



URC 2022

Abstract Book



We are pleased to present the 2022 UNC Charlotte Undergraduate Research Conference (URC) Abstract Book. The URC 2022 is a virtual conference. This year's conference provides a reason to celebrate another decade of undergraduate research and creativity at UNC Charlotte! With much gratitude, we recognize Dr. Bernadette Donovan-Merkert, Dr. Martha Cary (Missy) Eppes, and Dr. Christopher Cameron. Their dedication to undergraduate research was pivotal in forming a university committee to organize an annual Undergraduate Research Conference. From its start ten years ago in the Atkins Library, the URC has continued to grow into a campus, community, state, and now global event that features the brilliance of our undergraduate research at UNC Charlotte. The URC reflects one of the goals of the Office of Undergraduate Research (OUR), which is to support undergraduate students through opportunities to communicate their research to the wider community. We would like to thank Academic Affairs, the Honors College, the Levine Scholars Program, the Mu Chapter of the Phi Beta Delta (PBD) Honor Society for International Scholars, the Phi Kappa Phi (PKP) Honor Society, and urbanCORE for sponsoring the awards that are part of URC 2022.

The vast array of research project abstracts included in this book would not be possible without the commitment of our UNC Charlotte faculty. A big thank you to the faculty for your service and dedication to undergraduate research and scholarship at UNC Charlotte. The URC also represents the dedication of UNC Charlotte's faculty, staff, and graduate students, who participate as research advisors, mentors, and judges. A big thank you for your service and dedication to undergraduate research and scholarship at UNC Charlotte! We would also like to especially recognize the conference organizing committee, the staff in the Office of Undergraduate Research, and the student leaders who all played integral parts in the planning for URC 2022. Most of all, please join us in congratulating our undergraduate researchers for their hard work and efforts!

Dr. Erin Banks, Assistant Dean, Office of Undergraduate Research

Dr. Erik Jon Byker, Faculty Fellow and Chair, URC 2022 Organizing Committee

UNC Charlotte URC 2022 Organizing Committee Members and Student Leadership Team

Dr. Erin Banks, Assistant Dean, The Office of Undergraduate Research
Dr. Nhi Cao, Program Coordinator, The Office of Undergraduate Research
Dr. Erik Jon Byker, Committee Chair; Reading and Elementary Education, Cato College of Education
Dr. Luke Donovan, Kinesiology, College of Health and Human Services
Dr. Mohsen Dorodchi, Computer Science, College of Computing and Informatics
Dr. Aba Ebong, Electrical and Computer Engineering, William States Lee College of Engineering
Dr. Colleen Hammelman, Geography and Earth Science, College of Liberal Arts and Sciences
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Dr. Malin Pereira, English and Executive Director of the Honors College
Dr. Diane Zablotsky, Director of the Levine Scholars Program
Ms. Jemina Soerman, Graduate Assistant, The Office of Undergraduate Research
Mr. Amir Fleurizard, Student Volunteer, Bonner Leaders
Ms. Kryschelle Fakir, Student Volunteer, Honors Students and Merit Scholars
Ms. Sreya Kanamurlapudi, Student Volunteer, Honors Students and Merit Scholars
Ms. Ronni Lilly, Student Volunteer, Honors Students and Merit Scholars
Mr. Rhoen Hoff, Student Volunteer, Levine Scholars
Ms. Mia Jammal, Student Volunteer, Levine Scholars
Ms. Ellie McCutchen, Student Volunteer, Levine Scholars

Featured Speakers



Keynote Speaker: Seth Flynn

Seth Flynn has called North Carolina home for his entire life. He grew up in the mountain town of Burnsville, studied biology, chemistry, and gerontology at UNC Charlotte, and is now a rising fourth-year medical student at the Duke University School of Medicine. He loves working with older adults, serving as an activities volunteer at an assisted living home while at UNC Charlotte – he'll never forget his Saturday morning bingo crew - and is now as a student leader for a fellowship-funded postoperative follow-up program for senior veterans at the Durham VA Hospital. His clinical interests include geriatric dermatology, rural health, and expanding access to skin cancer screening and dermatologic care. Seth enjoys playing piano, building DIY furniture, and crocheting in his free time.

Closing Alumna Speaker: Taelor Malcolm

Taelor Malcolm is an alumna of the University of North Carolina at Charlotte and the Levine Scholars program. She graduated in 2019 with a dual degree in Economics and International Business. In 2021 she obtained a Master's degree in Urban Planning from Harvard University's Graduate School of Design. She currently serves as a director at the Mahoe Group, an urban planning and development firm based in Jamaica. During her academic career, she dedicated considerable time to researching issues related to affordable housing, environmental degradation and its effects on coastal communities in the Caribbean, as well as economic growth opportunities for BIPOC communities throughout the United States.



URC 2022 Schedule of Events

Monday, April 18, 2022

8:00 AM: The Undergraduate Research Conference (URC) 2022 Symposium platform opens to the public at this link: <https://symposium.foragerone.com/unc-charlotte-urc-2022> . Asynchronous reviewing and judging of the presentations can begin at this time. We encourage reviewers, judges, mentors, and advisers to use the Commenting feature in the URC 2022 Symposium by ForagerOne platform to add comments and provide feedback to the presenters.

Thursday, April 21, 2022

- 9:30 AM – 9:55 AM:** Opening Ceremony with comments by Dr. Banks and Dr. Byker, and Welcome Video by Provost Joan Lorden
- 9:55 AM – 10:20 AM:** Mr. Seth Flynn's Keynote Presentation and Q&A Time
(Thank you to the Office of Undergraduate Research for sponsoring the Honorarium for the Keynote Presentation)
- 10:30 AM – 1:30 PM:** Live Q&A Sessions with Oral Presenters (refer to the URC 2022 Symposium platform for the Q&A session times and Zoom link details)

Friday, April 22, 2022

- 8:00 AM – 12:45 PM:** Asynchronous reviewing and judging of the presentations continues.
*Judges should have judging completed and submitted by 1pm
- 1:00 PM – 1:25 PM:** Ms. Taelor Malcolm's Alumna Presentation and Q&A Time
(Thank you to the Office of Undergraduate Research for sponsoring the Honorarium for the Alumna Presentation)
- 1:25 PM – 1:30 PM:** Closing Remarks by the Office of Undergraduate Research and highlighting UNC Charlotte's *Undergraduate Research Journal*

Please note that the URC 2022 Awards will be announced by the OUR by Wednesday, April 27. The OUR will also notify the students who won awards by email. Please consider using Niner Commons to upload, document, and store your research presentation. Thank you for your participation in the URC 2022!

ABSTRACTS

Oral Presentations

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability

U - Charlotte

Arts and Design

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Abstract #: 100

Title: An Exploration of Extended Techniques in William O. Smith's Variants for Solo Clarinet

Student Author(s): Gavin Fulker

Faculty Advisor: Dr. Jay Grymes

Department: Music

The term “extended techniques” has historically been used in the context of Western music to describe the application of new and innovative approaches to playing music on traditional Western instruments. What constitutes extended technique can depend on the context of the time period’s current musical conventions, as all innovations of Western music have experienced early periods during which new ideas would be considered outside the normal practice, but in our current state of musical pedagogy this often constitutes techniques such as growls, slides, quarter tones, percussive sounds, and many more that can vary depending on the instrument being played. In the early 1960s, there had yet to be any pieces utilizing extended techniques specifically written for clarinet that had managed to gain notoriety. In 1963, following an experimental piece from 1961, William O. Smith became the first composer to write a solo work for clarinet entirely centered around these new approaches to producing sound in his piece Variants for Solo Clarinet. Smith’s work, inventing new ways of playing the clarinet and pushing the boundaries of traditional practice to produce this creative and daring composition, would set the groundwork for countless composers and their own works using these innovations in the six decades since. This presentation will explore the inspirations which led to Smith’s writing of Variants as well as analyzing the extended techniques, both taken from other sources and originally innovated by himself, throughout its movements. The presentation will conclude with a performance of Variants for Solo Clarinet.

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Abstract #: 101

Title: A Critical Analysis of Suzanne Haïk-Vantoura's Interpretation of Hebrew Songs

Student Author(s): Kathryn Goretzka

Faculty Author and Advisor: Dr. Jay Grymes

Department: Music

In her book, *Music of the Bible Revealed*, French scholar Suzanne Haïk-Vantoura hypothesized that the music of the Hebrew Bible was preserved as twenty distinctive cantillation marks in the traditional Masoretic Text, which was copied, edited, and distributed between the 7th and 10th centuries of the Common Era. This presentation will offer a critical analysis of Haïk-Vantoura's musical interpretations drawing upon the body of her work, including some of the performance aspects of her theory, to assess the likelihood of its potential historical validity. My method involves a critical analysis of her central thesis in concert with the major academic responses to her work by both musicians and scholars, especially in relation to traditional Jewish cantillation traditions. My presentation will include performances of Psalm 23, performed both in the traditional Jewish cantillation style and in Suzanne Haik-Vantoura's reading of the Masoretic text.

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Abstract #: 102

Title: Witchcraft in Opera during the 19th Century

Student Author(s): MacKenzie Hall

Faculty Advisor: Dr. Jay Grymes

Department: Music

As part of the larger movement of Romanticism, artists of nineteenth-century Western Europe became increasingly fascinated with witchcraft and the supernatural. This paper will discuss how witchcraft was treated in the plots and music of German and Italian operas in the nineteenth century, and how those representations were shaped by mainstream religious ideals as well as stereotypes. I examine four operas: Engelbert Humperdinck's *Hansel and Gretel*, Giacomo Puccini's *Le Villi*, Vincenzo Bellini's *Norma*, and Richard Wagner's *Lohengrin*. The findings result in a better understanding of and insight into how witchcraft was misunderstood and often misrepresented in operas by Christian Europeans of the nineteenth century.

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Abstract #: 103

Title: The Transcendental Studies of Franz Liszt

Student Author(s): Zac Jackson

Faculty Advisor: Dr. Jay Grymes

Department: Music

For my senior project, I plan on researching the life of the composer Franz Liszt and analyzing his set the transcendental etudes. I will begin the paper with a five-to-six-page biography of the Liszt that includes his early years as a student and his later years as one of the most sought out after teachers of the late romantic period. In the following section, I will provide a brief history of the transcendental etudes and how they evolved over the course of 25 years. Liszt initially published the first set of etudes in 1826 as a set of exercise for young pianists. Over the years, Liszt embellished these studies to increase the level of difficulty and did so in the years 1837 and 1851. In the subsequent sections, I will provide an analysis of the harmonic progressions, technical challenges, and overall form of each etude, with each summary being approximately two pages in length. In these summaries I will also include contemporary composers and teachers who inspired his compositional style in each work. Additionally, I will include musical examples in each summary as visual aid to the readers. Lastly, I will finish the paper with a two-to-three-page conclusion that will wrap up the life and works of the composer. I anticipate that my results will show how beneficial these etudes are to pianists who aspire to improve their technical abilities while at the same time, providing great music that audiences will enjoy for centuries to come.

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Abstract #: 104

Title: Function of Gospel Blues in African American Diasporic Music

Student Author(s): Winston Martin

Faculty Advisor: Dr. Jay Grymes

Department: Music

Music has been a part of African American life dating back to the period of enslavement. Our music was not just a form of art, it served a purpose. It functioned as a way for African Americans to send messages to each other through song and slowly evolved into a movement that describes what we went through and how we want life to change in the future. An important movement in this tradition was the advent of gospel blues music. It began with Gospel music serving as a way for African Americans to express overcoming their hardships and celebrating God for bringing them out of their struggle. Another significant genre in the development of Black music is the Blues. The blues served as taking those same chords from the church and putting into a more mainstream entertainment setting but still communicating the text of love and heartbreak that appeased the ears of audiences. Both genres represent major milestones in the creation of unique black voices in American music. This paper will show how Robert L. Morris combined these two traditions in his art song Gospel blues. Morris contributed to Gospel blues as bringing the style of the two genres together that showcased the hardships chords of the blues but delivering the message of the song through gospel. This presentation will conclude with a video of my performance of Gospel Blues.

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Abstract #: 105

Title: Motivation in Music

Student Author(s): Catherine Moore

Faculty Advisor: Dr. Jay Grymes

Department: Music

In teaching music to young students, expectancy-value and attribution are two factors which can impact whether the student persists and succeeds in music. In this presentation, I will be discussing the expectancy-value theory, which posits that motivation is determined by the two factors of the expectancy of success for a given task and how much value is placed on the given outcome of that task. I will also discuss the attribution theory, which examines the causes of a student's own behavior as well as the behavior of others. Lastly, I will demonstrate how the principles behind these theories can be applied to the piano student. Research has shown that a student's expectations of success and the value they place on the achievement of success in many ways proves to be a predictor of their actual performance. How the student view's ability and effort, among other attributes, also greatly impacts future performance.

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Abstract #: 106

Title: The Contrasting in Easter Cantatas of Bach and Hall Johnson

Student Author(s): Kaleb Scott

Faculty Advisor: Dr. James Grymes

Department: Music

Today with my presentation, I will be able to give you a small glimpse into the life of Francis Hall Johnson. Johnson is mostly known for his spiritual music and is well known in film production with his choir called "the Hall Johnson choir". He is important because he made the face and voices of African Americans become more useful instead of being looked down upon by non-people of color. Johnson was also ideal for being an African American composer to be included in the film industry while also having his choir being strictly African American which was very uncommon. One of Hall Johnson's larger-scale works was his Easter cantata *Son of Man*, which is what this presentation is about. Although the work has been lost, parts of it still exist through individual songs. This presentation will examine three songs from *Son of Man*: "Take my Mother Home," "Ride on King Jesus," and lastly, "I Got to Go Down." The presentation reestablishes their contexts in the lost cantata, as well as in Johnson's body of works. The presentation will conclude with a video of my performance "Ride on King Jesus." This piece is an inspiring piece because Johnson is telling others that Jesus has done his job and that now he is on his way home. In conclusion, Hall Johnson was world-renowned as not only being an African American composer but also having the courage to go into the film industry even if he was being mocked and discriminated against just because of his skin color and not because of his and his choir's talents.

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Education and Communication

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Abstract #: 107

Title: Understanding the Influence of the Pandemic on the Communication Consultant Experience Over Three Years

Student Author(s): Lindsey Frechette, Nicole Johnson, and Michaela Scott

Faculty Advisor: Dr. Heather Bastian

Department: Communication across the Curriculum, Office of Undergraduate Education

Research has found that peer mentorship can play a valuable role in a student's growth and development. At UNC Charlotte, the Communication Across the Curriculum (CxC) program trains communication consultants to serve as peer mentors and provide one-on-one support to students within select classes. Since Fall 2019, consultants' work has moved from in-person to remote to hybrid in response to the global pandemic. This applied research project investigates how consultant confidence, experience, and needs changed throughout the pandemic. In Fall 2019, 2020, and 2021 consultants completed an online survey consisting of Likert scale and open-ended questions that asked them to reflect on their confidence levels and in different aspects of their role. Consultant survey results from Fall 2019, 2020, and 2021 were compared and open-ended questions on the surveys were coded to analyze how consultant confidence, experience, and needs changed over the course of the pandemic. Select demographic factors also were analyzed to identify any significant impacts. Findings demonstrate trends in resiliency as well as ways in which the pandemic has changed how consultants experience this role and how the CxC program can better address those changes.

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Abstract #: 108

Title: Practices in Elementary Schools to Reduce Racial Stereotypes that Impact Students' Academic Performance

Student Author(s): Goeun Grace Park **H**

Faculty Advisor: Dr. Erik Jon Byker

Department: Reading and Elementary Education

Racial stereotypes in schools negatively influence students' academic success. There are a variety of methods that can reduce racial stereotypes that influence students' academic performance and help students who are in groups that face racial stereotypes. Students from a young age face heavy racism in their lives by the way they talk, interact, play, and live with other people (Kromidas, 2016). The purpose of this study is to examine the perceptions of stereotype threats among elementary school educators from across the United States (n=18). The study is primarily based on a survey research design (Hines, 1993). The survey includes Likert scale questions and open-ended responses to help answer the following research questions: (1) How do elementary school teachers reduce racial stereotypes in their classrooms that can impact students' academic performance? (2) What are their perceptions of the different methods they have tried? To analyze the data from my study, I used descriptive statistics and Miles and Huberman's (1994) three-step data analysis method. The preliminary findings from my study include that all participants think it is best to address racial stereotypes in the classroom since it is critically important to prevent the long-term effects racial stereotypes on students. Another finding from my survey was the impact of racial stereotypes on students and the implications of this impact in relation to the students' academic performance in school.

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Abstract #: 109

Title: Transition to Adulthood for Young Adults with Intellectual and Developmental Disabilities

Student Author(s): Spencer Reece **CE, H, NC**

Faculty Advisor: Dr. Leslie Bross

Department: Special Education

Young adults with intellectual and developmental disabilities (IDD) and their parents often experience challenges during the transition to adulthood. Previous research indicates parents with children with disabilities often do not have the supports or resources to successfully transition to adulthood, especially if their child has more intensive support needs. This research study investigated these issues, specifically the perspectives of young adults with IDD and their parents of the transition from a specialized school to adulthood. Data was collected from twelve semi-structured, audio/video recorded interviews with six young adults with IDD, ages 17-25, who attend or have attended specialized schools, and their parents. The results found many areas of need, including more specific disability programming, a lack of day-time activities, more support with transition processes, more high quality and experienced community-based supports, and difficulty with obtaining and maintaining social relationships. From the interviews, it was clear that the young adults with IDD and their parents experience unique challenges and have multiple areas of need in the transition to adulthood. Suggestions for future research related to the transition to adulthood for young adults with IDD and their parents are discussed.

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Health Sciences

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Abstract #: 110

Title: First Pass Success of Neonatal Endotracheal Intubation in a Level IV Neonatal Intensive Care Unit

Student Author(s): Michael Berrier

Faculty Advisor: Dr. Brian Ring

Department: Applied Physiology, Health & Clinical Sciences

Background: First pass success (FPS) during endotracheal intubation (ETI) attempts in neonatal patients is associated with decreased incidence of desaturations, bradycardia, and other adverse effects. Apneic oxygenation is associated with increased FPS in other populations. The objective of this study was to find the FPS rate in neonates to establish the feasibility and need for an apneic oxygenation protocol in the neonatal intensive care unit (NICU). Methods: A retrospective chart review was performed for subjects who required ETI in a Level IV neonatal intensive care unit (NICU) from July 1, 2021 to December 31, 2021. Subjects from birth to one year of age were included if they were intubated in the NICU or delivery room (DR). Primary outcome was the overall FPS rate during ETI. Secondary analysis was conducted to find the number of attempts overall for the gestational age groups and the FPS rate for each gestational age group. Results: Airway management was required 141 times for 94 patients, with a total of 327 ETI attempts. FPS was achieved in 39.7% of the total encounters. Average number of attempts overall was 2.9, while the average per gestational age group ranged from 1.0 to 4.5. Conclusions: FPS in neonatal ETI is very low across all gestational ages in the population identified. Given the association between multiple ETI attempts and adverse events, procedures like apneic oxygenation should be considered to reduce the risk of adverse events and number of attempts to achieve ETI.

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Abstract #: 111

Title: The Correlation Between the Timed Up-and-go Test and Overall Health

Student Author(s): Samantha Webb **CE, U**

Faculty Advisor: Dr. Trudy Moore-Harrison

Department: Kinesiology

BACKGROUND: The timed up-and-go test is a time-efficient and safe way to evaluate a participant's overall functioning mobility. The purpose of this study was to determine whether there was a correlation between the timed up-and-go test and overall health in senior citizens. **METHODS:** The up-and-go test is one of many tests performed at health risk assessments that take place at senior centers around Charlotte, North Carolina. Participants sit in a chair, walk eight feet around a cone, and return to sitting position while being timed. The sample size was 100 senior citizens, aged 55 and older, who voluntarily participated in health risk assessments. Differences in the up-and-go tests in different age groups were measured. **RESULTS:** As more seconds are added onto a participant's time to complete the up-and-go test, a correlation is seen between a higher time and being at risk for diseases such as diabetes and possibly COPD depending on the participant. Having a hard time moving functionally can lead to higher blood glucose and a lower lung capacity leading to diabetes and COPD in older adults. **CONCLUSIONS:** Timed up-and-go tests can provide healthcare professionals with a baseline in the overall health of senior citizens. With HbA1C, blood glucose, pulmonary function, blood pressure, and BIA results, senior citizens can be educated on where their health stands and how they can lead a healthier lifestyle in the future.

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Humanities

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Abstract #: 112

Title: Starstruck: An Analysis of the American Media Reaction Towards Valentina Tereshkova

Student Author(s): Dick Beekman **H**

Faculty Advisor: Dr. Mark Wilson

Department: History

This thesis explores the impact and reception Valentina Tereshkova had on the United States following her successful and historic June 1963 flight into space. Upon completion of her flight, Tereshkova became the first ever woman in space. While previous research has focused on the exclusion of woman in the American space program, little attention has been given to how Tereshkova herself was received among the American public. While renewed attention is being paid towards the role of women and people of color within the NASA space program following the release of Hidden Figures, the role of women in the Soviet space program and the impact they had on American society has been neglected. During a time when society regulated women into domestic roles, the progressiveness of Tereshkova's flight provides a fascinating exception towards norms within American society. It is expected that this thesis will find that Tereshkova's flight had a significant impact on American society that has previously been overlooked by historians. From preliminary research, it appears that American society gave significant attention and commentary towards the progressive role women seemed to have been prevalent throughout the nation. This research would be beneficial in identifying a possible turning point in the perceived role of women in both STEM and America in the years preceding the women's movement. Furthermore, this research could help identify any impact that Tereshkova had on shaping the perception of Soviet women in America.

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Abstract #: 113

Title: Mid-Bummer! Horror and Spatial Relations in Ari Aster's *Midsommar*

Student Author(s): Liam Caldwell **H**

Faculty Advisor: Dr. Matthew Rowney

Department: English

Ari Aster's 2019 horror film *Midsommar* immerses viewers into the story of Dani, a traumatized woman, as she participates in a Swedish festival. While everything seems beautiful and exotic on the surface, there are deeper and deadlier purposes to the event. The shock of the cultural disparity between Dani's modern American life and *Midsommar*'s archaic rituals comments on the social and ecological estrangement that industrialized societies experience when confronting their own alienated relation to the natural world. This paper aims to explore the ways in which Aster creates a sense of disconnect through his choice of setting and use of space within the film. Physical distance and perspective demonstrate the power dynamics between humans and their natural environment. The same establishing shots that reveal the bucolic grandeur of the festival grounds reveal the mutilated corpses of the human sacrifice. Frames such as these emphasize the magnitude of power within the natural world. The versatile images captured by Aster's cinematography expose the different capabilities of nature itself. The *Midsommar* rituals challenge Dani's assumptions about humanity and nature. None of Dani's challenges are without purpose—this film tells the same story with more terrors when under an ecocritical lens. Michel Serres, Bruno Latour, Michel Foucault and Phillippe Descola offer insight about the dynamism between humans, culture, history and nature—much like the cast does within the film. Ecocritics and Aster ask the audience to reconsider their own limited views of the natural world and realize its deeper significance within everyday life.

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Abstract #: 114

Title: "Honest, Intelligent, and Efficient Service": Black Women and Social Work in WWI Charlotte

Student Author(s): Olivia Dobbs **NC, U**

Faculty Advisor: Dr. Heather Perry

Department: History

During the First World War, Charlotte women became increasingly involved in social and civic work. The main organizations that saw significant progress were the Y.W.C.A., the Associated Charities society, and the War Camp Community Service. However, the historiography reflects the segregated nature of these organizations. Secondary and primary sources demonstrate a large focus on women such as Dr. Annie Lawrie Alexander and Elizabeth Preston Allan, both leading women in Charlotte's high society. To balance the historiography, I will focus on the efforts of three Black women whose efforts have previously been undermined. Mary Jackson McCrorey helped establish the Phyllis Wheatley branch of the Y.W.C.A., the only one for Black women in Charlotte, Miriam S. Nichols ensured the social assistance of the Black population through the Associated Charities society, and Mary "Mamie" McCullough headed the Black branch of the War Camp Community Service in Camp Greene. Archival research will prove to be essential. I will utilize university archives at UNC Charlotte and Johnson C. Smith University, newspapers such as the Charlotte Observer, and records of the three organizations to establish the work of these women. Through this archival research, I will analyze how the politics of racial segregation and integration affected Black women's service during the war and the overall effects of their work on the city of Charlotte. McCrorey, Nichols, and McCullough deserve to be recognized for their contributions to Charlotte's social and civic work during the First World War.

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Abstract #: 115

Title: Presence of Mestizaje in the Film Music of Jorge Negrete

Student Author(s): Alexandra Fitzgerald **H**

Faculty Advisor: Dr. David Dalton

Department: Language and Culture Studies

I am going to view several films from the Mexican Golden Age of cinema (roughly 1930-1969) starring Jorge Negrete. What I hope to accomplish in the final project is identifying representations of Mestizaje in the films and film music starring Jorge Negrete. Mestizaje means “mixing”, and specifically describes the mixing of ethnic and cultural groups in Mexican history. Mexican history started with the introduction of mestizaje during the Conquest of Mexico, which is what built Mexico up as the country it is today. Mestizaje has even been utilized by governments to legitimize its power, inspire a sense of what they viewed as “true” Mexican pride, and justify the persecution of native Amerindian communities. My personal goals when researching for and writing this paper are to: 1. Better understand a culture that I’m passionate about; and 2. Better understand how, as a performing artist, I ought to demonstrate culture and history through my craft. One of the main goals of film and music is to narrate a story to an audience through sounds and gestures. The performing arts are a means of telling people things they never knew before by touching their hearts in a meaningful way. The study of historical events and eras like this one gives us the tools to analyze problems in the past. As mentioned, my focus will be on one iconic actor in Mexican history, Jorge Negrete.

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Abstract #: 116

Title: Practically Modern: The Architecture Program at Black Mountain College

Student Author(s): Quinton Frederick **NC**

Faculty Advisor: Dr. Amanda Pipkin

Department: History

In 1940, Black Mountain College offered its first classes in construction and design, marking the official beginning of its architecture program. Before the school closed in 1956, architecture students completed a variety of successful on-campus construction projects under the direction of noteworthy architects like Lawrence Kocher, Walter Gropius, and Buckminster Fuller. After graduating, many of these students went on to successful careers in architecture and design. Despite these interesting developments, the architecture program at Black Mountain College has not received much historical coverage. This project argues that the unique educational environment at Black Mountain College played a significant role in the development of modern architecture in North Carolina and beyond. The school became a nexus of architectural ideas, where students and instructors benefited from the diverse practices and design philosophies they encountered. Comparing documented activities on campus with designs produced by students after graduating revealed shared ideas about the future of architectural practice. The research is structured around three of those ideas: democratic material usage, environmentally sensitive design strategies and new social building programs. Tracing these ideas beyond the school gives a better understanding of the practical impact and influence of the architecture program at Black Mountain College.

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Abstract #: 117

Title: Female Sexuality during the Spanish Inquisition in the Middle Colonial Period

Student Author(s): Olivia Hughes

Faculty Advisor: Dr. Amanda Pipkin

Department: History

I am comparing the effects of the Spanish Inquisition on female sexuality in Spain and Mexico between 1605-1750. The Spanish Inquisition started operating in Mexico in 1571 and is widely known for the torture and executions that were carried out in the name of Catholicism. Zeb Tortorici has conducted research on the idea of *contra natura* (against nature) and its relevance in the Inquisition's operation in colonial Mexico. The historiography of the Spanish Inquisition also includes research on how it constricted women's sexuality and how women across racial and class lines acted within those conditions. Historians have focused on the Inquisition's operation in Spain and its colonial possessions, with the latter including discussions of the cultural differences between the Spaniards and indigenous groups. My research intervention is comparing the differences between Spain and Mexico and tying *contra natura* into my comparative study as this has not yet been done. It will hopefully reveal to what extent the Inquisition operated as a means of eradicating the Nahua culture's ideas and practices regarding female sexuality. By comparing the situations of the two countries, it should become clearer whether the restrictions were more extreme in Mexico due to the pre-existing native culture or if the distance from Spain and unintended merging of cultures contributed to less extreme effects on women's sexuality.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability **U** - Charlotte

Abstract #: 118

Title: The Lost Crusade

Student Author(s): Tanner Ingrassia **H**

Faculty Advisor: Dr. Robert McEachnie

Department: History

My research examines the existing historiography on the First Crusade and Baltic crusades in an effort to extract the motivations of crusaders themselves, as well as the Catholic Church. Using this information, my intervention is to examine and explain the collapse of the Baltic crusades, and the factors that contributed to it. During the First Crusade, the Church and especially the Pope had far clearer motivations and much stronger leadership, and as such the crusade was far more effective. Conversely, the Baltic crusaders began openly ignoring the commands of the Pope, and in some cases even fought the Pope in open battle. My research aims to establish that the religious fervor, sense of duty, and wish for salvation that drove those joining the First Crusade did not exist among the Baltic crusaders, or were abandoned in favor of acquiring land illegally, thus granting themselves large amounts of power and a platform from which to abuse the native population (who at this point had begun to process of conversion to Catholicism) and subject them to extreme forms of feudalism. By examining correspondence, journals, and other records that contain the words of popes, crusading knights, and other church leaders, I aim to well-establish the positions and again the motivations of individual popes such as Innocent III or Gregory IX, as well as other individuals like the Bishop of Riga who had great influence over the counter-productive development of the Baltic crusades. In addition, I will examine the archaeological record in order to better understand the abuses of the crusading knight orders such as the Teutonic Order, to better illustrate their crimes and how far their actions strayed from the goals of the crusade they took part in.

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Abstract #: 119

Title: The Impact of Educational Reforms on Russian Women from 1850-1900:
Obtaining a Higher Education with the Help of Socialism

Student Author(s): Amber Litchfield **G, H**

Faculty Advisor: Dr. Steven Sabol

Department: History

Russia's political system reached its violent climax following the death of Tsar Alexander II in 1881. His death resulted from the tumultuous society that developed in Russia due to the clash of poor infrastructure and new philosophical ideas, making people crave justice for the discrepancies dealt to them by the government. As a result, revolutionary ideas formed, and many individuals gravitated towards socialism, namely women. In the mid to late nineteenth century, education was limited for women. Those born into nobility were able to receive higher education than their more impoverished counterparts. Still, these educations were not comparable to the ones men received at the time. With Alexander II's reign, Russia underwent numerous changes from the emancipation of serfs to major educational reforms, all of which impacted the women in society. Focusing on those reformations has been something that historians overlook when examining women's education. First, however, it's essential to consider the effects of the political climate and how it influenced those women. The main focus of this thesis will be examining the changing perspective of women from 1850 to 1900 in imperial Russia and how outside factors contributed to their move into traditionally male-dominated sectors, such as medicine. Examining written works by women from the time, understanding the progression of growth in those sectors that women had not been allowed to traditionally partake in, and acknowledging how their male counterparts perceived them are ways that I will follow that through.

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Abstract #: 120

Title: Not So Foreign: Fascism in Michigan, 1930s

Student Author(s): Tate Mason **H**

Faculty Advisor: Dr. Mark Wilson

Department: History

Since the second World War, fascism has been viewed by conservatives as little more than a term to demonize anything conservative. This perspective has prevented historians from accurately describing groups like the Second Ku Klux Klan, Black Legion, and figures like Father Coughlin as fascist. Instead, these entities are labeled as nativist or Americanist, analogs to nationalism seeking to preserve the traditional values of America. I will be using Michigan's history of fascism to prove that fascism existed in the interwar period. I will be looking at fascistic entities in Michigan in the form of the Klan, the Black Legion, and Father Charles Coughlin. Using these figures as a springboard, I will be examining how American fascism takes shape. Furthermore, I will be looking at the relationship between fascism and white supremacy in the United States, defining both and discerning how they are similar and different. Conducting this research will grant an insight into the conditions which allow fascism to develop in the United States, the socioeconomic groups which may be most likely to sympathize with fascism, as well as what factors made fascism fail to maintain a hold in America. This research will serve to provide an argument which supports the idea that fascism existed in America. In addition, I will also be able to put various fascist entities into perspective, as well as discern between fascism, nativism, Americanism, and white supremacy. Finally, my research will show what allows fascism to succeed, and what factors cause it to fail.

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Abstract #: 121

Title: Hoaxes in History: Scholarly Recognition and Public Hysteria

Student Author(s): Samantha Rivenbark **H**

Faculty Advisor: Dr. Shimon Gibson

Department: History

For my thesis I would like to analyze one hoax and two instances of misinterpretations or misinformation spread throughout history. These case studies are the Mummy's Curse, the lost city of Atlantis, and the lost continent of Mu. I assert that hoaxes and misinterpretation are different in the intentions behind them, but influence historical research and public reception of history. The scholarly reception of these hoaxes and misinterpretations are foundational to my research on how the public received and believed in each case study both at their peak and beyond. The Mummy's Curse was a hoax that peaked in the twentieth century, but had its roots in the nineteenth century, but after its peak the public no longer appeared to believe in the hoax, but it still presents in popular media. The lost civilization Atlantis was not a true hoax, but misinterpretations of history or an unproven hypothesis that expanded into the public eye. Hoaxes continued to be popular in academic and public circles and Atlantis remained a point of interest in Western popular cultures. History can sometimes have a disconnect between scholarly knowledge and what reaches the public, therefore hoaxes or misinterpretations often have been disproven in academic circles while still thriving in the public. To understand how and why this occurs, I will analyze the conceptions of each story in my case studies, their peaks in the public, scholarly research on each case, and where each case either faded out of the public eye or still exists today.

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Abstract #: 122

Title: Protest Music from the Late-1950s to Early-1980s

Student Author(s): Jake Scherer **H**

Faculty Advisor: Dr. Tina Shull

Department: History

The late-1950s to early-1980s are characterized as the proverbial peak when discussing protest music. This time frame saw the emergence of some of the most significant protest movements in history, particularly the Civil Rights and anti-Vietnam War movements in the United States. Musicians like Bob Dylan, Pete Seeger, and Jimi Hendrix, among others, used their music to reflect the ideologies and feelings of these protest movements and their respective countercultures. Furthermore, these particular musicians achieved significant commercial success, which raises the question: How and why were specific musicians embraced by counterculture while also achieving great commercial success? This thesis answers this question by analyzing and interpreting the significance of song lyrics, performances, interviews, and public appearances. Up to this point, scholarship has fallen short of genuinely analyzing these elements, as most scholarship debates the importance or the positive and negative aspects of protest music. The majority of analysis looks to explain what happened, overlooking how or why it happened. This thesis suggests that commercial success had minimal importance to counterculture and the musicians representing it. For example, Pete Seeger could have written feel-good dance-inspiring rock & roll similar to Elvis Presley, but instead, he opted to write the song of the Civil Rights movement, "We Shall Overcome." As demonstrated through their musical sound and persona, protest musicians were far more concerned with creating change and representing counterculture than selling records.

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Abstract #: 123

Conflicting Perspectives: The Mind-Body Connection in
Marguerite de Navarre's Heptameron (1558)

Student Author(s): Gabriela Swic **H**

Faculty Author and Advisor: Dr. Allison Stedman

Department: Languages and Culture Studies

This thesis, tentatively titled “Conflicting Perspectives: The Mind-Body Connection in Marguerite de Navarre's Heptameron (1558),” seeks to investigate how three of the novel’s intradiegetic narrators represent mind-body interaction in the stories they tell over the course of the main novella. Written during the French Renaissance by Marguerite de Navarre (1492-1549) and modeled after the Italian Decameron, the Heptameron tells the story of ten characters who convene in a monastery after escaping a flood. In order to pass the time and to keep their spirits up, the characters decide to tell stories, ten per day, on a variety of subjects. All of the stories have to be true and the characters alternate choosing both the daily topic and the order in which they will speak. As we shall see, when the stories are grouped by character instead of by topic and analyzed for evidence of belief in the mind-body connection, three distinct models of mind-body interaction emerge. The mind-body connection is the idea that the mind is part of the body and thus thoughts can be direct causes of disease and other physical symptoms. Although previous scholars have used feminist, structuralist, narratological and epistemological methodologies to study the Heptameron, scholars have yet to situate the text in the context of contemporary debates about the mind-body connection. As a result, knowledge of how writers associated with the évangelique religious reform reconciled such beliefs with Roman Catholicism remains limited. In placing the plots of the stories of the Heptameron in dialogue with early modern theories about prayer and about the power of the imagination, my thesis will reveal that although three distinct models of mind-body interaction emerge in the prologue, the text does in fact implicitly prioritize one model over another. Understanding which model gets priority and why will not only lead us to a better understanding of the Heptameron, but also to a better understanding of how beliefs about human agency, and about the relationship between the material and the immaterial, were theorized in the decades leading up to the French Wars of Religion.

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Abstract #: 124

Title: Constructed Situations: Social Sculpture: Guy Debord and Joseph Beuys contra Spectacle

Student Author(s): Hannah Grissom **H**

Faculty Advisor: Dr. Jae Emerling

Department: Art History

My art historical research is based on the theories prescribed by the twentieth-century French Marxist theorist, Guy Debord in his revolutionary book *Society of the Spectacle*. The book renders our current condition of life as being an accumulation of representations over actualities mediated by images, and these images, of course, are entrancing capitalist propaganda. More specifically, my research follows Debord's ideas of the spectacle in relation to time and history in that the capitalist propaganda aims to stagnate and alienate the viewer temporally to naturalize itself. However, Joseph Beuys's ideologies of "social sculpture" offer society a way out of the spectacle- a way out of representation. Beuys's neo-avant-garde aesthetic practices push back the entrancing images of the spectacle largely in part by his theory that anyone can be an artist, thus, giving autonomy and responsibility to the individual viewer. I chose this subject because I want people to be cognizant of the vast number of images fed to us each day and their following consequences. I have previously presented an earlier state of this research at the Society of Art Historian's Annual Undergraduate Symposium last February 2022. The research and writing are ongoing as it is part of my honors thesis paper which I will complete in the fall of 2022 with the advising of Dr. Jae Emerling.

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Abstract #: 125

Title: Impact of Culture and Background on Writing

Student Author(s): Grace Cooper

Faculty Advisor: Dr. Cat Mahaffey

Department: Writing, Rhetoric and Digital Studies

If two people described the same item, many would assume their writing samples to be similar. However, my findings show that the samples in truth would be astronomically different. There is a stark contrast between the description, sentence structure, and word choice. This is because each individual has a different life experience and background. What causes someone to be a different writer than their peers? The way their parents speak, the books they read, and their culture all create their individual writing characteristics (Teale William H, 1986; Bobbie Sanchez, 2020). Over time will our writing improve or become “worse”? What happens to our innate creativity? Through an inquiry-based research methodology, by reflecting and analyzing academic articles, researchers have shown this is dependent on our environment: a large factor in students' writing is their school system. Teachers are determining what is right or wrong. Is it grammar, syntax, or is it not a typical writing style? Can the definition of “right” and “wrong” cause students to lose their unique writing styles and techniques? It is highly encouraged for teachers to help their students become better writers while keeping their originality. When New Dorp High School implemented this style into their curriculum it contributed to a 13% increase in the school's graduation rate (Tyre Peg, 2018). Social justice for inclusive wiring is a passion that I see as extremely necessary to bring to light in order to promote an accepting society of diverse writing that appreciates an individual's background and creativity.

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Mathematics and Computer Sciences

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Abstract #: 126

Title: ModuleLog

Student Author(s): Christopher Egersdoerfer

Faculty Advisor: Dr. Dong Dai

Department: Computer Sciences

With the increasing prevalence of Parallel File Systems (PFSes) in the context of vast and complex server networks, the importance of accurate anomaly detection on runtime logs of parallel file systems is increasing. But as it currently stands, many state-of-the-art methods for log-based anomaly detection, such as DeepLog, have encountered numerous challenges when applied to parallel file system logs due to their irregularity and a lack of identifying characteristics. Although our previous work, SentiLog has shown promising results, the sentiment-based model lacks analysis of temporal dependencies within a log sequence, and hence misses important sequence-based anomalies. To circumvent these problems, this study proposes ModuleLog, a log anomaly detection solution which analyzes the temporal sequence of logging modules to detect irregularity. The key distinction from existing sequence-based anomaly detection solutions is the attempt to reduce the granularity of using individual log keys by grouping these keys by the module they reside in, based on the PFS source code. We apply an RNN architecture with regular LSTM cells to the sequence of modules. This method allows ModuleLog to be able to detect transition points between normal and abnormal logs in a given sequence, as well as detect sequences of abnormal logs.

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Abstract #: 127

Title: Identifying Differentially Expressed Genes Associated with Pancreatic Cancer by Deconvoluting Neoplastic Cells in Bulk Tumor Tissue Samples

Student Author(s): Ethan Feiza

Faculty Author and Advisor: Dr. Shaoyu Li

Department: Mathematics and Statistics

This project aims to detect differentially expressed genes (DEGs) in pancreatic tumor cells. The current challenge of detecting DEGs for pancreatic cancers is the low neoplastic cellularity of tumor samples. We propose to deconvolute the mRNA read counts of these tumor samples to normal and neoplastic cell-specific expression levels. We then test for genes that show different expression patterns between cell types. A reference-free deconvolution algorithm was applied to estimate the cellular compositions of cell samples. A generalized Poisson-Tweedie regression model was then used to test for DEGs within these samples. Extensive simulations were conducted to evaluate the empirical performance of inference techniques based on the Poisson-Tweedie distribution. The procedure was applied to a real mRNA sequencing data set of 148 pancreatic cancer tissue samples. Our top detected DEGs included COL3A1, REG, S100A6, LZTR1, COL1A1, SPARC, WWC1, C3, and NES, all having prior associations with pancreatic cancer. We then explore the molecular subtypes of PDAC by correcting the cellular heterogeneity and conducting a gene set enrichment analysis for underlying biological pathways of the disease.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability **U** - Charlotte

Abstract #: 128

Title: Exploring the Identity as a Computer Science Major for Women of Color

Student Author(s): Shakayla Alston and Ayana Lawson **CE, NC**

Faculty Advisor: Dr. Marlon Mejias

Department: Software and Information Systems

There are many students who seek a higher education and a career in the field of computer science. Within this field, we see a major discrepancy in the rate of which white male students will succeed in acquiring a degree, as well as seek a higher degree, in contrast to their minority women counterparts. With a focus on establishing a computer science identity, finding a sense of belonging, and overcoming many unique obstacles, we gain a deeper understanding into the experiences of minority women seeking a degree or career in computing. In previous publications conducting research pertaining to the struggles of minority women in computer science, we find it evident that the lack of acknowledging minority women's intersectional identities create a larger struggle to co-exist with their white-male counterparts. This can alter their sense of belonging and their ability to foster and create a computer science identity. As I continue interviewing UNCC women who are seeking a degree in computer science and also identify as minority women, I expect to find similarities within their experiences of navigating through the male dominant field. We must gain a deeper understanding into the barriers placed upon these minority women in an attempt to mitigate these barriers, encourage more minority women to enter the field, and ultimately increase diversity and inclusivity in computer science.

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Science, Technology, and Engineering

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Abstract #: 129

Title: Linking Weathering to the Mineralogy and Grain Size Characteristics of Supraglacial boulders of the Antarctica Dry Valleys

Student Author(s): Richard Gwyn

Faculty Author and Advisor(s): Dr. Martha-Cary Eppes, Dr. Valerie S. Reynolds, Dr. Jennifer Lamp, Dr. Kate Swanger, and Dr. Max Dahlquist

Department: Geography and Earth Sciences

Weathering plays a key overall role in long-term landscape evolution. In an ongoing investigation studying weathering characteristics of rocks found in extreme environments, we collected boulders of the Ferrar Dolerite along the Mullins Glacier in Beacon Valley, Antarctica. Boulders were located on the surface of the glacier in locations ranging from the head of the Mullins Glacier to its terminus in Beacon Valley. Boulders were collected and then subsampled for surface exposure dating as well as for mechanical and petrographic analysis. Boulders are believed to primarily travel supraglacially after deposition by headwall rockfall events, or via short durations of englacial transport, the distance down-glacier from the headwall represents a rough approximation of the boulders' relative exposure age (Mackay, et al., 2017). In this study, mineralogy, porosity, and grain size were determined using thin sections from a series of boulders of fine, medium, and coarse grain size, sampled from the headwall to a maximum distance of 5 km. To avoid sampling from sidewall erosion, we sampled along the centerline far from the sidewalls. Troughs on the sides of the glacier catch debris from sidewall rockfall events, preventing significant clast deposition on the glacier surface. Thin sections were stained blue, and >500 points were identified in each thin section, with maximum crystal size measured for >100 points. Samples are comprised primarily of plagioclase, pyroxene, olivine, glass, and opaque minerals, with common alteration in some thin sections. The point was classified as a pore when the crosshairs landed on blue-stained epoxy. We hypothesize that a portion of the porosity arises from mechanical weathering. (Lamp et al. 2017) hypothesized that a primary cause of mechanical weathering in the Dry Valleys is thermal stress. We therefore also hypothesize that mineralogy and grain size will influence porosity, given that thermal stresses are influenced by the relative proportion of minerals with differences in thermal expansion coefficients and the size of minerals (e.g., Eppes and Keanini, 2017). We will compare porosity with relative exposure age and mineralogy to test these hypotheses. This work may determine how small variations in mineralogy may influence weathering characteristics in one of the coldest, driest places on Earth.

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S - Sustainability

U - Charlotte

Abstract #: 130

Title: Achieving Highly Stable, Reversible Electrochromism of Thiazolothiazole Hydrogel Devices

Student Author(s): Maithili Acharya **S**

Faculty Author(s): Quy Nguyen, Tyler Adams, and Dr. Michael Walter

Faculty Adviso: Dr. Michael Walter

Department: Chemistry

Electrochromism, or color change due to the application of electricity, has gained much interest recently for uses in smart windows, sensing, energy conservation, and displays. The use of organic materials in this field is beneficial because they are cost-effective, made of easily synthesized compounds, can have high contrast, and show a variety of colors. Dipyrindinium thiazolothiazoles (TTz's) have recently shown high performance electrochromism, electrofluorochromism, and photochromism. The TTz's are highly fluorescence, water-soluble, have high stability, and electrochemically reversible. Because of its ability to accept two electrons, the TTz's show electrochromism by changing color from yellow to purple to blue and back to yellow. To create the electrochromic devices, we dissolve TTz's in a water-based hydrogel that conducts electricity between two pieces of conductive glass. The TTz hydrogel devices have previously shown stability up to 250 cycles, however, in applications like smart windows, the devices must last for thousands of cycles. We are studying the degradation pathways of these devices and their components by replacing the redox couple, the hydrogel, and how the TTz degrades over time. The degradation will be analyzed following transmittance changes during cycling, isolating the TTz compound after degradation, and verifying its structure via NMR and mass spectrometry. Once identified, the cause of degradation will subsequently be removed. The results of this stability study will be published and could be used to improve other organic electrochromic materials for redox flow batteries, sensors, organic photovoltaics (OPVs), OLEDs, and biosensors.

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Abstract #: 131

Title: Development of a Bacterial Glycan Immobilization Method for the Investigation of a Novel Therapeutic

Student Author(s): Alexis Murray

Faculty Author and Advisor(s): Dr. Jerry Troutman

Department: Chemistry

There has been a rise in immune-mediated inflammatory diseases such as multiple sclerosis (MS), and there is a lack of specialized agents for restoring immune homeostasis. The balance of the intestinal microbiota is crucial for disease prevention, immune development, and adaptation. Some of the factors that mediate these symbiotic interactions stem from bacterial membrane-associated sugar polymers called glycans, which are rare in nature and are highly underutilized as therapeutic agents. A glycan called capsular polysaccharide A (CPSA) from *Bacteroides fragilis* has been shown to protect against inflammatory diseases such as MS, colitis, asthma, and irritable bowel syndrome in mammalian models. However, obtaining this potential therapeutic material is limited by current isolation methods. The repeat polymer unit of CPSA has been chemically synthesized, however fragment lengths are limited, and several glycosidic linkages are required to enable the agents' immunogenic qualities. Additionally, when isolating CPSA from *B. fragilis* directly, the anaerobe is difficult to culture, and CPSA production levels are limited and inconsistent. Alternatively, our group has identified the function of enzymes required in the CPSA biosynthesis pathway by a chemoenzymatic methodology. This has enabled us to produce an efficient *Escherichia coli* expression system for isolating these materials from cells directly. We will develop a solid phase purification method and then utilize a hydrophobic immobilization strategy which captures a common lipid anchor called bactoprenyl phosphate (BP) that most glycans are built upon. This cost-effective and simple model system may be used to isolate this material for therapeutic applications.

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S - Sustainability **U** - Charlotte

Abstract #: 132

Title: Experimental Quantification of T. Brucei Telomerase RNA within Individual Cells

Student Author(s): Ali Hariri **H**

Faculty Author and Advisor(s): Dr. Kausik Chakrabarti

Department: Biological Sciences

Trypanosoma brucei is an extracellular parasite that is responsible for the disease “African sleeping sickness” in mammalian hosts. This parasite has two proliferative stages within its life cycle, each within a different host. It presents in the procyclic form in the tsetse fly, and as the bloodstream form in mammalian hosts. There are only a handful of clinically useful drugs available for this disease but these drugs cause severe side-effects. Because of these reasons, and since vaccination does not appear to be feasible due to the parasites ability to evade vertebrate immune system by producing variable surface glycoproteins (VSGs), new drugs are needed urgently. The activity of an RNA-protein enzyme, Telomerase, is a key requisite for rapid proliferation of the parasite. Telomerase extends the ends of chromosomes - telomeres – as each replication leads to loss of a slight amount of DNA under normal circumstances. Telomerase RNA (TR) is the molecule that contains the “template” that telomerase reverse transcriptase uses to add optimal length to telomeres during synthesis. I hypothesize that each parasite contains a set amount of telomerase RNA and will attempt to quantify this number in this project using several techniques including PCR, qPCR, and in vitro transcription. It is expected that my results will show me a given cellular concentration of TR molecules within the procyclic and bloodstream form of parasite. Measurements of the number of TR molecules in each parasite cell will allow further biochemical characterization of the telomerase and help in designing targeted therapeutics against trypanosoma telomerase.

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S - Sustainability

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Abstract #: 133

Title: Longtine 2.0: Using CRISPR-Cas9 to "Markerlessly" Edit the Yeast Genome

Student Author(s): Sarah Moody **H**

Faculty Advisor(s): Dr. Richard Chi

Department: Biological Sciences

The budding yeast *Saccharomyces cerevisiae* is an excellent model organism for studying a variety of critical cellular processes. Traditional methods to edit the yeast genome use PCR-based techniques (the "Longtine" method), in which primers containing gene-specific homology are used to amplify selectable marker cassettes. These cassettes are transformed into yeast and are integrated into the genome via homologous recombination. While simple, this method is limited by marker availability, and introducing multiple edits to the yeast genome increases the risk of "marker swapping" events. CRISPR-Cas9 technology has introduced methods to edit the genome without the need for selectable markers. This system directs Cas9 to a specific PAM site in a gene of interest via guideRNA. Once the PAM site is recognized, Cas9 will make a precise cut in the target gene, which is then repaired by a user-defined "repair template" containing the desired edit. Although highly efficient, it is hindered by costly reagents and the need to design and test new guideRNAs and repair templates for each edit. We have combined these two methods to create a novel, cost-effective way to "markerlessly" edit the yeast genome: by designing guideRNAs that target selectable markers, as well as a color-change assay using the Ade2 reporter gene to determine our method's efficacy. In our two-step system, edits are first made to the genome using selectable markers. Then, markers are removed from the genome and can then be used in subsequent genome edits, bypassing the limitations of marker availability and marker swapping events.

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Abstract #: 134

Title: Defining SNX-BAR Protein Lipid Binding Specificity

Student Author(s): Carrie Rapier **H**

Faculty Advisor(s): Dr. Richard Chi

Department: Biological Sciences

SNX-BAR proteins are a class of sorting nexins that play a role in membrane trafficking. Originally discovered to be key contributors to endosome function, the SNX-BAR proteins are thought to aid in the sorting of packages to their correct destination by using their cargo recognition and membrane remodeling properties. The long-standing assumption in the field is that all SNX-BAR proteins function similarly. However, work from our lab has identified other roles for SNX-BAR proteins, including an emerging number functioning on autophagy-related processes. Understanding the molecular mechanisms of how SNX-BAR proteins regulate autophagy is a major goal of the project. SNX-BAR proteins have been shown to possess two functionally important domains, a Phox homology (PX) which binds to lipids such as phosphatidylinositol 3-phosphate (PI3P) and a Bin/Amphiphysin/Rvs (BAR) domain that drives dimer formation. Our lab recently characterized a novel SNX-BAR protein, Vps501 that uniquely localizes to the vacuole membrane and has point mutations in the PX domain. We hypothesized Vps501's PX domain has binding activity dependent on membrane lipid composition of the vacuole membrane. To test this, we have successfully expressed Vps501 in bacteria and performed liposome sedimentation assays using other SNX-BAR proteins as a control to determine any lipid specificity.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability

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Abstract #: 135

Title: Inflammasome, Stemness and Breast Cancer Progression

Student Author(s): Joanne Azar **H**

Faculty Author(s): Julia Roberson and Dr. Didier Dréau

Faculty Advisor: Dr. Didier Dréau

Department: Biological Sciences

Breast cancer remains the most diagnosed cancer in women and is the second leading cause of cancer-related deaths in the US. In the past decades, targeted treatments, along with systemic chemotherapies, have led to improvements in breast cancer patient survival. Biologically, the heterogeneity of the tumor microenvironment and tumor cells, particularly cancer stem cells, is associated with poor response to treatment. Whether local inflammation promotes cancer cell stemness is unclear. Here, we hypothesize that the proinflammatory microenvironment generated through NLRP3 inflammasome activation triggers breast cancer stemness. We also provide evidence gathered from in vitro cancer models, suggesting that autocrine and paracrine NLRP3 inflammasome activation are associated with increased expression of stemness markers by breast cells. Furthermore, blocking NLRP3 inflammasome activation using the specific MCC950 inhibitor significantly limits the expression of stem markers on tumor cells. Together, our data support the role of local inflammation in the generation of breast stem cells and may provide potential stem-related therapeutic targets to prevent breast cancer progression.

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Abstract #: 136

Title: Correlation between MUC1 Expression and Sensitivity of PDA Cells to
STAT3-Inhibitor Napabucasin

Student Author(s): Priyanka Lala **H**

Faculty Author(s): Dr. Pinku Mukherjee

Faculty Advisor: Dr. Didier Dréau

Department: Biological Sciences

The purpose of this study is to determine if high MUC1 tumor subpopulations are more likely to benefit from STAT3-inhibitor Napabucasin alone or in combination with other drugs or antibodies. Cancer is one of the leading causes of death especially in the western countries. The main challenge for treatment is the heterogeneity and plasticity of the tumor and the key is to identify tumor antigens to target. MUC1 is a transmembrane glycoprotein known to be overexpressed and aberrantly glycosylated in cancer cells (Nath et. al. 2014). MUC1 regulates STAT3 expression in an auto inductive loop (Ahmad, 2011). Therefore, our hypothesis is that in high MUC1 PDA cells, MUC1-STAT3 survival pathway is constitutively activated that will make these cells more susceptible to anti-STAT3 therapies like Napabucasin, compared to low MUC1 PDA cells. For this study, different mouse and human breast, pancreatic, ovarian, colon cancer and melanoma cells with varying levels of MUC1 expression will be used. MTT cell survival assay, colony formation assay, invasion assay, western blot, PCR, and flow cytometry will be performed to test the hypothesis. Statistical significance determined with t-tests and ANOVA. It is expected that Napabucasin will be more effective in killing high MUC1 cells and disrupt the STAT3-MUC1 loop, thus reducing proliferation and stemness in high-MUC1 cells. The innovation of our proposed study is to help identify subpopulations of tumors that are likely to benefit from Napabucasin and other STAT3 inhibitor therapies alone or in combination with other drugs.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability

U - Charlotte

Abstract #: 137

Title: Inflammation, Immune Checkpoint Inhibitors and Breast Cancer Progression

Student Author(s): Bhavana Reddy **H**

Faculty Author and Advisor: Dr. Didier Dréau

Department: Biological Sciences

Inflammation plays a major role in cancer progression. In breast cancer, inflammation promotes a mesenchymal phenotype of cancer cells associated with both tumor growth and metastasis. Cancer cells with a mesenchymal phenotype also demonstrate an elevated expression of the immune checkpoint programmed death receptor ligand (PD-L1). Within the tumor, inflammation is facilitated through proinflammatory cytokine secretions, primarily from infiltrated immune cells such as macrophages triggered by NLRP3 inflammasome activation. Whether inflammation within the tumor microenvironment promotes PD-L1 expression remains to be determined. In particular, we hypothesize that NLRP3 inflammasome activation elicits PD-L1 expression by tumor cells and macrophages. Our results suggest that NLRP3 inflammasome activation, likely through secretions of pro-inflammatory cytokines IL-1beta and IL-18, promotes the PD-L1 expression in macrophages and tumor cells. These observations improve our fundamental understanding of the role of inflammation and immune checkpoint inhibitors in cancer progression and suggest the potential of targeting inflammasome-driven inflammation to prevent breast cancer.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

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Abstract #: 138

Title: Innate Immune Response to Viral Infection in Neurons

Student Author(s): Morgan Russ **H**

Faculty Author(s): Dr. Kristen Funk and Britanie Blackhurst

Faculty Advisor: Dr. Kristen Funk

Department: Biological Sciences

The central nervous system (CNS) controls most functions of the body and mind. Excessive inflammation and swelling in the CNS can lead to neurological diseases. Encephalitis, inflammation of the brain tissue, can be the result of infection by neurotropic RNA viruses, such as the West Nile virus (WNV). Viral encephalitis caused by WNV is associated with neurocognitive dysfunction. I hypothesize the innate immune mechanisms in neurons, in response to viral infections, cause DNA damage that contributes to neurologic dysfunction. The two main aims of my research are to identify mechanisms used by neurons to clear viral infection and to determine whether this causes DNA damage in infected neurons. In Aim 1, I will test this by, infecting primary neurons with WNV, then assessing expression of antiviral cytokines by quantitative reverse transcriptase chain reaction (qRT-PCR). I expect cytokines and antiviral molecules to be highly upregulated by neurons following viral infection. For Aim 2, I will assess DNA damage by performing western blots, qRT-PCR, and immunocytochemistry on cultured neurons following infection with WNV. I expect to find increased levels of DNA damage in neurons following viral infection. The results of this work will improve our understanding of the impact of neuroimmune responses to viral infections which will aid in developing effective therapeutics to treat or prevent neurological disorders.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

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Abstract #: 139

Title: Plasmodium Falciparum K13 Mutations in Ethiopia and the Impact on Artemisinin Resistance

Student Author(s): Maryna van Staden **H**

Faculty Author and Advisor: Dr. Eugenia Lo

Department: Biological Sciences

Malaria is a deadly disease caused by the Plasmodium parasite that are transferred to people through the bite of the infected female Anopheles mosquito. The malaria endemic affects millions of people worldwide including young children in tropical countries. Malaria is preventable and treatable with antimalarial medications like Artemisinin-based combination therapies that were recommended by the World Health Organization as first line treatment in 2005. Unfortunately, the parasite *P. falciparum* has developed resistance against Artemisinin in South America, Southeast Asia and Africa as well. The kelch propeller domain of the chromosome 13 (pfk13) in the *P. falciparum* have DNA codon mutations that are linked to Artemisinin resistance. This study seeks to identify these pfk13 mutations in samples collected from northwest Ethiopia during high and low transmission season and determine the frequency of mutations linked with Artemisinin resistance and how they differ in seasons. *P. falciparum* DNA containing pfk13 will be extracted from dried blood samples and amplified through PCR to compare mutations, samples with pfk13 will be confirmed through gel electrophoresis. Confirmed pfk13 samples will be compared to a reference strain so that genomic differences and the frequency can be observed. The expected results will show that the frequency of pfk13 mutations correlate with artemisinin use which will be higher during high transmission season and lower during low transmission season. This study will contribute to the understanding of Artemisinin resistance development in Africa and worldwide as well as how different ecological and epidemiological factors impact this change.

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Abstract #: 140

Title: Discovering Novel Biomarkers for Gametocyte Detection in Plasmodium Vivax

Student Author(s): Jonathan Williams **G**

Faculty Author(s): Daniel Kepple and Dr. Eugenia Lo

Faculty Advisor: Dr. Eugenia Lo

Department: Biological Sciences

For malaria parasites to transmit from infected humans to vector mosquitoes, gametocytes play a major role. Malaria parasites replicate asexually in the human host, and, in each replication cycle, a portion of the asexual stages develops into sexual gametocytes that permit transmission. The unique ability of Plasmodium vivax to undergo an early gametocyte production makes this disease challenging to manage and treat. By detecting gametocytes in infected hosts, this will allow for treatment, preventing the parasites from completing sexual reproduction in mosquitoes and infecting another individual. Conventional methods for gametocyte detection include microscopy and molecular screening of the Pvs25 and Pvs16 transcripts highly expressed in female gametocytes. However, microscopic detection offers low sensitivity, especially in infections with low gametocytemia. Furthermore, the use of Pvs25 and Pvs16 biomarkers could grossly underestimate the total gametocyte density without accounting for male gametocytes in an infection. Therefore, this study aims to identify novel biomarkers that allow the detection of female and male gametocytes. The expression of 26 gametocyte-specific genes was compared against Pvs25 and Pvs16 among 10 Ethiopian P. vivax transcriptomes. We found that genes including 6-cysteine protein Pvs230, and ULG8 in females and two CPW-WPC family protein genes in male gametocytes show higher expression than Pvs25. These genes are potential biomarkers for detecting both sexes of P. vivax gametocytes in low-density infections and estimating transmission reservoirs.

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Abstract #: 141

Title: Submicroscopic Infection and G6PD Deficiency in Malaria Patients

Student Author(s): Logan Witherspoon G

Faculty Author(s): Daniel Kepple, Beka Abagero, and Dr. Eugenia Lo

Faculty Advisor: Dr. Eugenia Lo

Department: Biological Sciences

Plasmodium vivax malaria is a neglected tropical disease, despite being more geographically widespread than any other form of malaria. Glucose-6-phosphate dehydrogenase (G6PD) is a cytosolic enzyme with a vital role for the integrity and functioning of red blood cells. Lower activity of G6PD enzyme can lead to acute hemolytic anemia especially after exposure to oxidative stressors like primaquine. Primaquine is an antimalaria drug for radical cure of *P. vivax* and blocking transmission of *P. falciparum*. It is important to identify G6PD deficient individuals and administer primaquine with special care due to its hemolytic side effects. This research aims to investigate the prevalence of G6PD deficiency in malaria patients from Bonga town in Southwestern Ethiopia. The level of G6PD activity was measured by careSTART™ POC biosensor. The overall median activity was calculated for females and males to determine if G6PD levels were normal, intermediate, or deficient. Further, portion of the G6PD gene was amplified and sequenced to examine the association between G6PD phenotype and genotype. Of the 271 subjects who were tested for G6PD phenotype, 19 out of 297 (7%) of individuals had a low level of G6PD enzyme, 38 (14%) had intermediate enzyme activity, and 214 (78.9%) had normal levels. No significant correlation observed between G6PD enzyme levels and odds of being infected by *P. vivax*. No mutations were observed in A376G, G202A, and C563T but three novel non-synonymous mutations in exon 2 among G6PD deficient individuals. Findings of this study have important implications to using primaquine for malaria treatment.

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Abstract #: 142

Title: Food and Shelter: Mapping Fish Life History in Saltmarshes
Using Diet and Habitat Biomarkers

Student Author(s): Kathryn Brinegar **S**

Faculty Author and Advisor: Dr. Paola López-Duarte

Department: Biological Sciences

Several fish enter estuaries during the larval stages and remain in there throughout the juvenile stage, where they feed and grow before returning to coastal areas as adults. In contrast to these transient fish, we also find permanent residents that complete their life cycle within estuaries. The first objective of this study is to compare diets of transient and resident fish in southern Louisiana salt marshes. To that end, fish were collected from three sites at varying distances from the coast. Muscle tissue samples from two transient species at the juvenile stage: spot [*Leiostomus xanthurus*] (n=18), and sand seatrout [*Cynoscion arenarius*] (n=7) and one permanent resident at juvenile and adult stages, Gulf killifish [*Fundulus grandis*] (n=25) were stable isotopes indicative of diet ($\delta^{13}\text{C}$: energy source; $\delta^{15}\text{N}$: trophic position, and $\delta^{34}\text{S}$: source and trophic level identification). Preliminary results suggest that Sand seatrout exhibit more marine signatures and a higher trophic position than the killifish and spot. The second objective is to determine whether dietary signatures reflect habitat use. We anticipate fish with more marine dietary markers are more recent arrivals in the marsh, and would have signatures that differ from the marsh resident fish. To evaluate habitat use, we will examine the otolith microchemistry signatures for the same samples. The biomarkers that reflect environment conditions (e.g., salinity) and habitat collected in this study will be used to create a tool for visualizations of fish life history in the marsh.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

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Abstract #: 143

Title: The Use of Macroinvertebrates as Bioindicators of Marsh Creation Success

Student Author(s): Casey Gatrell **H**

Faculty Advisor: Dr. Paola López-Duarte

Department: Biological Sciences

Saltmarshes provide several ecological functions (e.g., food sources and natural filtration) for many coastal species. In Southern Louisiana, these habitats face accelerated erosion due to the influences of dredging and sea-level rise. Restoration efforts such as the Lake Hermitage Marsh Creation project have been established in response to habitat loss and to promote the functional stability of local habitats. Following the construction of new marshes, bioindicator species can be used to assess the quality of the environment and how it changes over time. Within various tolerance classes, bioindicators are highly useful in determining the quality of a habitat to sustain life based on their abundance. This study aims to measure the success of newly-created sites using macroinvertebrate communities as bioindicators. We hypothesize that macroinvertebrates categorized as sensitive will be more prevalent in reference marshes and those categorized as resistant or tolerant will be more prevalent in created marshes because the latter sites would comparatively have less-developed functional stability. Macroinvertebrate species were collected at reference and created marsh sites using litter bags filled with dried vegetation and deployed three years following project completion. The contents of each bag were sorted, identified, and assigned a bioindicator class based on literature review. The relative abundance of these bioindicator classes was compared across sites. Preliminary results from the literature review indicate several organisms may be appropriate for use as bioindicators, including caddisflies (sensitive), flies (variable from sensitive to resistant), and several tolerant groups (amphipods, ticks, nematodes, and bristle worms).

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Abstract #: 144

Title: Comparison of Macroinvertebrate Species Abundance and Composition Before and After Freshwater Input

Student Author(s): Rachel Magallon **H**

Faculty Advisor: Dr. Paola López-Duarte

Department: Biological Sciences

Saltmarshes are habitats for numerous important coastal species. Vegetation and sediment accumulation protect coastal infrastructures from flooding and erosion. Diversion of the Mississippi River restricts freshwater and sediments to adjacent saltmarshes, resulting in coastal erosion and reduced macroinvertebrate abundance and diversity. Prior research suggests that saltmarshes with salinity levels above the estuarine ranges of 0-20 PSU have low biodiversity and that reconnecting saltmarshes with the Mississippi River can improve sustainability efforts. The impact of freshwater diversion on macroinvertebrates in newly-restored saltmarshes is less understood. The macroinvertebrates of interest to this project are, in general, worms, insects, crustaceans, and mollusks. We hypothesize that freshwater input from the Mississippi River to adjacent saltmarshes increases macroinvertebrate diversity, improving saltmarsh restoration efforts. We expect an increase in worm and insect abundance, with a decrease in crustacean and mollusk abundance. This project aims to (1) determine macroinvertebrate salinity tolerances/preferences through a literature review, (2) determine macroinvertebrate abundance and composition through sample collection and identification, and (3) determine the impact of salinity on macroinvertebrate community composition. The study sites of interest include saltmarshes in coastal Louisiana near the Mississippi River's West Pointe à la Hache siphon. Nylon bags filled with dried vegetation were deployed for two months to collect macroinvertebrate samples. The samples were preserved in ethanol and sorted and identified in the laboratory. Preliminary results indicate that 60% of the system's present taxonomic groups have narrow salinity ranges (stenohaline) and 40% have wider tolerances and therefore would be expected to survive lower salinity conditions.

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Abstract #: 145

Title: Discovering the Factors that Drive Biodiversity of Macroinvertebrates in Saltmarshes

Student Author(s): Aashiana Patel **S**

Faculty Advisor: Dr. Paola López-Duarte

Department: Biological Sciences

Saltmarshes are coastal wetlands that provide habitat, food, and refuge for marine invertebrates and fish. Efforts to mitigate the loss of saltmarshes include, The Lake Hermitage Marsh Creation Project in Plaquemines Parish, Louisiana. Macroinvertebrates are often used to determine the health of saltmarshes as they are indicators of overall marsh health and play a vital role in the marsh food web. The objective of this study is to determine whether variability in vegetation, elevation, inundation, and decomposition rates cause differences in macroinvertebrate biodiversity. We hypothesize that the site with higher vegetation diversity will have higher macroinvertebrate biodiversity. In 2018, samples were collected using nylon mesh bags that were filled with dried vegetation and deployed at varying distances from the marsh edge (1, 10, 25, 50 and 100 m) for ~2 months. Samples were sorted, identified, and counted under a dissecting scope. Preliminary results suggest that differences in elevation produce variations in community composition, as the highest site (Marsh A) had the most variation in community composition. Marsh vegetation and inundation are related to elevation, therefore we expect to see changes in the macroinvertebrate community that are associated with different types of vegetation and flooding rates. The results of this study help to inform restoration projects, specifically the influence that vegetation, elevation, and inundation have on insect abundance and diversity.

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S - Sustainability **U** - Charlotte

Abstract #: 146

Title: Microglial Responses to DNA Damage are Mediated by the Cytosolic Sensor cGAS

Student Author(s): Javier Avalos **H**

Faculty Author(s): Alex Suptela and Dr. Ian Marriott

Faculty Advisor: Dr. Ian Marriott

Department: Biological Sciences

The innate immune response is an essential component of the body's response to pathogens. Inflammatory responses that typically respond to pathogens can also be activated by DNA damaging events like ionizing radiation and oxidative stress. Following these events, DNA that is typically compartmentalized in the nucleus or mitochondria may leak into the cytoplasm where it can be detected by a DNA sensing protein called cyclic GMP-AMP synthase (cGAS). When DNA is recognized by cGAS, a pathway is initiated that results in the production and secretion of inflammatory molecules called cytokines and Type-I interferons. We hypothesize that cGAS mediates the immune response following DNA damage via the recognition of cytosolic DNA resulting from DNA damage in human microglia. PhD candidate Alex Suptela treated two microglial cell lines, one expressing normal levels of cGAS (WT) and the other lower levels of cGAS (cGAS KD), with ionizing radiation to induce DNA damage. RNA was then isolated from cells following treatment. Isolated RNA was sent to an outside company for sequencing with an analysis method called RNAseq and a literature search was performed on significant results. RNAseq data revealed higher levels of RNA that code for proteins that are often up-regulated in various types of cancer and several non-coding RNAs that recent literature shows may also play a role in cancer development. Together, these results indicate that the protein cGAS plays a pivotal role in the development of inflammatory responses in human microglia, and that its absence leads to the potential development of cancer.

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Abstract #: 147

Title: Effect of Salinity and Parental Exposure on the Developmental Success in
Nematostella Vectensis

Student Author(s): Sharmily Ambroise **H**

Faculty Advisor: Dr. Adam Reitzel

Department: Biological Sciences

Nematostella vectensis (the starlet sea anemone) is an organism with a broad geographic distribution including the coasts of England and North America. As an osmoconformer, *N. vectensis* actively or passively maintains its internal environment to be isotonic with its external environment. Due to the varying difference in salinities of their native estuarine environments, salinity is an important abiotic factor that can influence their behavior, development, and survival. The first goal is discovering the different levels of survival and responses that *N. vectensis* will have in various levels of low salinity depending on their developmental stage. This was done by exposing the organisms to various salinity levels and observing them. I hypothesize that the developmental stages of this species will have identical salinity tolerances due to their lack of specific tissues for regulating cellular osmolarity. The second goal is to discover if tolerance to high or low salinity levels is a trait that parents are able to pass down to their offspring. This will be done by culturing the parental organisms in various salinities, and after spawning them, observing signs of tolerance by exposing the offspring to extremely low and high salinities. I hypothesize that salinity of females, but not males, will impact the salinity tolerance of offspring due to potential differences in allocation of osmolytes to developing eggs. The results of this research can give further insight into the role of parent environments on offspring tolerance, and can be used to see how other species react to salinity based stressors.

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Abstract #: 148

Title: Bioflavonoids and Environmental Compounds Generate DNA Damage Through Topoisomerase II Inhibition and Oxidative Stress

Student Author(s): Destiny McKleny **H**

Faculty Author(s): Rachel Sielaty, Kiran Lalwani, and Dr. Christine Richardson

Faculty Advisor: Dr. Christine Richardson

Department: Biological Sciences

Bioflavonoids are found in fruits, vegetables, legumes, tea, coffee and wine and in over-the-counter dietary supplements. They contain pendant rings that feature a 4'-OH group essential for activity biochemically similar to the potent topoisomerase II (Top2) inhibitor etoposide. At low doses, bioflavonoids are antioxidants and have anti-inflammatory, anti-viral, anti-carcinogenic, cardioprotective properties. However, we demonstrated that a panel of six bioflavonoids induced double-stranded breaks (DSBs) and chromosomal translocations in a dose-dependent manner. To understand the biochemical activity of the bioflavonoids causing DNA breaks, cells were exposed to bioflavonoids at different doses and topoisomerase II (Top2) In vivo Complex of Enzyme (ICE) assays will be used to quantitate the amount of bioflavonoid-induced double-stranded breaks that are directly bound to Top2a or Top2b. We hypothesize that genistein, quercetin, kaempferol, naringenin and hesperidin will generate significant amounts of Top2b-bound double-stranded breaks. Results thus far from the ICE assay show that increasing the amounts of sample show a clear increase in the amounts of detectable trapped Top2-DNA complexes. These findings may have implications for understanding the biochemical activity of bioflavonoids and other dietary supplements with regard to their direct interaction with DNA, and they provide evidence to support a mode of action similar to that of etoposide in promoting DNA breaks and the types of genome instability such as chromosomal translocations and has implications for causing leukemias for infant leukemias. Results for the detection of Top2-DNA complexes are in progress.

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Abstract #: 149

Title: Using an NIH Compound Library to Screen for Novel DNA Damaging Agents

Student Author(s): Rasheed Yobo **H**

Faculty Advisor: Dr. Christine Richardson

Department: Biological Sciences

The chemotherapeutic agent etoposide is well known to cause DNA breaks and chromosomal translocations and cancers. Bioflavonoids have a similar biochemical structure as etoposide and are found in common foods and dietary supplements. Bioflavonoids genistein, quercetin, myricetin, quercetin, and kaempferol have all been shown to cause DNA breaks in previous studies of the Richardson lab. This study will expand on previous findings by screening a NIH chemical library (390 compounds) to determine which ones can cause DNA breaks and chromosomal translocations. I hypothesize that the compounds with the most similar structures to etoposide and the bioflavonoids previously studied will cause DNA breaks. Etoposide will be used as a positive control in this study. Untreated cells will be used as a negative control. Cells will be treated with individual compounds from the library and DNA damage scored using γ H2AX. The compounds will be labeled with a letter and number and will be left as unknown during treatment. Treated cells will also be analyzed to determine if DNA damage induced by the compounds can promote a chromosomal translocation detected using green fluorescent protein. This study may increase awareness of the potential dangers of a large and diverse set of environmental agents or toxins that can potentially cause genome instability and disease in humans.

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Abstract #: 150

Title: Identifying Collateral Sensitivity Networks in Burkholderia Multivorans

Student Author(s): Dalia Alsbiniati **H**

Faculty Advisor: Dr. Todd Steck

Department: Biological Sciences

Cystic fibrosis (CF) is chronic life-threatening disorder that targets the lungs and digestive system. With a buildup of mucus in the lungs being a common manifestation, patients with CF have a higher susceptibility to microbial colonization and bacterial infections. Burkholderia multivorans is a member of the Burkholderia cepacia complex (Bcc) that are known to cause debilitating lung infections that are often chronic and hard to eradicate in CF patients. While multiple therapies are available, the current use of more than one antibiotic at once increases the chances of multidrug resistance and are thus not successful in reducing infections in CF patients. Collateral sensitivity (CS) occurs when a bacterial strain becomes resistant to a treatment drug but is simultaneously sensitive to a second drug. Cross resistance (CR) occurs when a strain acquires resistance to one drug and is simultaneously resistant to other drugs. Antibiotic collateral sensitivity and the identification of antibiotic pairs that exhibit this interaction will aid in the development of treatment strategies that have not been successful before due to multidrug resistance. The focus of this research will aim to identify and characterize CS networks for various antibiotic pairs and their respective frequencies, it is likely that these frequencies will vary amongst the pairs. This study will expand on previous research that has studied the network frequencies within B. multivorans.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

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Abstract #: 151

Title: Identifying Collateral Sensitivity Networks and Associated Genetic Markers in Burkholderia Species

Student Author(s): Enosh Ishman **CE, G, H, NC**

Faculty Advisor: Dr. Todd Steck

Department: Biological Sciences

Antibiotic collateral sensitivity (CS), seen when a drug-resistant organism becomes sensitive to a drug it was not previously exposed to, might be used to develop therapies to treat chronic bacterial lung infection in cystic fibrosis patients. The purpose is to characterize how common this phenomenon is and to identify genes or specific mutations involved in collateral sensitivity (CS) in the study organism *Burkholderia cenocepacia*. Methods involve adding a layer of cells from each strain to a growth agar plate, then adding antibiotic disks to the center of the lawn. After incubation to promote bacterial growth, the killing area caused by antibiotic diffusing from the disk is measured. Collecting cells from the growth edge closest to the disk and repeating the plating results in a gradual increase in antibiotic resistance. Once the bacteria reach full resistance, they are tested for CS. If observed, the absolute resistance level is measured using an Etest, a strip of paper containing a known gradient of antibiotic concentration. The Etest strip is placed on a plate seeded with bacteria, which will grow up to the place on the strip corresponding to the killing antibiotic concentration. For whichever of seven antibiotics CS is observed, this process is repeated using the CS antibiotic as the new exposure drug. The ultimate goal is to identify mutations involved in CS by correlating genomic mutations with CS patterns, and confirming involvement of candidate genes by introducing that mutation into a wild type strain using gene editing techniques and determining if CS occurs.

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Abstract #: 152

Title: Role of Hsp70 Co-chaperones in Apn2 Activity

Student Author(s): Neha Galla **H**

Faculty Author(s): Siddhi Paranjape and Dr. Andrew W. Truman

Faculty Advisor: Dr. Andrew W. Truman

Department: Biological Sciences

Heat shock proteins, such as Hsp70 and Hsp90 are molecular chaperone proteins that assist in protein folding in cells. Hsp70 works in cooperation with several co-chaperone proteins to accomplish this goal. Past studies from the Truman lab have discovered the role of chaperones in regulating the stability of Apn2 in yeast (APE2 in mammalian cells). Apn2 is a protein involved in the DNA damage response mechanism of a cell. The goal of this study is to determine which of the Hsp70 co-chaperones binds to and stabilizes Apn2 in yeast. Currently, we are assessing Apn2 levels in 30 yeast strains lacking a particular co-chaperone protein via Western Blotting. To confirm these results, co-immunoprecipitation will be used to further study the strains that were identified to be sensitive. The results of this work may be used to create novel anticancer drugs based on silencing the APE2 protein in cancer cells by targeting Hsp70 co-chaperones.

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Social Sciences

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Abstract #: 153

Title: An Examination of the Ranked Choice Voting as a Means to Address Political Polarization

Student Author(s): Dick Beekman **H**

Faculty Advisor: Dr. Eric Heberlig

Department: Political Science and Public Administration

More so than any time since the conclusion of the Civil War, the nation finds itself divided and polarized over politics. Political polarization has led to the rise of political extremists and violence, most notably seen in the recent insurrection experienced at the nation's Capitol Building. Instead of rejecting partisanship and extremism, candidates themselves increasingly partake in this behavior firsthand. The current political climate of the day serves as inspiration for this paper. While much has been done to examine the causes of political polarization, possible solutions within our political structures themselves have been largely left unconsidered. Combined with previous research done on this topic, an argument is made for the implementation of ranked choice voting as a possible solution. It is hoped that by examining ranked choice voting through a practical experiment that this paper will be able to assess if it serves as a conduit for more moderate candidates to emerge. Should this paper find evidence that moderate candidates are more likely to emerge under a ranked choice voting system, it will provide perhaps a systemic blueprint for working to address the division within America.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

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Abstract #: 154

Title: Gentrification of Optimist Park: Looking into the Neighborhood Revitalization of Optimist Park and the Effect on Residents' Sense of Community

Student Author(s): Katherine Bolt **CE, NC, U**

Faculty Author(s): Dr. Erin Banks, Dr. Nhi Cao, and Boris Henderson

Faculty Advisor: Dr. Erin Banks

Department: Office of Undergraduate Research

Gentrification of the United States has rapidly increased over the last decade. This research will focus on the housing crisis of the Charlotte region, specifically Optimist Park. Neighborhood revitalization, or gentrification, negatively impacts original residents and their sense of community. In order to evaluate this relationship, we must unpack gentrification and understand the impact it has on decreasing residents' sense of community. The purpose of this research is to understand the relationships between gentrification and residents' sense of community. A literature review was conducted using JSTOR, ProQuest, EBSCO, and Taylor & Francis databases. Participating residents of Optimist Park will be given pre and post-surveys to gather information on their thoughts in regards to gentrification, sense of community, and displacement. Focus groups and community interviews will be administered to further collect data. The data collected will be analyzed and used to create a resource guide for residents of Optimist Park. We expect to find that the displacement of non-white residents and the increase of in-coming white residents leads to a decreased sense of community. Also, resource displacement of accessible shops and meeting places may follow a similar trend and contribute to a loss of familiarity. The findings of this study will contribute to the literature on the housing crisis and gentrification's effect on residents' sense of community. This research will be added to a part of a larger study to promote self-efficacy and advocacy for Charlotte homeowners.

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Abstract #: 155

Title: Political Displacement in Charlotte's West Davidson Neighborhood: How are Local Affordable Housing Policies impacting Black Residents in Gentrifying Communities?

Student Author(s): Claire Patrick **CE, H, NC, U**

Faculty Author(s): Dr. Erin Banks, Dr. Nhi Cao, and Boris Henderson

Faculty Advisor: Dr. Erin Banks

Department: Office of Undergraduate Research

Black flight, or the out-migration of Black residents from inner cities to the suburbs, occurred in cities across the United States between the 1990s and 2000s. More recently, these neighborhoods are witnessing an era of gentrification which is attracting newcomers resulting in rising home prices and the political displacement of long term residents. These shifts are particularly notable in Charlotte, North Carolina. This research seeks to examine how local political decisions, affordable housing policies, and the rising housing costs are changing the landscape of communities in the Charlotte region. To better understand this issue, surveys will be distributed to residents to capture their thoughts, feelings, and concerns about gentrification, displacement, and changes in their neighborhood. In addition, interviews and focus groups with residents and community leaders will be used to further understand the needs and desires of those being impacted. We expect to find preliminary evidence of displacement among local Black residents which is resulting in a shift of the physical, social, and cultural landscape of the neighborhood. Furthermore, these findings will help contribute knowledge to the growing body of literature regarding factors that impact displacement in communities of color as well as the pursuit to create, maintain, and grow generational wealth in the Black community. This research is part of a greater study that seeks to improve advocacy for affordable housing among long term residents as a means of addressing displacement in the Charlotte area.

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Abstract #: 156

Title: On the Impacts of Acute Stress on Episodic Memories in Premedical Students

Student Author(s): Justin Castillo **H**

Faculty Advisor: Dr. Malin Pereira

Department: Honors College

Stress affects everyone. It can prove beneficial or harmful to one's mental and physical health. The physical effects of stress may be the most noticeable, but the impacts on one's mental health are not always clearly seen. Acute stress is stress felt in the short term. Premedical, or premed, students often experience high levels of stress due to the academically rigorous coursework and pressure to perform well on the Medical College Admissions Test. Episodic memory is a form of long-term memory used to recall past experiences or events. Strong episodic memories help inform serial recall techniques used to study information ordered in lists and encourage future thinking. The inability to form new memories or retrieve older memories may pose a problem for premed students' performance in the classroom and overall well-being. This paper reviews the relationship between acute stress and episodic memory formation and recollection. Determining the relationship between these two concepts involved investigating the biochemical nature of acute stress, the current premed coursework and requirements for medical school, as well as the qualitative and quantitative impacts stress has on student test performance. Keywords or phrases, such as "memory", "episodic memory", "acute stress", "premed student", and "undergraduate student", were used in searches of academic databases. This study informs readers of the influence acute stress has on episodic memory and provides an argument for the need to implement changes in academic plans that could mitigate the negative effects described in this review for premed students.

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Abstract #: 157

Title: Funding challenges in the Mecklenburg County Food System during COVID-19: Opportunities and Next Steps

Student Author(s): Mariam Jaliawala **CE**

Faculty Advisor: Dr. Nicole Peterson

Department: Anthropology

The Charlotte-Mecklenburg Food Policy Council is working to understand how the food system has been affected by the pandemic. The purpose of this research is to document how community-based food system initiatives are responding to the pandemic and to understand the root problem of food insecurity. In order to document the challenges, the council needs to consider the perspectives of food organizations, the toll the pandemic has had on the populations they serve, and the ways they are trying to overcome these obstacles. Interviews with organizations were conducted about their experiences with Covid-19, with questions such as "What are some assets that your organization does not have but would support achieving your goals?" The method we will be using to conduct the following interviews is by coding through NVivo. We have found in these interviews that Covid-19 has made it more difficult for organizations to receive funding for various reasons. In the coding I found that it was harder to receive funds especially for those that were newly developed organizations because they did not have any established partnership and collaboration with organizations while it was easier for those that have been involved for a long time. Pandemic led to limited funding and that is why they lacked paying employees and had more volunteers which led to scarce resources. Furthermore, the research allows us to gain a better understanding of the communities around Charlotte and develop recommendations for how local food systems can support communities and increase resilience.

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Abstract #: 158

Title: Lower Attendance Rates during the Coronavirus Pandemic and the Role of Student Poverty

Student Author(s): Josie Peplinski **H**

Faculty Advisor: Dr. Jason Giersch

Department: Political Science and Public Administration

This presentation will explore how attendance in high-poverty schools suffered more than in other schools during the Coronavirus pandemic. In other words, this presentation seeks to answer the research question: How did concentrations of students in poverty affect the change in attendance rates when public schools in North Carolina shifted to virtual learning during the pandemic? Students below the poverty line have historically attended classes less frequently than students above the poverty line. Using data from the North Carolina Department of Public Instruction, this paper shows that attendance across all socioeconomic levels has decreased throughout the pandemic. This includes across the United States, across North Carolina, and across Mecklenburg County schools. However, with every percent increase of students in poverty in a school, the attendance between 2019 and 2020 decreases by .052 percentage points. This means that schools with high poverty rates saw larger decreases in attendance during the pandemic than schools with low poverty rates. The background research suggests that students in poverty have less access to the technology and internet access necessary to complete schoolwork, which could exacerbate the learning gap while students are physically out of school, leaving students who have lacked access to classroom resources over the past year significantly behind academically.

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Abstract #159

Title: Supporting the Holistic Development of Individuals through Church-Based Community Supports

Student Author(s): Anson Millard **CE, U**

Faculty Advisor: Dr. Susan Harden

Department: Middle, Secondary, and K-12 Education

This study involves community-engaged scholarship through a partnership with Camino Church and Camino Community Center, as well as a meta-analysis that synthesizes qualitative and quantitative research from the fields of Education, the Humanities, and Psychology. Homelessness is multidimensional, affecting an individual's educational development, access to resources, and ability to generate income. This study finds that church based community centers are uniquely positioned to service the vulnerable in communities through holistic, restorative supports. Those who participate in the act of volunteering have greater civic involvement and overall quality of life.

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Abstract #: 160

Title: College-age Students and their Susceptibility to Fake Information on Social Media

Student Author(s): Hannah Ryninger **H**

Faculty Advisor: Dr. Eric Heberlig

Department: Political Science and Public Administration

Since the 2016 presidential election, social media has seen a drastic increase in the amount of fake news online. Because college-age students are one of the largest demographics on social media, it's crucial to determine their ability to discern real from fake information. I developed a survey experiment using UNC Charlotte's Political Science Survey Lab. The experiment tested over 500 college-age students' ability to discern real from fake information on social media. Half of the respondents received a lesson on how to spot fake information, and the other half did not. I will use this data to compare the two groups and determine the effectiveness of interventions when it comes to fake information online. I hypothesize we will find that the respondents in the survey who did not receive a lesson on spotting fake news, did not think critically about the information they received and in turn, did not think it was fake or unreliable. I also hypothesize that respondents who received the lesson were more likely to spend more time on the survey, were more likely to have examined evidence further by clicking evidence links, and were more likely to discern the real news story from the fake one. This data will be useful in determining future tactics to help users on social media discern information properly and thus ensure users are not believing potentially false political information.

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Abstract #: 161

Title: Interpersonal Violence and Harassment Prevention Survey

Student Author(s): Anna Yoder

Faculty Author(s): Dr. Annelise Mennicke, Dr. Jessamyn Bowling, and Abigail Post

Faculty Advisor: Dr. Annelise Mennicke

Department: Social Work

This presentation will showcase lessons learned in survey research from the perspective of a burgeoning undergraduate research assistant (RA). The undergraduate RA assisted in the disseminations of the 2022 Interpersonal Violence and Harassment Prevention Survey, which is a survivor centered and LGBTQ+ inclusive campus climate survey. Members of the research team consist of two faculty, a graduate student, and an undergraduate student. First, the researchers collaborated to select items. The team searched for and collected both new scales and those from previous campus climate surveys, and met weekly to determine which measures to choose, attempting to balance survivor-centered practices with length considerations. Second, the team adopted the software platform Qualtrics for survey-building and collaborated to ensure survey flow. This involved verifying that response categories were consistent with scales, confirming that visibility is exceptional on both mobile and desktop platforms, assigning roles to team members to test display logic, etc. Finally, team members are collectively discussing and undertaking recruitment efforts, such as including LGBTQ+ elements in the survey flier and sending multiple email drafts to spell check and ensure formality. Inexperience with research methods presented challenges, but recommendations are offered to assist new researchers aiming to do survey data collection on topics such as interpersonal violence or LGBTQ+ issues. Specifically, we recommend consistent team meetings, establishing and adhering to deadlines, being mindful of small details, and allowing time for testing. Together, this can yield successful survey research that can be used to inform university processes and procedures.

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Abstract #: 200

Title: 3D Printing as a Tool for Architectural Analysis

Student Author(s): Quinton Frederick **CE, NC**

Faculty Advisor: Dr. Emily Makas

Department: Architecture

The Container/Contained exhibition examines the life and work of architect Phil Freelon. Focusing on civic buildings like libraries and museums, Freelon primarily designed spaces that celebrated African American stories and identities. Freelon felt that architecture should be more than just a container, and that “it should help to tell the story.” Freelon used a variety of unique design strategies to accomplish this goal. 3D printed architectural models created for the exhibition helped investigate and communicate these design strategies in some of Freelon’s most notable projects - the National Museum of African American History and Culture, the Harvey B. Gantt Center for African American Arts and Culture and the BRITE Facility at North Carolina Central University. For each of these buildings, a series of four or five models chronologically demonstrated the most important components of Freelon’s design. Digital models were created using measured architectural drawings and Rhinoceros 3D modeling software. The resulting process models revealed three common themes in Freelon’s design strategies: roots, a response to site or regional history; ideas, an organizing design gesture and skin, references made in the material and pattern of the building’s exterior. This research project provided new analysis of a significant architect and encouraged additional use of 3D printing technology in architectural history and museum exhibitions.

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Abstract #: 201

Title: Modeling Moretti

Student Author(s): Parker Gillespie

Faculty Advisor: Dr. Jeff Balmer

Department: Architecture

Architect Luigi Moretti's career spanned two significant periods of twentieth-century Italy: his Neo-rationalist projects of the Fascist era, and his post-war career synonymous with the 'Economic Miracle' of the 1950s and 60s. My research will focus on an iconic mid-career project Casa Girasole (1950). Featuring a split-pedimented façade and distinctive flared side elevations, this luxury apartment block has been widely identified as a harbinger of the post-modernist movement in architecture. My method will consist of recreating the Girasole building in a digital modeling environment. Thorough analysis of the full set of archival architectural plans is aimed at determining Moretti's fundamental design methodologies. The goal is to document a cohesive recreation of the Girasole building in drawing and modeling, determining the different phases that the design process that culminated in the building as constructed.

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Abstract #: 202

Title: Phil Freelon: Empowering Diversity and Culture through Design

Student Author(s): Sydney Ly

Faculty Advisor: Dr. Emily Makas

Department: Architecture

How can a designer use architecture as a means of empowering diversity and culture? Since the world is constantly changing, so does the expansion of ideas and forms of architecture. The late Phil Freelon is an African-American architect that broke boundaries by creating an architecture that is more than just about aesthetics. Freelon uses architecture as a means of conveying history, culture, and the empowerment of diversity in his designs. Achieving the experience and celebration of diversity through architectural expression is one of the most challenging details to integrate into a design. Freelon accomplished this architectural expression by creating forms that inherit qualities related to the African and African-American cultures. These may include the carving of spaces, how the DNA of the facade is laid out, and the type of materials and selections of colors used in the project. Through analyzing and examining the projects that Freelon had worked on, especially on the renovation of Emancipation Park, I was able to conclude that the craft and intention behind every design detail are essential to conveying the cultural expression or identity of the project. These findings show how impactful the materiality and the form of a structure have on the world as it not only embraces and signifies the traditional culture of the African and African-American communities, but it makes the project distinguishable in terms of bringing awareness to cultural identity through architecture.

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Abstract #: 203

Title: Legacies: Augmented Reality

Student Author(s): Danielle Walden, Jessica "J.B." Burke, and Debra Smith **CE, U**

Faculty Advisor: Dr. Heather Freeman

Department: Art & Art History

In 1906, Charlotte's Brevard Street Library for Negroes opened as the first public African American library in North Carolina. UNC Charlotte's Associate Professor of Africana Studies, Dr. Debra Smith, examines Brevard Street Library in Legacies: African-American Female Pioneers with a chapter featuring Allegra Marea Westbrook, a librarian during Charlotte's Civil Rights movement. The "Legacies: Augmented Reality" project seeks to restore Brevard Street Library in a digital space through visual, audio, and literary storytelling. It invites the public to connect to Charlotte's roots and the history of its Black communities through an augmented reality application and separate 360-degree video. Using archival photographs, the AR application is recreated through 3D modeling and re-imagined through illustrative surface texturing. References of the intersection of S. Brevard and E. MLK Jr. streets, where the library previously lived, informed the space for the 360-degree video. The applications will include audio of Dr. Debra Smith reading from her chapter on Allegra Marea Westbrooks, as well as archival audio of Westbrooks speaking about the library, black education, and literacy in the early 1900's. The ideal audience for these experiences are current Charlotte residents with ties to Charlotte's Black communities, school children, and those who regularly interact with the intersection of S. Brevard and E. MLK Jr. Blvd. Important development notes include integrating animations and adding subtitles to the 360 video. In the future, Legacies: Augmented Reality hopes to expand the project with more accessibility features, Spanish translation, and possibly other stories from Dr. Smith's Legacies: African-American Female Pioneers.

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Abstract #: 204

Title: Virtual Reality: The Haves and the Have Nots

Student Author(s): Levar Fredericks **H**

Faculty Advisor: Dr. Erik Jon Byker

Department: Honors College

The purpose of this research project is to investigate how exposure to virtual reality (VR) equipment shapes people's perspectives on VR and their overall willingness to try the expanding metaverse. The research is framed by the Technology Acceptance Model and is conducted through surveys and data analysis, such as searching for correlations. This research came about as a result of Facebook's transition into becoming Meta, during late October of 2021, which indicated their dedication towards expanding the metaverse. Also, in order to inform this research's area of inquiry, previous literature and research studies were reviewed on subjects including the perception of privacy and security in VR, the adoption of VR devices, and more. The research contributes a means of evaluating society's acceptance of VR technology, in a way that can be used to suggest marketing improvements, thus making it important. It is expected that most people surveyed will have no prior experience with VR equipment and dislike the mainstream price tag associated with it. Therefore, it is hypothesized that those invested in the expansion of VR and the metaverse could benefit from putting more effort into marketing cheaper headsets. That way, through making the technology more accessible, increased users could be attracted that may then be interested in upgrading to the costlier options once they have experienced VR.

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Abstract #: 205

Title: Pay by Position

Student Author(s): Daniel Jackson and Cate Stadelman **CE**

Faculty Advisor: Dr. Susan Harden

Department: Middle, Secondary, and K-12 Education

This community-engaged project is in partnership with the League of Women Voters Charlotte Mecklenburg Chapter. The purpose of the project is to compile data to inform a corporate scorecard on the important metrics of the gender equity gap. With the cooperation of Cate Stadelman, an automated design and virtual framework was engineered to provide the LWV with a detailed manual and beta toolsets. Pay by Position explored the nuances of the gender pay gap and the financial equity between administrative and worker-level positions. The current literature suggests that this paradigm of the gender pay gap is largely misunderstood. The gap between the wage of all female workers and male workers is much smaller than what most mass media and political positions broadcast. This is because the overgeneralized statistic of the 80% difference in gender is overlooking the majority of jobs taken by a specific gender. Within the US, there is a higher concentration of female workers in education and health care while there is an equally disproportionate number of males in the engineering industry. Some academic publications go into depth as to why the gap between different positions varies based on the industry. Tech and research institutions are more likely to keep the pay gap under control, or at least within the federal standards, than industrial or corporate businesses. The literature points back to the question of whether Tournament or Equity theory resolves this conflict. Unfortunately, both systems are flawed in the sense that they apply inconsistently across different industries.

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Education and Communication

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Abstract #: 206

Title: Dance and SEL (Social Emotional Learning) Curriculum Design

Student Author(s): Maggie Church and Alyssa Gray

Faculty Advisor: Dr. Marissa Nest

Department: Dance

Social Emotional Learning (SEL) allows for students to obtain skills and behaviors which they can use and carry throughout their academic journey and life. SEL supports students in the areas of self-awareness, social awareness, self-management, relationship skills, and responsible decision making (CASEL 2021). In education, specifically Arts Education, there has been a lack of literature describing intentionally implementing SEL competencies into planning the set curriculum. In this action research project, we are using Dance Education as a way to implement SEL skills into students' academic journey. We are partnering with Niner University Elementary, teaching dance lessons and working with their students in K-2 grade levels. Niner University Elementary is already incorporating SEL into their school culture, and this context has been an advantage for us during this project. At Niner University Elementary we are teaching students dance lessons in which we are incorporating SEL skills as well as addressing curriculum standards in Arts Education. We are designing, implementing, and refining curriculum modules as we implement SEL skills into dance. We are identifying certain dance concepts and activities that are helping with the development of SEL skills for the students. This action research project began in Fall 2021 and will span over the 2021/2022 school year. In this project, we are exploring ways to intentionally implement SEL into dance lessons and piloting these lessons at Niner University Elementary. At this stage we are creating, refining, and documenting lesson plans as well as reflecting on our experiences as teachers. Our next steps for the future are to collect data next school year and use this to help us to come to findings about SEL incorporated into dance curriculum. Our goal is to create dance lessons which we can share with others who are looking to implement.

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Abstract #: 207

Title: Content Analysis of Black Trumpet players on YouTube

Student Author(s): Jillian Tucker

Faculty Advisor: Dr. Evelyn Ormar

Department: Music

Approximately 2.1 billion people used YouTube monthly in 2020 (Statista Research Development, 2022). In July through September 77% were ages 15 to 25 (Statista Research Development, 2022). Kellner and Kim (2010) argued that “YouTube, combined with a transformative critical pedagogy, can help realize the Internet’s potential for democratization and transformative pedagogy, while also noting its limitations” (p.6) including diversity and identity relevance. After searching YouTube using the word “trumpet” I found and viewed 237 videos of people actively playing a B-flat trumpet and entered the video title, length, view count, thumbs up/down, date posted, and perceived categories of race, age, biological sex, and number of performers into a database. When analyzing perceived categories room for error and bias is present. Therefore, a second researcher independently watched (N = 237) videos and entered them into a separate database. A 92.5% reliability was obtained. Within the 237 videos, I found 11% (n = 27) had performers perceived as Black and 100% (n = 27) of those were perceived as adults. The perceived sex included 96% (n = 26) male, and 4% (n = 1) female. Therefore, there is an 11% chance of seeing a black trumpet performer who will likely be an adult male and 4/10 of a 1 percent chance of seeing a black female trumpet performer. Given the widespread use of YouTube, K-12 black trumpet students who do not see themselves represented may view themselves as devalued while white students may develop an unhealthy sense of their own importance.

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Abstract #: 208

Title: Dismantling the School-To-Prison Pipeline

Student Author(s): Amori Smith

Faculty Advisor(s): Dr. Kelly Anderson

Department: Special Education

This systematic review of the literature examined the School-to-Prison Pipeline. In this review, the author explored the demographics and infractions of students who are introduced into the pipeline. The results of this review revealed that Black and Brown youth and students with disabilities make up the bulk of the school-to-prison pipeline's population. The common infractions that the students' committed causing the school-to-prison pipeline introduction were mainly nonviolent acts of disrespect. Through the lens of Critical Race Theory, the author explores ways educators can prevent student introduction to the pipeline, as well as supports that could be implemented to assist reentry of mainstream education after students transition from incarceration. Findings from this literature review suggest that with a personalized plan, professional development for everyone involved, and consistent progress monitoring, students can begin to work towards reentry and successfully achieve their educational goals.

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Abstract #: 209

Title: Teachers' and Principals' Perspectives of Leadership: A Search for Within-School Alignment

Student Author(s): Tara N. Gabriel **CE, H**

Faculty Author and Advisor: Dr. Adriana L. Medina

Department: Reading and Elementary Education

The purpose of this study was to examine alignment of how middle school principals and teachers perceive leadership. Administrators struggle to effectively stabilize academic reform implementation (Anderson, 2017; Cooke, 1985; Ravitz, 2010). Teachers are the first to feel the impact of administrator-led school-wide reform. Teachers' perceptions of administrative leadership impact school change, often associated with school culture (Atasoy, 2020; Ishimaru, 2012). Our study sought to answer: How close do teachers' and principals' perceptions of leadership practices align within the same school? Questionnaire data were collected from two principals and six teachers in two schools within the same school district. Questions focused on leadership style and attributes, how change is implemented, and faculty collaboration. A qualitative analysis was employed to examine alignment. Findings suggest transformational leadership can be implemented through recognizing leadership qualities, collaborating with partners, and distributing responsibilities to cultivate academic and social change in school culture. Additional findings suggest opportunity for growth with regards to alignment of leadership perceptions and practices. There is a need for common language around leadership practices. Professional development opportunities for shared understanding of leadership qualities and styles has the potential to positively impact school culture. Limitations included a small sample size and one school level. Therefore, further research should focus on elementary, middle, and high school leadership and explore more teachers' perceptions. Leadership and school culture are connected; future research should examine school cultural changes that enhance and support school leadership. This study contributes to the greater understanding between top-down leadership and transformational leadership.

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Abstract #: 210

Title: Empowering Teachers with Culturally Responsive and
Equitable Quantitative Data Analysis

Student Author(s): Autumn McDonald **NC**

Faculty Advisor(s): Dr. Erik Jon Byker

Department: Reading and Elementary Education

My purpose is to examine how to empower teachers with culturally responsive and equitable quantitative data analysis tools. As future teachers, quantitative data analysis is important because over a specific time span data can show consistency or inconsistency in a specific area. Data can also show a starting point, growth, and progress. I examined North Carolina data from the U.S. Department of Education's Civil Rights Data Collection (<https://ocrdata.ed.gov/>). I had two research questions: (1) What do the quantitative data from the Civil Rights Data Collection descriptive statistics reveal about schools and learners in NC? (2) What are culturally responsive and equitable ways to be responsive to this data? I found that African American students were in the majority of students that were below proficiency on their reading levels. I also found that Hispanic and Latino students were consistently low. American Indian students had the highest percentile for low reading proficiency, but no data was recorded for the year 2017. I recommend the following to be responsive to these data findings: one-on-one sessions with students, having culturally relevant texts for students to read including picture books to support reading development with visuals, and working closely with families to provide support for reading practice at home. This study was influential to my development as a future teacher by allowing me to analyze and identify data based strategies to improve student performance, as well as think deeply about the cultural relevance I incorporate into my classroom.

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Abstract #: 211

Title: Examining the Global Challenge of Bullying, Discrimination and Prejudice
Using the Systems Thinking Methodology

Student Author(s): Amelia McTeague**, Julie-Anna Bailey***, Britney Bell**, Braydon Byrd**, Nathan Friesz**, Derin Tekin**, Chyna Arnold*, Brooke Madison*, and Maggie Parrish*** **G, NC**

Faculty Advisor(s): Dr. Nicole Dobbins, North Carolina A&T State University; Dr. Adriana Medina & Erik Jon Byker, UNC Charlotte; and Dr. Jeremy Hilburn, UNC Wilmington

Mentor Educator(s): Gabriela Bermingham & Jennifer Jordan

Affiliations: North Carolina A&T State University*, UNC Charlotte**, UNC Wilmington***

The purpose of our Executive Summary presentation is to describe and report on the global challenge of Bullying, Discrimination and Prejudice. This research prepares us as scholars to recognize the Global Ready initiatives in the State of North Carolina. The North Carolina Department of Public Instruction's Global Educator Digital Badge (GEDB) program is an example. The GEDB program supports NC learners to develop global competencies as they investigate and act on issues of global significance through a systematic form of inquiry. For this research project, we used a Systems Thinking methodology to examine the global challenge of Bullying, Discrimination and Prejudice. We had three research questions: (1) What are two root causes of the global challenge? (2) What are two symptoms of the global challenge and how do these symptoms manifest in the local context and the global context? and (3) What Sustainable Development Goal(s) are connected to this global challenge? We found a number of root causes and symptoms related to our global challenge. The global challenge connects with Sustainable Development Goal #4: Quality Education and Sustainable Development Goal # 16: Peace and Justice. The overall contribution of this research study is that it helps to prepare us as researchers to promote equality for elementary students.

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Abstract #: 212

Title: Examining the Global Challenge of the Effects of COVID-19 on Immigration in the United States Using the Systems Thinking Methodology

Student Author(s): Jasmine Patterson**, Canaan Eident**, Lamia Bilal*, Karmen Massey*, Laina Perota***, Susie Borda**, Devyn Miller**, Kairo Brunson**, Darian Harris**, and Mason Jessup** **G, NC**

Faculty Advisor(s): Dr. Nicole Dobbins, North Carolina A&T State University; Dr. Adriana Medina & Erik Jon Byker, UNC Charlotte; and Dr. Jeremy Hilburn, UNC Wilmington

Mentor Educator(s): DeLana Parker

Affiliations: North Carolina A&T State University*, UNC Charlotte**, UNC Wilmington***

The purpose of our Executive Summary presentation is to describe and report on the global challenge of the effects of COVID-19 on immigration in the United States. This research prepares us as scholars to recognize the Global Ready initiatives in the State of North Carolina. The North Carolina's Global Educator Digital Badge (GEDB) program is an example. The GEDB program supports NC learners to develop global competencies as they investigate and act on issues of global significance through a systematic form of inquiry. For this research project, we used a Systems Thinking methodology to examine the global challenge of the effects of COVID-19 on immigration in the US. We had three research questions: (1) What are two root causes of the global challenge? (2) What are two symptoms of the global challenge and how do these symptoms manifest in the local context and the global context? and (3) What Sustainable Development Goal(s) are connected to this global challenge? We found a number of root causes and symptoms related to our global challenge. The global challenge connects with SDG # 3: Good Health and Wellbeing and SDG # 11: Sustainable Cities and Communities. The overall contribution of this research study is that it helps to prepare us as researchers to better understand immigration patterns during the pandemic and how COVID has affected these patterns.

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Abstract #: 213

Title: Examining the Global Challenge of Equity and Inclusion Using the Systems Thinking Methodology

Student Author(s): Samari McLean*, Evelyn Moreno**, Bhuvi Alluri**, Evan Bracy*, Jocelyn Gomez-Silguero**, Grant Dale**, Steven Nguyen**, Joshua Huffman**, Cailyn Breeden***, and Georgia Pleasants*** **G, NC**

Faculty Advisor(s): Dr. Nicole Dobbins, North Carolina A&T State University; Dr. Adriana Medina & Erik Jon Byker, UNC Charlotte; and Dr. Jeremy Hilburn, UNC Wilmington

Mentor Educator(s): Michele Henriquez and Christine Sisco

Affiliations: North Carolina A&T State University*, UNC Charlotte**, UNC Wilmington***

The purpose of our Executive Summary presentation is to describe and report on the global challenge of equity and inclusion. This research prepares us as scholars to recognize the Global Ready initiatives in the State of North Carolina. The North Carolina's Global Educator Digital Badge (GEDB) program is an example. The GEDB program supports North Carolina's learners to develop global competencies as they investigate and act on issues of global significance through a systematic form of inquiry. For this research project, we used a Systems Thinking methodology to examine the global challenge of equity and inclusion. We had three research questions: (1) What are two root causes of the global challenge? (2) What are two symptoms of the global challenge and how do these symptoms manifest in the local context and the global context? and (3) What Sustainable Development Goal(s) are connected to this global challenge? We found a number of root causes and symptoms related to our global challenge. The global challenge of equity and inclusion connects with SDG # 4: Quality Education and SDG #10: Reduced Inequalities. The overall contribution of this research study is that it helps to prepare us as researchers to increase the equity and inclusion in schools.

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Abstract #: 214

Title: Investigating the Global Challenge of Access to a Quality Education
using the Systems Thinking Methodology

Student Author(s): Jaylynn Nawrocki**, Davida Cabbagestalk*, Andrea Guerrero**, Sarah
Camden**, Teh Peh**, Joshua Jaico**, Michael Mathes**, Lauren Money*, Mary Beth Brock***,
and Payce Rohrer*** **G, NC**

Faculty Advisor(s): Dr. Nicole Dobbins, North Carolina A&T State University;
Dr. Adriana Medina & Erik Jon Byker, UNC Charlotte; and Dr. Jeremy Hilburn, UNC Wilmington

Mentor Educator(s): Jennifer Keefe

Affiliations: North Carolina A&T State University*, UNC Charlotte**, UNC Wilmington***

The purpose of our Executive Summary presentation is to describe and report on the global challenge of quality education. This research prepares us as scholars to recognize the Global Ready initiatives in the State of North Carolina. The North Carolina's Global Educator Digital Badge (GEDB) program is an example. The GEDB program supports NC learners to develop global competencies as they investigate and act on issues of global significance through a systematic form of inquiry. For this research project, we used a Systems Thinking methodology to examine the global challenge of access to a quality education. We had three research questions: (1) What are two root causes of the global challenge? (2) What are two symptoms of the global challenge and how do these symptoms manifest in the local context and the global context? and (3) What Sustainable Development Goal(s) are connected to this global challenge? We found a number of root causes and symptoms related to our global challenge. The global challenge connects with SDG #1: No Poverty, because education and poverty go hand-in-hand, a person's status can affect their education directly or indirectly. The global challenge also connects with SDG #4 : Quality Education, because ensuring inclusivity to all students makes for an equitable experience. The overall contribution of this research study is that it helps to prepare us as researchers to understand how education is perceived and varies throughout different global challenges.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability **U** - Charlotte

Abstract #: 215

Title: Analyzing the Global Challenge of Human Rights
Using the Systems Thinking Methodology

Student Author(s): Colette Fraley***, Jessie Ruckart***, Bhumika Gurung**, Kathy Osorio**,
Josiah Clarke**, Trinity Soto**, Asa Moore*, Iasia Collier*, and Peyton Townsend** **G, NC**

Faculty Advisor(s): Dr. Nicole Dobbins, North Carolina A&T State University;
Dr. Adriana Medina & Erik Jon Byker, UNC Charlotte; and Dr. Jeremy Hilburn, UNC Wilmington

Mentor Educator(s): Stephanie Morgan

Affiliations: North Carolina A&T State University*, UNC Charlotte**, UNC Wilmington***

The purpose of our Executive Summary presentation is to describe and report on the global challenge of human rights and needs. This research prepares us as scholars to recognize the Global Ready initiatives in the State of North Carolina. The North Carolina's Global Educator Digital Badge (GEDB) program is an example. The GEDB program supports NC learners to develop global competencies as they investigate and act on issues of global significance through a systematic form of inquiry. For this research project, we used a Systems Thinking methodology to examine the global challenge of human rights and needs. We had three research questions: (1) What are two root causes of the global challenge? (2) What are two symptoms of the global challenge and how do these symptoms manifest in the local context and the global context? and (3) What Sustainable Development Goal(s) are connected to this global challenge? We found a number of root causes and symptoms related to our global challenge. The global challenge connects with SDGs: Good Health and Well-Being (#3); Reduced Inequalities (#10), and Peace, Justice and Strong Institutions (#16). The overall contribution of this research study is that it helps to prepare us as researchers to prevent unconscious bias and increase our global competency and knowledge to actively spread awareness as we continue in our educational careers.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability **U** - Charlotte

Abstract #: 216

Title: The Global Challenge of Making Healthy Choices in Relation to
Access to Healthy Food: Using the Systems Thinking Research Design

Student Author(s): Emily Sutton***, Brendan Clement**, Kia Jeffers**, Ashley Plott**, Jacob
Phelps**, Jonathan Johannesen**, Chimere Condrey*, Mohogani Morman*, and
Madison Greene*** **G, NC**

Faculty Advisor(s): Dr. Nicole Dobbins, North Carolina A&T State University;
Dr. Adriana Medina & Erik Jon Byker, UNC Charlotte; and Dr. Jeremy Hilburn, UNC Wilmington

Mentor Educator(s): Shanna Buckner

Affiliations: North Carolina A&T State University*, UNC Charlotte**, UNC Wilmington***

The purpose of our Executive Summary presentation is to describe and report on the global challenge of healthy choices in relation to access to healthy food. This research prepares us as scholars to recognize the Global Ready initiatives in the State of North Carolina. The North Carolina's Global Educator Digital Badge (GEDB) program is an example. The GEDB program supports NC learners to develop global competencies as they investigate and act on issues of global significance through a systematic form of inquiry. For this research project, we used a Systems Thinking methodology to examine the global challenge of Healthy choices in relation to the access to healthy food. We had three research questions: (1) What are two root causes of the global challenge? (2) What are two symptoms of the global challenge and how do these symptoms manifest in the local context and the global context? and (3) What Sustainable Development Goal(s) are connected to this global challenge? We found a number of root causes and symptoms related to our global challenge. The global challenge connects with SDG 3: Good Health and Well-being, which is about ensuring healthy lives and promoting the well-being of all people at all ages. The overall contribution of this research study is that it helps to prepare us as researchers to promote healthy choices and promote access to healthy choices.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability **U** - Charlotte

Abstract #: 217

Title: Using Systems Thinking Research Design to Investigate the
Global Challenge of Single Use Plastics

Student Author(s): Amy Urquijo***, Gabriela Schiappacasse-Mathy**, Yanasia Jones**,
Coraima Quizhpi**, Seamus Pattyson**, Lauren Keith**, Abigail Ramos Leon**,
Reagan Cooper*, Morgan Purcell*, and Madison Ketchie*** **G, NC**

Faculty Advisor(s): Dr. Nicole Dobbins, North Carolina A&T State University;
Dr. Adriana Medina & Erik Jon Byker, UNC Charlotte; and Dr. Jeremy Hilburn, UNC Wilmington

Mentor Educator(s): Dr. Kaitlyn Holshouser and Natalia Mejia

Affiliations: North Carolina A&T State University*, UNC Charlotte**, UNC Wilmington***

The purpose of our Executive Summary presentation is to describe and report on the global challenge of single-use plastics. This research prepares us as scholars to recognize the Global Ready initiatives in the State of North Carolina. The North Carolina's Global Educator Digital Badge (GEDB) program is an example. The GEDB program supports NC learners to develop global competencies as they investigate and act on issues of global significance through a systematic form of inquiry. For this research project, we used a Systems Thinking methodology to examine the global challenge of single use plastics. We had three research questions: (1) What are two root causes of the global challenge? (2) What are two symptoms of the global challenge and how do these symptoms manifest in the local context and the global context? and (3) What Sustainable Development Goal(s) are connected to this global challenge? We found a number of root causes and symptoms related to our global challenge. The global challenge connects with SDG # 11: Sustainable Cities and Communities and SDG #13: Climate Action. The overall contribution of this research study is that it helps to prepare us as researchers to work towards creating a more sustainable environment.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability

U - Charlotte

Abstract #: 218

Title: Climate Change in the Ocean

Student Author(s): Brooke Lewis***, Mae Petit**, Hayden Leonard**, Aleigha Zerbe**, Ali Smith**, Eva Dimitrijevic**, Bailey Simet**, Ma'Kayshia Davis*, Ebony Torres*, and Holly Weaver*** **G, NC**

Faculty Advisor(s): Dr. Nicole Dobbins, North Carolina A&T State University; Dr. Adriana Medina & Erik Jon Byker, UNC Charlotte; and Dr. Jeremy Hilburn, UNC Wilmington

Mentor Educator(s): Erin Plummer and Emily M. Burrus

Affiliations: North Carolina A&T State University*, UNC Charlotte**, UNC Wilmington***

The purpose of our Executive Summary presentation is to describe and report on the global challenge of climate change in the ocean. This research prepares us as scholars to recognize the Global Ready initiatives in the State of North Carolina. The North Carolina's Global Educator Digital Badge (GEDB) program is an example. The GEDB program supports NC learners to develop global competencies as they investigate and act on issues of global significance through a systematic form of inquiry. For this research project, we used a Systems Thinking methodology to examine the global challenge of climate change in the ocean. We had three research questions: (1) What are two root causes of the global challenge? (2) What are two symptoms of the global challenge and how do these symptoms manifest in the local context and the global context? and (3) What Sustainable Development Goal(s) are connected to this global challenge? We found a number of root causes and symptoms related to our global challenge. The global challenge connects with SDG #13: Climate Action and SDG #14: Life Beneath the Ocean. The overall contribution of this research study is that it helps to prepare us as researchers to become more globally conscious and knowledgeable on the topic which in turn will help prevent climate change.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability

U - Charlotte

Abstract #: 219

Title: Using the Systems Thinking Methodology to Examine the
Global Challenge of Global Warming and Climate Change

Student Author(s): Katelyn Lynch**, Shelby Shiller**, Carson Uselman**, Cameron Dyer**,
Adrienne Gibson**, Josh Leins**, Benjamin Lopansri**, Jaquan Wellington*, Lulu Whatley***,
and Mary Hannah Lewis** **G, NC**

Faculty Advisor(s): Dr. Nicole Dobbins, North Carolina A&T State University;
Dr. Adriana Medina & Erik Jon Byker, UNC Charlotte; and Dr. Jeremy Hilburn, UNC Wilmington

Mentor Educator(s): Tsianina Tovar and Candace Reich

Affiliations: North Carolina A&T State University*, UNC Charlotte**, UNC Wilmington***

The purpose of our Executive Summary presentation is to describe and report on the global challenge of global warming and climate change. This research prepares us as scholars to recognize the Global Ready initiatives in the State of North Carolina. The North Carolina's Global Educator Digital Badge (GEDB) program is an example. The GEDB program supports NC learners to develop global competencies as they investigate and act on issues of global significance through a systematic form of inquiry. For this research project, we used a Systems Thinking methodology to examine the global challenge of global warming and climate change. We had three research questions: (1) What are two root causes of the global challenge? (2) What are two symptoms of the global challenge and how do these symptoms manifest in the local context and the global context? and (3) What Sustainable Development Goal(s) are connected to this global challenge? We found a number of root causes and symptoms related to our global challenge. The global challenge connects with SDG #13: Climate Action and SDG #15: Life on Land. The overall contribution of this research study is that it helps to prepare us as researchers to bring awareness to the effects of climate change and how we can prevent global warming from harming the world.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability **U** - Charlotte

Abstract #: 220

Title: Using Systems Thinking Research Design to Analyze the
Global Challenge of Human Rights and Needs

Student Author(s): Asante Stokes-Deas**, Payton McFarland**, Claire Stalnaker**,
Ashlyn Faw**, Kyle Tuozzo**, Maria Theresa Louis**, Joshua Williams*, Moraya Lewis*,
Shirlee Ann Williams***, and Danielle Mickas*** **G, NC**

Faculty Advisor(s): Dr. Nicole Dobbins, North Carolina A&T State University;
Dr. Adriana Medina & Erik Jon Byker, UNC Charlotte; and Dr. Jeremy Hilburn, UNC Wilmington

Mentor Educator(s): Tia Gilliam-Wilson and Unique Norward

Affiliations: North Carolina A&T State University*, UNC Charlotte**, UNC Wilmington***

The purpose of our Executive Summary presentation is to describe and report on the global challenge of human rights and needs. This research prepares us as scholars to recognize the Global Ready initiatives in the State of North Carolina. The North Carolina's Global Educator Digital Badge (GEDB) program is an example. The GEDB program supports NC learners to develop global competencies as they investigate and act on issues of global significance through a systematic form of inquiry. For this research project, we used a Systems Thinking methodology to examine the global challenge of human rights and needs. We had three research questions: (1) What are two root causes of the global challenge? (2) What are two symptoms of the global challenge and how do these symptoms manifest in the local context and the global context? and (3) What Sustainable Development Goal(s) are connected to this global challenge? We found a number of root causes and symptoms related to our global challenge. The global challenge connects with SDG #1: No Poverty and SDG #8: Decent Work and Economic Growth. The overall contribution of this research study is that it helps to prepare us as researchers to promote equal opportunity, economic growth and employment in order to have a source of income to provide basic needs.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability

U - Charlotte

Abstract #: 221

Title: Engaging in a COIL Project to Investigate the Sustainable Development Goals in Kazakhstan and the United States

Student Author(s): Kylee Hughes** and Alexandra Beltsova* **G**

Faculty Advisor(s): Dr. Svetlana Ibragimova* and Dr. Erik Jon Byker**

Affiliations: Kostanay State University, Kazakhstan* and UNC Charlotte, USA**

The purpose of our research poster is to investigate and compare aspects of the United Nations' Sustainable Development Goals (SDGs) across two different contexts. The main research questions for our comparative and international comparative study is: What are the similarities and differences among Kazakhstan and the United States related to the aspects of Sustainable Development Goals? What are ways both countries are making progress to the SDG 2030 Goal Year? To conduct this research, we used a literature review research design methodology and engaged in a Collaborative Online International Learning (COIL) experience with university students in Kazakhstan. This COIL is sponsored by the American Councils for International Education for the Central Asia University Partnerships Program (UniCEN). The UniCEN program's mission is to build capacity for substantive international engagement between higher education institutions in the United States and Central Asia. For our COIL experience, we met several times for comparative and international types of Webinars and continued our interaction using tools like Google Doc and What's App. We found that there were many similarities and some differences across the two contexts. The research poster includes an examination of the challenges and possibilities in meeting our selected SDGs by the 2030 goal year set by the United Nations.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability **U** - Charlotte

Abstract #: 222

Title: Investigating and Comparing the United Nations' Sustainable Development Goals in Kazakhstan and the United States

Student Author(s): Payton McFarland**, Cornelia Nirean**, and Nail Davletshin* **G**

Faculty Advisor(s): Dr. Svetlana Ibragimova* and Dr. Erik Jon Byker**

Affiliations: Kostanay State University, Kazakhstan* and UNC Charlotte, USA**

The purpose of our research poster is to investigate and compare aspects of the United Nations' Sustainable Development Goals (SDGs) across two different contexts. The main research questions for our comparative and international comparative study is: What are the similarities and differences among Kazakhstan and the United States related to the aspects of Sustainable Development Goals? What are ways both countries are making progress to the SDG 2030 Goal Year? To conduct this research, we used a literature review research design methodology and engaged in a Collaborative Online International Learning (COIL) experience with university students in Kazakhstan. This COIL is sponsored by the American Councils for International Education for the Central Asia University Partnerships Program (UniCEN). The UniCEN program's mission is to build capacity for substantive international engagement between higher education institutions in the United States and Central Asia. For our COIL experience, we met several times for comparative and international types of Webinars and continued our interaction using tools like Google Doc and What's App. We found that there were many similarities and some differences across the two contexts. The research poster includes an examination of the challenges and possibilities in meeting our selected SDGs by the 2030 goal year set by the United Nations.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability **U** - Charlotte

Abstract #: 223

Title: Investigating and Comparing Aspects of United Nations' Sustainable Development Goal 6: Clean Water in Kazakhstan and the United States

Student Author(s): Brenda Morales Flores** and Aldiyar Akhmetov* **G**

Faculty Advisor(s): Dr. Svetlana Ibragimova* and Dr. Erik Jon Byker**

Affiliations: Kostanay State University, Kazakhstan* and UNC Charlotte, USA**

The purpose of our research poster is to investigate and compare aspects of the United Nations' Sustainable Development Goal #6: Clean Water across two different contexts. The main research questions for our comparative and international comparative study are: (1) What are the similarities and differences among Kazakhstan and the United States related to the aspects of Sustainable Development Goal #6: Clean Water and (2) What are ways both countries are making progress to the SDG 2030 Goal Year? To conduct this research, we used a literature review research design methodology and engaged in a Collaborative Online International Learning (COIL) experience with university students in Kazakhstan. This COIL is sponsored by the American Councils for International Education for the Central Asia University Partnerships Program (UniCEN). The UniCEN program's mission is to build capacity for substantive international engagement between higher education institutions in the United States and Central Asia. For our COIL experience, we met several times for comparative and international types of Webinars and continued our interaction using tools like Google Doc and What's App. We found that there were many similarities and some differences across the two contexts. The research poster includes an examination of the challenges and possibilities in meeting Sustainable Development Goal #6 by the 2030 goal year set by the United Nations.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

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U - Charlotte

Abstract #: 224

Title: Comparing the Global Issue of Access to Clean Water
in Kazakhstan and the United States

Student Author(s): Unique Norward** and Diana Kokkuzova* **G**

Faculty Advisor(s): Dr. Svetlana Ibragimova* and Dr. Erik Jon Byker**

Affiliations: Kostanay State University, Kazakhstan* and UNC Charlotte, USA**

This comparative and international research poster examines and reports on Sustainable Development Goal (SDG) 6: Clean Water in Kazakhstan and the United States. The research is part of a collaborative project sponsored by the American Councils for International Education to increase partnerships between US and Central Asian higher education institutions. The main research questions for our comparative and international comparative study are: (1) What are the similarities and differences among Kazakhstan and the United States related to the aspects of Sustainable Development Goal #6: Clean Water and (2) What are ways both countries are making progress to the SDG 2030 Goal Year? To conduct this research, we used a literature review research design methodology and engaged in a Collaborative Online International Learning (COIL) experience with university students in Kazakhstan. This COIL is sponsored by the American Councils for International Education for the Central Asia University Partnerships Program (UniCEN). The UniCEN program's mission is to build capacity for substantive international engagement between higher education institutions in the United States and Central Asia.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability **U** - Charlotte

Abstract #: 225

Title: Comparing the Sustainable Development Goals in Kazakhstan and the United States through an International COIL Experience

Student Author(s): Mackenzie Smart** and Kristina Molibozhenko* **G**

Faculty Advisor(s): Dr. Svetlana Ibragimova* and Dr. Erik Jon Byker**

Affiliations: Kostanay State University, Kazakhstan* and UNC Charlotte, USA**

The purpose of our research poster is to investigate and compare aspects of the United Nations' Sustainable Development Goals (SDGs) across two different contexts. The main research questions for our comparative and international comparative study is: What are the similarities and differences among Kazakhstan and the United States related to the aspects of Sustainable Development Goals? What are ways both countries are making progress to the SDG 2030 Goal Year? To conduct this research, we used a literature review research design methodology and engaged in a Collaborative Online International Learning (COIL) experience with university students in Kazakhstan. This COIL is sponsored by the American Councils for International Education for the Central Asia University Partnerships Program (UniCEN). The UniCEN program's mission is to build capacity for substantive international engagement between higher education institutions in the United States and Central Asia. For our COIL experience, we met several times for comparative and international types of Webinars and continued our interaction using tools like Google Doc and What's App. We found that there were many similarities and some differences across the two contexts. The research poster includes an examination of the challenges and possibilities in meeting our selected SDGs by the 2030 goal year set by the United Nations.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

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U - Charlotte

Abstract #: 226

Title: Investigating and Comparing Sustainable Development Goal #2: No Hunger in Kazakhstan and the United States

Student Author(s): Korinne Talley** and Sara Galymtayeva* **G, H**

Faculty Advisor(s): Dr. Svetlana Ibragimova* and Dr. Erik Jon Byker**

Affiliations: Kostanay State University, Kazakhstan* and UNC Charlotte, USA**

The purpose of our research poster is to investigate and compare aspects of the Sustainable Development Goal (SDG) #2: Zero Hunger. The main research question for my international comparative study is: What are the similarities and differences among Kazakhstan and the United States related to the aspects of Sustainable Development Goal 2: Zero Hunger. To conduct this research, I used a literature review research design methodology and engaged in a Collaborative Online International Learning (COIL) experience with university students in Kazakhstan. This COIL is sponsored by the American Councils for International Education for the Central Asia University Partnerships Program (UniCEN). The UniCEN program's mission is to build capacity for substantive international engagement between higher education institutions in the United States and Central Asia. For our COIL experience, we met several times for comparative and international types of Webinars and continued our interaction using tools like Google Docs and What's App. We found that there were many similarities and some differences across the two contexts related to SDG #2. The research poster includes an examination of the challenges and possibilities in meeting SDG #2: Zero Hunger the 2030 goal year.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

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Health Sciences

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability

U - Charlotte

Abstract #: 227

Title: Investigating the Role of Ydj1 Phosphorylation on the DNA Damage Response

Student Author(s): Elizabeth Abedi and Courtney Shrader

Faculty Advisor: Dr. Andrew Truman

Department: Biological Sciences

Cells deal with stresses that cause protein unfolding through expression of a variety of molecular chaperones such as Hsp70, Hsp90 and Hsp40. Our recent studies have uncovered a role for Hsp40 (Ydj1 in budding yeast) in regulating the cellular response to DNA damage. Loss of Ydj1 promotes destabilization of the ribonucleotide reductase (RNR) complex in yeast, resulting in decreased DNA base synthesis and cellular sensitivity to DNA damaging agents. Although Ydj1 is a relatively well-studied protein, the role of phosphorylation on Ydj1 function remains unclear. To study the impact of Ydj1 phosphorylation on the heat shock and DNA damage responses, we have created a series of 20 Ydj1 phosphorylation-site mutants. These represent 10 previously identified sites that have been mutated to either alanine (non-phosphorylatable) or aspartic acid (mimics constitutive phosphorylation). We intend to examine how these cells respond to heat shock and DNA damaging agents. Going forward, phosphorylation sites that impact the DNA damage response will be further characterized. Specifically, we hope to measure the stability of RNR subunits and interaction of these subunits with Ydj1 via mass spectrometry and co-immunoprecipitation.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability

U - Charlotte

Abstract #: 228

Title: LYNX Blue Line Extension Association with Transportation Access to Low-cost Healthcare Facilities and Annual Check-Ups in Hidden Valley

Student Author(s): Merel Devaney **CE, H, NC, U**

Faculty Advisor: Dr. Deborah Beete

Department: Public Health Sciences

The LYNX Blue Line Extension was built alongside the outer edge of the Hidden Valley Neighborhood in Charlotte, North Carolina. Hidden Valley is a historically important neighborhood in Charlotte and was the home to Charlotte's past mayor, Harvey B. Gantt. Hidden Valley houses groups of individuals that have been historically marginalized individuals with resulting health disparities in comparison to the health of the rest of Mecklenburg County. The addition of the Blue Line Extension may have affected transportation access to low-cost healthcare facilities for residents of this neighborhood. Access to healthcare facilities is an important factor for a longer life expectancy. Six low-cost healthcare facilities were identified near and around Hidden Valley. Accessibility modeling was used to find the difference of transportation access in 2014 and 2019 for residents of Hidden Valley with a focus on three census tracts. These findings were then observed in conjunction with rates of adults who have received an annual check-up. The association between these two factors before and after the completion of the Blue Line Extension could give a greater understanding of access to care in the city of Charlotte. This research will allow for further insight into future transportation policy and infrastructure projects that other cities may pursue.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability **U** - Charlotte

Abstract #: 229

Title: Motivation and Barriers to Physical Exercise in Elderly Adults

Student Author(s): Sarah DuBose

Faculty Advisor: Dr. Trudy Moore-Harrison

Department: Kinesiology

It is imperative to be physically fit over the course of one's life. The benefits associated with exercise directly relate to health outcomes and often serve as protective factors against disease. UNC Charlotte's Health Risk Assessment Program (HRAP) focuses on, and analyzes elderly risk for cardiovascular disease, Type 2 diabetes, and obesity, all of which can be mitigated via physical exercise. In the elderly population, physical exercise is often overlooked as hazardous, painful, and unnecessary. However, elderly adults are at higher risk for health complications due to age-associated immune system dysfunction (Montecino et al., 2013). Hwang and Yeo-Sook (2007) pointed toward implementing self-efficacy tactics in elderly patients in order to increase regular exercise rates. Lees et al. (2008), researched what barriers exist among the elderly regarding exercise behavior. This data prompted our study to combine both the motivating factors and barriers to exercise among the elderly to analyze both variables at once. We hope that our future results will overwhelmingly highlight a specific category (or categories) of factors that motivate individuals in order to gain information on which factor is most influential amongst elderly participants. We expect to outline what barriers are most present amongst elderly adults, thus allowing future strides to be made to reduce obstacles and increase physical activity among the elderly. Further research is needed in order to promote motivators and change thinking regarding barriers to physical activity.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

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Abstract #: 230

Title: Assessing the Impact of COVID-19 on the Health and Well-Being of Female Healthcare Professionals in North Carolina, United States

Student Author(s): Catherine Luba and Mahita Sadula **CE, H**

Faculty Advisor: Dr. Monika Sawhney

Department: Public Health Sciences

The Coronavirus Disease of 2019 (COVID-19) disrupted everyone's life, but it arguably affected healthcare professionals the most. The impact of COVID-19 is great, but few studies have been done on healthcare professionals, and even fewer have been done on the gender dynamics in healthcare. The purpose of this study is to find out how substantially it directly affected healthcare professionals in regards to mental health and well-being, with a focus on gender. We will be able to look at North Carolina, U.S., along with the medical sites being private facilities and cross-sectors, which shows a different perspective. This cross-sectional study will focus on demographics (gender, race, job characteristics), burnout, stress, and how COVID-19 as an event affected healthcare professionals. This study will be conducted by distributing a completely anonymous survey (Qualtrics®) through an anonymous link by a blind copy email to 1000 probable participants, which will be sent through the three medical organizations in North Carolina's respective databases. Three analytical instruments are used in the survey: Perceived Stress Scale (PSS), Oldenburg Burnout Inventory (OBI), and the Impact of Events Scale (IES-R), which look at their respective areas of burnout, stress, and COVID-19. Preliminary analysis shows that there is an increase in stress, burnout, PTSD, due to COVID-19. especially in women when comparing gender. The results of this study will address the gender gap and reassess the needs of healthcare providers in the future to create appropriate intervention and coping strategies.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

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Abstract #: 231

Title: Assessing the Impact of COVID-19 on the Health and Well-being of Healthcare Professionals in North Carolina, United States

Student Author(s): Mahita Sadula and Catherine Luba **CE, H, NC**

Faculty Advisor: Dr. Monika Sawhney

Department: Public Health Sciences

The emergence of the Coronavirus Disease 2019 (COVID-19) pandemic has significantly altered social and economic activities, work conditions, and overall everyday life. Currently, there are limited studies that examine how these changes influence the health and well-being of healthcare professionals. Around the world, the COVID-19 crisis continues to overwhelm healthcare systems. Healthcare professionals, especially, are more likely to be in unprecedented situations and are at a higher risk of contracting COVID-19 than the general public. The purpose of this study is to examine the continual effect COVID-19 has on the health and well-being of healthcare professionals by assessing the prevalence of stress, burnout, psychological distress, and other factors experienced among healthcare professionals. A cross-sectional, anonymous survey through an electronic application (Qualtrics®) will be administered to a sample of 1000 participants from three medical organizations in North Carolina. Demographic information and job characteristics will be collected, including occupation, length of working experience, experience in a COVID-19 hospital unit, and total working hours during the COVID-19 pandemic. The self-administered online questionnaire also encompasses the Perceived Stress Scale (PSS), Oldenburg Burnout Inventory (OLBI), and the Impact of Event Scale-Revised (IES-R) to evaluate the perception of stress, burnout, and distress caused by traumatic events, respectively. The preliminary results show that healthcare professionals experienced higher levels of burnout, stress, and other negative effects on their mental health and well-being since the start of the COVID-19 pandemic. This study will help to address and reassess coping and supporting needs of healthcare workers during future outbreaks.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability

U - Charlotte

Abstract #: 232

Title: Early Mobilization in Patients Hospitalized with COVID-19: A Narrative Literature Review

Student Author(s): Brandy Sharpe

Faculty Advisor: Dr. Brian Ring

Department: Kinesiology

Purpose: The purpose of this narrative review is to describe the implementation of early mobilization in hospitalized mild to moderate COVID-19 patients. **Methods:** Key search terms and multiple medical research databases were utilized for information related to the application of EM in COVID-19. Forty-five articles were identified. Articles underwent a two-phase review for inclusion and exclusion criteria by one investigator. Thirty-two articles met inclusion criteria. Article references were reviewed to capture current evidence surrounding the subject matter. **Discussion:** The majority of relevant studies were case reports, detailing how movement was applied to COVID-19 patients. Bias found within the literature was due to investment in place of employment, patient population, or reliance data collected from patient records post-acute care. Feasibility, application, and improved outcomes were reported but lacked objectivity. In addition, most of the studies were limited to a single site, included small patient population, and lacked a comparator. **Conclusion:** EM within the mild to moderately ill population is feasible, applicable, may cause strain on hospital resources, and may offer benefit to patients during acute care hospitalization. Further research is needed to support EM in COVID-19. **Key Indexing Terms:** COVID-19, SARS-CoV-2, mobilization, mobility, ambulation, physical therapy, occupational therapy, critical care, ICU, hospitalization

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability **U** - Charlotte

Abstract #: 233

Title: Best Practice in Sputum Collection

Student Author(s): Susan Thomas

Faculty Advisor: Dr. Brian Ring

Department: Kinesiology

Background: Sputum collection is a useful resource for pulmonary diagnostics related to microbial infections. The purpose of this investigation is to evaluate the perceived best practice for obtaining invasive sputum samples based on the perspectives of various physicians at a tertiary care facility. Data obtained will provide the appropriate method for collecting sputum samples to potentially reduce healthcare cost, time, and adverse effects.

Methods: A preliminary literature review was performed to establish the current practices related to invasive sputum collection techniques. Semi-structure interviews were conducted with physicians on the intensive care units in what directs their decision when ordering invasive sputum collections. Additionally, a semi-structure interview was conducted with the equipment manager of the Respiratory Department to obtain the cost of the necessary supplies needed/required to perform each type of sputum collection. A total of 83 physicians and respiratory therapists were provided with a quantitative survey to evaluate which technique is frequently used for obtaining invasive sputum collection. **Results:** It is anticipated that the majority of those surveyed will demonstrate a propensity for the use of the standard technique of invasive sputum collection. This anticipation will result in a decrease in cost to the participating center and its patients. **Conclusion:** It is anticipated that there will be revision of how invasive sputum collection is obtained at the participating center. This information will decrease cost and time with eliminating the use of unnecessary supplies and performing unwarranted invasive sputum collection.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability **U** - Charlotte

Humanities

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability **U** - Charlotte

Abstract #: 234

Title: CAMINO Clinic: Using Translation to Change the Healthcare Field

Student Author(s): Mackenzie Jane Amberg **CE, H**

Faculty Advisor: Dr. Jeffery Killman

Department: Languages and Culture Studies

Beginning in 2003, as a newly founded clinic, the now Camino Health Center continues to be utilized by the Latino community and immigrants in need of health care that is not only accessible to them but that also feels familiar and comfortable. The Camino Clinic currently sees thousands of Latino patients and has created a strong sense of trust within the community. The idea of easily accessible health care, especially for a demographic that oftentimes has the hardest time finding it, is something that should be the standard. At Camino, translation is a powerful tool that is used to create an environment that people can come into and feel safe, heard and like their needs are being met. The research division of Camino Health Center records responses from surveys, which are translated into Spanish, to evaluate the main needs and concerns of the community. This study sheds light on the types of surveys that are translated to Spanish and the strategies used to make them accessible to target respondents. This study will discuss and show how using specific translation techniques can make a community health clinic more accessible according to patients' health, language, and cultural needs, drawing on examples of translation work completed by the author during an internship she carried out at Camino. Improved patient accessibility will help health centers to provide their patients with better services and advanced communication methods.

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Abstract #: 235

Title: Becoming the People's Princess: Princess Diana's Media Image and Its Impact on British Public Opinion

Student Author(s): Grace Below **H**

Faculty Advisor: Dr. Peter Thorsheim

Department: History

My entry for the 2022 URC is my History Honors thesis. My thesis focuses on Princess Diana's media image from 1981 to 1997, as well as her legacy. I evaluate the impact of Diana's media image on British public opinion. My research is based on the question: how has Diana's popularity and public image impacted British public opinion about monarchy to the present day? While the historiography of this topic focuses on the massive media response to Diana's death, my thesis builds on this scholarship by showing the progression of Diana's image in the media from 1981 to 1997, as well as her media legacy. By studying British media sources such as The Times, The Guardian, The Sun, Daily Mail, and Daily Mirror I have tracked the progression of Diana's media image from her introduction in 1981 to her death in 1997, as well as her 21st century legacy. I then compare this data to the data found in sources of British public opinion during the same time span. I include polls from MORI (Market and Opinion Research International) and surveys from the Mass Observation Project to show the juxtaposition between quantitative and qualitative public opinion data. The evaluation of these sources concludes that the evolution that is seen in Diana's media image is reflected in public opinion about the royal family. However, the media exaggerated many aspects of Diana's public adoration, especially following her death, and the British public as a whole view Diana more indifferently than the media often reports.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

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Abstract #: 236

Title: Medusa in the Renaissance: Set in Stone?

Student Author(s): Rebecca Brantley **H**

Faculty Advisor: Dr. Maren Ehlers

Department: History

There have been many interpretations of Medusa's mythology over time as well as various representations of her. The Renaissance period brought about a revival of Greek mythology in work, and lasted until about the nineteenth century. As the Renaissance went on, it slowly traveled along Europe, beginning in Italy then moving more north toward the Netherlands over a few centuries. By comparing Italian and Flemish artistic depictions of Medusa between the fourteenth and sixteenth centuries, this research project will show how ideas spread during the Renaissance and Baroque eras and how contrasting views of women in society manifested in Medusan imagery and art. Comparing the different depictions of Medusa from these two geographic regions, will reveal similarities and differences that can show how the two cultures were connected during the Renaissance. While Medusa and other Greco-Roman mythologies traveled from the Italian Renaissance to Northern Europe, these different depictions of Medusa can show how her myth was interpreted similarly in both cultures. I will specifically be looking at Italian and Flemish depictions. Medusa is a manifestation of an idea around women that could be found in both cultures - that idea being powerful women were bad or dangerous. Medusa allows for a third artistic depiction or symbol of women in society. The Virgin Mary was the positive comparison of women, virtuous and pure, while Eve represented sin, selfishness, and mistakes. Medusa was representative of powerful women being dangerous and sexual promiscuity, an idea that both Italian and Flemish cultures expressed with the other two.

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Abstract #: 237

Title: Mandatory Minority: The Armenian Community in Palestine, 1920-1948

Student Author(s): Samra Kanwal

Faculty Advisor: Dr. Ella Fratantuono

Department: History

Following World War I, the British, with the support of the League of Nations, established a mandate over Palestine. Historians have generally studied this mandate period only in terms of being a prelude to the subsequent Arab-Jewish conflicts and the emergence of the state of Israel. However, studying Mandatory Palestine's diverse array of religious and ethnic communities offers historians greater insight into how imperialism and mandatory authorities attempted to shape and use the region and its people and how locals resisted, subverted, or exploited these attempts. One of these communities was the Armenian, composed of native Armenian Palestinians who had ancient roots in the Holy Land as a Christian group and recently arrived refugees of the Armenian Genocide. This paper explores the relationship between the Armenian community of Mandatory Palestine and the British government, using British Foreign Office documents from the Confidential Print collection and articles from *The Palestine Post*, a Jerusalem-based English newspaper established in 1932. This paper will explore three questions. First, how did Armenians in Mandatory Palestine become a source of contention between the French and British Empires in the post-war Middle East? Second, how were Armenians used to serve broader British imperial interests in the Levant and Caucuses? Third, what was the relationship between Armenians and Arabs during the mandate period, the 1947-1948 War that saw the establishment of Israel, and its aftermath?

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Abstract #: 238

Title: Media Misrepresentations of the Black Panther Party

Student Author(s): Abby Lantos **H**

Faculty Advisor: Dr. Amanda Pipkin

Department: History

Huey P. Newton and Bobby Seale founded the Black Panther Party for Self-Defense in 1966 in Oakland, California. The Black Panthers were one of many Black Power groups in America that believed in the self-determination of black people. Despite the incredible things their group stood for, including things like achievable housing, the end of police brutality, and realistic education about the black experience in America, the media's portrayal of the group distorted and misrepresented their goals. The Black Panthers did believe in the right of self-defense, including the use and open carry of guns, yet this is the only aspect of the organization that the media chose to represent. The Black Panthers created a violent aura around themselves that demanded the attention of prominent media outlets, which often left their goals hidden under the surface. The Black Panther Party sought freedom, which was the first goal of their Ten-Point Program. America denied black people the same rights as whites, and the Black Panthers stood to change this. The Panthers created Survival Programs to address the needs of black neighborhoods neglected by the government, including affordable housing and the free lunch program. Despite this, the media has only ever portrayed the Black Panthers as violent and "gun-toting" criminals who were a threat to American society. This study aims to recognize the Black Panther Party for the incredible initiatives they stood for, not just the violent image painted by popular culture.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability **U** - Charlotte

Abstract #: 239

Title: Climate Refugee Stories: Charlotte Histories, Just Futures

Student Author(s): Audrey Whisnant **CE, NC, S, U**

Faculty Advisor: Dr. Tina Shull

Department: History

Despite the current knowledge base regarding climate change, environmental justice and resultant migration on a larger scale in the United States, much research had yet to be conducted on this subject for the city of Charlotte, North Carolina prior to this project. This study works to fill in gaps in current knowledge by researching a broad range of Charlotte and North Carolina histories relating to themes of migration, environmental changes and environmental racism, segregation/gentrification, urban renewal, indigenous history, and social justice activism. Research is contributing to a Charlotte-based component of the project to be titled "Charlotte Histories, Just Futures" that will be on exhibit at the Levine Museum in Charlotte and at Atkins Library in the Spring of 2023. Mixed historical and environmental methods include viewing historical documents, newspapers, archival records, reviewing oral history recordings, and community-based research such as surveying of environmental justice organizations and actions in Charlotte. Communication with community members prevalent in the field was initiated to build collaboration and ensure the work conducted in this study has not already been completed. Along with this, we aim to lift up voices already speaking to the intersections of these issues and their actions. Although the study is still in progress, preliminary findings were able to connect many areas of pollution and environmental hazard in Charlotte to predominantly BIPOC communities. This reflects a pattern that has been prevalent throughout history. This project will continue its research through the work of Dr. Shull, her students and OUR scholars.

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Abstract #: 240

Title: The Battle for Hetch Hetchy and Its Impact on the Yosemite Native Americans

Student Author(s): Alex Wilson **H**

Faculty Advisor: Dr. Amanda Pipkin

Department: History

In early American environmentalism there were two schools of thought, preservationism and conservationism. Conservationists thought that we should preserve natural resources for future generations to use, while preservationists thought that we should preserve nature with no ulterior motive. The two schools of thought clashed in the first two decades of the twentieth century due to San Francisco proposing to dam the Hetch Hetchy Valley in Yosemite National Park and use it as a reservoir. The preservationists, led by John Muir and his Sierra Club, debated the conservationists for years until the government approved the damming of Hetch Hetchy. The government made this ruling an exception, and took a preservationist approach to the environment. The acts enacted in the immediate aftermath of the battle for Hetch Hetchy led to the Native Americans of Yosemite being slowly removed from their homes. There have been many studies on how the Hetch Hetchy debate has shaped environmentalism in America, but little on what it did to actual people. The debate led to the Organic Act of 1916, which required national parks to be used for recreational purposes. It also led to the creation of the National Park Service, who were hostile to the Native Americans. Parks being used for recreation meant that they could no longer be a home to Native Americans, and the National Park Service were the ones who formulated a plan to slowly remove all Native Americans from Yosemite.

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Mathematics and Computer Science

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability

U - Charlotte

Abstract #: 241

Title: Evaluating Location Privacy Methods for Environmental Health Studies

Student Author(s): Ashley Bang **G**

Faculty Advisor: Dr. Liyue Fan

Department: Computer Science

Environmental health studies often use participants' longitudinal location data to track the individual exposure to their respective element of study, such as fine particles PM2.5. In accordance with such data, privacy is crucial in maintaining safe and responsible research practices so these studies can be conducted without risk of privacy breaches. However, it has not been studied whether current location privacy methods could generate useful data for environmental health studies. To uphold this, different location privacy methods are tested to ensure their efficacy in this application with existing real-life datasets. This is achieved by computing the aggregated environmental exposure using real location traces vs. privacy-enhanced traces, generated by various location privacy methods. Air pollution case studies from Beijing and Rio de Janeiro were utilized in conducting these methods and visualized through the kriging interpolation. With this, the location data of those individuals participating in environmental health studies can be tested while protecting their privacy and this privacy-protecting data collection approach is applicable for a wide range of studies within this avenue of research.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

S - Sustainability **U** - Charlotte

Abstract #: 242

Title: Comparing Model Performance Based on Value-at-Risk and Expected Shortfall

Student Author(s): Benjamin Dula

Faculty Advisor: Dr. Eliana Christou

Department: Mathematics and Statistics

Value-at-Risk (VaR) and Expected Shortfall (ES) are well-known used measures of financial risk. Existing methods are based on modeling the time series of returns, such as GARCH or distribution-free GARCH (DFGARCH) models, modeling the quantiles of returns, such as quantile autoregression (QAR) model, or using the Historical method. In this work, we perform an extensive real data analysis in order to compare the performance of these commonly used methods. Therefore, the purpose of this research is two-fold: to compare these methods for different financial states and to illustrate the importance of VaR and ES. More particularly, we demonstrate how these methods react to a large change in volatility, such as a crisis period like the COVID-19 pandemic, and to a stable market period. The data analysis is based on returns from S&P500 Index, Bitcoin USD, U.S. 30 Year Treasury Bond, U.S. Dollar Index, and Chinese Yuan. For each model, we estimate the 1%, 2.5%, and 5% VaR and ES and use backtesting to evaluate the performance of each method. The expected results of this research are: (1) DFGARCH will respond the quickest to increased volatility from a crisis period and display the most accurate number of exceptions, i.e., the proportion of times the actual returns fall below the VaR; and (2) the Historical Method is anticipated to react the slowest and most conservatively to increased noise.

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U - Charlotte

Abstract #: 243

Title: In Search of a Predictive Model for Aflatoxin Insurance Claims Based on Temperature Data

Student Author(s): Fausto German Jimenez **S**

Faculty Advisor: Dr. Gabriel Terejanu

Department: Computer Science

Aflatoxin is a carcinogenic product of mold that affects thousands of corn-producing farms in the United States every year, so being able to predict when a county will have compromising aflatoxin levels could be beneficial for insurance companies. With this research, our objective is to create a machine learning model capable of predicting whether a county will have aflatoxin insurance claims based on its daily average temperature for a particular year. To find such a model, we used day-by-day temperature data from all U.S. counties from 2010 through 2020, as well as the insurance claims due to aflatoxin they reported during those years. We trained an extra-trees, binary classification model using Scikit-Learn with an oversampled version of the temperature data from 2010 through 2019 as the model's inputs and whether or not the county had aflatoxin insurance claims as its output. After training, we found the average accuracy, precision, and recall on the testing dataset for this model to be 98.15%, 97.26%, and 99.14%, respectively. By performing Welch's t-test on the model's predictions for counties that grew corn and reported aflatoxin losses vs. counties that grew corn and did not report aflatoxin losses in 2020, we found that there was a 99.99% statistical difference ($p\text{-value} \approx 1.18 \times 10^{-6}$) between the two groups of predictions. As demonstrated by this experiment, training an extra-trees, binary classifier with temperature data alone can be an effective way of predicting aflatoxin insurance claims in the United States.

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Abstract #: 244

Title: Detection and Utilization of ErrP for Agent Learning

Student Author(s): Miguel Jover, Ben Poole, Andrew Quinn, Sai Bharadwaj, and Reddy Arrabelly

Faculty Advisor: Dr. Jake Lee

Department: Computer Science

To match the increasing demand for interactions with artificial intelligence (AI) in medicine and science, many strive to find the most efficient and accurate method to interact with AI models. Brain-computer interfaces (BCI) allow for direct communication between the human brain and the AI model by interpreting biosignals into commands and predictions. Direct brain communication with AI accelerates the development and heightens the reliability and accuracy of AI research. One of the most popular biosignals for BCI, electroencephalogram (EEG) data, has been widely used because of cost-effectiveness and high precision time measurements. Error-related potential (ErrP) is the brain's automatic response to errors and mistakes, which can be captured with EEG devices. Therefore, detecting ErrP signals enhances human interactions with AI and improves reliability in the medical and behavioral science fields. For instance, error detection can aid in motor neurorehabilitation by analyzing the ErrP signals of a rehabilitating patient's intended motor movements. In this project, we analyze the collected EEG brain signal data and develop predictive machine learning models to forecast possible future erroneous events. Various machine learning methods are explored and tested to be able to relate human behaviors and brain signal patterns.

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S - Sustainability **U** - Charlotte

Abstract #: 245

Title: Beyond the PCA: A Comprehensive Review of Dimension Reduction Techniques

Student Author(s): Tanmay Kenjale **H**

Faculty Advisor: Dr. Eliana Christou

Department: Mathematics and Statistics

Regression analysis is a key tool in modeling the relationship between predictor variables and the conditional mean of the response variable. However, as the number of predictors increases, existing estimation methods become challenging. Dimension reduction techniques are utilized to reduce the number of predictors while maintaining the same amount of information. Therefore, the purpose of this work is to provide a thorough analysis of several dimension reduction techniques and provide recommendations regarding the decision-making process. This project considers two categories of techniques: unsupervised and supervised. Unsupervised techniques focus on finding a low-dimensional predictor that maintains the maximum possible variability of the original data. In contrast, supervised techniques focus on finding a low-dimensional predictor that contains all the information necessary to describe the conditional distribution. For this work, we consider the principal component analysis (PCA), the sliced inverse regression (SIR), and the sliced average variance estimation (SAVE). We also consider the kernel PCA (KPCA) and the kernel SIR (KSIR), which extract nonlinear features. The performances of the various techniques are demonstrated through extensive simulations and real data applications. The findings show that (a) supervised techniques typically perform better than unsupervised techniques in regression settings; (b) nonlinear techniques can perform better than linear techniques but have higher computation times; (c) PCA can perform well and has the shortest computation time, although it may not always be adequate in regression; (d) SAVE has strict assumptions that results in lower versatility; and (e) SIR provides the best combination of performance and computation time.

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Science, Technology, and Engineering

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U - Charlotte

Abstract #: 246

Title: Characterizing the Diversity of Heat Shock Proteins in *Nematostella Vectensis* and *Saccharomyces Cerevisiae*

Student Author(s): William Alexander

Faculty Advisor: Dr. Adam Reitzel

Department: Biological Sciences

Heat shock proteins (HSPs) are a highly conserved family of proteins critical to both environmental stress response and cellular function under normal conditions. HSP's are present in all living organisms and have evolved multiple variants (isoforms) in certain lineages. While previous research has established well-conserved HSP70 isoforms in the sea anemone *Nematostella vectensis* and in *Saccharomyces cerevisiae* budding yeast, the reasoning behind this is still not fully understood. As such, the purpose of this research is to understand the phylogenetic diversity as well as the functional diversity of HSP70 isoforms in these organisms. Phylogenetic relatedness of HSP70 proteins from each species was compared using two software packages (MEGA and RaXML). Functional diversity will be explored through molecular experiments at a later date, plans for those experiments will be developed using the discovered phylogenetic data. Specific differences in the amino acid sequence, including known functional domains, of each isoform are compared as well as individual amino acids prone for modifications (e.g., phosphorylation). The noted differences are then mapped on the phylogenetic tree to illustrate the evolution of these changes over time. Analysis of this data allows for prioritization of specific amino acids for mutation creating a baseline for future molecular experiments. Ultimately the goal of this work is to prepare for molecular experiments where specific amino acids will be mutated to study the evolution of structure-function relationships in the HSP70 family of proteins.

CE - Community Engaged **G** - Global **H** - Honors **NC** - North Carolina

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Abstract #: 247

Title: Roles of Estrogen on Gliotic Cell Responses to Neovascular Retinopathies

Student Author(s): Taylor Bridgeforth

Faculty Author(s): Dr. Richard Cliver and Dr. Maribel Vazquez

Faculty Advisor: Dr. Maribel Vazquez

Department: Biomedical Engineering

Significant adult vision loss results from neovascular retinopathies (NRs), where new pathological vessels from existing retinal veins extend along the inner retinal surface disrupting vision. Retinal Müller Glia (MG) repair and protect retinal neurons from degeneration, injury, and apoptosis via gliosis, a group of processes that regulate changes in MG cellular and molecular behavior. Although initial MG gliosis is neuroprotective, the prolonged dysregulation of retinal homeostasis leads to disruptive behaviors and subsequent glial scar formation. Current Health Disparities in adult vision loss are strongly linked with gender, as post-menopausal women are significantly more likely to lose vision from NRs than men. Therefore, MG cells were cultured in 24 well plates and examined in response to five different 17beta-estradiol doses against control (no estradiol). Each well was examined from 0-72 hours to calculate cell morphology via cell shape index, MG proliferation, and survival. Higher doses of 17beta-estradiol increased MG survival by over 15% compared to control. The estrogen further enabled MG to adhere with highly extended morphology and proliferate at a 10% higher rate than control. Women of childbearing age produce the highest levels of the 17beta-estradiol hormone, which may help MG protect the retina prior to menopause. The lower viability and adhesion of MG cells in response to lowered dosages of 17beta-estradiol helps identify a role of estrogen in progressive NRs among post-menopausal women. Quantitative study of these underlying biological mechanisms will greatly aid the reduction of Health Disparities in adult vision loss and help develop regenerative treatments for women.

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S - Sustainability

U - Charlotte

Abstract #: 248

Title: Molecular Mechanisms underlying Glial Inflammatory Responses to Neisseria Meningitidis

Student Author(s): Erin Davis

Faculty Advisor: Dr. Brittany Johnson

Department: Biological Sciences

Over 1.2 million cases of bacterial meningitis occur worldwide each year. The bacterial pathogen *Neisseria meningitidis* (Nm) is the leading cause of pyogenic and epidemic meningitis, a life-threatening condition with a 15% mortality rate. Additionally, up to 20% of survivors suffer long-term central nervous system (CNS) deficits due to severe neuroinflammation. Within the CNS, microglia and astrocytes are cells crucial to the initiation and regulation of these immune responses to bacterial infections. Our lab and others have demonstrated both microglia and astrocytes rapidly release proinflammatory cytokines followed by later production of anti-inflammatory cytokines in response to Nm challenge. Intriguingly, Nm has been reported to bind and import host cytokines that then drive changes in bacterial gene expression, suggesting that cytokine responses serve as environmental cues to promote virulence. This study begins to address the hypothesis that Nm pathogen-associated molecular patterns (PAMPs) initiate glial immune responses that, in turn, regulate bacterial gene expression to further exacerbate infection. Nm was grown to mid-log phase in the absence or presence of host inflammatory cytokines TNF, IL-6, and IL-1 β , or anti-inflammatory cytokines IL-10 and IL-19. An RNA sequencing approach was used to compare differences in transcriptome-wide gene expression profiles for Nm. These pilot studies are an essential first step in dissecting the intimate relationship between Nm and glial cells that underlies the development of detrimental neuroinflammation. Future studies will confirm novel gene clusters or molecular pathways and genes associated with Nm immune stimulation and evasion.

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Abstract #: 249

Title: Development of Research Database for Lithium-Ion Battery Safety Experiments

Student Author(s): John Driver

Faculty Advisor: Dr. Jun Xu

Department: Mechanical Engineering

Lithium-ion batteries have the potential to be a fire/explosion hazard when damaged or fail to operate safely. Battery safety experiment allows us for a better understanding of the safety mechanism of lithium-ion batteries. Due to the variety of battery cell types and test conditions, a research database is needed to organize and manage experimental data. In this research, a database framework for battery safety research will be developed. The databased will be implemented and used in UNC Charlotte's Vehicle Energy & Safety Laboratory (VESL) lithium-ion battery safety research. The database will be built based on a SQL-based database and consider the real need for experimental testing on lithium-ion batteries. The database will have a good universality. The database will be compatible with various data formats, such as single value (dimensions of batteries or their components (anode, separator, etc.), pre and post-test mass), array (voltage, temperature curves), character (label, battery material types), pictures, and videos. The database will be user-friendly and easily accessible. To facilitate data retrieval, both local and remote access is allowed. Different permission setups for different users can also be set up according to the manager's needs. The database will assist data collection, storage, and analysis for battery safety experimentation and support ongoing battery research by providing a means of data collection.

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Abstract #: 250

Title: DNA-templated Silver Nanoclusters formed with C12 DNA Hairpins Inhibit Bacterial Growth while Possessing Unique Fluorescent Properties

Student Author(s): Alora Dunnavant, Alex Rolband, Leyla Danai-Nolder, Liam Yourston, Damian Beasock, Elizabeth Skelly, and Alexey Krasnoslobodtsev

Faculty Advisor: Dr. Kirill Afonin

Department: Chemistry

As the number of multi-drug resistant bacteria species surges, the need for a novel antibacterial treatment becomes increasingly necessary. Silver is a historically known, and widely accepted, antibacterial agent. Although silver has been acknowledged to have substantial antibacterial effectiveness, its applications in the medical field today are narrowed by solubility problems presented by silver nanostructures. In order to overcome solubility issues while still maintaining the antibacterial properties of silver, DNA-templated silver nanoclusters (DNA-AgNCs) are emerging as a promising technology. While encouraging antibacterial performance, DNA-AgNCs emit unique fluorescence dependent on the primary structure of the templating oligonucleotide. Typically, cytosine rich oligonucleotides are used due to the high affinity of silver cations for cytosine. This unique fluorescence allows for optical advantages in the visualization of the DNA-AgNCs. Linear, 12 cytosine (C12) templating oligonucleotides have been demonstrated to form polydisperse fibrous structures in solution. To form monodisperse DNA(C12)-AgNCs, seven nucleotide extensions are placed on the 5' and 3' ends of the C12 template, allowing the oligonucleotide to form a DNA hairpin (C12hp). In this work, the optical and antibacterial properties of the DNA(C12hp)-AgNC have been assessed, demonstrating the potential application of this material in a variety of biomedical settings.

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Abstract #: 251

Title: Unraveling the Complexity of Macroinvertebrate Food Webs in Saltmarshes

Student Author(s): Yuleny Gomez Rodriguez **S**

Faculty Advisor: Dr. Paola López-Duarte

Department: Biological Sciences

Creation of salt marshes is known to increase the biodiversity of new habitats; however, the effects on food web interactions at the macroinvertebrate level are less understood. Our own work suggests that newly-created marshes (3 years) have lower biodiversity indices than natural reference marshes. The gap in knowledge suggests the need for additional research concerning the trophic differences and similarities between newly-created and natural marshes. The ultimate goal is to use stable isotope analysis to determine whether newly-created marshes contribute equally to local food webs as naturally established marshes. In this study, we will trace the trophic pathways throughout each marsh and compare the trophic connectivity to the neighboring marshes. Stable $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ isotope signatures of macroinvertebrates (insects, arachnids, amphipods, polychaetes, nematodes) will be collected from three marsh sites, one reference and two restored marshes located in the Lake Hermitage Marsh Creation area in Louisiana. We hypothesize that higher biodiversity in natural marshes will lead to greater contributions to the larger food web relative to created marshes because the increase in biodiversity at the macroinvertebrate level will lead to enhanced trophic linkages. Understanding the contributions of macroinvertebrate communities is important because they are at the base of a more complex saltmarsh food web.

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Abstract #: 252

Title: Comparison of High-Shear, Low-CAPE Supercell Thunderstorms in the Southeastern United States versus the Great Plains

Student Author(s): Jasen Greco

Faculty Advisor: Dr. Casey Davenport

Department: Science, Technology, and Engineering

High-shear, low-CAPE (HSLC) environments describe a special class of severe weather in which anomalously high vertical wind shear makes up for a lack of convective available potential energy (CAPE). These environments are not very common, but when they do occur they present a significant forecasting challenge, as it can be difficult to anticipate when they will generate high wind speeds and tornadoes. The initial conditions, severity, and longevity of supercell thunderstorms (long lived, isolated storms capable of producing tornadoes) within HSLC supercell cases can also differ depending on their location in the United States. This study aims to quantify that difference by assessing and comparing HSLC cases in the Southeastern United States to HSLC cases in the Great Plains. Ten HSLC events were selected between 2016 and 2021, with 5 from the Southeastern United States, and 5 from the Great Plains. Each case was manually examined via radar to determine the presence of supercells, as well as their convective organization and overall longevity. Next, reports of tornadoes, wind, and hail were collected for each case to quantify their severity. To better understand differences in organization, longevity, and production of severe weather, near-storm environmental profiles from operational weather models were also collected for each case. Initial analyses of the longevity and severe weather events suggest that HSLC cases in the Southeastern United States are more impactful than those in the Great Plains.

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Abstract #: 253

Title: Broadening the Scope: New Measures of Relationship Satisfaction During Conflict

Student Author(s): Daniel Jackson, AJ Siegel, and Stephany Nunez

Faculty Advisor: Dr. Amy Canevello

Department: Psychological Science

Theory suggests that relationship satisfaction may be qualitatively different depending on people's motivational orientation (Crocker & Canevello, 2016). In the egosystem, people focus on their own needs to the exclusion of others. In the ecosystem, people consider their own and others' needs equally. Existing measures of relationship satisfaction do not capture relationship satisfaction in the eco- and egosystems. The goal of this study was to compare new measures of relationship satisfaction in the eco- and egosystems to established measures of relationship satisfaction. We also tested whether our new measures of relationship satisfaction explained unique variance in relationship outcomes. Undergraduates (N=373) who were in a romantic relationship of at least six months completed measures of relationship satisfaction in the ecosystems and egosystems, destructive responses to relationship conflict, and four established and well-validated measures of relationship satisfaction from the close relationships literature. Relationship satisfaction in the eco- and egosystems were positively related to existing measures of relationship satisfaction, but these associations were not so strong that they suggested that our measures completely overlapped with existing ones. These new measures of relationship satisfaction also captured unique variance in destructive responses to relationship conflict, providing initial evidence that relationship satisfaction in the eco- and egosystems may be useful in understanding relationship processes. Thus, these data suggest that expanding our conceptualization and understanding of relationship satisfaction to incorporate motivation may allow for a broader understanding of outcomes in ongoing romantic relationships.

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Abstract #: 254

Title: Preya Database: An Expanded Database for Elucidation of Phage-Receptor Host Interactions

Student Author(s): Elana Kravitz

Faculty Advisor: Dr. Richard Allen White III

Department: Bioinformatics

Bacteriophages (e.g., phages) represent the bulk of the vast diversity of viruses on this planet. Currently, we are facing a 'silent pandemic' of antibiotic resistant bacteria (e.g., ARB) that is a clear and present danger to human, animal, and ecosystem health. WHO predicts over 10 million people will die each year from ARB by 2050, beyond its current at ~700,000 each year. Phages present a unique opportunity to tackle ARB through 'Phage Therapy.' Being bactericidal (i.e., bacterial lethal), phages are able to lyse and kill their bacterial host with limited resistance whereas antibiotics are bacteriostatic, preventing growth but allowing bacteria time to build breakthrough resistance mutations. Critically lacking are databases in order to relationally design and engineer phages to combat ARB. The current best database, Phage Receptor Database (PhReD), is not open source, difficult to navigate, and is limited to 534 phage-receptor interactions listed without structural or primary sequence information. Here we present 'Preya,' an integrated open source, easy to use framework for collating phage-receptor interactions from publications to high throughput sequencing analysis. Preya is expertly curated directly from BioDF portal, PDB, and manually examined for accuracy. The database contains the primary sequence information for the phage-host receptor, PDB structural entry, UniProt ID, MMDB ID, GenBank ID, and the publication validating the phage-receptor binding. The Preya database represents the first fully integrated database for rational design of phage-host receptor interactions that will be bedrock to engineer phage therapies to combat ARB.

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Abstract #: 255

Title: Data Analytics for Stormwater Infrastructure

Student Author(s): Cullen McNinch, Jenny Qi, Christopher Schultz, and
Sreelekha Pasikanti **NC, S**

Faculty Advisor: Dr. Nicole Barclay

Department: Engineering Technology and Construction Management

One essential infrastructure system that requires upgrades is that of stormwater infrastructure. These systems are instrumental in reducing flooding, however as factors such as climate change, population growth, and urbanization worsen, this infrastructure will be strained from an increased frequency of extreme weather events and impervious surfaces. The work presented here is part of a larger study that uses four machine learning models to accurately predict pipeline infrastructure condition and failure. The primary objectives of this work are to (i) use data science pipelines to simplify the input data for these machines learning algorithms, allowing for more accurate predictions; and (ii) conduct parameter optimization, which also has the potential to create significant improvements in the accuracy of the models. The Synthetic Minority Over-Sampling Technique (SMOTE) was used for parameter optimization, as this process allows for machine learning algorithms of any kind to generalize imbalanced datasets in order to improve the accuracy of these models. The models, including a logistic regression, a linear regression, a decision tree classifier, and a neural network, were developed from input data accessed through Charlotte-Mecklenburg Stormwater Services. The combination of normalizing the inputs for the models and the inclusion of SMOTE parameter optimization significantly increased the accuracy of the models. To compare the results of these models, the area under the curve for the receiver operating characteristics graph was calculated to best understand the advantages and disadvantages of each model.

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Abstract #: 256

Title: Investigating the Extent of Duffy Binding Protein Gene Multiplication in Plasmodium Vivax Malaria Infections

Student Author(s): Rei Rama **G, H**

Faculty Author(s): Kareen Pestana

Faculty Advisor: Dr. Eugenia Lo

Department: Biological Sciences

Plasmodium vivax is the most widespread human malaria parasite and is particularly resilient to current elimination efforts. To achieve elimination specifically targeting *P. vivax*, a blood-stage malaria vaccine has been developed based on *P. vivax* Duffy-binding protein (DBP). Red blood cell invasion by *P. vivax* requires interaction between the Duffy Antigen Receptor for Chemokines (DARC) and DBP. This critical interaction makes PvDBP the most promising candidate for a blood-stage vaccine against this parasite species. However, prior study has shown that parasites with multiple copies of PvDBP are markedly less neutralized in vitro by human monoclonal antibodies, raising the concern that the PvDBP-based vaccine could be less effective to infections with multiple PvDBP copies. Further, the increasing number of *P. vivax* cases in Duffy-negative individuals hypothesizes that *P. vivax* may multiply PvDBP gene copies to enhance the production of binding proteins and increase the likelihood of invasion to Duffy-negative RBCs causing infection. This study aims to determine the extent of PvDBP copy number variation in Duffy-positive and Duffy-negative *P. vivax* infections from Ethiopia. I will also examine the correlation of such variation with parasitemia (i.e., the number of infected RBCs as a proxy for invasion capability). A TaqMan assay was used to determine the Duffy genotype and 18s quantitative PCR to measure the density of *P. vivax* samples. Amplifications using primers flanking PvDBP tandem repeats were conducted to detect PvDBP multiplications. These genetic findings are essential to evaluate the effectiveness of the PvDBP-based vaccine across Africa.

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Abstract #: 257

Title: Understanding the Hsp70 Phosphorylation Via the Chaperone Code Array

Student Author(s): Ainella Rysbayeva **CE, G, H, NC, S, G**

Faculty Author(s): Siddhi Paranjape

Faculty Advisor: Dr. Andrew Truman

Department: Biological Sciences

Organisms are continuously exposed to environmental stresses that cause protein unfolding and misfolding. To deal with these stresses, cells make proteins known as chaperones that act as custodians of the cell, repairing and refolding damaged proteins. One well-studied chaperone that is made in all cells of all organisms is Heat Shock Protein 70 (Hsp70). In addition to keeping cells alive, Hsp70 is important in processing of proteins that cause cancer and neurodegenerative disease. Previous studies have examined how stress regulated the level of Hsp70 protein. Recent work uncovered numerous chemical modifications on Hsp70 which regulate its activity and which we collectively term the “Chaperone Code”. Less than 20 of these modifications have been fully explored in terms of their regulation and function. To understand the modifications of Hsp70, we utilized budding yeast which can be genetically manipulated and is amenable to large-scale screening. We mutated all 73 known phosphorylation sites on budding yeast Hsp70 (Ssa1) to either alanine (phosphor-mutant) to block phosphorylation or aspartate/glutamate (phospho-mimic) to mimic constitutive phosphorylation. Although two phospho-mimic mutations did not support cell viability, the remaining 144 mutants were screened against a variety of stressors allowing us to generate a phenotypic “fingerprint” for each mutant. These stressors are DNA damaging drugs, such as Hydroxyurea, Caffeine, UV, MMS, UV radiation, and also heat stress at 37 °C and 39 °C. By understanding how these modifications alter Hsp70 function in cells, we hope to develop novel therapies for cancer and neurodegenerative disease based on fine-tuning the chaperone code.

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Abstract #: 258

Title: Functionalizing Zeolite to Remove Water Contaminants

Student Author(s): Nikki Thai and Jenna Barilovits **S**

Faculty Advisor: Dr. Jordan Poler

Department: Chemistry

Low cost sustainable water treatment materials are required to ensure the removal of molecular and metal ion contaminants from drinking water. These contaminants are harmful to the environment and to human health. Traditional water treatment facilities cannot remove these substances to below the maximum contamination level (MCL) determined by the USEPA. We have developed a new material that can reach the required performance metrics. We will present a novel synthesis that functionalizes natural materials like zeolite with ion exchange polymers that remove these contaminants from the water. We show that these new polymer functionalized materials remove polyfluoroalkyl substances (PFAS), and other metal ions to below their MCL. The scheme and details of the synthesis and purification will be described. The characterization of the materials using infrared spectroscopy, thermogravimetric analysis, energy-dispersive X-ray spectroscopy will be presented for various synthetic protocols. We have quantified the amount of silane and polymer present in zeolite, as well as its ability to adsorb perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). Our current methods of detecting these materials using Mass Spectrometry are insufficient. We have developed an EPA approved method to concentrate the analyte so as to make the detection limits low enough for real-world applications. In order to optimize and commercialize zeolite, we have compiled a spreadsheet of data describing the prices, adsorption abilities and regenerability of various filtration systems. Future studies will focus on improving absorption properties and maximizing regenerability.

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Abstract #: 259

Title: Assembling Fe₄S₄ clusters with Janus Biscarbene Linkers

Student Author(s): My Vuong, Jonathan Gillen, and Connor Moore **H, S**

Faculty Advisor: Dr. Christopher Bejger

Department: Chemistry

Metal chalcogenide clusters have recently been shown to function as building blocks for redox active main chain organometallic polymers (MCOPs). In this study, we explore the assembly of bioinspired Fe₄S₄ clusters as a route to new functional MCOPs. Specifically, the phosphine ligated Fe₄S₄(PPri₃)₄ cluster undergoes global ligand substitution in the presence of benzo-bis-imidazolylidene (bis(NHCs)) bridging linkers under solvothermal conditions in benzene. The blue-colored polymer was characterized via IR spectroscopy, powder X-ray diffraction (PXRD), Brunauer-Emmett-Teller (BET) analysis, and scanning electron microscopy (SEM). The material's surface plays an important role in how the solid interacts with its environment, therefore, the BET analysis, SEM and energy dispersive X-ray spectroscopy (EDX) have been used to measure the surface area and analyze the elemental composition of Fe₄S₄ - MCOP. Solid state electrochemical analysis, including cyclic voltammetry, of the polymer will also be presented. The polymer is redox active and is currently being investigated for catalysis and energy storage.

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Abstract #: 260

Title: COVID-19 and Its Sickening Impact on Italy

Student Author(s): Aaron Anthony, Noor Ramzan, Donnell Bostic, and Aby Nunez **G, S**

Faculty Advisor: Dr. Vaughn Schmutz

Department: Sociology

The global pandemic of COVID-19 has had extreme effects on the entire world but it does not just stop there. The pandemic has affected international tourism countries economically. In Italy, for example, studies show that international tourism and the number of arrivals was about 95,399,000 in 2019 but when the pandemic hit in 2020, it declined to 38,419,000. The pandemic not only led to a huge loss of money for businesses but also caused the poverty rates to increase tremendously. Data shows that about 11.5 million Italians lost their jobs back in March when the lockdown was issued. Additionally, economic impacts are not the only concern. Tourism also presents environmental challenges in Italy. Therefore, our project aims to answer the question: How has the COVID-19 pandemic affected the level of tourism to Italy and how did this impact the severity of poverty and pollution? For example, studies show overbuilding was one of the main environmental issues which lead to over-tourism, air pollution, and light pollution. We will be looking at news articles and studies done in Italy, looking over collected data over the years, and exploring how international nongovernmental organizations and nonprofit organizations are planning to resolve these issues.

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Abstract #: 261

Title: Awareness and Barriers to Utilizing the On-Campus Food Pantry Among UNCC Students

Student Author(s): Kaley Aucello **H, NC, U**

Faculty Advisor: Dr. Kim Buch

Department: Psychological Science

Food insecurity is an issue affecting the lives of college students daily. UNC Charlotte established an on-campus food pantry in 2014 to combat this issue yet UNC Charlotte students are still experiencing food insecurity at alarming levels. The purpose of this study was to examine and further understand who is utilizing the Jamil Niner Student Pantry and what barriers impede student utilization of and access to the on-campus food pantry. The survey questions were included as part of a study conducted by Dr. Peterson, an anthropology professor at UNC Charlotte. Participants were asked to complete a multiple-choice survey created to support research on UNCC student's perceptions and awareness of the Jamil Niner Student Pantry. Survey data was analyzed through SPSS to determine subgroup differences. Trends in the data allowed for the formulation of proposed innovative solutions to eliminate the barriers to student's utilization of the Jamil Niner Student Pantry.

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Abstract #: 262

Title: Norway's Global Role in Promoting Renewable Energy

Student Author(s): Lena Ayesh, Haley Pickering, Thomas Vairo, and Alyse Moffitt **G, S**

Faculty Advisor: Dr. Vaughn Schmutz

Department: Sociology

Sustainability issues have disproportionately negative effects on developing nations. According to the World Health Organization, water and air pollution both disproportionately affect developing nations. As a result, many developed nations contribute resources to projects that address environmental threats in less developed nations. Norway, specifically, contributes financially to such efforts and is a world leader in renewable energy and sustainable power. Our research focuses on Norway's role in providing foreign aid to address sustainability issues. Therefore, our objective is to answer the question: What does Norway contribute to such projects in developing nations and how does it promote renewable energy around the world? We will conduct secondary data analysis on the topic based on reports of monetary aid, nongovernmental (i.e., NGO), governmental assistance, and by evaluating specific case studies. Our research will draw on government records, current events, media coverage, and academic articles. For example, in 2022, Norway has contributed \$3,000,000.00 to the UN Environmental Programme. Additionally, throughout the research process, the world-system theory, first proposed by Immanuel Wallerstein, will be applied to this case. This globalization theory helps further explain Norway's responsibility and impact the nation has on economically/politically weaker nations. One of the main goals of researching this topic is to explore the effectiveness of Norway's foreign aid and assess their role as a model for other nations in environmental sustainability.

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Abstract #: 263

Title: Extraversion and Leader Emergence

Student Author(s): Heather Cox and Leah Bourque

Faculty Advisor: Dr. Anita Blanchard

Department: Psychological Science

The Covid-19 global pandemic created a shift in the way people work, socialize, learn, and engage in group discussions and projects. With the massive increase in video conferencing, group dynamics will likely change. Specifically, group leaders emerge differently in new online environments. This study tests if individuals who measure high in extraversion will emerge as leaders in these online groups. Research on extraversion and leader emergence has been conducted, however it has neglected to include online groups, creating a gap in the literature. The study will be conducted using college students at UNC Charlotte. These students are part of a study in which groups of three or four students develop and rank ways to improve online teaching. The students participate in a zoom meeting and their suggestions are documented in Google drive. Meeting recordings will be reviewed. Emerging leaders will be identified as the students who control the document and lead the discussion. They will be coded Leader=1. Everyone else in the group will be coded Leader=0. Measures of extraversion were collected from an initial assessment. The researcher hypothesizes that college students who score high in extraversion will emerge as leaders in online groups. To test the hypothesis, we will correlate the leader measures with extraversion scores.

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Abstract #: 264

Title: Debt and Career Choice

Student Author(s): Zarin Khan **CE**

Faculty Advisor: Dr. Scott Fitzgerald

Department: Sociology

The American Dream is often associated with obtaining higher education which allows individuals to become successful with their career choice. However, the term American Dream was coined in the early 1930s, a time when higher education guaranteed success, and student debt was an investment towards it. The economy had higher job security for both individuals with and without a college degree. Many college students from different social backgrounds seek upward mobility through higher education and career choice. However, higher education often requires student loans and financial stress. Fear of job insecurity may influence college students to invest in a major which is more likely to lead to a successful career. Success, however, is not guaranteed, and higher student debt does not always correlate with better career outcomes. In this study, we interviewed currently enrolled college students at a large, public university about their background, major, financial stress, and career plans to understand how these might differ by socioeconomic standing. In our analysis, we combine data from semi-structured interviews and short surveys to answer our research questions. Our findings will contribute to better understanding the role of financial literacy and financial stress on college students' academic and career decisions.

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Abstract #: 265

Title: How Does Pollution in the Nile River Affect the Future of Egypt and its Sustainability?

Student Author(s): Emma Palmer, Kyndall Allen, Nyla Young, and Jade Suszek **G, S**

Faculty Advisor: Dr. Vaughn Schmutz

Department: Sociology

The Nile River is one of the biggest rivers in the world and Egypt relies on it for about 97% of its water. In recent years, there has been a threat to the Nile due to a variety of pollutants that have far-reaching effects. Pollution is negatively affecting civilians' health, the growth of agricultural products, the shipping industry that uses the Nile, and the renewability of the water. The research question we will be focusing on is: how does pollution in the Nile river affect the future of Egypt and its sustainability, agriculture, economy, and health? In addition to demonstrating the effects these threats to the Nile pose to multiple sectors of the country and world, we will examine efforts underway to address the pollution problem. We will draw on academic studies, media reports, and non-governmental organizations to identify the main threats and possible solutions that will address the sustainability of the Nile. In addition, we will examine Egypt's 2030 sustainability goals to consider the actions the government is taking to address this issue. We will explore whether the current approach will promote sustainability and respond to the challenges faced by several sectors, including agriculture, the economy, and the health of Egyptians. This will be beneficial to not only Egypt but to the entire world and the future sustainability of waterways.

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Abstract #: 266

Title: Fukushima Nuclear Disaster

Student Author(s): Caroline Pittroff, Meria Chitpanya, Ava Powchak, Kyla Whitten, and Yara Ibrahim **G, S**

Faculty Advisor: Dr. Vaughn Schmutz

Department: Sociology

Oceans supply countries around the world with an abundance of different types of resources that are important for sustaining human life. These resources are especially important for island countries, like Japan, which heavily rely on the ocean's fish populations for food. In 2011, a tsunami crashed into the City of Fukushima causing mass damage to a local nuclear plant and leaving it with a lot of excess nuclear waste. The Japanese government decided to dump the waste into the Pacific Ocean most likely due to the fact that it's the 'cheapest' option. This brings forth the question: How has the Fukushima nuclear disaster affected Japan's outlook on nuclear power and ocean preservation? Throughout our research, we will be gathering information through multiple different types of sources including, but not limited to, non-governmental organizations (NGOs) and governmental websites. We will be exploring the Japanese public's viewpoint on the disaster, their reaction, and how, as a community, they are trying to move forward. We will also be looking into the Japanese government's reaction to the Fukushima nuclear disaster and what steps they are planning on taking in regards to nuclear power and how they plan on managing ocean protection regulations. Prioritizing the sustainability of the ocean surrounding Japan is important for the future generations of Japanese citizens so it is important to see how Japan plans on dealing with this issue, as it could also set examples on how they deal with other issues to come.

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Abstract #: 267

Title: Multicultural Policy and Collaborative Intentions: Effects on the Racial Majority

Student Author(s): Ricky Rodriguez-Cue

Faculty Advisor: Dr. Amy Canevello

Department: Psychological Science

Considering the increasing levels of diversity in America, it is important that organizations are able to facilitate effective collaboration between members of different groups while maintaining their group identities. This is challenging because generally homogenous groups collaborate more effectively than diverse groups. One-way organizations attempt to facilitate positive interracial relations is with multicultural diversity policies. However, multicultural diversity policies can trigger feelings of exclusion and identity threat in Non-Hispanic Whites, generally feeling more comfortable with colorblind policies. Logically, people who feel excluded and threatened in their group should not collaborate well. However, a study by Ballinger and Crocker (2020) found that Whites may have shifted toward a nonzero-sum view of multicultural policies, stemming from their lack of perceived exclusion and identity threat. It could be hypothesized that Whites' shift to a nonzero-sum view of multiculturalism would make their collaboration just as likely in groups that promote multicultural beliefs compared to colorblind. However, even from a nonzero-sum perspective, Whites view diverse groups included in multicultural initiatives as separate from their sense of self. The present study hypothesizes that Whites will maintain a nonzero-sum perspective of multiculturalism. However, the perception of being in an outgroup from those explicitly included in multicultural diversity policy will activate self-image goals that lessen interpersonal trust and increase competitiveness, subsequently lowering their collaborative intentions. It will test this hypothesis in an experimental survey where the participants read a fictitious company's mission and values statement, then complete measures of identity threat, self-image goals, interpersonal trust, competitiveness, and collaborative intentions.

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Abstract #: 268

Title: Measuring the Emotional Experiences of LGBTQIA+ Adults

Student Author(s): Jacquelyn Stelmack **H**

Faculty Advisor: Dr. Lisa Walker

Department: Sociology

Past studies on gender and emotional experiences have found evidence that women experience negative emotions more frequently than men, supporting Kemper's structural theory of emotion (stating that structural factors such as status and power impact individual emotional experiences) and the idea that women inherit low-status roles more often than men (Simon and Nath 2004). However, much of the research in this area focuses on binary gender identities and heterosexual relationship dynamics. There seems to be little research that takes other sexualities and gender identities into account when considering emotional experiences. Simon and Nath found that differences in men and women's role experiences (particularly parental roles) are responsible for differences in the frequency of calmness, excitement, and anxiety. We will be looking into how the frequency of these emotions may change if respondents are in same-sex relationships, which may not be influenced by gender and parental roles in the same way a heterosexual relationship might be. We will also include nonbinary and trans identities in our research in order to find a more accurate picture of how gender and emotional experiences are related. We will also be investigating any potential differences in the contexts that elicit emotions such as anger and sadness among sociodemographic groups. We will create and implement a questionnaire to collect data on emotional experiences and labeling that includes more options to self-identify sexuality and gender identity than in previous work.

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Abstract #: 269

Title: Similarity of Characteristics Effect on Group Leadership Style

Student Author(s): Kim Torres, Leah Bourque, and Jordan Duran

Faculty Advisor: Dr. Anita Blanchard

Department: Psychological Science

With a surge of online workgroups amid the ongoing global pandemic, research of online teams has become increasingly important. Leadership in online teams is different than face-to-face (FtF) teams. What kinds of leadership styles emerge in online groups? This study seeks to explore how an online group's perceived similarity impacts the style of leadership that emerges. While previous FtF studies focus on personality predictors of leadership style (i.e., extraversion, neuroticism), this study seeks to explore the influence of perceived group member similarity. The proposed research will analyze emergent leadership styles within online groups during brainstorming of best practices for improving online teaching. Each groups' similarity of perspectives was manipulated in three groups: similar, dissimilar, and control. Specifically, the groups were told their perspectives (whether similar or dissimilar) are good for group work. Each group conversation will be coded for indications of shared leadership. It is hypothesized that groups perceived as dissimilar will portray a shared leadership environment. The reasoning is that different perspectives will incite more collaboration and create collective influence. This research contributes to science by exploring the effects of team similarity on leadership and online group outcomes. These findings can be useful in ongoing efforts to encourage diverse perspective collaboration within group work.

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Abstract #: 270

Title: Water Sustainability and Availability in Kenya

Student Author(s): Dean Trojanowski and Kalkidan Post **G, S**

Faculty Advisor: Dr. Vaughn Schmutz

Department: Sociology

Climate change has created multiple challenges in achieving water quality and sustainability around the world. The negative effects of climate change are often especially pronounced in developing countries. In Kenya, for example, climate change along with poor water management, contamination, and population growth has led to a water crisis that threatens the availability of clean water for millions of Kenyans. In this project, we address the question: what are the main threats to the sustainability and availability of water in Kenya and what are governmental and nongovernmental actors doing to address them? We will examine several governmental, non-governmental organizations (NGOs) and activist groups on social media that have put forth efforts to both bring awareness to the pressing issues and direct ways to solve them. We will analyze Kenya's future sustainability goals and the actions they are currently taking to reach them, such as the Go Blue initiative in cooperation with France, Germany, Italy, Portugal and the United Nations Environment Programme (UNEP). Additionally, we will explore how UNEP and the international community are supplying technical expertise and financial resources to address Kenya's water availability and sanitation processes. This will allow us to assess whether current approaches are sufficient to tackle the current issues Kenya faces in adapting to climate change.

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Abstract #: 271

Title: Mental Health Care Concerns among Marginalized Women

Student Author(s): Kayla Walker **NC**

Faculty Advisor: Dr. Victoria Scott

Department: Psychological Science

Rates of postpartum depression (PPD) are disproportionately high among marginalized populations, such as low-income, minority, and immigrant women. The Holistic Opportunity for Everyone (H.O.P.E.) Initiative seeks to integrate behavioral and public health services to meet the holistic needs of WIC and Family Planning clinic clients in Mecklenburg County, North Carolina that serve a high percentage of clients from marginalized populations. A literature review was conducted on mental health concerns amongst marginalized women using keywords related to socioeconomic status, race/ethnicity, mental health perceptions. Twenty peer-reviewed sources published in databases (e.g. Sage Journals and PsychINFO) between 2007-2022 were analyzed. Findings suggest that Hispanic/Latina women had personal barriers such as beliefs and stigma about mental health and illness, hesitancy to seek treatment for symptoms of PPD, and cultural beliefs about motherhood and the role of women. Previous investigators found that Black/African American women sought help more frequently from and had significantly more confidence in religious leaders for mental health support. Additionally, low-income women were at greater risk for severe PPD due to financial stressors. By gathering a better understanding of how members of marginalized communities generally feel about PPD and mental health treatments, the H.O.P.E. Initiative can approach mental health care from a more culturally sensitive perspective. Next steps would be to survey patients enrolled in the H.O.P.E. Initiative to get direct feedback on their personal views of PPD and how their providers are meeting their needs.

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Abstract #: 272

Title: A Systematic Review of Validated Measures of Bystander Intervention

Student Author(s): Madi Williams, Hannah Carlson, Neha Kissler, and Gabrielle Haley

Faculty Advisor: Dr. Annelise Mennicke

Department: Social Work

Purpose: This study aimed to systematically identify all US- based validated measures of bystander intervention to provide recommendations for future measurement development, which can be used to evaluate the effectiveness of bystander intervention programs. **Methods:** Following PRISMA-P guidelines, electronic databases and emails were systematically searched to identify validated measures of bystander intervention-related constructs. Research team members double screened titles, abstracts, and full text articles based on inclusion criteria. Team members extracted data that correlated with the scales, such as general scale information, item details, and sample information and used them for data analysis. **Results:** Out of the 8,559 articles initially identified, 24 articles containing scales met inclusion criteria. The primary domains of included scales were interpersonal violence (67%), assessing constructs of intent/likelihood/willingness to help (50%), and taking action steps of the situational model (71%). On average, scales contained 14 items, and most scales used Likert-style response options. Most scales were validated using college samples of primarily white, heterosexual women. **Conclusion:** Findings indicate that more rigorous approaches to measurement of bystander intervention are needed. To promote inclusivity, future scales should be validated using more diverse populations. The domains that the scales assessed were also limited (e.g., mostly for interpersonal violence). Furthermore, future scales should be developed to assess bystander intervention-related constructs across broader domains of harm, such as problematic drinking. Finally, results also demonstrated a lack of consistency in measurement development, thus best practices should be adopted in future measurement development.

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