population is maintained. We utilized a diphtheria toxin receptor model in combination with Hoxa11-CreERT2 allele to ablate Hox-expressing skeletal stem cells in the adult mouse zeugopod. Specifically, we examined the diphtheria toxin dosage effects in Hoxa11-expressing cells. Control and mutant animals were treated with tamoxifen to activate Cre, followed by diphtheria toxin to ablate the Hox-expressing cells. Efficiency of deletion was examined via loss of Hoxa11eGFP expression. Our preliminary data indicates that the deletion of Hoxa11 was evident using both the 5 μg/kg and 1 μg/kg dosages, however, complete ablation was not achieved. To achieve maximum cell ablation, we plan to optimize the length of exposure of diphtheria toxin. Additionally, we aim to perform these experiments in mouse embryos. These findings support the usefulness of the diphtheria toxin receptor model for the ablation of Hox-expressing cells. We will further optimize our dosing strategy to efficiently ablate Hoxa11-expressing skeletal stem cells and examine the effects of the loss of this population of cells.

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Microbiology/Cell & Molecular Biology

Understanding CupA in the CO2 Concentrating Mechanism of Synechococcus sp. PCC7942

The CO2 concentrating mechanism in cyanobacteria is one of the most efficient systems across species in carbon fixation. Its components and genes are mainly known, but how they work together in order to overcome environmental and physiological obstacles is unknown. One way cyanobacteria’s CCM works is by using CO2 Uptake proteins (Cups) with the NDH-1 complexes on the thylakoid membrane to convert CO2 in the cell to HCO3-. During times of elevated CO2 environmental conditions, the CupA gene is induced along with the constitutively expressed CupB genes. The two systems are known to differ in their affinity for CO2, CupA being the higher affinity. Studies have shown CupA may only work with CupB, while the reverse is not true as CupB works efficiently with or without CupA. This research is to test this hypothesis, and to better determine the relationship between the genes. This was done by genetically modifying strains of Synechococcus sp. PCC7942 for comparison by physiological spot assays.

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Biomedical Engineering

Analysis of Bending Properties of Carbon Fiber Reinforced Composites

This research aims to study the mechanical properties of carbon fiber reinforced composites, or CFRC, and further investigates the influence of thermal treatments and its effects on the composites. When using carbon fiber as the reinforcing material the material should show enhanced properties in performance. Following ASTM-D7264-D7264M-15 standards a three-point bending test was utilized to evaluate flexural stiffness of the specimens produced by a Markforged Mark II 3D printer. The Mark II is a commercial grade 3D printer with the capability of printing parts that are reinforced with continuous carbon fiber. Using the MTI-2k testing machine the bending properties were measured. A Lindberg/Blue Mechanical Convection Oven was utilized to give the thermal treatment. Results revealed that the thermally treated composites performed superior when compared to the untreated specimens. The composites that underwent the thermal treatment displayed a 24% increase in strength and an 8.8% increase in modulus. Continuous CFRC enhanced the tensile strength and modulus of the printed specimens, it also offers various advantages to many fields and industries. In the biomedical industries, CFRC are often used in prosthetics and enables the mimicking of human limbs.
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Oklahoma State University, with Dr. Rachel Lim
Strategic Communications

The Effect of Stereotypes on the Perceptions of the Hispanic/Latinx Population

The Hispanic/Latinx population in the United States has increased significantly in the past decades. However, the Latino media gap is still prominent and has not kept up with the amount of Hispanic/Latinx media consumers. As a result of the media gap and misrepresentation in the media, the stereotypical portrayal of this population continues to exist and have effects on the way that this group perceives themselves and is perceived. Media is oftentimes a social cue that acts as an external factor in acculturation, making it difficult for Hispanic/Latinx individuals to connect with their culture when it is being stigmatized. Positive portrayals, on the other hand, can increase the visibility of a minority group. To test the hypothesis that negative and positive sentiments in the media have an effect on the opinions of the Hispanic/Latinx population, an ongoing experiment will be conducted to analyze the causal relationship between the following variables: positive versus negative portrayals and news segments versus entertainment segments. With the assistance of Dr. Rachel Lim, assistant professor at the School of Media and Strategic Communications at Oklahoma State University and the Ronald E. McNair Postbaccalaureate Achievement Program, the study is projected to develop until the summer of next year. The ultimate goal is to not only showcase the effects of stereotypes and misrepresentation in the media, but also to encourage minority groups to participate in the production of media in order to be represented and portrayed as accurately as possible.

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Sociology

Implications of State Legislative Guidance for Gender Non-Conforming Inclusivity in Midwestern Public Schools

In what was targeted to be the most inclusivity-conscious age of public administration, there exists detrimental gaps in federal policy regarding LGBTQIA+ school policies. Moreover, public school district policies in the midwest, along with their respective state legislatures, have significant room for improvement to protect non-gender conforming students and educators. This project explores how sexual orientation, gender identity, and gender expression are presently protected through guiding documents in midwest K-12 education. The main goal is to assess current gaps in protections, and the causal impact of state legislative guidance on individual schools districts’ adoption of protecting and affirming policies. This is done using a quasi-experimental approach on the basis of qualitative coding of policies for quantitative analysis. Primary, deductive coding was conducted in binary form for Anti-Discrimination, Equal Education Opportunity, Harassment and Bulling, Records, Dress Codes, Field Trip, Disciplinary, and even Curricular procedures. Present results show how significant growth is needed to protect gender identity, such as how 3% of districts in Illinois presently have inclusive policy protections for gender identity. A major issue exists within the data of whether or not Illinois and surrounding states promote advocacy through Administrative Policies to protect Transgender students, being just 38 out of the 150 districs that were sampled (25%). This project will move forward in the graduate-research lab of Dr. Mollie McQuillan where secondary data will be collected, and a difference-in-difference analysis will be conducted. This project has strong implications in gender inclusivity and equity for young learners and their respective educators.
The History, Success, and Implementation of Community Theatre in America

Across the United States today our youth are struggling to find a place where they feel they can belong. The theatre creates an environment where these kids can collaborate with peers from all social classes. Theatre began in the 5th century, in the beginning these performances focused on comedy and tragedy. Comedies were written with leaders such as Sophocles and Dionysus at the tail end of the joke while tragedies depicted real life accounts of soldiers coming back from the war. Whether the audience cried or laughed their way home from the theatre, they left the production with a shared experience and a sense of community. This is the same focus that community theatres have today. Today many theatres across the country are run by volunteers from all levels of society. Finances are often the downfall of community theatre. A successful community theatre begins with experienced leadership. It takes a great deal of knowledge to be able to gather a group of artists with a strict budget and bring everyone's vision to life. In researching community theatres across the country, the differences between successful community theatres and those who were forced to close their doors became clear. This data that has been gathered will assist future community theatres to avoid poor business decisions and follow in the path of successful community theatres that have come before.

It’s Morphin’ Time!: How Power Rangers Shaped Generations

My research for the Ronald E. McNair scholarship program is centering on how Power Rangers has a positive impact on any age demographic around the world. I will also cover how parents, the media and children psychiatrists blamed Power Rangers for making children violent. I will approach this research by conducting interviews with actors from any generation of the television show, with Ron Wasserman, the man who created the original theme song for Mighty Morphin’ Power Rangers, with parents, children psychiatrists and former Power Ranger actors. I will discuss the origins of Super Sentai in Japan that Power Rangers uses footage for, how Haim Saban created Power Rangers and how Stan Lee tried to bring Super Sentai to America. Then I will move on to explain the controversies that Power Rangers had during 1993, the death of Thuy Trang and how Power Rangers was banned in New Zealand. I will transcribe the interviews that I have conducted with the permission of the people that I have interviewed and their views on Power Rangers. Finally I will discuss and go in depth the cultural impact of Power Rangers, my personal stories, the Power Ranger convention called Power Morphicon, how Power Rangers got a national holiday that is on August 28th, the positive messages/diversity that Power Rangers presents, Power Rangers still being continued to this day, the fans and finally how Power Rangers lives on.
Feasibility of the Elkins Hypnotizability Scale - Spanish Version

The Elkins Hypnotizability Scale (EHS) is a valid and highly reliable standardized scale that measures individual differences in hypnotizability for clinical care and research. However, the EHS currently does not provide a translated version of the scale for Spanish-language speakers. The absence of a translated EHS suggests a lack of access to clinical research and hypnotic interventions to predominantly Spanish-speaking populations. The present study aims to mitigate this disparity by making the EHS accessible to Spanish-speaking adults, thereby facilitating their eligibility for experimental research and clinical care. The Spanish-translated EHS was administered to nine participants proficient in Spanish. All participants identified as Hispanic or Latinx, and 77.7% reported their primary language spoken at home was Spanish only or more Spanish than English. After the session, participants responded to two questionnaires that further assess feasibility. The participants rated their levels of pleasantness and comprehension of the EHS on a scale of 1 to 10. There was an average reporting of 8.67 (SD=1.80) and 7.67 (SD=3.08) on rates of pleasantness and comprehension, respectively. The hypnotizability levels measured using the Spanish version are normally distributed, creating a bell-shaped curve with an average score of 6 (SD=2.65). These results are consistent with their corresponding rates reported in the English EHS, proving that a Spanish EHS is feasible for further research. The translated EHS resulting from this feasibility study extends the possibility of future research in hypnosis to more linguistically diverse samples that better represent the actual population.

Satisfaction and Transference of Family-Centered AAC Camp Activities

Research suggests that successful augmentative and alternative communication (AAC) intervention outcomes are linked to family support. Family involvement may also prevent AAC abandonment. A four day overnight camp, for children (ages 5-15) who use AAC and their immediate family members, was designed to support family bonding, communication, and networking. AAC users, caregivers, and siblings engaged in activities such as crafts, adaptive sports/games, and social events. An adult caregiver completed a fourteen question exit survey assessing the camp experience, satisfaction, and AAC use. Caregivers indicated high levels of satisfaction (8.5 mean, 2.5 SD). Of the eight camp activities, the dance/ice cream social and bowling resulted in the highest level of participation. Bowling (4 responses) and cooking (3 responses) were the activities most often reported to result in high levels of AAC use at camp. Six of the fourteen caregivers predicted that bowling and AAC programming instruction would most support family AAC use at home. A second survey will be sent to caregivers one month after camp to determine transference of camp activities to the home environment. It is expected that activities that generated the most communication opportunities with families at camp will be most likely to transfer to the home environment. Results are expected to support best practices in future family centered AAC camp programming. The project supports families as they reflect on their camp experience and provide feedback to advocate for family gains and needs. The work was made possible by the UW-Whitewater McNair program.
Quantifying the Organic Carbon Preservation Potential of Biogenic Iron Sulfide Minerals

The global carbon cycle is heavily dependent on the transformation of organic and inorganic phases by living organisms. Bacteria are critical for this process because of their diverse metabolic activity. Heterotrophs oxidize organic carbon (OC) to produce carbon dioxide, while autotrophs fix carbon dioxide for biomass production. Biogenic minerals naturally form in the presence of cells and may play a role in OC preservation due to their interactions with cellular membranes and organic molecules derived from microbial biomass. This study examined the role of sulfate-reducing bacteria (SRB) in forming iron sulfide (Fe-S) minerals and their interactions with OC as a mechanism that removes carbon from the carbon cycle. In anoxic environments, SRB convert sulfate to sulfide, which reacts with ferrous iron to form Fe-S minerals. This study aimed to: a) identify the effect of different lactate (electron donor) concentrations on biomass production, and b) determine the organic carbon sequestration capacity of Fe-S minerals in cultures of Desulfovibrio hydrothermalis AM13 and Desulfovibrio magneticus RS-1, which is a marine SRB. Organic carbon could be measured in minerals precipitated in all conditions. OC levels stabilized after 2-4 months and remained stable for over one year, which indicates a potential for long-term carbon preservation. Fe-S minerals may be able to sequester more OC than observed in our experiments. Future work involves investigating mechanisms of interactions between iron sulfide minerals and organic carbon derived from biomass.

Examining the Effects of COVID-19 as it Pertains to Child Abuse

Child abuse includes physical abuse, emotional abuse, sexual abuse, and neglect. In the State of Texas, available public data reports that there are 184 children cases of child abuse each day, seven children that are maltreated every hour, and at least four children who die on average each week due to child abuse and neglect. One area of concerns for child abuse is the lack of voice children have or are given at home and at school to address cases of child abuse. It remains largely unknown whether a public health crisis such as the COVID-19 pandemic can influence the rate of reporting or significance of child abuse in Texas. The purpose of this research study is to investigate whether the numbers of child abuse cases in El Paso, Texas has changed due to stay at home order and the closure of school, parks, and other day facilities during the COVID-19 pandemic. Data will be obtained from the Texas Department of Family and Protective Services, El Paso district office over a 5-year period from 2016-2021. A quasi-group comparison will be made to determine whether cases features are different before, during or after the COVID-19 pandemic; the period between, March 2020 to May 2021 will be designated as the ‘during’. These findings will provide meaningful data to understand the possible influence of a public health crisis on child abuse, such that meaningful interventions can be provided.
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Aerospace Engineering

Analyzing the movement of small UAVs in varying Wind Stabilities

The goal of this research is to analyze the movement patterns of small scale unmanned aerial vehicles in differing wind stabilities. This project is currently being undertaken with the construction of a quadcopter using the Brown University DuckieDrone kit created in conjunction with Professor Tellex from Brown. The overall goal is to have a quadcopter to test a variety of movement patterns in an indoor lab where the most consistency can take place. The indoor lab will be used along with software such as MatLab to accurately track different wind patterns and how the quadcopter is affected. This is to lead to better ways to control small unmanned aerial vehicles in outdoor environments and increase their effectiveness while utilizing their advantages. Current research shows the building of the quadcopter and difficulties that come with how the quadcopter is put together.

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Kinesiology

Demographics & Prevalence of Ankle Injuries in Division 3 Athletes

Ankle injuries among student athletes are common and can prevent an athlete from returning to play. Athletes must be injury-free prior to in-season competition, during competition, and in post-season training to be successful. Previous epidemiological studies have reported national prevalence data. However, the incidence of ankle injury among division 3 athletes is largely unknown. A retrospective chart review was performed over a two-year span (January, 2019-May, 2021). Relevant clinical data for ankle injuries were coded into a spreadsheet; descriptive statistics and incidence rates were calculated. There were a total of 490 student athletes playing 8 sports during the study period. The distribution of males to females was 48.2% (males) and 33.5% (females). The incidence rate for ankle injuries was 17% (n=73 out of 424 injuries). The incidence rate in males (16.9%) was higher than females (10.9%). Among the 73 ankle injuries, 41.3% were grade 1, 33.3% were grade 2 and 25.3% were grade 3. Inversion of the foot accounted for 80.8% of ankle injuries in both males and females. These findings provide initial evidence to support the need for physical training and other interventions to prevent ankle injuries in this population. More research is needed to identify whether leg dominance influences ankle injury and to determine the clinical significance of the sex differences identified.

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Economics

Food Insecurity in an Anthropogenic Age: An Analysis into How Consumer Demand Will Shift during Crisis Events

Consumers in the United States may need to adjust their food demand due to food insecurity caused by climate warming events. Research has focused on how climate change impacts food supply chains and distribution; however, there was little research on how consumers responded to these changes. This study analyzed how consumers across the United States responded to food insecurity caused by crisis events (i.e. pandemics and climate change), how
consumers shifted from grocery store vendors to local food vendors, and if migration or food miles may increase based on potential food shortages. One study was initiated through survey and a one-factor, two-level between-subjects experimental design to assess perceptions of food insecurity and food purchasing behavior. Further, the survey was designed in Qualtrics and administered via Amazon Mechanical Turk and a regression analysis was run via SPSS. The study was targeted to people in urban and rural areas in the Midwest, South, East, and West regions of the United States. Furthermore, participants were selected between the ages of 18-65 and there was a sample size of 195 participants, of which were paid $1.00 each. In this research, we hypothesized that consumers would shift their food purchasing from grocery stores to local vendors in light of crisis events. Furthermore, we hypothesized that this shift in market demand may encourage food miles. Both hypotheses were proven to be true in the study. Future directions may include a second study to further evaluate consumer demand.

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Psychology

The Effects of Adverse Childhood Experiences on Mental Health and Academic Performance of College Students

The questions about the mental and physical health of individuals who have experienced trauma has been a topic of interest that has recently started to gain more attention. Some areas of focus include the extent of a person's trauma, the effect of trauma on future mental and physical health, and the impact trauma has on an individual's interactions with others and from new relationships. In this study, I will analyze the content of multiple peer-reviewed articles surrounding the topic of trauma and its impact on mental/physical health. The study will be conducted through a thorough analysis of the material. The goal of the study is to find more information on traumatic events and the effects of them on individuals currently in college, specifically the impact on their academic performance and their relationships with other people.

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History

Black Masculinity in the Civil Rights Era: Non-Violent Protest versus Armed Self-Defense

The Civil Rights Movement of the 1960s evolved after centuries of racist policy and violence towards the Black community, creating a lasting change to the way our nation interacts with Black Americans. As the movement grew, two factions developed, and each of these groups represented a unique set of ideas and methods to achieve true equality for all. One of the key factors in these ideologies is based on the concept of Black masculinity and how each group viewed the role of Black men in American society. From “respectability politics” and non-violent protest, to armed self-defense and direct action, this presentation will explore the origins of these concepts and demonstrate how they were used in the pursuit of civil equality. The unique stereotypes and expectations placed on Black men in the United States had a major effect on these methods and a lasting influence on the effectiveness of the 1960s movement, as well as the calls for racial justice and equity today.
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*Animal Science*

**The Effects of Total Equine™ Grain Containing Ascophyllum nodosum and Chelated Minerals on Fitness and Body Composition in Adult Quarter Horse Mares**

Supplementation of sporting horses has recently becoming an increasingly popular means to improve athletic performance. However, evidence-based literature on the effects of supplementation on fitness and performance is lacking. The purpose of this study was to assess the effects of an extruded total feed (Total Equine™) with and without a Sulphur supplement (Total Equine-15 Natural™) on post-exercise recovery. Six Quarter Horse mares were fed 3 different diets: Total Equine™ (TM), Total Equine™ + Equine-15 Natural™ (TM15), control (Ctrl), in a Latin square design study with a 6wk washout period between each 3wk experimental period. Horses were exercised daily, six days a week, during each experimental period. An submaximal test (4 min at 4.3 mph, 14 min at 9.5 mph, 6 min at 13.5 mph) was conducted on days 0 and 21. Resting and post-exercise (5, 10, 30-min post-exercise) blood lactate, respiratory rate, heart rate, and rectal temperature were assessed at the start and end of each experiment period. Body weight and body composition was assessed both pre- and post-study. Data was analyzed using GraphPad Prism. Analysis found that in a submaximal intensity exercise heart rates remained relatively unaffected; the only time it was shown to change was at 5- and 10- minutes post exercise in horses with the TM15 diet ($p=0.03$ and $p=0.04$). Based on the parameters of this study post exercise recovery did not improve during this submaximal exercise.

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*Psychology*

**Exploration of Second Language Learners' Motivation and Simpatía among Students in West Texas**

The purpose of this study is to explore motivational factors of aspiring bilinguals (L2’s) and compare motivational themes found in previous studies to see what differences, similarities, or new themes may arise among college students in the Southern United States. Lastly cultural values as measure by the Simpatía Scale (Acevedo et al., 2020) will be identified and its subsequent relationship to L2 motivation. Ultimately the goal is to continue to explore and define pathways that increase motivation to become bilingual since many positive benefits have been identified in the literature for monoglot cultures (Perryman, 2016). My study will use mixed methods. A qualitative analysis of the interview data will be conducted using the qualitative program. The program to analyze the data is called Dedoose. To analyze the quantitative data of Simpatía Scale scores of L1’s and L2’s, a T-test will be conducted using SPSS software.
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Psychological Science

Measuring Differences in Academic Beliefs of First-Generation and Non-First-Generation College Students

Measurable differences in achievement outcomes have been documented in first-generation and non-first-generation college students. Among variables that influence differences in academic outcomes, students’ academic beliefs have been shown to affect both behaviors and performance. However, efforts that have examined potential differences in academic beliefs between first generation and non-first-generation students are limited. In this study we examined potential differences in academic beliefs between first-generation and non-first-generation college students. Specifically, we examined these beliefs: intellectual humility (Porter & Schumann, 2018); theories of intelligence (Dweck, 2000); academic self-concept (Marsh & O’Neill, 1984); learned helplessness (Sorrenti et al., 2015), and task value (Pintrich et al., 1991). Data was collected from 557 undergraduate students from a southern university as part of a research participation requirement for coursework. The sample included 226 males and 331 females, 99 of which identified as first-generation college students (458 non-first-generation students). Academic beliefs were measured using seven validated Likert-like scales. Five t-tests were conducted to assess differences in academic beliefs. One significant (task value) and four nonsignificant differences were found between the academic achievement beliefs of first-generation and non-first-generation students. Results suggest that first-generation college students’ academic beliefs are more similar than dissimilar to non-first-generational students. This is a positive finding as individuals cannot control whether they are a first generation or a non-first-generation student. Follow-up studies are needed to further examine potential differences in academic beliefs between first-generation and non-first-generation students as these beliefs are related to achievement behaviors and performance (Schunk et al., 2014).

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Computer Engineering & Neuroscience

Analysis of behavior-seizure correlates in a mouse epilepsy model

Absence epilepsy is characterized by spike-and-wave discharges (SWD) in electroencephalographic (EEG) signals that correspond to cognitive and behavioral arrest in patients. Many studies have identified various physiological effects of absence epilepsy on human development, and pharmaceutical intervention has significantly improved the treatment of absence seizures. However, despite these advances there remains little understanding of mood and behavioral comorbidities commonly present in pediatric and adult patients with childhood-onset absence epilepsy. The Ank3 gene provides a unique opportunity to study these comorbidities, as it has been linked to mood disorders in human genetics studies and more recently to absence epilepsy in rodents. Thus, this study aims to identify unique event-related behavioral correlates in EEG signals of Ank3-knockout (KO) mice. Here, we take advantage of two supervised learning algorithms to identify SWD events from EEG recordings and to track the animals’ movements from the video recordings. The kinematic information produced from the movement tracking was then used to estimate behavioral states (e.g., sleeping and walking) via a personally developed algorithm that was cross validated by a subset of videos manually scored by an observer. Power of EEG signals during these behavioral states was estimated for signal frequencies between 1 and 50 Hz using a Morlet wavelet transform. Preliminary results suggest that KO mice exhibited increased slow gamma (~25-45 Hz) power during sleep and walking compared to wildtype...
controls. Preliminary results also suggest that these increases in slow gamma correlated with Ank3 gene dosage and seizure phenotype severity.

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Neuroscience

Analyzing Activation in Discrete CRH Populations Following Aversive and Appetitive Stimuli in Male and Female Mice

Chronic stress impacts emotions, thoughts, and behavior; for example, responses to negative stimuli become exaggerated while responses to positive stimuli are diminished. Corticotropin-releasing hormone (CRH) neurons respond to stress and reward through context-dependent release from discrete populations. Whether multiple populations of CRH neurons collectively respond to stimuli is unknown. We tested whether aversive or appetitive stimuli would differentially activate CRH populations and alter behavior. We exposed transgenic mice expressing tdTomato in CRH neurons to soiled rat bedding (aversive) or bacon softies (appetitive) after which brains were collected for immunohistochemistry. Next, we visualized the immediate early gene product cFos (a marker of neural activity) in three CRH populations: the paraventricular hypothalamus (PVN), central amygdala (CeA), and paraventricular thalamus (PVT). Behavioral analysis showed that mice exposed to soiled rat bedding tended to increase movement and velocity, which is indicative of anxiety-like behavior. Since PVN responds to aversive rather than appetitive stimuli, we expect more tdTomato+ to be colabeled with cFos in the PVN in response to the aversive stimulus. As CEA is responsive to both positive and negative valence, we expect no differences in tdTomato/cFos colabel in this region. Analysis of behavior and CRH responsivity in stress-naïve mice will allow future studies to investigate how chronic stress affects the functionality of the CRH system.

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Computer Science & History

The Carceral Response to COVID-19

COVID-19 hit prisons, jails, and detention centers especially hard, with incarcerated individuals facing markedly greater risks in confined spaces. It is the aim of this study to gauge the macro and micro-level impacts that the pandemic has had on incarcerated individuals in America between April 2020 and January 2021. Understanding the impact of such national crises simultaneously demands contextualization within the broader sphere of carceral studies, including the history and consequences of mass incarceration in the national landscape. The research aims to explore COVID-19 infection and death rates through databases such as the UCLA COVID-19 Behind Bars Data Project, which generally collects facility-level data from federal, state, and county correctional agencies across the country when available, and through public records requests when not. It also attempts to capture the responses of justice-involved populations to the pandemic in order to avoid quantifying the experiences of these communities and to more accurately gauge collective sentiment. Overall, a lack of adequate COVID-19 handling procedures in prisons and jails put incarcerated populations at far greater risk for infection and death. The egregious impact of COVID-19 on incarcerated populations reify the need for institutional accountability among prisons and jails. Communicating the perilous effects of COVID-19 on those who are powerless to its spread functions as a powerful political cudgel in the battle for these protections.
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Natural Resource Management/Wildlife Ecology

Impacts of Harmful Algal Blooms on Plankton Communities

Zooplanktons are a food web key in freshwater reservoirs and contribute to water quality, nutrients, and algal densities. The current focus is to report the plankton communities before and after a harmful algal bloom effect (HAB). A HAB may decrease the number of species composition in the affected reservoir. We identify and count zooplankton species from the Oklahoma reservoirs. Zooplanktons are sub-sampled from whole samples and identified under a Leica Microscope using a North American image-based key. This helps with measuring diversity in the species number and relative abundances. Tecumseh Reservoir in the summer of 2019—which a HAB was observed and Meeker a control reservoir that did not have a HAB observed. Therefore, we compare how zooplankton communities change due to a disturbance in one of the affected communities. I’ve observed smaller zooplankton species families, like Cladocerans—Daphinias and Copepods—a variety of larger zooplankton species. Identifying under the family level taxonomy, Daphiindae family did not differ on May 30 nor on June 13 (an earlier date from HAB), while Copepods were decreasing. The Copepods tremendously increased in Meeker in June compared to May. This concludes that smaller species may have survived the HAB in Tecumseh, while larger zooplankton had a major decrease in the species composition. As for biomass, the amount of zooplankton species were stable in both reservoirs around May 30, but on June 27 (HAB happened) we see a slight decrease in biomass in Tecumseh, which may show the smaller species surviving and the larger zooplankton species dying.

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Psychology

Examining deindividuation among college students: Soliciting political & religious views

Politics and Religion are among some of the strongest factors that seem to split up individuals. In past years, extreme radical theories and conspiracies have even strengthened core beliefs. I believe that sight of other individuals affects a lot of collective beliefs and can cloud judgment when dealing with political and religious aspects. For this reason, I would like to introduce anonymity in a different angle. Deindividuation is a phenomenon that occurs when and an individual loses his self-awareness among groups during situations in which he believes he cannot be personally identified. If individuals can bond through this process, their unconscious beliefs will arise and aid them in conversing with one another. My investigation will examine the minds of individuals through suggestive clips relating to either political or religious material with the use of full facemasks to cover identity. If propaganda works through the subconscious, then the same methods can be applied through deindividuation to draw out ideas and conversations amongst the individuals. My aim is to create a more efficient environment for individuals to resolve worldwide problems despite factors such as political and religious beliefs. Not only that, but I want the individual to walk out of the room knowing that they said everything they wanted to and that they ultimately feel heard.
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Sociology  

**Historical and Contemporary Influences of Settler Colonial and White Supremacist Ideologies, Policies and Practices on Black, Indigenous and People of Color (BIPOC) in the U.S. Education System**

The purpose of this study is to illuminate the legacies of settler colonial and white supremacist ideologies, policies, and practices in the United States educational system, and how those legacies may influence the experiences, opportunities, and acts of resistance of Black, Indigenous and People of Color (BIPOC). It is critical to further explore the effect of the construction and enforcement of a binary that positions western research practices and knowledge as culturally superior to non-western research practices and knowledge. The following question guided this study: How might the legacies of settler colonial and white supremacist ideologies, policies, and practices in the United States educational system influence the contemporary experience, opportunities, and acts of resistance of BIPOC students in the United States educational system? This qualitative study utilized interviews which allowed for the researcher to collect data that is produced from conversations with BIPOC students who have graduated from high school or higher education. Interviews were recorded and transcribed to identify shared themes of BIPOC students. The findings of this study are: 1. the systematic barriers to BIPOC histories and knowledge by normalizing white histories and identities in curriculum and having higher education as primary access to cultural studies. 2. the impact of racialized cultural environments on learning by the exclusive white spaces impacting academic performance, and cultural representation being significant to identity formation and academic success.

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**Real-Time Force Measurements of Murine Myoblasts Using Graphene Strain Sensor**

**Introduction:** Contractility and the corresponding force generation by cells is necessary for all movement in the body. When exposed to varying environmental stimuli, contractile cells and tissues undergo phenotypic changes resulting in altered contractility. Currently, limited tools exist that allow for scalable real-time measurements of force generation in muscle cells[1]. Using a graphene as a mechano-sensor with stiffness controlled PDMS, we developed a device to measure contractions and force generation in real-time. Incorporation of muscle cells onto softer PDMS surfaces presents a known challenge that our project hopes to overcome.

**Materials and Methods:** Murine skeletal muscle cells (C2C12) are known for their contractile capabilities following differentiation into myotubes[2]. C2C12s were seeded on soft polydimethylsiloxane (PDMS, Sylgard 184, 15:1, 1MPa) and allowed to grow to confluency. Brightfield images (20X, phase), were taken for visual tracking of differentiation, while functional analysis of myotubes was determined through visual inspection during electronic stimulation (IonOptix, C-Pace, 0.5Hz, 40V, 24ms) over 5 days.

**Results and Discussion:** C2C12 myoblasts demonstrated rapid proliferation on soft PDMS, reaching confluency in 2 days. Images revealed myotube formation as early as 5 days following confluency, but contractions were absent even under electrical stimulation. Suggesting a phased differentiation of C2C12 cells into myotubes, with morphology precluding contractility.

**Conclusion:** Utilization of PDMS as a culture surface, although necessary to approach physiologic culture conditions,
presents a non-trivial challenge. Therefore, future studies will involve increased culture times, pharmacologic activation of differentiation to optimize the potential contractility and force measurements acquired with our graphene sensors. 


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English

Queer Embodiment: Tracing the Lived Realities of EDI Movements

As researchers, we are driven by questions around LGBTQ+ Identities and their intersectionalities (Crenshaw, hooks, Lorde) with other axis of embodied differences (e.g., race, class, gender, disability). While energized by the potential for intersectional thinking, we’ve become increasingly interested in wanting to study the complexity around institutionalizing diversity work (Ahmed, On Being Included 22). We believe in the need to foreground diversity at the institutional level, and we’re grateful to work and study on a campus that foregrounds equity, diversity, and inclusion as an institutional priority and keep aspect of its mission. At the same time, when we “follow” (Ahmed) diversity as term around, we are aware, especially as two queer-identifying individuals, of the ways in which statements or appeals to diversity can simultaneously disregard the more complex, lived experiences of queer students. There’s an outcry from the queer population at the University of Wisconsin-Eau Claire for heartfelt queer activism, heartfelt movements, heartfelt change—change that falls beyond diversity statements and Equity, Diversity, and Inclusion task forces. We aim to not only address the need for a complex understanding of the queer experience but begin to better understand the ways in which queer students continue to feel unseen on a nationally recognized LGBTQ+ friendly campus. Addressing this underlying need of the queer population is significant: the university will better understand where we too often fall amiss and begin to close the gap between our national recognition and the needs of the queer folks that are ever predominant on our campus.

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International Business

How Mentorships Could Affect Black Male Resilience

There are multiple barriers affecting the resilience of Black males at the collegiate level. The development of Black male-specific mentor programs at the collegiate level will help build resilience in Black males. Previous researchers have found that mentors play a vital role in student success. This research shows that poverty, discrimination, and social identity have affected Black male resilience the most over time. African American males who participated in this research use support systems of family, classmates, and the university faculty and staff to overcome their barriers Without a reliable mentor at young age students, the collegiate experience can be affected negatively. After reviewing these sources multiple gaps in data regarding Black male resiliency were identified. Research shows redlining (discrimination based on demographic location) and poverty to be the main factors affecting resilience, and although they affect Black male resilience greatly, our research has shown the lack of positive mentors in a Black male’s life can be identified as the underlying effect to their collegiate success. Through in-depth analysis of resilience surveys, we identified if the issue was race-related or personal. We also used personal interview methods to make an observative analysis that mentorships affect Black male resilience.
The Instruction of Gratitude in Parent-Child Dyads

The practice of gratitude has been proven to result in many positive outcomes, but like many other psychological interventions, there has been little research on gratitude interventions. In the modern day, parents often feel detached from their children and struggle to help them navigate the hardships of their adolescent years. Teaching parents the instruction of gratitude can result in enhanced parent-child relationships, increased positive affect, and more positive peer interactions. Weaknesses were identified in available studies and measures were applied in order to improve the arrangement of this study. Based on the findings, a research design was created to investigate the effectiveness of a ‘counting blessings’ focused gratitude intervention on school-aged children. A sample of 7-15 parents with children aged 8-12 will be recruited through various platforms such as local churches and social media. The participants will be divided into two conditions: the ‘counting blessings’ condition and the control condition. Both conditions will be taking pre and post tests in order to measure positive affect, depression, anxiety, and gratitude. The groups will then enter a week-long intervention in which they will be instructed to engage in the study once every day of the week. The intervention will encourage parent-child dyads to actively look for instances in their day for which they are grateful. This study is ongoing and has not reached any results or conclusions thus far. For future research on gratitude, it is recommended to conduct longer interventions with double-blind procedures if possible.

Raptors on the River: Pajaro River Levee Study

Burrowing rodents can weaken the compacted fill of earthen levees, undermine access roads and cause erosion, sloughing and other maintenance problems. In some cases, a burrow can completely penetrate a levee, leading to piping, erosion of levee material, and potential levee failure. The Santa Cruz Predatory Bird Research Group (SCPBRG) implemented a pilot study to investigate the effectiveness of recruiting raptors (hawks and owls) to supplement Zone 7 Flood Control Water Conservation and Flood Control District’s (Zone 7) pest management activities. Our study site is a five-mile stretch of the Pajaro River levee in Watsonville, California on the Santa Cruz County side of the levee. Six barn owl nest boxes and six raptor perches were placed along a 2.5 mile stretch of the levee and an adjacent 2.5 mile stretch was left unimproved as a control. The raptor observations and rodent burrowing activity were monitored using ESRI 123 Survey app and GIS mapping. Pellets were also collected and analyzed to monitor predators and their diet. We are able to track and compare rodent burrow density along the levee between treatment areas and across years. Our results indicate that rodent predators are prevalent at the study site, are utilizing the raptor recruitment structures and are consuming small mammals and rodents. Our initial results indicate that encouraging rodent predators like raptors could potentially be a good tool for managing rodent populations at the Pajaro River levee.
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Psychology

Environmental Correlates between Parent-Child Interactions and Creativity

Creativity is important to cultivate in children. The environment in which a child is reared plays a huge role in the extent to which creativity is fostered. This study is aimed to investigate how parental attributes are associated with creativity expression in children. We used a coding scheme to analyze three activities the parent and the child completed together: reading a non-worded picture book, completing a puzzle, and exploring a box containing toys. Child creativity was represented by how the child scored on the creative foraging task. This novel task measures creativity by the child’s ability to create unique shapes out of virtual blocks. There were 25 participants in the study. We hypothesized that positive affect, healthy scaffolding, and responsiveness expressed by the parent will be positively associated with creativity in children. Autonomy and independence in children will be positively associated with creativity has also been predicted. There will be a general linear regression done to test the associations between parents creating safe spaces and autonomy in children as it relates to creativity in children.

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Wayne State University, with Farron McIntee
Psychology

Mental Health States of BUILD Scholars

During these trying times of the COVID-19 pandemic, mental health among the country has been perceived to be declining. COVID-19 has revealed how important understanding mental health is and gives us a chance to analyze the effects of stress on the mind. Even those with stable living have been mentally uprooted. I focused on studying the mental health of BUILD students who participated in the BUILD Research Collaboratory (BRC). The question that I studied along with Justin Carthage and Willow Weibel was, “How has the psychological stress of COVID-19 affected BUILD Scholars?” We chose this topic because we are all passionate about addressing the century old stigmas of mental health. As psychology and neuroscience majors we understand the history of mental health, and its ever evolving status in the world. We hypothesized that African American BUILD Scholars are more affected by the stresses of COVID-19. It is a fact that COVID-19 pandemic has disproportionally impacted POC, especially black POC. This is due to underlying racial disparities that are still being perpetuated in society today.

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St. Olaf College, with Chandrika Piyathilake
Biology

Papilloma Virus Vaccines and Prevention of Cervical Cancer

Cervical cancer (CC) is the third most common cancer among women worldwide. Prophylactic HPV vaccines were developed to prevent the development of cervical intraepithelial neoplasia (CIN) 2+ due to HPV genotypes however the vaccine fails to include all high-risk human papillomavirus (HR-HPV). The specific aims of this study are to identify the most prevalent non-vaccine HPV genotypes detected in CIN 2+ lesions (cases) compared to ≤ CIN 1 (non-cases) and determining whether socio-demographic, lifestyle related CIN risk factors and plasma
concentrations of vitamin B12 alter the risk of being diagnosed with non-vaccine HPV related CIN 2+. The study population consisted of 1476 women who did not receive HPV vaccines, split into 2 groups; group A (positive for genotypes not included in qHPV) and group B (positive for genotypes not included in 9VHPV). Pearson χ² tests and unconditional logistic regression models were performed to assess the variables. Results show that race (p=0.032), plasma vitamin B12 (p=0.016), smoking status (p=0.014), and number of lifetime sexual partners (p=0.008), are risk factors for developing CIN 2+. Additionally, the most prevalent HR-HPV genotype found is genotype 35 with a prevalence percentage of 36% and a p-value of 0.033 in group A and 75% prevalence in group B with a p-value of 0.013. Additionally, HR-HPV genotypes should be incorporated into the vaccine to protect against the genotypes that are not included. Incorporation of vitamin B12 in the diet and abstention from smoking should reduce the risk of developing CIN 2+ lesions in vaccinated women.

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Sul Ross State University, with Biology

Effects of Total Equine® Feed and Equine-15 Natural® Supplement on the Dry Matter and NDF digestibility in Adult Quarter horse mares

The study focused on the impacts of Total Equine® (TE®) and Total Equine-15 Natural® (TE-15®) on NDF digestibility (NDFd) and DM digestion (DMd) in mares using an in-vitro system. Diets included chelated minerals and Brown seaweed (Ascophyllum nodosum) in TE® and elemental sulfur in TE-15®. Study design was a 3x3 Latin square (2wk adjustment period, 1wk collection period, 6wk washout period). Six mares avg 13yrs were offered Bermuda hay ad libitum. Concentrates offered were Control grain (Ctrl), TE® grain (TE), and TE® + TE-15® (TE-15®). Grain was offered at 0.004% BW per manufacturer guidelines. Each horse was assigned an individual Daisy jar. The inoculant contained fresh fecal matter and McDougall’s buffer. ANKOM F57 bags containing ~0.05g of (Bermuda, Alfalfa, TE®, and Ctrl grain) ground to 1mm were placed in each jar in triplicate. Bags were incubated for 24 or 48hr then dried and weighed to calculate DMd. Bags were then processed for Neutral Detergent Fiber (NDF) to calculate NDFd. Data was analyzed using Proc Mixed procedures in SAS. No effect (P=0.12) was seen for Bermuda on DMd or NDFd among treatments. Alfalfa was impacted at 24hr for both DMd and NDFd (P=0.001 and 0.0003 respectively) at 24hr. DMd and NDFd were both decreased with the TE-15 (60.44 and 43.13) diet in comparison to Ctrl (63.9 and 37.88) and TE® (64.33 and 35.8) respectively. Results indicate that the inclusion of the TE-15® sulfur supplement may inhibit DMd and NDFd in the diet. Further research is needed to determine impacts on other forages.

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University of Wisconsin-Eau Claire, with Derek Gingerich Biology
Familial and Societal Impacts on LGBTQIA+ College Students and Mental Health

The objective of this study is to explore the perceptions of LGBTQIA+ members in communities of Midwestern universities and the factors that they believe have contributed to their mental health challenges and/or resilience. Exploration of both informal and formal supports in the coming out process will hopefully be identified to provide a clearer picture of areas of support including perceptions of the effectiveness of the formal supports including their accessibility and expertise. The research design is a qualitative study utilizing self-identified LGBTQIA+ population currently enrolled in college. A purposive sampling will occur by reaching out to Midwest college campus LGBTQIA+ resource centers to provide connection to students who are identify as LGBTQIA+. Once an initial group of students has been contacted a snowball sampling approach will then be utilized to reach out to other members of the community that may be appropriate for the study to obtain at minimum 6-8 respondents. While the sample size is small it is appropriate for an exploratory qualitative study. Data will be analyzed via a constant comparison approach to identify key themes. Questions provided by the researchers will be open ended to ensure that content area around family experiences, social supports during the coming out process, and college resources and communities engaged in are clearly identified and explored. Respondents who identify the use of formalized supports will be asked a subset of questions that explores their perceptions of the degree of expertise with LGBTQIA+ communities the formalized supports appeared to have.

Using multivariate cluster sample analysis to show habituation and cardiovascular reactivity patterns

Habituation is a form of adaptation relating to the decrease in one’s physiological responses after repeated exposures to a stimulus. Understanding how our bodies habituate to stress will further our knowledge about stress reactivity relating to future health outcomes. Acting as an extension to previous research, we had two main aims with this paper: 1) to see whether the four potential cardiovascular reactivity patterns--persistent reactor, persistent blunter, habituator, and sensitizer--can be observed from our dataset, and 2) whether specific reactivity patterns of systolic blood pressure (SBP), diastolic blood pressure (DBP), and heart rate (HR) observed in previous studies can be seen. Data gathered from a within-subjects design involving 445 participants (Mean (SD) age = 19.5 (1.3) years, 61.9% female, 66.4% Caucasian) was grouped into clusters using multivariate cluster analysis. The session consisted of two exposures to an arithmetic stressor, with BP and HR recorded throughout. After building graphs with four, five, and six clusters, we favored the five cluster graph since it produced groups that showed varying combinations of cardiovascular stress reactivity without being overwhelming to the viewer. We were able to identify clusters of blunters, overreactors, and a cluster showing exaggerated BP with average HR response (which has been shown to have the greatest risk of hypertension). Future studies should include a more diverse race and age demographic. Although not all four of the proposed cardiovascular patterns were seen in this analysis, expanding the number of clusters could provide insight to even more specific patterns.
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On behalf of Baylor University and the Baylor McNair Scholars Program, we thank you for attending the 2021 Virtual Baylor McNair Research Conference!

“Whether or not you reach your goals in life depends entirely on how well you prepare for them and how badly you want them. Before you can make a dream come true, you must first have one.”

–Dr. Ronald E. McNair

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