ECU

Research & Creative Achievement Week

March 31 - April 4

#RCAW 2025

go.ecu.edu/rcaw

Innovate

Create

Educate

ADA Accommodation:
ADA-Coordinator@ecu.edu 252-737-1018

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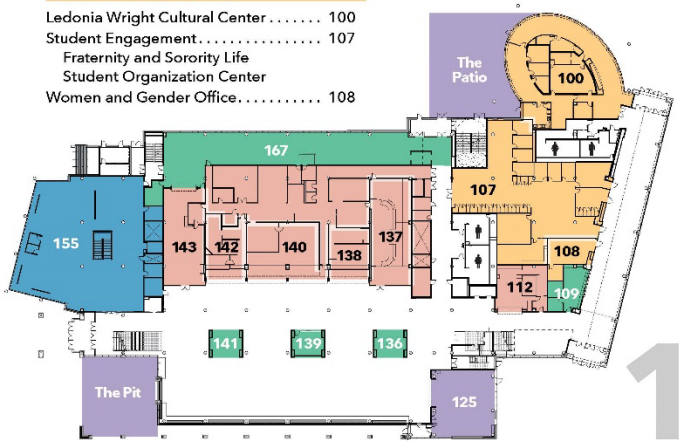

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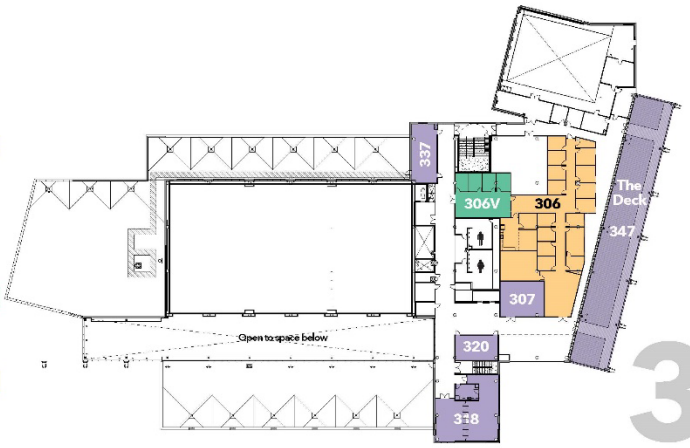

Each year at East Carolina University, the Graduate School and the Office of Undergraduate Research within the Office of Research collaborate to bring Research & Creative Achievement Week to the Pirate community! This year, the RCAW events take place Monday through Friday, March 31 to April 4th. This event highlights and celebrates the extraordinary accomplishments of our students and postdoctoral scholars in creative activities and research. This year's theme, Innovate, Create, Educate, reminds us of the depth and breadth of work we will see from our students during the week. The week's activities include podium presentations, poster sessions, and virtual presentations, both synchronously and asynchronously. There are also events from within units around campus, including the International Scholars' & Students Symposium, the Water Resources Center Summit, and more!

A change this year is the Wednesday, April 2nd celebration of ECU achieving the prestigious R1 classification from the Carnegie Foundation. The R1 status is the highest a university can achieve and the diligence of our faculty, staff, and students made this happen in February 2025. Join us for that great celebration!

These events are an excellent experience for our students and postdoctoral scholars to share their research and creative activities with the university and the eastern NC community. Both undergraduate and graduate students, along with the postdoctoral scholars, are mentored by our incredible faculty, who not only demonstrate prominent levels of expertise in their fields, but also consistently provide the important mentoring needed for our students and postdoctoral scholars to succeed. This week could not happen without the support of our faculty.

Special Thanks for Sponsors, Partners, Organizers, and Mentors

East Carolina University Academic Affairs
Graduate School
Office of Undergraduate Research
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Office of Innovation and Engagement

Organizers & Partners

Tuan Tran, RCAW Co-Chair, Director of Undergraduate Research
Kathleen Cox, RCAW Co-Chair, Associate Dean, Graduate School
Tuan Tran, Organizer, Capture 180 Research Challenge
Nehad Elsawaf, Chair & Organizer, International Scholars' and Students' Symposium
Sharon Paynter, Chief Innovation and Engagement Officer/Interim Chief Research Officer
Mary Farwell, Assistant Vice Chancellor for Research Development, Office of Research
Angela Lamson, Senior Faculty Fellow, Office of Innovation and Engagement
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Robert Hughes and Nathan Hudson, Organizers, LaserTAG Capturing the Art of Science Image Competition
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Water Resources Center & Community Partners
Faculty, Staff, Graduate Students – for serving as moderators and judges
Neuroscience Student Association – Allie Kondracki, Cameron Fox, Cindy Martines, David Menjivar, Diane Zodulua, Kamariya Willingham, Lawson Cross, Lisandra Hernandez-Cruz, Michelle Jacobs, Nina Nieves, Yakira Striblin, Ysabella Olivo, Ysabella Villacorte
Harley Drange, Graduate School Graduate Assistant
Ellie McHone, Graduate School Graduate Assistant

Faculty Mentors

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Ables, Elizabeth
Aileru, Azeez
Allen, William
Alstaedter, Laura Levi
Anderson, Eric
Anllo, Laren
Asch, Rebecca
Ashby-King, Drew
Atherton, Leigh
Aziz, Shahnaz
Bailey, George
Baker, Courtney
Baker, Michael
Baluyot, Sieg
Barber, Dennis
Beltran-Huarac, Juan
Blakeslee, April
Bolin, Linda
Bowler, Mark
Brewer, Michael
Broskey, Nicholas
Bryson, Sara
Burnette, Kristin
Burns, Colin
Caiola, Courtney
Cavanagh, John
Christian, Cal
Clemens, Stefan
Cooke Bailey, Jessica
Cuthbertson, Carmen
Dannhauer, Moritz
Das, Bhibha
DeChabert-Rios, Jacqueline
Dewitt, Regina
Dias, Nancy
Didonna, Alessandro
Dillon-Spruill, Megan
Ding, Qin
Dingfelder, Michael
Dodge Evans, Hillary
Dolbier, Christyn
Domire, Zachary
Driscoll, Virginia
Duba, Kura
DuBose, Katrina
Duggan, Gabe
Eagle, Scott
Eldridge, Lori
Etheridge, Randall
Ewen, Charles
Feczko, Robert
Field, Erin
Forbes, Thompson
Garvin, Bobbie
George, Stephanie
Gillette, Davidson
Golden, Jeannie
Gregory, Kristen
Gyawali, Sohan
Habeeb, Christine
Haddock, Rose
Hart, David
Hegde, Archana
Heimann-Rios, Adriana
Henderson, Michelle
Herndon, Nic
Hines, Ian
Houmard, Joseph
Hu, Xin Hua
Hudson, Nathan
Hughes, Robert
Humphrey, Charles
Issa, Fadi
Iverson, Guy
Johnson, Jerry
Katwa, Laxmansa
Kearney, Gregory
Keiper, Brett
Kitchin, Claudia
Knox, David
Kovar, Cheryl
Kowalczyk, Christine
Kulas, Anthony
Larsen, Deirdre
Lawrence, Jeanne-Marie
Lazure, Tim
Lee, Hugh
Lee, Myon Hee
Lee, Tammy
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Lewis, Travis
Lin, Zi-Wei
Litwa, Karen
Lu, Qun
Luczkovich, Joseph
Maher, Derek
Malkin, Michelle
Mannie, Mark
Matthews, Jennifer
May, Linda
McCunney, Dennis
McIntyre, Amy
McRae, Susan
Milton, Morgan
Moore, E. Whitney
Moore, Shawn
Morley, James
Morris, Sandra
Moysey, Stephen
Mruk, Karen
Muhammad, Amanda
Muldrow, Adrienne
Murakami, Tomoyuki
Murata, Ramiro
Murphy, Karly
Nazari-Heris, Morteza
Neck, Nadine
Normoyle, Cat
O'Driscoll, Michael
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Pardi, vanessa
Passwater, Chelsea
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Perrucci, Daniel
Perry, Jamie
Perry, Megan
Pestaner, Mitzi
Pokhrel, Lok
Pooser, David
Pudlo, Jason
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Richman, Alice
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Rider, Patrick
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Roop, Martin
Roop, Marty
Rothermich, Kathrin
Russell, Kelli
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Sastre, Lauren
Schacht, Ryan
Schmidt, Cameron
Schoemann, Alexander
Schwalbe, Ruth
Sears, Samuel
Sharer, Wendy
Shearman, Sachiyo
Simeonsson, Kristina
Spain, Renee
Sriramula, Srinivas
Stevens, John
Stock, Joe
Szatmari, Erzebet
Tanner, Chuck
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Tumin, Dmitry
Turbeville, Lauren
Van Dross, Rukiyah
Vance-Chalcraft, Heather
VanNiekerk, Tara
Wade, Eric
Walcott, Christy
Walenski, Matthew
Walenski, Matthew
Walfield, Scott
Walker, Joi
Walker-Bailey, Catherine
Weckesser, Gerland
Wedge, Ryan
Wells, Angela
White, Avian
Whited, Matt
Williford, Andrew
Willson, John
Wilmes, Justin
Woodlief, Tracey
Wu, Xian
Yang Li
Yeazell, Shawn
Yong-Qing, Li
Zeager, Lester
Zeczycki, Tonya

Schedule of Events

All events are in the Main Campus Student Center

Monday, March 31, 2025

Undergraduate Student Presentation Day 8:30 AM – 5:00 PM
2nd Floor Ballrooms and Meetings Rooms

- Undergraduate Podium Presentations
- Undergraduate Poster Presentations

Tuesday, April 1, 2025

Graduate Student & Postdoctoral Scholar Presentation Day 8:30 AM – 5:00 PM

- Graduate & Post-Doc Podium Presentations
- Graduate & Post-Doc Poster Presentations
- Graduate Virtual Poster Presentations (Asynchronous)

International Scholars' and Students' Symposium 2:00 – 5:00 PM
BlackBox Theatre

Wednesday, April 2, 2025

R1 Celebration Day! 10:00 AM – 1:30 PM
2nd Floor Ballrooms

Water Resources Center Stakeholder Summit 9:00 AM – 4:00 PM
2nd Floor Gallery & Reception Area, Room 249 & 253
List of Events, Summit Agenda & Registration Link
Remote Attendance is Possible!

Thursday, April 3, 2025

Capturing the Art of Science 10:00 AM – 12:30 PM
Laser Technologies Application Group (TAG) Keynote Address
Blackbox Theater

Capture 180 Research Challenge 2:00 – 4:00 PM
Preliminary Rounds Room 249 & 253
Final Round BlackBox Theatre
Website

Friday, April 4, 2025

RCAW Awards Ceremony 12:00 PM
By Invitation Only
Student RCAW presentation winners, Distinguished Graduate Faculty Mentor Awards, Outstanding Thesis & Dissertation Awards, LaserTAG winners, Capture 180 winners and more!!

Capture 180 Research Challenge

rede.ecu.edu/undergraduate

ABOUT CAPTURE 180

The Capture 180 Research Challenge tasks undergraduates to describe their work in 2-3 minutes, using one static slide or prop. It is based on the popular 3MT® competition for graduate students.

JUDGING & PRIZES

Capture 180 judges are students, community partners, and leaders within various ECU units. They are charged to use the judging criteria of:

- Impact, Comprehension, and Content
- Audience Engagement
- Communication

The challenge is divided into two rounds, a preliminary round with two groups carrying out their presentations in parallel, and a final round. The field is reduced in half after the preliminary round. The final round is composed of presenters who have advanced from the preliminary round. Presenters who do not advance to the final round are cordially invited to attend the final round. In the final round, the presenter who ranks first according to the judges will be the Overall Champion. The audience will have an opportunity to complete an online survey with the same criteria. The presenter who ranks first according to the audience's rating will be the People's Choice Winner. Both winners are announced afterwards and receive paperweight awards. Winners and their mentors will be invited to attend the RCAW Awards Luncheon and Ceremony.

ADA Accommodation: 252-737-1018 or ada-coordinator@ecu.edu

ECU

CAPTURE
180 RESEARCH CHALLENGE

Main Campus Student Center
April 3rd, 2025 | 2:00 PM - 4:30 PM

EVENT ITINERARY

Preliminary Round

1:45 PM – 2:00 PM	Check-In Group A MCSC 249 Group B MCSC 253
2:00 PM – 2:45 PM	Presentations
2:45 PM – 3:00 PM	Judge Deliberations Final Round Presenters Announced

Final Round MCSC 200

3:15 PM – 3:30 PM	Check-In and Introduction
3:30 PM – 4:15 PM	Final Round Presentations
4:15 PM – 4:30 PM	Judge & Audience Deliberations Winners Announced

ACKNOWLEDGEMENTS

Final Round Judges

Alejandra Valle Garcia
Admissions Counselor
Undergraduate Admissions

Jamie Bloss
Library Associate Professor
Laupus Health Sciences Library

Kathy Cox
Associate Dean
ECU Graduate School

Preliminary Round Judges

Ketan Chamakura
Dhanushi Dedakia
Thanh Nguyen
Jungyeon Park

Preliminary Round Moderators

Maelee Becton
Giulianna Catalano

Video and Onsite Assistance

Douglas S. Bell, Jr

Group A
PRELIMINARY PRESENTATIONS
MCSC 249 1:45 PM -3:00 PM

Moderator: Maelee Becton

1. Investigating the Role of the Nucleocytoplasmic Protein Tnpo-SR in the Germline Stem Cells of Drosophila Melanogaster
The Uber of the Cell: How Tnpo-SR Drives Drosophila Germline Stem Cell Destiny
Lovens Paul (Biochemistry)
Elizabeth T. Ables (Mentor)

2. Altered Cell Signaling in an Aged Model of Heart Failure with Preserved Ejection Fraction
Aging is Not Optional: Characterizing a Model of HFpEF with Aging in Mind
Caitlyn Mooers (Biology)
Bobbie Garvin (Mentor)

3. Voice-Based Mood Detection for Emotionally Appropriate AI Responses
Creating Conversational Systems That Read the Room, Not Just the Words
Weston Nelson (Computer Science)
Nic Herndon (Mentor)

4. Examining Southwest Airline's Paradoxical Communicative Response to the December 2022-2023 Crisis
Weathering the Storm: The Impact of Southwest's Paradoxical Crisis Communication
Ilaria Noonan (Communication)
Drew T. Ashby-King (Mentor)

5. AI-Powered Chatbot for Automated Essay Review: Enhancing Writing Feedback and Revision
Smart Feedback, Stronger Writing: AI-Powered Essay Review
Stephanie Sarambo (Computer Science)
Nic Herndon (Mentor)

6. Investigating the Role of Tuberous Sclerosis Complex in Synapse Formation
When Crafting Synapses You Better Bee on the Lookout for Genetic Mutations as it Tends to Get Complex
Robin Thomas (Biology, Molecular/Cell Biology)
Karen Litwa (Mentor)

7. Navigating the Pitch: Path Planning and Computer Vision for Soccer Robots
Where Technology Meets the Pitch
Darby Waters (Computer Science)
Nic Herndon (Mentor)

Group B
PRELIMINARY PRESENTATIONS
MCSC 253 1:45 PM - 3:00 PM

Moderator: Giulianna Catalano

1. Using Machine Learning to Predict Breast Cancer Recurrence Score: Improving Accuracy
Empowering Lives Through Collective Intelligence: Machine Learning for Breast Cancer Prognostics
Majoie Ngandi (Software Engineering)
Nic Herndon (Mentor)

2. Creation of the First B-Cell Specific Ataxin-1 Conditional Knockout Mouse Model
Created the First B-Cell-Specific Ataxin-1 Knockout Mouse Model, Revealing its Immunoregulatory Role and its Impact on Autoimmune Disease Mechanisms
Cindy Martines (Neuroscience)
Alessandro Didonna (Mentor)

3. Breast Cancer Recurrence Prediction with Machine Learning
Predicting Breast Cancer Recurrence Using Machine Learning Models to Examine Both Tumorous and Non-tumorous Regions of Breast Biopsy Images
Sofia Azam (Computer Science)
Nic Herndon (Mentor)

4. Beyond Interpretation: Religious Experience as Phenomenon, Narrative, and Transformation
Framing the Ineffable: Culture, Psychology, and Contemplation in Religious Experience
Wally McCown (Religious Studies)
Derek Maher (Mentor)

5. Puzzles and Playlists: Can Music Help ADHD Focus?
Puzzles and Playlists: How Can Music Help ADHD and Neurotypical Minds Focus?
Dhwani Hada (Neuroscience)
Michael Baker (Mentor)

6. Molecular Surveillance of Babesia sp Infection in Lemurs of Madagascar
Tiny Ticks, Big Impact: Exploring Babesia Infections in Lemurs of Madagascar
Lulea Adams (Biology)
Fidisoa Rasambainarivo (Mentor)

7. Computational Pathology for Cancer Recurrence Prediction
Decoding Breast Lesions: How AI Sharpens the Line Between Ductal Carcinoma in Situ and Usual Ductal Hyperplasia
Marian Sousan (Computer Science)
Nic Herndon (Mentor)

8. Leveraging Virtual Reality for Pedagogical Innovation: A Case Study of a 3D Heart Model for Anatomical Education
Bridging Technology and Anatomy: Using VR To Deepen Spatial Understanding and Drive Innovation in Medical Education Through Interactive and Dynamic 3D Organ Visualizations
Garrett Moore (Art)
Amy McIntyre (Mentor)

FINAL ROUND PRESENTATIONS
MCSC 200 (Blackbox Theatre)
3:30 PM – 4:30 PM

Moderator: Tuan Tran
Director of Undergraduate Research | REDE

LaserTAG

Capturing the Art of Science Keynote Address

North Carolina Biotechnology Center
LASERTAG
Laser Tech Applications Group

ECU LaserTAG &

ECU Research and Creative Achievement Week

present

A *Capturing the Art of Science* Seminar

with

Ryohei Yasuda, Ph.D.

Scientific Director, Max Planck Florida Institute

Biochemical Signal Computation in Synaptic Plasticity

Activity-dependent changes in synaptic strength and structure are crucial for acquiring, storing, and retrieving information in the brain. These changes are orchestrated by a complex cascade of biochemical reactions involving hundreds of intracellular and extracellular signaling proteins at the synapse. To elucidate the operational principles of these signaling networks, we have developed innovative 2-photon fluorescence lifetime imaging (2pFLIM)-based techniques, enabling visualization of the spatiotemporal dynamics of protein activity with single-synapse resolution. To bridge the gap between behavioral plasticity and signaling dynamics, we employed miniature 2-photon fluorescence lifetime imaging microscopy (mini-2pFLIM), allowing us to image signal transduction in freely behaving animals. Additionally, we have developed various optogenetic and chemogenetic enzyme inhibitors targeting key kinases, such as CaMKII and PKC. This approach has allowed us to correlate the temporal dynamics of enzymes within synapses to behavioral plasticity. Our techniques have provided unprecedented insights into the mechanisms underlying synaptic plasticity, circuit function, and behavioral adaptations.

Thursday, April 3, 2025
11 AM - Noon
MAIN CAMPUS STUDENT CENTER
Black Box Theater

International Scholars' & Students' Symposium

Tuesday April 1st, 2025

Black Box Theater, Main Campus Student Center #200 (2:30- 5:00 PM)

2:30-2:40

Opening Remarks: Dr. Nehad Elsawaf – International Scholars' Symposium Chair and Organizer.

2:45- 3:00

Fostering expertise and leadership development among study abroad participants: The *Sustainable Buenos Aires* project, Laura Levi Altstaedter and Emily Saddison Department of Foreign Languages and Literatures; Kylie Williams, Department of Geography, Planning and Environment; and Mauro Falasca, Department of Marketing and Supply Chain Management, East Carolina University, Greenville, NC, 27858

3:00-3:15

Development of a Calibrated Supercritical CO_2 Densimeter using Raman Spectroscopy Jinbo Chen, Department of Engineering, East Carolina University, Greenville, NC, 27858

3:15-3:30

Estrogen-Dependent Exacerbation of Ethanol-Induced Cardiac Dysfunction: Role of Circadian Clock Protein Period 2 Suppression and Ferroptosis Augmentation, Syed Anees Ahmed, Abdel A. Abdel-Rahman, Department of Pharmacology and Toxicology, Brody School of Medicine, East Carolina University, Greenville, NC, 27858

3:30-3:45

Development of the General Ocean Model (GOM) and high-resolution transport algorithm implementation, Jungwoo Lee, Department of Engineering, East Carolina University, Greenville, NC, 27858

3:45 –4:00

Evaluating Key Performance Indicators and Economic Viability of Hemp-Based Construction Products Versus Conventional Insulations in the US Residential Sector, Carol Massarra and Akash Waghani, Department of Construction Management, East Carolina University, Greenville, NC, 27858

4:00- 4:15

Dynamic In-Context Databases: Expanding LLMs to Complex Data Operations Tianjiao Zhao and Yu Pan, Department of Construction Management, East Carolina University, Greenville, NC, 27858 and Biological Systems Engineering, University of Nebraska–Lincoln, Lincoln, NE, 68583

4:30- 4:45

Non-Operative Management of Scoliosis in Spinal Muscular Atrophy: A Case Report, Omar Taha BS, East Carolina University, Greenville, NC, 27858, East Carolina University, Greenville, NC, 27858 and Matthew Weintraub BSE, Mehdi Elfilali BA, and Pancholi Parekh DPT, Columbia University, Irving Medical Center, NY,10032

4:45-5:00

"Distance Traveled" Program Increases Interest in Orthopedics in Title I High School Students, Omar Taha BS, East Carolina University Brody School of Medicine, Greenville NC, 27858, and Matthew Weintraub BSE, Ritt Givens BS, Matan Malka BA, Grace Plassche, MD, Avonley Nguyen, and Christen M. Russo, MD, Columbia University, Irving Medical Center, NY, 10032

5:00- Concluding remarks- Dr. Nehad Elsawaf

International Scholars' & Students' Symposium Abstracts

Fostering expertise and leadership development among study abroad participants: The *Sustainable Buenos Aires* project, Laura Levi Altstaedter and Emily Saddison, Department of Foreign Languages and Literatures; Kylie Williams, Department of Geography, Planning and Environment; and Mauro Falasca, Department of Marketing and Supply Chain Management, East Carolina University, Greenville, NC, 27858

This presentation showcases the *Sustainable Buenos Aires* project, an interdisciplinary collaborative project focused on investigating conservation and sustainability efforts in the city of Buenos Aires, Argentina. The project is framed within the fields of Digital Humanities and Sustainability, specifically goals 3 and 11 from among the 2030 United Nations Sustainable Development Goals, which aim to "ensure healthy lives and promote well-being for all at all ages" (Goal 3) as well as to "make cities and human settlements inclusive, safe, resilient and sustainable" (Goal 11), respectively. The first phase of this project includes the student-led development of an interactive digital map of the Buenos Aires province that showcases spaces and places that reflect local sustainability and conservation efforts. The design of the map utilized temporal raster data of global land cover from 1992 to 2020 in order to monitor shifts across time; the interpretation of these data and the map allow users to visualize undeveloped land as well as changes within urban areas and their growth overtime. The map also includes information regarding local policies in place related to the use of space within the city of Buenos Aires, as well as details about key spaces that serve as examples of conservation and sustainability efforts across the city. The second phase of the project involves the collaborative design of two experiential learning visits to key spaces within the city of Buenos Aires that showcase conservation and sustainability efforts: *El Rosedal de Palermo* and *Ecoparque*. These experiential learning visits, which faculty leaders will incorporate into their 2025 Summer in Buenos Aires ECU faculty-led study abroad program, will include pre-departure lectures using the interactive digital map created in Phase 1 as well as in-country visits, both co-designed and co-led by the project team. The experiences will also include a post-visit workshop and reflection designed and led by the faculty leaders. The presentation will end with concluding remarks and reflections from the student-faculty team.

Development of a Calibrated Supercritical CO_2 Densimeter using Raman Spectroscopy Jinbo Chen, Department of Engineering, East Carolina University, Greenville, NC, 27858

CO_2 densimeters are currently limited by inconsistencies in calibration, hardware differences, and sparse data, particularly near the critical point. These discrepancies lead to significant uncertainties in density measurements, with errors ranging from 10% to 28%. Given the importance of accurate CO_2 density data for processes involving energy, combustion, turbomachinery, etc., a more reliable densimeter is needed. This research aims to develop a highly accurate and calibrated CO_2 densimeter focused on measuring CO_2 densities near the critical point. The densimeter will be used to improve the current s-CO_2 thermodynamic model which can potentially enhance s-CO_2 turbomachinery simulation accuracy and overall performance. The approach will begin by reproducing the data from a 2020 study that calibrated CO_2 density using their developed system in conjunction with Raman spectroscopy. This process involves correlating the separation of the Fermi diad on a Raman spectrum with CO_2 density as a function of pressure and temperature based on an Equation of State. This research will use a similar setup to verify the accuracy of the results. Once the initial data is validated, this research will expand the range of temperatures and densities measured, focusing on the critical point (31.1°C) and critical region. By modifying the system, this research aims to significantly reduce uncertainty, particularly in the critical region where even slight variations in temperature and pressure can lead to significant measurement errors. This project will produce new calibration equations across multiple temperature and density ranges, extending beyond the current literature's limitations.

Estrogen-Dependent Exacerbation of Ethanol-Induced Cardiac Dysfunction: Role of Circadian Clock Protein Period 2 Suppression and Ferroptosis Augmentation, Syed Anees Ahmed, Abdel A. Abdel-Rahman, Department

of Pharmacology and Toxicology, Brody School of Medicine, East Carolina University, Greenville 27834, NC, United States

Alcohol exacerbates cardiovascular dysfunction in females in an estrogen (E2)-dependent manner. While E2 confers cardioprotection in premenopausal women and experimental menopause models, its interaction with circadian clock proteins and ferroptosis in the female heart under ethanol (EtOH) exposure is still unexplored. We tested the hypothesis that suppression of the cardioprotective circadian protein Period 2 (Per2) contributes to E2-mediated exacerbation of EtOH-induced cardiac oxidative stress and dysfunction.
Female Sprague-Dawley rats (n = 6–8) underwent bilateral ovariectomy (OVX) and received either EtOH (5% liquid diet) or a control diet, with or without E2 supplementation, for 8 weeks. Cardiovascular function was assessed using radiotelemetry and echocardiography, while the biochemical and molecular analyses evaluated underlying mechanisms.

Treatment with E2 reduced the body weight and fat mass in OVX as well as in OVX+EtOH+E2 rats. Echocardiography showed improved cardiac function in OVX treated with E2 alone vs. exacerbated cardiac dysfunction when EtOH was added to E2. Molecular analyses revealed higher Per2 expression, redox enzyme activity, GPX4, and cardioprotective microRNAs (1, 133a, 208a, 499) levels in OVX+E2, while suppressed Per2, glutathione depletion, GPX4 degradation, reduced cardioprotective microRNAs, and ferroptosis markers were increased in OVX+EtOH+E2.

E2 preserves cardiac function under physiological conditions but exacerbates EtOH-induced dysfunction via Per2 suppression, oxidative stress, and ferroptosis. The loss of E2-mediated Per2 upregulation plays a critical role in ethanol-induced myocardial ferroptosis in E2-replete rats. These findings highlight a potential cardiovascular risk for menopausal women consuming ethanol while on E2 replacement therapy.

Keywords: estrogen, radiotelemetry, bilateral ovariectomy, blood pressure, cardiac circadian protein Per2, Ferroptosis, hemeoxygenase-1
Supported by NIH grant 2R01 AA14441-15

Development of the General Ocean Model (GOM) and high-resolution transport algorithm implementation,

Jungwoo Lee, Department of Engineering, East Carolina University, Greenville, NC, 27858

The General Ocean Model (GOM) is a three-dimensional, unstructured-grid ocean circulation model developed using both finite-volume and finite-difference methods. To enhance its capability in coastal circulation modeling, an accurate and efficient salinity transport algorithm is essential for resolving baroclinic density-driven flows. The Total Variation Diminishing (TVD) scheme, a well-established second-order transport algorithm known for its computational efficiency, was implemented in GOM. The performance of the TVD scheme was evaluated using idealized test cases, including a lock-exchange experiment and a U-shaped channel simulation. Additionally, the model was applied to a real-world scenario in Mobile Bay, Alabama, to assess its efficiency and applicability. Preliminary results demonstrate that the high-resolution TVD transport scheme enables GOM to accurately and efficiently simulate salinity dynamics in a tidally driven estuarine system.

Evaluating Key Performance Indicators and Economic Viability of Hemp-Based Construction Products Versus Conventional Insulations in the US Residential Sector, Carol Massarra and Akash Waghani, Department of Construction Management, East Carolina University, Greenville, NC, 27858

In response to the growing concerns over climate change and the increasing frequency of unpredictable natural disasters, such as storms, flooding, and hurricanes, the construction industry is gradually transitioning from traditional building materials to more sustainable and eco-friendly alternatives. This research investigates the potential of hemp-based construction products, specifically Hemp Wool insulation and Hempcrete, as sustainable substitutes for conventional insulation materials (such as fiberglass, mineral wool, cellulose, and closed-cell spray foam) in the U.S. residential housing sector. The study employs a two-pronged comparative analysis, examining key performance indicators (KPIs) and cost implications. The first comparative analysis evaluates the performance of these materials across six KPIs: thermal conductivity, water absorption, fire resistance, biodegradability, availability, and ease of installation. The second analysis focuses on the cost comparison, including both the initial cost and repair costs associated with water damage, particularly in flood- and hurricane-prone regions. Additionally, the research develops a cost calculator to estimate the initial and repair costs of these materials for various standard housing units in the U.S. residential sector. The findings show that Hemp Wool insulation offers comparable thermal performance and fire resistance to conventional materials, while also being biodegradable. It is easy to install and non-toxic, making it suitable for DIY projects and small to medium-sized construction companies without heavy equipment. However, its high-water absorption limits its use in regions prone to flooding. Cost analysis reveals that Hemp Wool insulation can provide significant savings over Mineral Wool (20%) and Closed Cell Spray Foam (44%). On the other hand, Hempcrete is found to be relatively expensive and less suitable for hurricane-prone areas due to its high-water absorption and elevated repair costs. The study recommends further research to address the water absorption issue, including the exploration of treatments to enhance water repellency. Additionally, long-term performance studies should be conducted to assess the real-world applicability of these materials. Overall, this research offers valuable insights into the viability of hemp-based construction products, helping inform decisions regarding the adoption of sustainable building materials in the U.S. residential sector.

Dynamic In-Context Databases: Expanding LLMs to Complex Data Operations Tianjiao Zhao and Yu Pan, Department of Construction Management, East Carolina University, Greenville, NC, 27858 and Biological Systems Engineering, University of Nebraska–Lincoln, Lincoln, NE, 68583-0726

Large language models (LLMs) are emerging as few-shot learners capable of handling various tasks, including comprehension, planning, reasoning, question answering, and arithmetic calculations. At the core of these capabilities is the LLMs' proficiency in representing and understanding structured or semi-structured data, such as tables and graphs. Numerous studies have shown that reasoning on tabular data or graphs is not only feasible for LLMs but also offers a promising research direction, where these data are treated as in-context information. The lightweight and human-readable nature of in-context databases positions them as potential alternatives to traditional databases in typical RAG (Retrieval-Augmented Generation) setups. However, current work focuses almost exclusively on static in-context data, which does not allow for dynamic updates. To address this limitation, we propose a delta encoding approach to enable dynamic database updates. Our research explores how data stored in traditional RDBMS can be encoded as in-context text, allowing LLMs to perform CRUD (Create, Read, Update, and Delete) operations on these databases. In previous experiments, we tested LLMs' proficiency with relatively simple and general types of databases. In this study, we extend the scope to more complex datasets, including traffic accident records and construction equipment management, the latter involving real-time updates of equipment status. By updating the prososed InConDB benchmark, we aim to demonstrate the performance of different language models in enabling in-context databases, while revealing their strengths and limitations.

Non-Operative Management of Scoliosis in Spinal Muscular Atrophy: A Case Report, Omar Taha BS, Matthew Weintraub BSE, Mehdi Elfilali BA, Pancholi Parekh DPT, East Carolina University, Greenville, NC, 27858, Columbia University, Irving Medical Center, NY,10032

Spinal muscular atrophy (SMA) is a progressive neuromuscular disorder caused by mutations in the *SMN1* gene, often leading to scoliosis and associated respiratory decline. Advances in gene therapy, particularly Spinraza, have improved survival, necessitating new approaches for managing spinal deformities. While surgical interventions remain standard, research on non-operative treatments, such as bracing and physiotherapeutic scoliosis-specific exercises (PSSE), is limited.

We present the case of an 18-year-old male with SMA Type 3 who has been followed for seven years with a non-operative approach, including PSSE, nighttime bracing, and, later, Spinraza therapy. At baseline, he had a 20° thoracic and 30° lumbar Cobb angle with early obstructive pulmonary impairment. Over two years, he completed 30 PSSE sessions emphasizing pelvic corrections, postural alignment, and respiratory training while transitioning from a Providence brace to a nighttime Rigo-Chêneau-style (RSC) brace. At the two-year follow-up, lumbar scoliosis improved to 22°, and thoracic kyphosis decreased from 60° to 33°. Following Spinraza initiation at 36 months, he continued bracing and PSSE with reduced therapy frequency. At the 39-month follow-up, his curves remained stable (22° thoracic, 29° lumbar), contrasting with the expected progression rate of 7.2° per year in untreated SMA scoliosis. Pulmonary function also improved, deviating from the typical decline observed in SMA patients.

This case demonstrates that a combined non-operative approach—including PSSE, nighttime bracing, and Spinraza—may mitigate scoliosis progression and improve pulmonary function in SMA. PSSE likely contributed through spinal elongation and respiratory-specific exercises, while the RSC brace facilitated rib cage expansion. These findings challenge the notion that bracing in SMA is purely palliative and suggest that non-operative strategies could offer meaningful benefits. Non-operative management, including PSSE and nighttime bracing, may play a role in stabilizing spinal deformities and improving pulmonary outcomes in SMA. Further research is needed to explore the long-term efficacy of these approaches in modifying disease progression.

“Distance Traveled” Program Increases Interest in Orthopedics in Title I High School Students, Omar Taha BS, East Carolina University Brody School of Medicine, Greenville NC, 27858, Matthew Weintraub BSE, Ritt Givens BS, Matan Malka BA, Grace Plassche, MD, Avonley Nguyen, Christen M. Russo, MD, Columbia University, Irving Medical Center, NY, 10032

The Distance Traveled program aims to enhance adequate representation in orthopedic surgery by increasing early exposure, knowledge, and interest in musculoskeletal (MSK) medicine among title1 high school students. Title 1 high schools are a federal designation for schools serving a high percentage of students from low-income families. The program focuses on addressing barriers such as limited field exposure, lack of role models, misconceptions about physical demands, and negative stereotypes. A pipeline initiative utilizing hands-on simulations, mock surgeries, expert lectures, and Q&A sessions on topics and activities relating to orthopedic surgery. The program employed pre- and post-program surveys to assess changes in participants’ interest, career orientation, and knowledge of orthopedics. Data were analyzed using within-subject T-tests (alpha = 0.05). Implemented in Title I public high schools across New York City, targeting communities traditionally underrepresented in medicine and orthopedics. In its inaugural year, the program reached 160 students through five events. Survey responses were collected from 100 participants before the program and 66 after its completion. The cohort was notably diverse: 36% identified as Black or African American, 65% as Hispanic, and 72% as female. Participants showed statistically significant improvements in several areas: increased interest in orthopedics ($p = 0.003$), Greater inclination toward pursuing medical school ($p = 0.014$) and orthopedic careers ($p = 0.02$), improved perceptions of orthopedic surgeons ($p = 0.012$), Enhanced familiarity with orthopedic terminology and overall confidence in understanding the field ($p = 0.001$) .The Distance Traveled program is a promising, reproducible model for increasing representation and inclusion in orthopedic surgery, a field historically lacking gender and ethnic representation. By improving early exposure and interest in the field among underrepresented high school students, this initiative has the potential to contribute to a more representative physician workforce.

Undergraduate Podium Presentations – Monday, March 31

MCSC 249 | Humanities **9:30 AM - 11:00 AM**

UPM01 9:30-9:45 ***Jordan Burchett,*** The Effects of Systemic Racism: How the Behavioral Perspective Can Facilitate Prevention and Intervention

UPM02 9:45-10:00 ***Ilaria Noonan,*** Examining Southwest Airline's Paradoxical Communicative Response to the December 2022-2023 Crisis

UPM03 10:00-10:15 ***Catherine Nuijens,*** The Thin Line: When Democracies Turn Against Themselves

UPM04 10:15-10:30 ***Diane Zodulua and Yakira Striblin,*** Black Woman Victims of Domestic Violence: How the Behavioral Perspective can be used to Develop Individualized Interventions

UPM05 10:30-10:45 ***Trenton Hightower,*** Does AI Truly Create Art? Exploring Questions of Intention and Perception

UPM06 10:45-11:00 ***Alexiya Nieves,*** Autism in Hispanic Families - How the Behavioral Perspective can Help Facilitate Early Diagnosis and Intervention

Moderator: Margaret Milteer
Judge: Laura Bright, Clark Nall

MCSC 200 (BlackBox Theatre) **10:00 AM - 11:15 AM**
Education
Engineering
Social Sciences
Technology and Computer Sciences
Visual Art & Design

UPM07 10:00-10:15 ***Weston Nelson,*** Voice-Based Mood Detection for Emotionally Appropriate AI Responses

UPM08 10:15-10:30 ***Olivia Winter,*** The Hands of Life

UPM09 10:30-10:45 ***Sophie Arruza,*** Cloud Coverage Estimation for Improved Atmospheric Acoustic Predictions

UPM10 10:45-11:00 ***Caroline Meininger,*** Lilly's Magical Toolbox

UPM11 11:00-11:15 ***Catherine Harris,*** Adherence to Male Rape Myths

Moderator: Amy Cooley
Judge: David Hart, James Clifford

MCSC 253 | Human Health **1:00 PM - 1:45 PM**

UPM12 1:00-1:15 ***Emma Stewart,*** Consistency in Clinical Reporting of Nasopharyngoscopy Findings: A Multisite Study

UPM13 1:15-1:30 ***Raghav Yelamanchili,*** Community Attitudes Towards Mental Health in the Indigenous Communities of the Nilgiris

UPM14 1:30-1:45 ***Marcus Okafor,*** A Relationship Between Exercise and Obesity

Moderator: Tundé Falohun
Judge: Elizabeth Baker, Graham Bitzer

MCSC 200 (BlackBox Theatre) | Natural Sciences **1:15 PM - 2:15 PM**

UPM15 1:15-1:30 ***Emma Lou Pakulniewicz,*** Characterization of Background-Dependent Effects of zfl1;zfl2 Double Mutants in Maize Development

UPM16 1:30-1:45 ***Christine Chan,*** Microplastic Settlement Across a Salinity Gradient in the Pamlico Sound

UPM17 1:45-2:00 ***Joshua Packard,*** The Effect of Fiber Tension on Blood Clot Digestion (Fibrinolysis)

UPM18 2:00-2:15 ***Madison Mays,*** Nestling Diet and its Effect on Developmental Rate and Gut Microbiomes in Eastern Bluebirds

Moderator: Tonya Zecycki
Judge: Ethan Carrow, Nathan Hudson

MCSC 249 | Biomedical Sciences **1:30 PM - 3:30 PM**

UPM19 1:30-1:45 ***Nandini Vishwakarma,*** Dopamine Receptor Control of Collagen Transcription and Secretion: Relevance to Fibrosis, Health, and Disease

UPM20 1:45-2:00 ***Cindy Martines,*** Creation of the First B-Cell Specific Ataxin-1 Conditional Knockout Mouse Model

UPM21 2:00-2:15 ***Kia Sehizadeh,*** µCT Analysis of Craniofacial Skeleton in ADAP1 KO Mice

UPM22 2:15-2:30 ***Lawson Cross,*** Effect of Housing Conditions on Larval Zebrafish Spinal Cord Regeneration Post Spinal Cord Injury (SCI)

MCSC 249 | Biomedical Sciences (cont'd) 2:45 PM - 3:30 PM

2:30-2:45 **BREAK**

UPM23 2:45-3:00 ***Dylan Miller,*** Computational Tracking of Fibrin Polymerization

UPM24 3:00-3:15 ***Lydia Simmons,*** Characterizing the DNA Binding Activity of Biofilm Regulatory Protein SypG From Vibrio fischeri

UPM25 3:15-3:30 ***Lovens Paul,*** Investigating the Role of the Nucleocytoplasmic Protein Tnpo-SR in the Germline Stem Cells of Drosophila Melanogaster

Moderator: Ian Barton
Judge: Swati Surkar, Brittany Roenker

Undergraduate Poster Presentations – March 31

Order by Poster Number

All Poster Sessions are in the Ballrooms of the Main Campus Student Center

9:30-11:30 UPR1
Samuel Stafford, *Atlantic Mackerel, Vitamin A, Inflammation, and Gut Microbiome*

9:30-11:30 UPR2
Lauren Garcia, *Evaluating Treatment Efficacy of a Novel Nano-Antibiotic against Drug-Resistant Pseudomonas aeruginosa Planktonic and Biofilm Forms in a COPD Model*

9:30-11:30 UPR3
Peyton Disser, *tDCS and Social Language Processing: Investigating the rTPJ's Role in Sarcasm and Teasing Interpretation*

9:30-11:30 UPR4
Molly Thomas, *Athlete Recovery and External Workload in Collegiate Women's Soccer Players*

9:30-11:30 UPR5
Danielle Williams, *Modeling Utero-Ovarian Blood Flow and the Impacts of Hysterectomy on the Ovarian Blood Supply*

9:30-11:30 UPR6
Kaylin Lisk, *Evaluating the Biocompatibility of MIcelles in Melanoma Cells*

9:30-11:30 UPR7
Maegan Parrish, *Depression & Anxiety Levels of Club & DI Athletes*

9:30-11:30 UPR8
Robin Thomas, *Investigating the Role of Tuberous Sclerosis Complex In Synapse Formation*

9:30-11:30 UPR9
Hana DiAugustine, *Influence of Glucose Concentration on Macrophage Polarization in Vitro*

9:30-11:30 UPR10
Haley Williams, *Covering Collagen: Pyrene as Probe and Protector*

9:30-11:30 UPR11
Kira Standish, *SypA: A Key Biofilm Regulatory Protein in Vibrio fischeri*

9:30-11:30 UPR12
Kara DuBois, *STORMing the Synapse: A Developmental Timeline of Synapse Formation in Autism Spectrum Disorders*

9:30-11:30 UPR13
Colton Rust, *Preparing Mariprofundus erugo, a novel iron-oxidizing bacteria for type cultures*

9:30-11:30 UPR14
Taylor Job, *Snapping Hip Syndrome and Muscle Stiffness*

9:30-11:30 UPR15
Bridget Smith-Butler, *Empowering Health and Well-Being: Integrating CMHRP, CMARP, and Healthy Beginnings*

9:30-11:30 UPR16
Ginny Stroud, *Does body position in a MRI machine impact the perception of speech and resonance?*

9:30-11:30 UPR17
Dhwani Hada, Hannah Snead *Pathway to Health Professions: Implementing Undergraduate Interprofessional Education*

9:30-11:30 UPR18
Madison Wood, *Buprenorphine Prescription in North Carolina*

9:30-11:30 UPR19
Bhumi Patel, *Investigating College Students' Blood Pressure Knowledge: Implications for Long-Term Cardiovascular Health*

9:30-11:30 UPR20
Kendall Pixley, *Bridging Rural Inequities in Diabetes and Glaucoma Education and Screening in North Carolina (BRIDGES-NC)*

9:30-11:30 UPR21
Emma Williams, *Event related potentials to noun and verb production*

9:30-11:30 UPR22
Ava Gentile, *PEP Squad*

9:30-11:30 UPR23
Katelyn Vogel, *Determing Prosthesis Acceptance: Differences in Patient Characteristics and Utilization of Rehabilitation after Lower Limb Amputation*

9:30-11:30 UPR24
Nathan Kiger, *Gathering Data For A Health Deprivation Dashboard For North Carolina Counties*

9:30-11:30 UPR25
Cooper Slough, Kevin Reilly *The Effect of Maximal Voluntary Breath Hold on Blood Pressure and Augmentation Index*

9:30-11:30 UPR26
Makayla Langley, *Impact of Fatigue on Postural Stability and Brain Wave Activity*

9:30-11:30 UPR27

Anna Honeycutt, *Visually Translating Culinary Medicine: The Innovation Behind Creating a Healthy/Wholesome Cookbook Raising Food Literacy and Combating Cardiometabolic Risks*

9:30-11:30 UPR28
Myles Byrd, *Enhancing Vision Care: The Critical Role of Retinal Imaging for Women and Children*

9:30-11:30 UPR29
Calissa Watson, *Exploring Patient Perspectives Through Visual Research*

9:30-11:30 UPR30
Abby Mountz, *An MRI Analysis: Is there a correlation between bihamular distance and intravelar levator veli palatini length?*

9:30-11:30 UPR31
Lydia Crawford, *Shouting for Success? Examining Voice Changes, Hydration, and Professional Help-Seeking in Athletes*

9:30-11:30 UPR32
Stephanie Sarambo, *AI-Powered Chatbot for Automated Essay Review: Enhancing Writing Feedback and Revision*

9:30-11:30 UPR33
Ricardo Zeferino-Rodriguez, *Developing Interactive Software For Sperm Motility Analysis*

9:30-11:30 UPR34
Jordan Welborn, *Improving Convergence in Transformers: A Bidirectional Attention Approach*

9:30-11:30 UPR35
Alec Lozano, *Will introducing younger students to robots propel them to pursue computer science?*

9:30-11:30 UPR36
Ryan Hall, *Ultra Realistic Graphics Rendering Through Means of Gaussian Splatting*

9:30-11:30 UPR37
Darby Waters, *Navigating the Pitch: Path Planning and Computer Vision for Soccer Robots*

9:30-11:30 UPR38
July Park, *Enhancing IoT Cybersecurity through Attack Simulation and Machine Learning-Based Detection*

9:30-11:30 UPR39
Thomas O'Sullivan, *Enhancing Vision Transformers with Selection Based Attention Mechanisms*

9:30-11:30 UPR40
Majoie Ngandi, *Using Machine Learning to Predict Breast Cancer Reccurence score: Improving accuracy*

9:30-11:30 UPR41
Sofia Azam, *Breast cancer recurrence prediction with machine learning*

9:30-11:30 UPR42
Marian Sousan, *Computational Pathology for Cancer Recurrence Prediction*

10:00-12:00 UPR43
Kelly Williford, *Teacher Recruitment and Retention in Rural Areas*

10:00-12:00 UPR44
Savannah Brooks-Farrar, *The Effects of Music Relationship on College Musicians and Athletes Over Time*

10:00-12:00 UPR45
Brooke Stephenson, *Supporting Education through the Growth of the ECU School of Hospitality Leadership Food & Wine Festival*

10:00-12:00 UPR46
Mikaela Trank, *Expanding Cultural Competency through a Digitally Immersive Map of Buenos Aires*

10:00-12:00 UPR47
Lauren Ingram, *The Impact of High-Stress Periods and Health Education on Injury Prevalence Among Student Musicians*

10:00-12:00 UPR48
Hannah Shook, Jordan Cline, Caleigh Jones *Impact of a Student-Led Clinical Practicum on Dysphagia Knowledge and Competency in Graduate Speech Pathology Clinicians*

10:00-12:00 UPR49
Lexi Karaivanova, *Rock on Bones: Western Music and Russian Rock in Perestroika and Post-Soviet Cinema*

10:00-12:00 UPR50
Emma Saddison, Kaylie Williams, Emma Saddison *Sustainability in Buenos Aires*

10:00-12:00 UPR51
Sara Kalawska, *Religion and Socioeconomic Status: How Does Locus of Control Fit in?*

10:00-12:00 UPR52
Bethany Petersen, *Jamming for Connection? - Does informal music-making increase interpersonal communication skills when compared to formal music-making.*

10:00-12:00 UPR53
Joshua Dail, *Associations of HPV infection with cardiovascular health (CVH): Findings from the National Health and Nutrition Examination Survey (NHANES)*

10:00-12:00 UPR54
Lydia Randall, *The Effects of Fatigue on Postural Control in Healthy Populations: A study using Novel Pedar in-sole pressure system and a force plate to evaluate balance*

10:00-12:00 UPR55
Loghan Jones, *Exploring the Possible Correlation Between Levator Origin Distance and Craniofacial Syndrome Diagnosis*

10:00-12:00 UPR56
Sudiksha Modugu, Laasya Sai Channa *A Systematic Literature Review on Asian Indian Parenting Children with Disabilities: What we learnt and What is in the Future?*

10:00-12:00 UPR57
Paulina Weglarczyk, *Determining if East Carolina University is willing to become a more trauma-informed campus.*

10:00-12:00 UPR58
Za'Qualyn Henderson, *Birthing Experiences*

~~**10:00-12:00 UPR59**~~ **CHANGED TO ONLINE PRESENTATION**
~~**Aliah Spencer,** *Evaluating Rural Healthcare Disparities and Applying Public Health Interventions*~~

10:00-12:00 UPR60
Tyler Bryant, *EPOC Substrate Metabolism AT/RT*

10:00-12:00 UPR61
Madison Butcher, *Semi-automated measurement of vowel formant centralization to assess acquired apraxia of speech from narrative samples.*

10:00-12:00 UPR62
Trisha Rangaraju, *The association of functional performance deficits with quadriceps strength deficits*

10:00-12:00 UPR63
Melony Grace Hodges, *Determining factors for developing a framework for a feasibility study before opening a rural dental clinic*

10:00-12:00 UPR64
Luis Ramirez, *Computational Analysis of Pitch Modulation: Prosodic Adaptation to L2 Avatar Patients a Mixed-Reality Simulation*

10:00-12:00 UPR65
Kyrstin Rollins, *Mobile Sensorimotor Integration Assessment in Soccer Players*

10:00-12:00 UPR66
Riley Weaver, *MCH - STEP/ Public Health Internship*

10:00-12:00 UPR67
Rachel Lee, *Investigation of the psychological and social factors influencing students' knowledge of and access to professional clothing*

10:00-12:00 UPR68
Bryana Backues, *Influence of mom vs sibling on preschool-aged children's physical activity levels*

10:00-12:00 UPR69
Kenison Parker, *Verbal Feedback and Cadets' Shooting Performance*

10:00-12:00 UPR70
Jay Blackwelder, *Understanding differences in gambling behavior between sports wagers and other forms of gambling*

10:00-12:00 UPR71
Kailan Woodard, *Effectiveness of Social Media Campaigns in Increasing Awareness of the Combined Health Risks of Vaping and Alcohol Use in College Students*

10:00-12:00 UPR72
Aaliyah Buford, *College Students' Interest, Barriers, and Preferences for Trauma-Sensitive Yoga Programs based on Trauma Type*

10:00-12:00 UPR73
Parker Lee, *Student Belonging at ECU and How it Affects Academic Success*

10:00-12:00 UPR74
Molly McClain, *The Prevalence and Danger of Drivers Under the Influence Around East Carolina University*

10:00-12:00 UPR75
Cassidy Morrison, *Understanding the operation and distribution of tribal casinos across the U.S.: A comparative analysis of state-wide casino domains and self-exclusion programs under Native American tribal ownership for responsible gaming initiatives*

10:00-12:00 UPR76
Makayla Norris, Elina Kaveh, Joshua Knipe, Kaitlyn Cannon, Gillian Christman Look *Good, Age Well: The Role of Subjective Age in Understanding Workplace Behaviors*

10:00-12:00 UPR77
Gracie Sweeney, *Analysis of pauses in the narrative speech of healthy speakers and speakers with aphasia*

10:00-12:00 UPR78
Gillian Christman, *More than a phase: The impact of sexual orientation, age, and prescriptive stereotype violation on coworker perceptions*

10:00-12:00 UPR79
Hayden Humphreys, *Exploring the ethical decision-making differences between accounting students and professionals*.

10:00-12:00 UPR80
Hannah Carte, *AI and the Detection of Deceptive Speech in Fraudulent Behavior*

10:00-12:00 UPR81
Sarah Maisto, *Emerging Trends and Approaches to Student Leadership within Higher Education*

10:00-12:00 UPR82
Neeraj Mehra, *Technology's Impact on Entrepreneurship*

10:00-12:00 UPR83
Keifer Boyd, *Exploring High School Athletics through an Accounting Perspective*

10:00-12:00 UPR84
Jackson Godwin, *Incentives for Tax Abuse by Micro-Captive Insurance Companies*

10:00-12:00 UPR85
Kelly Adams, *Perceptions of AI-Generated Content: How College Students Feel about AI-created Content in the Field of Marketing*

1:00-3:00 UPR86
Paul Jones, *Efficacy of Formulated Insecticide Product ReMoa Tri® Against Mosquitoes Exposed in a Field Trial or Laboratory Wind Tunnel*

1:00-3:00 UPR87
Allison Simmons, *Overexpression of Eip75B results in early lethality and egg chamber death in Drosophila*

1:00-3:00 UPR88
Dhanushi Dedakia, *Magneto Mechanical Actuation to Treat Brain Cancer*

1:00-3:00 UPR89
Kendall Wilkerson, Elucidating *Neuroprotective Signatures of Cannabidiol in a Valproic Acid Model of Autism Spectrum Disorders*

1:00-3:00 UPR90
Jacob Krakover, *Advancing the understanding of the Vibrio fischeri biofilm formation through the response regulator SypG*

1:00-3:00 UPR91
Madeline Herring, *The Perception, Judgement, and Justification of SSRI Usage*

1:00-3:00 UPR92
Mason Schwartz, *Spilanthol as a Prospective Fungicidal Treatment of Oral candidiasis caused by Candida spp.*

1:00-3:00 UPR93
Kristalina Kiriai, *Myoferlin is localized to mitochondria associated membranes in adult T-cell Leukemia: potential impact on cellular metabolism?*

1:00-3:00 UPR94
Madison Kennedy, *Examining the Relationship between Confidence and Individual Performance in an ROTC Rope Pull Task.*

1:00-3:00 UPR95
Ysabella Villacorte, *Redistribution of pRhoA in the Mouse Hippocampus and Cortex: Implications for Neurodegenerative Disorders*

1:00-3:00 UPR96
Garrett Moore, *Leveraging Virtual Reality for Pedagogical Innovation: A Case Study of a 3D Heart Model for Anatomical Education*

1:00-3:00 UPR97
Neil Garza Hernandez, *Characterizing the indirect interactions of the H-NS-Like gene silencer MucR on the expression of the virB operon in Brucella abortus.*

1:00-3:00 UPR98
Emma Rush, *Comparison of field trial and wind tunnel exposure of mosquitoes to insecticide formulated products*

1:00-3:00 UPR99
Cindy Martines, *Creation of the First B-Cell Specific Ataxin-1 Conditional Knockout Mouse Model*

1:00-3:00 UPR100
Jake Roberson, *Immunotoxicology of Understudied PFAS Found in North Carolina*

1:00-3:00 UPR101
Erin Lang, *Characterization of N-glycans in a Newly Engineered Single Knockout Zebrafish Model*

1:00-3:00 UPR102
Megan Zeidler, *Reproductive Coercion: An Innovative Intervention for Adolescent Females – Phase II*

1:00-3:00 UPR103
Claire Boger, *Nursing Retention Strategies in the Acute Care Setting*

1:00-3:00 UPR104
Hannah Huffman, *Exploring the Influence of Self-Awareness of Emotions Among BSN Students*

1:00-3:00 UPR105
Emma Campbell, Ava B. O'Neill, Labdhi A. Shah *Equine Assisted Learning to Reduce Burnout, Perceived Stress, and Promote Resilience*

1:00-3:00 UPR106
Haley Richardson, *The Impact of a Cancer Diagnosis on the Adolescent and Young Adult Experience*

1:00-3:00 UPR107
Aniah Atkinson, *Nursing Student's Well-Being While In Nursing School*

1:00-3:00 UPR108
Aryn Cimmerer, *Honors College Students in Nursing School: Exploring the Cause of Attrition Rates*

1:00-3:00 UPR109
Matthew Sadlowski, *Faculty Perspectives of Utilizing Graduate Research Assistants within a College of Nursing*

1:00-3:00 UPR110
Alia Throckmorton, *Examining the Impact of a Mother's Health and Environment on her Child's Health in Utero and Personal Health Outcomes*

1:00-3:00 UPR111
Sydney Crumpler, *Anesthesia Awareness and Repercussions*

1:00-3:00 UPR112
Sydney Rogers, *Exploring the Adverse Effects of Anesthesia and how Nurses can Alleviate It*

1:00-3:00 UPR113
Neesha Dutta, *Investigating the role of miRNAs in nicotine-dependent behaviors and transgenerational mechanisms in Caenorhabditis elegans*

1:00-3:00 UPR114
Sydney Coll, *Collagen, interrupted: Analysis and application of fluorescent collagen capsules*

1:00-3:00 UPR115
Scott Alkins, *Substrate-Induced Conformational Changes in Animal LOX's*

1:00-3:00 UPR116
Thanh Nguyen, *Optimization of "Green" Nitration of Vanillin and o-Vanillin*

1:00-3:00 UPR117
Max Washington, *A comparison of extraction methods to identify volatile compounds produced by bryophytes in the nests of prothonotary warblers (Protonotaria citrea)*

1:00-3:00 UPR118
Prisha Singh, *Can higher mesograzer abundance and diversity influence epibiont load in seagrass beds?*

1:00-3:00 UPR119
Victoria Woollen, *Investigating the role of microRNAs on the transgenerational effects of nicotine using Caenorhabditis elegans*

1:00-3:00 UPR120
Brianna Stanley, *Comparing Biodiversity Between Restored and Natural Oyster Reefs*

1:00-3:00 UPR121
Avery Van Benthuysen, *Beach driving impacts on nesting sea turtles: A qualitative analysis from Cape Hatteras, North Carolina*

1:00-3:00 UPR122
Kaitlyn Cannon, *Could I be High Potential? The Role of Perceived Learning Agility in Different Aged Workers*

1:00-3:00 UPR123
Essence Hopkins, *Shaping Social Perception: How tDCS Affects Sarcasm Interpretation Across Empathy Groups in the Right TPJ*

1:00-3:00 UPR124
Marley Ray, *The production and comprehension of reversible dative and benefactive sentences*

1:00-3:00 UPR125
Matthew Walston, *Public Perceptions of Juvenile Justice*

1:00-3:00 UPR126
Benjamin Shaw, *Mindfulness Based Program Participation Interest, Motivators, Barriers, and Preferences in Emerging Adults with Low Income*

1:00-3:00 UPR127
Kendall Brockman, *Barriers to Resistance Training in College Women*

1:00-3:00 UPR128
A'riana Crumpler, *Menstrual Stations at Carol G. Belk*

1:00-3:00 UPR129
Chloe Cannon, *Enhancing Digital Equity in Eastern North Carolina*

1:00-3:00 UPR130
Melina D'Rozario, *A Comparative Case Study on the United States Government and Military Response: 2010 Haitian Earthquake and Hurricane Maria in 2017*

1:00-3:00 UPR131
Ella Donahue, Kylie Palmer *Enhancing Sensory Development in Early Childhood Through Innovative 3D-Printed Sensory Boxes*

1:00-3:00 UPR132
Rashanda Cooper, *Closing the Gaps and Increasing Community Involvement in Child and Maternal Health: Results of the 2024 North Carolina Title V Needs Assessment*

1:00-3:00 UPR133
McKenzie Denis, *Digital Equity Outreach*

1:00-3:00 UPR134
Jake Pleasant, Lawson Barbee *The Impact of ASCM on IDIS*

1:00-3:00 UPR135
Kylie Palmer, Ella Donahue *Enhancing Sensory Development in Early Childhood Through Innovative 3D-Printed Sensory Boxes*

1:30-3:30 UPR136
Nema Salaheldeen, *Enhancing Biodiesel Yield through Enzymatic Transesterification of Waste Cooking Oils*

1:30-3:30 UPR137
Chris Kalapurackal, *Using Second-Life Electric Vehicle (EV) Batteries as Energy Storage Economic, Environmental, and Social Impacts*

1:30-3:30 UPR138
Brooke Butler, *Wetland Design Tool for Wastewater Treatment*

1:30-3:30 UPR139
Kyle Kirwin, Trent Byrum Molly Lasure *Summary of Near-Shore Long Range Atmospheric Acoustics Field Measurements*

1:30-3:30 UPR140
Zasha Griffin, *Inorganic Nitrogen Export from Waterfowl Impoundments*

1:30-3:30 UPR141
Savanah Tribbe, *Demographic Factors that Influence Age of First Depression Medication Use in Pediatric Cancer Patients*

1:30-3:30 UPR142
Reagan Daniel, *Males vs. Females: Physical Strength, Confidence, & Effort in ROTC*

1:30-3:30 UPR143
Kaylee Meer, *Understanding College Student Stress: Conceptualizations and Health Outcomes*

1:30-3:30 UPR144
Coleman Bass, *PIKE Performance: Fraternity Health Initiative*

1:30-3:30 UPR145
Elayna Arthur, Karigan Zaferatos *College Students' Perceptions of Older Adults*

1:30-3:30 UPR146
Colbie Bond, *Drivers of Support for Marine Energy Development in North Carolina*

1:30-3:30 UPR147
Joshua Knipe, Gillian Christman, Kaitlyn Cannon, Makaila Dawson *Is it because of my age? The impact of discrimination and goal (dis)engagement on successful aging*

1:30-3:30 UPR148
Nick Marsicano, *On the acceptability of short passive sentences with and without thematic violations*

1:30-3:30 UPR149
Brianna Winsett, *Function of Crispr-tagged and altered forms of translation factors in C elegans germ cell mRNA translation*.

1:30-3:30 UPR150
Sophia DeBruhl, *Effects of Plant-Growth-Promoting Bacteria on Plant Salinity Stress*

1:30-3:30 UPR151
Naomi Benson, Arhemy Franco-Gonzalez*,* *Optimizing Arginine for enantioselectivity in a Warfarin Synthesis*

1:30-3:30 UPR152
Katlyne Hoover, *FBF/PUF and CYB-1/Cyclin B Promote Sperm Viability by Inhibiting CED-4-mediated Apoptosis*

1:30-3:30 UPR153
Braddock Rhodenhiser, *Evaluating the impacts of black gill disease on hepatopancreas size in penaeid shrimp*

1:30-3:30 UPR154
Heather Mainor, *Prescribed burns and avian reproduction: investigating fire impact on Eastern Bluebird egg and clutch size*

1:30-3:30 UPR155
Amilia Price, *Investigation Proton Absorption using SRIM Simulations*

1:30-3:30 UPR156
Alexus Wilson, *Molecular Level Insights into PFAS Interactions with Human Serum Proteins*

1:30-3:30 UPR157
Gianna Provenzano, Kelsey Dudash *Abundance and Distribution of Larval Fishes and Eggs over the Cape Hatteras Front*

1:30-3:30 UPR158
Billy Hinson, *Toxoplasma gondii seroprevalence and transmission factors among six free-ranging lemur species*

1:30-3:30 UPR159
Joanna Kirkendoll, *Immobilized enzyme approach to anti-microbial peptide production*

1:30-3:30 UPR160
Hannah King, *Anxiety-like and Motor Activity Abnormalities in Adult Zebrafish Deficient in Hybrid and Complex Types of N-glycans*

1:30-3:30 UPR161
Jannire Mireles-Camey, *Super-Resolution Imaging to Visualize the Composition of Developing Synapses*

1:30-3:30 UPR162
Maria Mendoza-Guerra, *Stimulation of kinin B1 receptor induces mitochondrial dysfunction in microglial cells*

1:30-3:30 UPR163
Deniya Evans, *Effects of Gestational Diabetes Mellitus Treatment on Placenta Triglycerides and Efficiency*

1:30-3:30 UPR164
Noah Sampson, *Cloning and Characterization of Regulatory T Cells for Therapeutic Applications in Autoimmune Diseases*

1:30-3:30 UPR165
Kaylee Krause, Douglas Sandford Bell, Jr. *The Role of ADAP/Centaurin--a1 in Hippocampal-Based Trace Eyeblink Classical Conditioning*

1:30-3:30 UPR166
William Carroll, *The effects of hypofibrinolytic defects on the digestion of blood clots.*

1:30-3:30 UPR167
Matthew Geib, *Low Fidelity Surgical Simulation Models*

1:30-3:30 UPR168
McKyrah Brown, *Impact of micro- and nanoplastics on heart development in an in vitro testing battery*

1:30-3:30 UPR169
Noel Locher, *Semitendinosus Tendon Stiffness vs. Time After Anterior Cruciate Ligament Reconstruction*

1:30-3:30 UPR170
Alexis Thomas, *Structural and quantitative analysis of the prostamide 15d-PMJ2 by NMR and computational studies.*

1:30-3:30 UPR171
Trinity Coates, *Does HERS2 Upregulation Contribute to Ethanol-Induced Cardiotoxicity?*

1:30-3:30 UPR172
Bayli Locklear, *Investigating the effect of 15dPMJ2-induced PGE2 synthesis on tumor growth and immune cell infiltration in CT26 colon tumor*

1:30-3:30 UPR173
Adriana Rodriguez, *Determining the Role of Transcription Factor Ftz-F1 in Germline Stem Cell Maintenance*

1:30-3:30 UPR174
Sruthi Kannajoshyula, *Increased B1R expression and microglial activation in hypertension*

1:30 – 3:30 UPR175
Caitlyn Mooers, Altered cell signaling in an aged model of heart failure with preserved ejection fraction

Undergraduate Poster Presentations – March 31

Order By Poster Number

All Poster Presentations are in the Ballrooms – March 31 (Monday)			
Time	**Poster #**	**Presenter (First Author)**	**Topic Area**
9:30-11:30	UPR1	Samuel Stafford	Biomedical Sciences
9:30-11:30	UPR2	Lauren Garcia	Biomedical Sciences
9:30-11:30	UPR3	Peyton Disser	Biomedical Sciences
9:30-11:30	UPR4	Molly Thomas	Biomedical Sciences
9:30-11:30	UPR5	Danielle Williams	Biomedical Sciences
9:30-11:30	UPR6	Kaylin Lisk	Biomedical Sciences
9:30-11:30	UPR7	Maegan Parrish	Biomedical Sciences
9:30-11:30	UPR8	Robin Thomas	Biomedical Sciences
9:30-11:30	UPR9	Hana DiAugustine	Biomedical Sciences
9:30-11:30	UPR10	Haley Williams	Biomedical Sciences
9:30-11:30	UPR11	Kira Standish	Biomedical Sciences
9:30-11:30	UPR12	Kara DuBois	Biomedical Sciences
9:30-11:30	UPR13	Colton Rust	Biomedical Sciences
9:30-11:30	UPR14	Taylor Job	Biomedical Sciences
9:30-11:30	UPR15	Bridget Smith-Butler	Human Health
9:30-11:30	UPR16	Ginny Stroud	Human Health
9:30-11:30	UPR17	Dhwani Hada	Human Health
9:30-11:30	UPR18	Madison Wood	Human Health
9:30-11:30	UPR19	Bhumi Patel	Human Health
9:30-11:30	UPR20	Kendall Pixley	Human Health
9:30-11:30	UPR21	Emma Williams	Human Health
9:30-11:30	UPR22	Ava Gentile	Human Health
9:30-11:30	UPR23	Katelyn Vogel	Human Health
9:30-11:30	UPR24	Nathan Kiger	Human Health
9:30-11:30	UPR25	Cooper Slough	Human Health
9:30-11:30	UPR26	Makayla Langley	Human Health
9:30-11:30	UPR27	Anna Honeycutt	Human Health
9:30-11:30	UPR28	Myles Byrd	Human Health
9:30-11:30	UPR29	Calissa Watson	Human Health
9:30-11:30	UPR30	Abby Mountz	Human Health
9:30-11:30	UPR31	Lydia Crawford	Human Health
9:30-11:30	UPR32	Stephanie Sarambo	Technology & Computer Sciences
9:30-11:30	UPR33	Ricardo Zeferino-Rodriguez	Technology & Computer Sciences
9:30-11:30	UPR34	Jordan Welborn	Technology & Computer Sciences
9:30-11:30	UPR35	Alec Lozano	Technology & Computer Sciences
9:30-11:30	UPR36	Ryan Hall	Technology & Computer Sciences
9:30-11:30	UPR37	Darby Waters	Technology & Computer Sciences
9:30-11:30	UPR38	July Park	Technology & Computer Sciences
9:30-11:30	UPR39	Thomas O'Sullivan	Technology & Computer Sciences
9:30-11:30	UPR40	Majoie Ngandi	Technology & Computer Sciences
9:30-11:30	UPR41	Sofia Azam	Technology & Computer Sciences
9:30-11:30	UPR42	Marian Sousan	Technology & Computer Sciences
10:00-12:00	UPR43	Kelly Williford	Education
10:00-12:00	UPR44	Savannah Brooks-Farrar	Fine & Performing Arts
10:00-12:00	UPR45	Brooke Stephenson	Interdisciplinary Innovation
10:00-12:00	UPR46	Mikaela Trank	Education
10:00-12:00	UPR47	Lauren Ingram	Fine & Performing Arts
10:00-12:00	UPR48	Hannah Shook	Education
10:00-12:00	UPR49	Lexi Karaivanova	Humanities

10:00-12:00	UPR50	Emma Saddison	Humanities
10:00-12:00	UPR51	Sara Kalawska	Humanities
10:00-12:00	UPR52	Bethany Petersen	Human Health
10:00-12:00	UPR53	Joshua Dail	Human Health
10:00-12:00	UPR54	Lydia Randall	Human Health
10:00-12:00	UPR55	Loghan Jones	Human Health
10:00-12:00	UPR56	Sudiksha Modugu	Human Health
10:00-12:00	UPR57	Paulina Weglarczyk	Human Health
10:00-12:00	UPR58	Za'Qualyn Henderson	Human Health
~~10:00-12:00~~	~~UPR59~~	~~Aliah Spencer~~	~~Human Health~~ Changed to ONLINE presentation
10:00-12:00	UPR60	Tyler Bryant	Human Health
10:00-12:00	UPR61	Madison Butcher	Human Health
10:00-12:00	UPR62	Trisha Rangaraju	Human Health
10:00-12:00	UPR63	Melony Grace Hodges	Human Health
10:00-12:00	UPR64	Luis Ramirez	Human Health
10:00-12:00	UPR65	Kyrstin Rollins	Human Health
10:00-12:00	UPR66	Riley Weaver	Human Health
10:00-12:00	UPR67	Rachel Lee	Human Health
10:00-12:00	UPR68	Bryana Backues	Human Health
10:00-12:00	UPR69	Kenison Parker	Social Sciences
10:00-12:00	UPR70	Jay Blackwelder	Social Sciences
10:00-12:00	UPR71	Kailan Woodard	Social Sciences
10:00-12:00	UPR72	Aaliyah Buford	Social Sciences
10:00-12:00	UPR73	Parker Lee	Social Sciences
10:00-12:00	UPR74	Molly McClain	Social Sciences
10:00-12:00	UPR75	Cassidy Morrison	Social Sciences
10:00-12:00	UPR76	Makayla Norris	Social Sciences
10:00-12:00	UPR77	Gracie Sweeney	Social Sciences
10:00-12:00	UPR78	Gillian Christman	Social Sciences
10:00-12:00	UPR79	Hayden Humphreys	Business
10:00-12:00	UPR80	Hannah Carte	Business
10:00-12:00	UPR81	Sarah Maisto	Business
10:00-12:00	UPR82	Neeraj Mehra	Business
10:00-12:00	UPR83	Keifer Boyd	Business
10:00-12:00	UPR84	Jackson Godwin	Business
10:00-12:00	UPR85	Kelly Adams	Business
1:00-3:00	UPR86	Paul Jones	Biomedical Sciences
1:00-3:00	UPR87	Allison Simmons	Biomedical Sciences
1:00-3:00	UPR88	Dhanushi Dedakia	Biomedical Sciences
1:00-3:00	UPR89	Kendall Wilkerson	Biomedical Sciences
1:00-3:00	UPR90	Jacob Krakover	Biomedical Sciences
1:00-3:00	UPR91	Madeline Herring	Biomedical Sciences
1:00-3:00	UPR92	Mason Schwartz	Biomedical Sciences
1:00-3:00	UPR93	Kristalina Kiriai	Biomedical Sciences
1:00-3:00	UPR94	Madison Kennedy	Biomedical Sciences
1:00-3:00	UPR95	Ysabella Villacorte	Biomedical Sciences
1:00-3:00	UPR96	Garrett Moore	Biomedical Sciences
1:00-3:00	UPR97	Neil Garza Hernandez	Biomedical Sciences
1:00-3:00	UPR98	Emma Rush	Biomedical Sciences
1:00-3:00	UPR99	Cindy Martines	Biomedical Sciences
1:00-3:00	UPR100	Jake Roberson	Biomedical Sciences
1:00-3:00	UPR101	Erin Lang	Biomedical Sciences
1:00-3:00	UPR102	Megan Zeidler	Nursing
1:00-3:00	UPR103	Claire Boger	Nursing

1:00-3:00	UPR104	Hannah Huffman	Nursing
1:00-3:00	UPR105	Emma Campbell	Nursing
1:00-3:00	UPR106	Haley Richardson	Nursing
1:00-3:00	UPR107	Aniah Atkinson	Nursing
1:00-3:00	UPR108	Aryn Cimmerer	Nursing
1:00-3:00	UPR109	Matthew Sadlowski	Nursing
1:00-3:00	UPR110	Alia Throckmorton	Nursing
1:00-3:00	UPR111	Sydney Crumpler	Nursing
1:00-3:00	UPR112	Sydney Rogers	Nursing
1:00-3:00	UPR113	Neesha Dutta	Natural Sciences
1:00-3:00	UPR114	Sydney Coll	Natural Sciences
1:00-3:00	UPR115	Scott Alkins	Natural Sciences
1:00-3:00	UPR116	Thanh Nguyen	Natural Sciences
1:00-3:00	UPR117	Max Washington	Natural Sciences
1:00-3:00	UPR118	Prisha Singh	Natural Sciences
1:00-3:00	UPR119	Victoria Woollen	Natural Sciences
1:00-3:00	UPR120	Brianna Stanley	Natural Sciences
1:00-3:00	UPR121	Avery Van Benthuysen	Natural Sciences
1:00-3:00	UPR122	Kaitlyn Cannon	Social Sciences
1:00-3:00	UPR123	Essence Hopkins	Social Sciences
1:00-3:00	UPR124	Marley Ray	Social Sciences
1:00-3:00	UPR125	Matthew Walston	Social Sciences
1:00-3:00	UPR126	Benjamin Shaw	Social Sciences
1:00-3:00	UPR127	Kendall Brockman	Social Sciences
1:00-3:00	UPR128	A'riana Crumpler	Social Sciences
1:00-3:00	UPR129	Chloe Cannon	Social Sciences
1:00-3:00	UPR130	Melina D'Rozario	Social Sciences
1:00-3:00	UPR131	Ella Donahue	Community Engagement
1:00-3:00	UPR132	Rashanda Cooper	Community Engagement
1:00-3:00	UPR133	McKenzie Denis	Community Engagement
1:00-3:00	UPR134	Jake Pleasant	Community Engagement
1:00-3:00	UPR135	Kylie Palmer	Community Engagement
1:30-3:30	UPR136	Nema Salaheldeen	Engineering
1:30-3:30	UPR137	Chris Kalapurackal	Engineering
1:30-3:30	UPR138	Brooke Butler	Engineering
1:30-3:30	UPR139	Kyle Kirwin	Engineering
1:30-3:30	UPR140	Zasha Griffin	Engineering
1:30-3:30	UPR141	Savanah Tribbe	Social Sciences
1:30-3:30	UPR142	Reagan Daniel	Social Sciences
1:30-3:30	UPR143	Kaylee Meer	Social Sciences
1:30-3:30	UPR144	Coleman Bass	Social Sciences
1:30-3:30	UPR145	Elayna Arthur	Social Sciences
1:30-3:30	UPR146	Colbie Bond	Social Sciences
1:30-3:30	UPR147	Joshua Knipe	Social Sciences
1:30-3:30	UPR148	Nick Marsicano	Social Sciences
1:30-3:30	UPR149	Brianna Winsett	Natural Sciences
1:30-3:30	UPR150	Sophia DeBruhl	Natural Sciences
1:30-3:30	UPR151	Naomi Benson	Natural Sciences
1:30-3:30	UPR152	Katlyne Hoover	Natural Sciences
1:30-3:30	UPR153	Braddock Rhodenhiser	Natural Sciences
1:30-3:30	UPR154	Heather Mainor	Natural Sciences
1:30-3:30	UPR155	Amilia Price	Natural Sciences
1:30-3:30	UPR156	Alexus Wilson	Natural Sciences
1:30-3:30	UPR157	Gianna Provenzano	Natural Sciences

1:30-3:30	UPR158	Billy Hinson	Natural Sciences
1:30-3:30	UPR159	Joanna Kirkendoll	Natural Sciences
1:30-3:30	UPR160	Hannah King	Biomedical Sciences
1:30-3:30	UPR161	Jannire Mireles-Camey	Biomedical Sciences
1:30-3:30	UPR162	Maria Mendoza-Guerra	Biomedical Sciences
1:30-3:30	UPR163	Deniya Evans	Biomedical Sciences
1:30-3:30	UPR164	Noah Sampson	Biomedical Sciences
1:30-3:30	UPR165	Kaylee Krause	Biomedical Sciences
1:30-3:30	UPR166	William Carroll	Biomedical Sciences
1:30-3:30	UPR167	Matthew Geib	Biomedical Sciences
1:30-3:30	UPR168	McKyrah Brown	Biomedical Sciences
1:30-3:30	UPR169	Noel Locher	Biomedical Sciences
1:30-3:30	UPR170	Alexis Thomas	Biomedical Sciences
1:30-3:30	UPR171	Trinity Coates	Biomedical Sciences
1:30-3:30	UPR172	Bayli Locklear	Biomedical Sciences
1:30-3:30	UPR173	Adriana Rodriguez	Biomedical Sciences
1:30-3:30	UPR174	Sruthi Kannajoshyula	Biomedical Sciences
1:30 – 3:30	UPR175	Caitlyn Mooers	Biomedical Sciences

Order By Presenter First Name

Undergraduate Poster Presentations
In Alphabetical by FIRST NAME Order

All Poster Presentations are in the Ballrooms – March 31 (Monday)

Time	Poster #	Presenter (First Author)	Topic Area
10:00-12:00	UPR72	Aaliyah Buford	Social Sciences
9:30-11:30	UPR30	Abby Mountz	Human Health
1:30-3:30	UPR173	Adriana Rodriguez	Biomedical Sciences
9:30-11:30	UPR35	Alec Lozano	Technology & Computer Sciences
1:30-3:30	UPR170	Alexis Thomas	Biomedical Sciences
1:30-3:30	UPR156	Alexus Wilson	Natural Sciences
1:00-3:00	UPR110	Alia Throckmorton	Nursing
~~10:00-12:00~~	~~UPR59~~	~~Aliah Spencer~~	~~Human Health~~ Changed to ONLINE Presentation
1:00-3:00	UPR87	Allison Simmons	Biomedical Sciences
1:30-3:30	UPR155	Amilia Price	Natural Sciences
1:00-3:00	UPR107	Aniah Atkinson	Nursing
9:30-11:30	UPR27	Anna Honeycutt	Human Health
1:00-3:00	UPR128	A'riana Crumpler	Social Sciences
1:00-3:00	UPR108	Aryn Cimmerer	Nursing
9:30-11:30	UPR22	Ava Gentile	Human Health
1:00-3:00	UPR121	Avery Van Benthuysen	Natural Sciences
1:30-3:30	UPR172	Bayli Locklear	Biomedical Sciences
1:00-3:00	UPR126	Benjamin Shaw	Social Sciences
10:00-12:00	UPR52	Bethany Petersen	Human Health
9:30-11:30	UPR19	Bhumi Patel	Human Health
1:30-3:30	UPR158	Billy Hinson	Natural Sciences
1:30-3:30	UPR153	Braddock Rhodenhiser	Natural Sciences
1:00-3:00	UPR120	Brianna Stanley	Natural Sciences
1:30-3:30	UPR149	Brianna Winsett	Natural Sciences
9:30-11:30	UPR15	Bridget Smith-Butler	Human Health
1:30-3:30	UPR138	Brooke Butler	Engineering
10:00-12:00	UPR45	Brooke Stephenson	Interdisciplinary Innovation
10:00-12:00	UPR68	Bryana Backues	Human Health
9:30-11:30	UPR29	Calissa Watson	Human Health
10:00-12:00	UPR75	Cassidy Morrison	Social Sciences
1:00-3:00	UPR129	Chloe Cannon	Social Sciences
1:30-3:30	UPR137	Chris Kalapurackal	Engineering
1:00-3:00	UPR99	Cindy Martines	Biomedical Sciences
1:00-3:00	UPR103	Claire Boger	Nursing
1:30-3:30	UPR146	Colbie Bond	Social Sciences
1:30-3:30	UPR144	Coleman Bass	Social Sciences
9:30-11:30	UPR13	Colton Rust	Biomedical Sciences
9:30-11:30	UPR25	Cooper Slough	Human Health
9:30-11:30	UPR5	Danielle Williams	Biomedical Sciences
9:30-11:30	UPR37	Darby Waters	Technology & Computer Sciences
1:30-3:30	UPR163	Deniya Evans	Biomedical Sciences
1:00-3:00	UPR88	Dhanushi Dedakia	Biomedical Sciences
9:30-11:30	UPR17	Dhwani Hada	Human Health
1:30-3:30	UPR145	Elayna Arthur	Social Sciences
1:00-3:00	UPR131	Ella Donahue	Community Engagement
1:00-3:00	UPR105	Emma Campbell	Nursing
1:00-3:00	UPR98	Emma Rush	Biomedical Sciences
10:00-12:00	UPR50	Emma Saddison	Humanities

9:30-11:30	UPR21	Emma Williams	Human Health
1:00-3:00	UPR101	Erin Lang	Biomedical Sciences
1:00-3:00	UPR123	Essence Hopkins	Social Sciences
1:00-3:00	UPR96	Garrett Moore	Biomedical Sciences
1:30-3:30	UPR157	Gianna Provenzano	Natural Sciences
10:00-12:00	UPR78	Gillian Christman	Social Sciences
9:30-11:30	UPR16	Ginny Stroud	Human Health
10:00-12:00	UPR77	Gracie Sweeney	Social Sciences
1:00-3:00	UPR106	Haley Richardson	Nursing
9:30-11:30	UPR10	Haley Williams	Biomedical Sciences
9:30-11:30	UPR9	Hana DiAugustine	Biomedical Sciences
10:00-12:00	UPR80	Hannah Carte	Business
1:00-3:00	UPR104	Hannah Huffman	Nursing
1:30-3:30	UPR160	Hannah King	Biomedical Sciences
10:00-12:00	UPR48	Hannah Shook	Education
10:00-12:00	UPR79	Hayden Humphreys	Business
1:30-3:30	UPR154	Heather Mainor	Natural Sciences
10:00-12:00	UPR84	Jackson Godwin	Business
1:00-3:00	UPR90	Jacob Krakover	Biomedical Sciences
1:00-3:00	UPR134	Jake Pleasant	Community Engagement
1:00-3:00	UPR100	Jake Roberson	Biomedical Sciences
1:30-3:30	UPR161	Jannire Mireles-Camey	Biomedical Sciences
10:00-12:00	UPR70	Jay Blackwelder	Social Sciences
1:30-3:30	UPR159	Joanna Kirkendoll	Natural Sciences
9:30-11:30	UPR34	Jordan Welborn	Technology & Computer Sciences
10:00-12:00	UPR53	Joshua Dail	Human Health
1:30-3:30	UPR147	Joshua Knipe	Social Sciences
9:30-11:30	UPR38	July Park	Technology & Computer Sciences
10:00-12:00	UPR71	Kailan Woodard	Social Sciences
1:00-3:00	UPR122	Kaitlyn Cannon	Social Sciences
9:30-11:30	UPR12	Kara DuBois	Biomedical Sciences
9:30-11:30	UPR23	Katelyn Vogel	Human Health
1:30-3:30	UPR152	Katlyne Hoover	Natural Sciences
1:30-3:30	UPR165	Kaylee Krause	Biomedical Sciences
1:30-3:30	UPR143	Kaylee Meer	Social Sciences
9:30-11:30	UPR6	Kaylin Lisk	Biomedical Sciences
10:00-12:00	UPR83	Keifer Boyd	Business
10:00-12:00	UPR85	Kelly Adams	Business
10:00-12:00	UPR43	Kelly Williford	Education
1:00-3:00	UPR127	Kendall Brockman	Social Sciences
9:30-11:30	UPR20	Kendall Pixley	Human Health
1:00-3:00	UPR89	Kendall Wilkerson	Biomedical Sciences
10:00-12:00	UPR69	Kenison Parker	Social Sciences
9:30-11:30	UPR11	Kira Standish	Biomedical Sciences
1:00-3:00	UPR93	Kristalina Kiriai	Biomedical Sciences
1:30-3:30	UPR139	Kyle Kirwin	Engineering
1:00-3:00	UPR135	Kylie Palmer	Community Engagement
10:00-12:00	UPR65	Kyrstin Rollins	Human Health
9:30-11:30	UPR2	Lauren Garcia	Biomedical Sciences
10:00-12:00	UPR47	Lauren Ingram	Fine & Performing Arts
10:00-12:00	UPR49	Lexi Karaivanova	Humanities
10:00-12:00	UPR55	Loghan Jones	Human Health
10:00-12:00	UPR64	Luis Ramirez	Human Health
9:30-11:30	UPR31	Lydia Crawford	Human Health
10:00-12:00	UPR54	Lydia Randall	Human Health

1:00-3:00	UPR91	Madeline Herring	Biomedical Sciences
10:00-12:00	UPR61	Madison Butcher	Human Health
1:00-3:00	UPR94	Madison Kennedy	Biomedical Sciences
9:30-11:30	UPR18	Madison Wood	Human Health
9:30-11:30	UPR7	Maegan Parrish	Biomedical Sciences
9:30-11:30	UPR40	Majoie Ngandi	Technology & Computer Sciences
9:30-11:30	UPR26	Makayla Langley	Human Health
10:00-12:00	UPR76	Makayla Norris	Social Sciences
1:30-3:30	UPR162	Maria Mendoza-Guerra	Biomedical Sciences
9:30-11:30	UPR42	Marian Sousan	Technology & Computer Sciences
1:00-3:00	UPR124	Marley Ray	Social Sciences
1:00-3:00	UPR92	Mason Schwartz	Biomedical Sciences
1:30-3:30	UPR167	Matthew Geib	Biomedical Sciences
1:00-3:00	UPR109	Matthew Sadlowski	Nursing
1:00-3:00	UPR125	Matthew Walston	Social Sciences
1:00-3:00	UPR117	Max Washington	Natural Sciences
1:00-3:00	UPR133	McKenzie Denis	Community Engagement
1:30-3:30	UPR168	McKyrah Brown	Biomedical Sciences
1:00-3:00	UPR102	Megan Zeidler	Nursing
1:00-3:00	UPR130	Melina D'Rozario	Social Sciences
10:00-12:00	UPR63	Melony Grace Hodges	Human Health
10:00-12:00	UPR46	Mikaela Trank	Education
10:00-12:00	UPR74	Molly McClain	Social Sciences
9:30-11:30	UPR4	Molly Thomas	Biomedical Sciences
9:30-11:30	UPR28	Myles Byrd	Human Health
1:30-3:30	UPR151	Naomi Benson	Natural Sciences
9:30-11:30	UPR24	Nathan Kiger	Human Health
10:00-12:00	UPR82	Neeraj Mehra	Business
1:00-3:00	UPR113	Neesha Dutta	Natural Sciences
1:00-3:00	UPR97	Neil Garza Hernandez	Biomedical Sciences
1:30-3:30	UPR136	Nema Salaheldeen	Engineering
1:30-3:30	UPR148	Nick Marsicano	Social Sciences
1:30-3:30	UPR164	Noah Sampson	Biomedical Sciences
1:30-3:30	UPR169	Noel Locher	Biomedical Sciences
10:00-12:00	UPR73	Parker Lee	Social Sciences
1:00-3:00	UPR86	Paul Jones	Biomedical Sciences
10:00-12:00	UPR57	Paulina Weglarczyk	Human Health
9:30-11:30	UPR3	Peyton Disser	Biomedical Sciences
1:00-3:00	UPR118	Prisha Singh	Natural Sciences
10:00-12:00	UPR67	Rachel Lee	Human Health
1:00-3:00	UPR132	Rashanda Cooper	Community Engagement
1:30-3:30	UPR142	Reagan Daniel	Social Sciences
9:30-11:30	UPR33	Ricardo Zeferino-Rodriguez	Technology & Computer Sciences
10:00-12:00	UPR66	Riley Weaver	Human Health
9:30-11:30	UPR8	Robin Thomas	Biomedical Sciences
9:30-11:30	UPR36	Ryan Hall	Technology & Computer Sciences
9:30-11:30	UPR1	Samuel Stafford	Biomedical Sciences
10:00-12:00	UPR51	Sara Kalawska	Humanities
10:00-12:00	UPR81	Sarah Maisto	Business
1:30-3:30	UPR141	Savanah Tribbe	Social Sciences
10:00-12:00	UPR44	Savannah Brooks-Farrar	Fine & Performing Arts
1:00-3:00	UPR115	Scott Alkins	Natural Sciences
9:30-11:30	UPR41	Sofia Azam	Technology & Computer Sciences
1:30-3:30	UPR150	Sophia DeBruhl	Natural Sciences
1:30-3:30	UPR174	Sruthi Kannajoshyula	Biomedical Sciences

9:30-11:30	UPR32	Stephanie Sarambo	Technology & Computer Sciences
10:00-12:00	UPR56	Sudiksha Modugu	Human Health
1:00-3:00	UPR114	Sydney Coll	Natural Sciences
1:00-3:00	UPR111	Sydney Crumpler	Nursing
1:00-3:00	UPR112	Sydney Rogers	Nursing
9:30-11:30	UPR14	Taylor Job	Biomedical Sciences
1:00-3:00	UPR116	Thanh Nguyen	Natural Sciences
9:30-11:30	UPR39	Thomas O'Sullivan	Technology & Computer Sciences
1:30-3:30	UPR171	Trinity Coates	Biomedical Sciences
10:00-12:00	UPR62	Trisha Rangaraju	Human Health
10:00-12:00	UPR60	Tyler Bryant	Human Health
1:00-3:00	UPR119	Victoria Woollen	Natural Sciences
1:30-3:30	UPR166	William Carroll	Biomedical Sciences
1:00-3:00	UPR95	Ysabella Villacorte	Biomedical Sciences
10:00-12:00	UPR58	Za'Qualyn Henderson	Human Health
1:30-3:30	UPR140	Zasha Griffin	Engineering

Undergraduate Online Poster Presentations – March 31

Synchronous via MS Teams

UOP01 3:00 – 3:15 PM **Aliah Spencer** Human Health

Evaluating Rural Healthcare Disparities and Applying Public Health Interventions

Mentor: Rose Haddock

Please scan this QR code to go to Aliah's Microsoft Teams Meeting link.

Graduate Student & Postdoctoral Scholar Podium Presentations – April 1

MCSC 253	Biomedical Sciences, Human Health	8:45 AM – 11:00 AM
GPP1	**Benjamin Brisard,** *Revealing Fertilization-Competent Sperm Subpopulations*	
GPP2	**Alexandria Warren,** *Convergence of Ecdysone signaling and BMP signaling on germline stem cell maintenance and differentiation in the Drosophila ovary*	
GPP3	**Keerthana Surabhi,** *Identification of actin mutants with neurodegenerative disease-like phenotypes via mutagenesis of the actin-ATP interface*	
GPP4	**Abigahill Simon,** *Social Regulation of the Parathyroid Type II Neuropeptide System in Zebrafish (Danio rerio)*	
GPP5	**Savanna Williams,** *Epicardial Adipose Tissue Promotes Atrial Fibrosis via Cytokine Modulation*	
GPP6	**Jude Kinkead,** *Molecular Recognition in Bacterial Transition State Regulators*	
GPP7	**Cat Brown,** *Understanding and Addressing Health Disparities Amongst Eastern North Carolin Firefighters using Cardiometabolic Risk Scores*	
GPP8	**Maria Kalogeromitros,** *Distraction Osteogenesis in Syndromic Pierre Robin Sequence: Case Study of Koolen De Vries Syndrome*	
Judges:	*Leslie Kennedy, Susanne Van Der Veen*	
Moderator:	*Jennifer Perry*	

MCSC 253	Fine & Performing Arts and Visual Art & Design	11:30 – 12:45 pm
GPP50	**Rachael Lowman,** *Resilience Through Textile Arts*	
GPP51	**Narges Sedaghat,** *The Role of Iranian Immigrants in Enriching America's Cultural Tapestry*	
GPP52	**Eliza Landis,** *Transformation: Finding the Wild in Liminal Spaces*	
GPP53	**Ryan McDowell,** *Trail and Error, An American Experience*	
GPP54	**Stacy Rodgers,** *Poignant Disarray*	
Judges	*Brandon Stilley, Brian Culbertson*	
Moderator	*Sarah Maness*	

MCSC 253	Biomedical Sciences, Human Health, Engineering	1:00 – 3:30 PM
GPP9	**Yara Maayah,** *Remote magnetic actuation of anisotropic ND-PEG coated iron oxide nanoparticles as a cytoskeleton targeted breast cancer therapy*	
GPP10	**Sam Minier,** *Improving MRI Contrast in Breast Cancer: The Role of Iron Oxide Nanoparticle MorpGrhology in Contrast Enhancement*	
GPP11	**Hoda Jabbour,** *A Novel Platform for Antiviral Therapy that Synergistically Combines the Antiviral Activities of a Viral Host Receptor and an Immune Modulator*	
GPP12	**Jodi Ogle,** *A Stealthy Pathogen's Hidden Talent: A Look into How a Novel Exopolysaccharide Contributes to Brucella Virulence*	
GPP13	**Yonghong Qin,** *Comparison of blood pressure waveforms in a model of palmar artery tree for hemodynamic simulations*	
GPP14	**Sam McCrary,** *ICD Support Groups: Are They Still Relevant Now?*	
GPP 15	**Ankur Padhye,** *Impact of Exertion and Load carriage on Metatarsal Bone Stress in Physically active Females*	
GPP16	**Graham Bitzer,** *Characterizing the regulation of the genes encoding the Type IV secretion system in Brucella abortus by the quorum-sensing regulators, VjbR and BabR, with the H-NS-like gene-silencer MucR*	
GPP 17	**Berwin Singh Swami Vetha,** *Optimization and Evaluation of Pluronic F127 Micelles for Cancer Drug Delivery Applications*	
Judges	*Morgan Milton, Brian Dietrick*	
Moderator	*Swati Surkin*	

MCSC 249	Technology & Computer Sciences, Interdisciplinary Innovation, Engineering, Natural Sciences	9:00- 10:30 AM
GPP18	**Brannon McCutcheon,** *A Super Patching Transformer*	
GPP19	**Roshan Saud,** *Fine Scale Measurement of Urban Shade Patterns for Urban Heat Resilience*	
GPP20	**Matthew Stengrim,** *Application of Monin-Obukhov Similarity Theory to a Near-Shore Atmospheric Acoustic Model: A Measurement Informed Evaluation*	
GPP21	**Jude Dilioha,** *Nitrogen Dynamics of Swine CAFO Waste in Groundwater and Surface Water located in North Carolina.*	
GPP22	**Clark Andersen,** *Social Network Analysis to Measure Trust and Learning in Three Undergraduate Organic Chemistry Laboratory Contexts*	
GPP23	**Mohammad Nazmul Alim,** *Development of a CCD camera-based system for dose rate mapping of rock materials for OSL dating*	
GPP24	**Katherine Dale,** *Eastern Pacific fish spawning patterns demonstrate mixed spatiotemporal tradeoffs in response to environmental changes*	
Judges	*Heris Morteza Nazari, David Tulis*	
Moderator	*Thompson Forbes*	

MCSC 249	Community Engagement, Interdisciplinary Innovation, Engineering, Natural Sciences	11:00 AM – 12:45 PM

GPP25 **Carrie Adams,** *Effects of Social Dominance on the Morphological and Functional Activity of the Diencephalic Posterior Tubercular Nucleus*

GPP26 **Noah Green,** *Removing Barriers to School Health Assessments with Optimally Timed Clinic Events Leveraging Partnerships Across the Healthcare System in Pitt County*

GPP27 **Homeira Faridnejad,** *Dosimetry calibration for low-energy protons (2-4 MeV) using Gafchromic film dosimeters*

GPP28 **Okey Ohanaka,** *Calculating the Shear Viscosity for a Multi-Component System of Quarks and Gluons*

GPP29 **Mason Ross,** *Numerical Evaluation of the Shear Viscosity of the Quark Gluon Plasma*

GPP30 **Tristan Bench,** *Luminescence Dating the Deposition Timelines of Alluvial Fan Sediments in Antarctica as a Proxy for Glacial Melt*

GPP55 **Elnaz Pezeshki**, *Using Hydrological Modeling and Geophysical Methods to Enhance the Understanding of Saltwater Intrusion and Soil Salinization Dynamics in a Coastal Watershed*

Judges *Eric Oakley,*

Moderator *Sachiyo Sherman*

MCSC 249	Community Engagement, Education, Social Sciences	1:15 – 3:15 PM

GPP31 **Victor Ihuka,** *Pitt Perspectives – A Model for Rural Economic Development: Leveraging Culture and a Strong Sense of Place*

Co-Presenters: Ayodeji Odunaike

GPP32 **Chalyne Barrow,** *Assessing North Carolina Pre-K Teachers' Knowledge, Confidence, and Experience on Trauma Informed Care*

GPP33 **Fiona Freeland,** *Identifying Changes in Team Formation Within CUREs Following Team Science Training Using Social Network Analysis*

GPP34 **Elizabeth Pierce,** *Boosting Skills & Confidence: The Power of Peer Tutoring in High School Math*

GPP35 **Thomas Vitti,** *Frequentist and Bayesian Measurement Invariance: Comparisons with Ordinal Indicators.*

GPP36 **Darius Lawton,** *Exploring the Roles of Societal Influences on Black Men's Lifelong Physical Activity Behaviors*

GPP37 **Jarah Newton,** *The Effects of a Yoga Intervention on Female First-Year College Students' Anxiety, Resilience, and Quality of Life*

GPP38 **Mary Green,** *How does the congruence of leader estimated self-efficacy and follower self-efficacy predict performance in a military setting?*

Judges *David Hisle, Joshua Peery*

Moderator *Olga Smirnova*

Blackbox Theater (Room 200) **Fine & Performing Arts and Visual Art & Design** **8:30 AM – 10:00 AM**

~~**GPP44** **Sam Gorritz,** *Synthesis of a Monster*~~ *CANCELLED*

GPP45 **Autumn Standbridge,** *Exploring Devotional Practice*

GPP46 **Parker Estes,** *CTRL + ©*

GPP47 **Austin Irby,** *The Ghost of You: Self-Portraiture as a Site of Memory, Trauma, and Medical Intervention*

GPP48 **Heather Fraccalvieri,** *Narratives of Working Women*

GPP49 **Justin Tyler King,** *By Any Means of Making*

Judges *Clark Nall, Janee' Avent Harris*

Moderator *Michelle Ratliff*

Blackbox Theater (Room 200) **Social Sciences, Humanities** **11:00 AM – 12:30 PM**

GPP39 **Bishop Guempel,** *Behavioral Adjustments and Emergent Efficacy Beliefs in Team Performance During a Rope-Pulling Task*

GPP40 **Eric Larsen,** *Dynamic Predictors of Posttraumatic Stress in Adolescent and Young Adult Cancer Survivors*

GPP41 **Courtney Alston,** *A Behavioral Observation System for Trauma-Informed Student-Teacher Interactions*

GPP42 **Tanner Ruffin,** *I've Lost My Appetite For Work*

GPP43 **Ernestina Akorfa Akorli,** *The Rhetorical Agencies of Ghanaian Celebrity Women's Digital Engagement: Exploring How Instagram Fosters Unique Literacies for Ghanaians.*

Judges *Mark Sanders, Travis Lewis*

Moderator *Virginia Driscoll*

Graduate Student & Postdoctoral Scholar Poster Presentations - April 1,

All posters on April 1 are in the MCSC Ballrooms

Biomedical Sciences and Natural Sciences	**10:00 AM – 12:00 PM**
GP1	**Dillon Garbrandt,** *Renal Oxidative Stress in Renin-Angiotensin-Aldosterone Model of Hypertension*
GP2	**Collin Brinkley,** *Site-specific Connexin-43 Phosphorylation Contributes to Left Ventricular Dysfunction in Estrogen Treated Male Rats*
GP3	**Kylie Cashwell,** *Beyond CASA: A New Framework for Sperm Motility Analysis*
GP4	**Noah Schaaf,** *The Role of Myoferlin in the Metabolism of HTLV-1 Infected Cells*
GP5	**Rachael Johnson,** *Defining mechanisms that regulate cell divisions in a stem cell niche*
GP6	**Madi Swyers,** *The Effect of GPR4 and GPR68 knockouts on B16F10 Subcutaneous Tumor Growth and Modulation of the Tumor Microenvironment*
GP7	**Syed Anees Ahmed,** *Estrogen-Dependent Exacerbation of Ethanol-Induced Cardiac: Role of Circadian Clock Protein Period 2 Suppression and Ferroptosis Augmentation*
GP8	**Vedant Deshpande,** *Engineering and Biological Aspects of Microwave-Based Bacterial Spore Inactivation: A Case Study with B. subtilis*
GP52	**Ellissa DeFeyter,** *Decadal Changes in Ichthyoplankton Community Composition along Inshore-Offshore Transects in Onslow Bay*
Judges	*Ryan Wedge, Erzebet Szatmari*

Biomedical Sciences	**1:00 PM – 3:00 PM**
GP9	**Bo Ao,** *Structural Hemisphericity in Pediatric Hearing Loss: The Role of Twist and Torque*
GP10	**Elody Bensch,** *Vibrio fischeri Biofilm Regulation: Uncovering the Structural and Functional Mechanism of SypA and SypE*
GP11	**Mina Norman,** *PUF-8 and CYB-3 Promote Germline Stem Cell Proliferation and Tumorigenesis by Inhibiting CED-4-Mediated Apoptosis*
GP12	**Aravind Elangovan,** *Analysis of Fibrin Fiber Polymerization*
GP13	**Miranda Harkess,** *Fibrin Fiber Tension Dynamics During Fibrinolysis: Investigating the Impact of Pregnancy*
GP14	**Ponette Kleutgens,** *Dopaminergic and Opioid Combination Drug to Treat Peripheral Nerve Injury*
Judges	*Nicholas Broskey, Michelle Ratliff*

Biomedical Sciences 10:00 AM – 12:00 PM

GP15 **Will Murray,** *Efficacy of Oil- and Water-Based Mosquito Control Formulated Products Evaluated Against Mosquitoes in a Novel Compact Wind Tunnel*

GP16 **Raven Slade,** *Droplet Distribution of Formulated Products on Mosquitoes Exposed via Wind Tunnel*

GP17 **Kai Li,** *Fibroblastic Reticular Cells And HIV Latency Establishment*

GP18 ~~**Ansleigh Reid,** *The Redox Environment Influences Transglutaminase 2's (TG2's) Conformational Ensemble*~~ **CANCELLED**

GP19 **Kylar Wiggins,** *The Role of Amyloid Beta Peptides in the Innate Immune System: Antimicrobial Properties and Contributions to Alzheimer's Disease Onset*

GP20 **Tundé Falohun,** *Analytical Workflow for Evaluation of Traditional Medicine Protocols*

GP21 **Constantin Heinemann,** *The effect of fighter and helicopter helmets on cervical extensor muscle force in flight postures*

Judges *Adam Burch, Paulina Diaguero-Ramos*

Human Health and Interdisciplinary Innovation 10:00 AM – 12:00 PM

GP22 **Taylor Gay,** *The Importance of Hearing Birthing Stories: What Surveys Don't Tell Us*

GP23 **Morgan Johnson,** *How Neighborhood Community Centers Map play a role in improving maternal health outcomes*

GP24 **Charlie McFee,** *Impacts of Inflow and Infiltration on the Nitrogen Removal Efficiency of Three Wastewater Treatment Plants in Eastern North Carolina*

GP25 **Karie Lyman,** *Turn2Care: Staff Driven Initiative to Increase Turning and Repositioning Compliance for Patients with BMAT Scores of 1 & 2*

GP26 **Michael Denning,** *Comparing prehospital time among pediatric poisoning patients in rural and urban settings*

GP27 **Carlos Ochoa,** *Investigating the Role of pH-sensing G Protein-Coupled Receptors GPR4 and GPR132 in Colorectal Cancer: Multi-Statistical and Survival Analysis Approach*

Judges *Alex Schoemann, Karen Litwa*

Interdisciplinary Innovations, Technology & Computer Sciences 10:00 AM – 12:00 PM

GP28 **Spencer Jones,** *Rolling the Dice: The Alarming Rise of Gambling Among Emerging Adult Men*

GP29 **Anita Bhandari,** *Evaluating Object Detection Algorithms for Crowded Sperm Microscopy Videos*

GP30 **Simon Polishchuk,** *Transformer Network for Brain Activity Source Localization in EEG Measurements*

GP31 **Saumya Jaiswal,** *AI-Driven Innovation for Next-Generation Vision Healthcare": A First Step Toward Intelligent and Proactive Eye Care Solutions*

GP32 **Lee Ostadi,** *An Autoencoder for 3D Gaussian Splatting: Enabling Transformations of 3D Scenes Through a Learned Latent Space*

GP84 **James Williams**, *Deep learning in cyber security*

Judges *Sohan Gyawali, Nic Herndon*

Human Health 10:00 AM – 12:00 PM

GP33 **Kaitlin LoVerme,** *The effect of the cold pressor test on arterial wave reflection amplitude and timing in young healthy adults*

Co-Presenters: JaNae Buckner, Olivia Rose

GP34 **DaiSha Dowson,** *Enhancing Linguistic Equity in Healthcare: Communication Accommodation in Patient Interactions*

GP35 **Aaliyah McClendon,** *Physical Activity Levels in Black and White women during early pregnancy*

GP36 **Ayobami Alimi,** *Predicting and Mapping the Geographic Distribution of Glaucoma in the United States: Examining Correlations with Environmental and Social Determinants Using the All of Us Dataset*

GP37 **Gillian Tiralla,** *Skeletal Muscle Fiber Type Distribution May Predict Phenotype at Risk of Developing Metabolic Syndrome*

GP38 **Osahon Asowata,** *Sex and Race\Ethnic Differences in the Effect of Comorbidity on Glaucoma among Older Adults in the United States: Findings from the Health and Retirement Study*

Judges *Kelley Reinsmith-Jones, Amandeep Kaur*

Interdisciplinary Innovations, Human Health, Natural Sciences 10:00 AM – 12:00 PM

GP39 **Katherine Foster,** *Elucidating Biofilms in Cueva Ventana and Their Impact on the Preservation of Culturally Significant Rupestrian Rock Art - A Collaborative Community-Geoscience Approach*

GP40 **Natalie Clark,** *Distal Bicep Tendon Repair : Utilizing Knotless Retensionable All Suture Anchors Technique*

Co-Presenters: Shawn Yeazell, Sean Parker, Michael McNally

GP41 **Naina Sharma Bastakoti,** *Occupational Hazards Among Mosquito Control Personnel*

GP42 **Lexi Anderson,** *Knowledge and Attitudes Towards Pain Management in Critical Care Nurses*

GP43 **Rolando Valladarez Cuestas,** *Physical Activity Adherence in Former High School Athletes: A Comparison with Non-Athletes and the Role of Burnout and Enjoyment*

GP44 **Elizabeth Klemm,** *The reliability and validity of ultrasound elastography to quantify muscle tension*

Judges *Li Yang, Kristen Gregory*

Interdisciplinary Innovations, Human Health, Natural Sciences 1:00 – 3:00 PM

GP45 **Andrew Jakobowski,** *Allosteric Regulation of Human 15-Lipoxygenase-2 by Calcium and Heavy Metal Interactions*

Co-Presenters: Mia Verdugo

GP46 **Jayson Eldridge,** *Chemical Fingerprinting of Gahnite: Implications for Critical Mineral Exploration and Deposit Discrimination*

GP47 **Anna Smith,** *Preliminary Assessment of Nitrogen Treatment Efficiency of a Retrofit Stormwater Wetland*

GP48 **Jada Barnes,** *Investigating the role of Periplasmic Binding Protein, Fat B, in the binding interaction of [Iron (III)- Siderophore] complexes in Brucella Abortus.*

GP49 **Emily Scott,** *Examining astrocyte development and plasticity in zebrafish (Danio rerio)*

GP50 **Kayla Evans,** *Prevalence and Diversity of Plasmodium Parasites in Sympatric, Free-Ranging Lemur Species in Madagascar.*

GP51 **Cambria Miller,** *Invasive species blues: Investigating trophic impacts and distribution of blue catfish in Albemarle Sound*

Judges *Greg Kearney, Travis Alford*

Natural Sciences 1:00 – 3:00 PM

GP53 **Terry Papavasilis,** *The Science of Shipwrecks: Diving into the Ecology of the Graveyard of the Atlantic*

GP54 **Jarrett Nagy,** *Dissertation Plan on The Analysis of Silicate Minerals for elemental composition using PIXE, and Correlation to luminescence reading for geological provenance determination.*

GP55 **Tori Cole,** *Development of new anti-fouling coatings with improved environmental capabilities*

GP56 **Yongtao Hu,** *Organic catalytic and improved cell delivery potential of beta cyclodextrin derivative*

GP57 **Lizzy Rottenberk,** *Zeros of moments of characteristic polynomials of random matrices*

Judges *Chalani Prematilake, Hudson Sangrody*

Community Engagement and Social Sciences 1:30 – 3:30 PM

GP58 **Gabriella Morin,** *Assessing COVID-19 Mortality Hot Spots and Healthcare Disparities Across North Carolina During the Pandemic Period: A Novel Metric and Spatial-Scan Statistic Approach*

GP59 **Margaret Milteer,** *"Shorty Your Silence Was Golden:" What Grave Markers Can Tell Us Beyond the Epitaph*

GP60 **Tori Weiss,** *Do Patterns Matter? Testing the Spanish Colonial Pattern on Charles Towne, North Carolina*

GP61 **Daisy Edmondson,** *Sensitive Topics in Romantic Relationships*

GP62 **Emily Pacilio,** *Increasing On-Task Behavior in a Fourth Grade Student Using the MotivAider*

GP63 **Lydia Garas,** *Exploring Remote Work Intensity Influences: A Self Regulatory Focus Perspective on Job Demands and Resources Model*

Judges *Mitzi Pestaner, Jeanne Hoover*

Social Sciences 1:30 – 3:30 PM

GP65 **Grace Evans,** *Administering an Aphasia Test Battery*

GP66 **Talia Hoffman,** *Vitamin D Deficiency during the prenatal and early infancy increases the risk of infant mortality versus VDD in later childhood.*

GP67 **Kexuan Zhou,** *Does a higher prevalence of mental health challenges (e.g., anxiety or depression) correlate with increased gambling behavior in individuals?*

GP68 **Savannah Horvick,** *Identifying Barriers & Facilitators to Inpatient Palliative Care: Perspectives from Surgical Critical Care*

GP69 **Grace Osusky, Social** *Stress and Age at Death: The Role of Legislative Change on Survival*

GP70 **Addison Carrasquillo,** *Navigating Anxiety and Uncertainty: Cultural Adjustment of International Students at ECU*

GP71 **Megan Milter,** *How Murals Illustrate Northern Ireland's Political and Sectarian Conflict Through Political and Non-Political Messages*

GP72 **Ciara Covington,** *Unlocking Employee Well-Being: The Mediating Effect of Diversity Climate in an Inclusive Workplace*

Judges *Julie Linder, Stephanie George*

Education 1:30 – 3:30 PM

GP73	**Adrianne Mitchell,** *A Viewpoint on Medical School Electives: Post-USMLE Step 1 Changes*
GP74	**Godgive Umozurike,** *Production and Implementation of a Medical Student-led Pediatric Palliative Care Module*
GP75	**Jonicia Dixon,** *Unleashing Potential: Exploring Factors and Strategies to Enhance Student Motivation in the Classroom*
GP76	**Caitlin Elliott,** *The Impact of STEM Education*
GP77	**Abby Harrison,** *English Language Learners' Parental Involvement*
GP78	**Heather Jones,** *Bridging the Literacy Gap: Analyzing the data of CFA and mClass Assessments in Rural, Low-Income Communities*
Judges	*Beth Byrd, Elizabeth Baker*

Education **1:30 – 3:30 PM**

GP79	**Eryn McGahhey,** *Internship Insanity: An Investigation into the Stress Levels and Coping Strategies of Preservice Teachers*
GP80	**Robyn Spence,** *Attendance Patterns at a Title I Elementary School*
GP81	**Kelsey Stewart,** *Comparing Classroom Engagement Strategies between Native English Speakers and English Language Learners*
GP82	**Kaitlyn Tucker,** *Growth of Gifted Learners*
GP83	**Jennifer Lee,** *Teacher-Mentors Impacting Today's Middle School Students with Organization Strategies*
Judges	*Joseph Stock, James Clifford*

Order by Last Name

Session Room and Time on Tuesday April 1st	Number	First Name	Last Name	Topic Area
RM 249 11:00 - 12:30 PM	GPP25	Carrie	Adams	Interdisciplinary Innovation
Blackbox 11:00 AM - 12:30 PM	GPP43	Ernestina Akorfa	Akorli	Humanities
RM 249 9:00 AM - 10:30 AM	GPP23	Mohammad Nazmul	Alim	Natural Sciences
Blackbox 11:00 AM - 12:30 PM	GPP41	Courtney	Alston	Social Sciences
RM 249 9:00 AM - 10:30 AM	GPP22	Clark	Andersen	Natural Sciences
RM 249 1:00 - 3:15 PM	GPP32	Chalyne	Barrow	Education
RM 249 11:00 - 12:30 PM	GPP30	Tristan	Bench	Natural Sciences
RM 253 1:00 PM - 3:30 PM	GPP16	Graham	Bitzer	Biomedical Sciences
RM 253 8:45 AM - 11:00 AM	GPP1	Benjamin	Brisard	Biomedical Sciences
RM 253 8:45 AM - 11:00 AM	GPP7	Cat	Brown	Human Health
RM 249 9:00 AM - 10:30 AM	GPP24	Katherine	Dale	Natural Sciences
RM 249 9:00 AM - 10:30 AM	GPP21	Jude	Dilioha	Natural Sciences
Blackbox 8:30 - 10:15 AM	GPP46	Parker	Estes	Visual Art & Design
RM 249 11:00 - 12:30 PM	GPP27	Homeira	Faridnejad	Natural Sciences
Blackbox 8:30 - 10:15 AM	GPP48	Heather	Fraccalvieri	Visual Art & Design
RM 249 1:00 - 3:15 PM	GPP33	Fiona	Freeland	Education
~~Blackbox 8:30 - 10:15 AM~~ Cancelled	~~GPP44~~	~~Sam~~	~~Gorritz~~	~~Fine & Performing Arts~~
RM 249 1:00 - 3:15 PM	GPP38	Mary	Green	Social Sciences
RM 249 11:00 - 12:30 PM	GPP26	Noah	Green	Interdisciplinary Innovation
Blackbox 11:00 AM - 12:30 PM	GPP39	Bishop	Guempel	Social Sciences
RM 249 1:00 - 3:15 PM	GPP31	Victor	Ihuka	Community Engagement
Blackbox 8:30 - 10:15 AM	GPP47	Austin	Irby	Visual Art & Design
RM 253 1:00 PM - 3:30 PM	GPP11	Hoda	Jabbour	Biomedical Sciences
RM 253 8:45 AM - 11:00 AM	GPP8	Maria	Kalogeromitros	Human Health
Blackbox 8:30 - 10:15 AM	GPP49	Justin Tyler	King	Visual Art & Design
RM 253 8:45 AM - 11:00 AM	GPP6	Jude	Kinkead	Biomedical Sciences
RM 253 11:30 AM - 12:45 PM	GPP52	Eliza	Landis	Visual Art & Design
Blackbox 11:00 AM - 12:30 PM	GPP40	Eric	Larsen	Social Sciences
RM 249 1:00 - 3:15 PM	GPP36	Darius	Lawton	Social Sciences
RM 253 11:30 AM - 12:45 PM	GPP50	Rachael	Lowman	Visual Art & Design
RM 253 1:00 PM - 3:30 PM	GPP9	Yara	Maayah	Biomedical Sciences
RM 253 1:00 PM - 3:30 PM	GPP14	Sam	McCrary	Human Health
RM 249 9:00 AM - 10:30 AM	GPP18	Brannon	McCutcheon	Technology & Computer Sciences
RM 253 11:30 AM - 12:45 PM	GPP53	Ryan	McDowell	Visual Art & Design

RM 253 1:00 PM - 3:30 PM	GPP10	Sam	Minier	Biomedical Sciences
RM 249 1:00 - 3:15 PM	GPP37	Jarah	Newton	Social Sciences
RM 253 1:00 PM - 3:30 PM	GPP12	Jodi	Ogle	Biomedical Sciences
RM 249 11:00 - 12:30 PM	GPP28	Okey	Ohanaka	Natural Sciences
RM 253 1:00 PM - 3:30 PM	GPP15	Ankur	Padhye	Human Health
RM 249 11:00 – 12:45 PM	GPP55	Elnaz	Pezeshki	Natural Sciences
RM 249 1:00 - 3:15 PM	GPP34	Elizabeth	Pierce	Education
RM 253 1:00 PM - 3:30 PM	GPP13	Yonghong	Qin	Biomedical Sciences
RM 253 11:30 AM - 12:45 PM	GPP54	Stacy	Rodgers	Visual Art & Design
RM 249 11:00 - 12:30 PM	GPP29	Mason	Ross	Natural Sciences
Blackbox 11:00 AM - 12:30 PM	GPP42	Tanner	Ruffin	Social Sciences
RM 249 9:00 AM - 10:30 AM	GPP19	Roshan	Saud	Interdisciplinary Innovation
RM 253 11:30 AM - 12:45 PM	GPP51	Narges	Sedaghat	Visual Art & Design
RM 253 8:45 AM - 11:00 AM	GPP4	Abigahill	Simon	Biomedical Sciences
Blackbox 8:30 - 10:15 AM	GPP45	Autumn	Standbridge	Fine & Performing Arts
RM 249 9:00 AM - 10:30 AM	GPP20	Matthew	Stengrim	Engineering
RM 253 8:45 AM - 11:00 AM	GPP3	Keerthana	Surabhi	Biomedical Sciences
RM 253 1:00 PM - 3:30 PM	GPP17	Berwin Singh	Swami Vetha	Engineering
RM 249 1:00 - 3:15 PM	GPP35	Thomas	Vitti	Social Sciences
RM 253 8:45 AM - 11:00 AM	GPP2	Alexandria	Warren	Biomedical Sciences
RM 253 8:45 AM - 11:00 AM	GPP5	Savanna	Williams	Biomedical Sciences

Order by Number

Session Room and Time on Tuesday April 1st	Number	First Name	Last Name	Topic Area
RM 253 8:45 AM - 11:00 AM	GPP1	Benjamin	Brisard	Biomedical Sciences
RM 253 8:45 AM - 11:00 AM	GPP2	Alexandria	Warren	Biomedical Sciences
RM 253 8:45 AM - 11:00 AM	GPP3	Keerthana	Surabhi	Biomedical Sciences
RM 253 8:45 AM - 11:00 AM	GPP4	Abigahill	Simon	Biomedical Sciences
RM 253 8:45 AM - 11:00 AM	GPP5	Savanna	Williams	Biomedical Sciences
RM 253 8:45 AM - 11:00 AM	GPP6	Jude	Kinkead	Biomedical Sciences
RM 253 8:45 AM - 11:00 AM	GPP7	Cat	Brown	Human Health
RM 253 8:45 AM - 11:00 AM	GPP8	Maria	Kalogeromitros	Human Health
RM 253 1:00 PM - 3:30 PM	GPP9	Yara	Maayah	Biomedical Sciences
RM 253 1:00 PM - 3:30 PM	GPP10	Sam	Minier	Biomedical Sciences
RM 253 1:00 PM - 3:30 PM	GPP11	Hoda	Jabbour	Biomedical Sciences
RM 253 1:00 PM - 3:30 PM	GPP12	Jodi	Ogle	Biomedical Sciences
RM 253 1:00 PM - 3:30 PM	GPP13	Yonghong	Qin	Biomedical Sciences
RM 253 1:00 PM - 3:30 PM	GPP14	Sam	McCrary	Human Health
RM 253 1:00 PM - 3:30 PM	GPP15	Ankur	Padhye	Human Health
RM 253 1:00 PM - 3:30 PM	GPP16	Graham	Bitzer	Biomedical Sciences
RM 253 1:00 PM - 3:30 PM	GPP17	Berwin Singh	Swami Vetha	Engineering
RM 249 9:00 AM - 10:30 AM	GPP18	Brannon	McCutcheon	Technology & Computer Sciences
RM 249 9:00 AM - 10:30 AM	GPP19	Roshan	Saud	Interdisciplinary Innovation
RM 249 9:00 AM - 10:30 AM	GPP20	Matthew	Stengrim	Engineering
RM 249 9:00 AM - 10:30 AM	GPP21	Jude	Dilioha	Natural Sciences
RM 249 9:00 AM - 10:30 AM	GPP22	Clark	Andersen	Natural Sciences
RM 249 9:00 AM - 10:30 AM	GPP23	Mohammad Nazmul	Alim	Natural Sciences
RM 249 9:00 AM - 10:30 AM	GPP24	Katherine	Dale	Natural Sciences
RM 249 11:00 - 12:30 PM	GPP25	Carrie	Adams	Interdisciplinary Innovation
RM 249 11:00 - 12:30 PM	GPP26	Noah	Green	Interdisciplinary Innovation
RM 249 11:00 - 12:30 PM	GPP27	Homeira	Faridnejad	Natural Sciences
RM 249 11:00 - 12:30 PM	GPP28	Okey	Ohanaka	Natural Sciences
RM 249 11:00 - 12:30 PM	GPP29	Mason	Ross	Natural Sciences
RM 249 11:00 - 12:30 PM	GPP30	Tristan	Bench	Natural Sciences
RM 249 1:00 - 3:15 PM	GPP31	Victor	Ihuka	Community Engagement
RM 249 1:00 - 3:15 PM	GPP32	Chalyne	Barrow	Education
RM 249 1:00 - 3:15 PM	GPP33	Fiona	Freeland	Education
RM 249 1:00 - 3:15 PM	GPP34	Elizabeth	Pierce	Education
RM 249 1:00 - 3:15 PM	GPP35	Thomas	Vitti	Social Sciences
RM 249 1:00 - 3:15 PM	GPP36	Darius	Lawton	Social Sciences
RM 249 1:00 - 3:15 PM	GPP37	Jarah	Newton	Social Sciences
RM 249 1:00 - 3:15 PM	GPP38	Mary	Green	Social Sciences
Blackbox 11:00 AM - 12:30 PM	GPP39	Bishop	Guempel	Social Sciences

Blackbox 11:00 AM - 12:30 PM	GPP40	Eric	Larsen	Social Sciences
Blackbox 11:00 AM - 12:30 PM	GPP41	Courtney	Alston	Social Sciences
Blackbox 11:00 AM - 12:30 PM	GPP42	Tanner	Ruffin	Social Sciences
Blackbox 11:00 AM - 12:30 PM	GPP43	Ernestina Akorfa	Akorli	Humanities
~~Blackbox 8:30 - 10:15 AM~~ CANCELLED	~~GPP44~~	~~Sam~~	~~Gorritz~~	~~Fine & Performing Arts~~
Blackbox 8:30 - 10:15 AM	GPP45	Autumn	Standbridge	Fine & Performing Arts
Blackbox 8:30 - 10:15 AM	GPP46	Parker	Estes	Visual Art & Design
Blackbox 8:30 - 10:15 AM	GPP47	Austin	Irby	Visual Art & Design
Blackbox 8:30 - 10:15 AM	GPP48	Heather	Fraccalvieri	Visual Art & Design
Blackbox 8:30 - 10:15 AM	GPP49	Justin Tyler	King	Visual Art & Design
RM 253 11:30 AM - 12:45 PM	GPP50	Rachael	Lowman	Visual Art & Design
RM 253 11:30 AM - 12:45 PM	GPP51	Narges	Sedaghat	Visual Art & Design
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RM 253 11:30 AM - 12:45 PM	GPP53	Ryan	McDowell	Visual Art & Design
RM 253 11:30 AM - 12:45 PM	GPP54	Stacy	Rodgers	Visual Art & Design
RM 249 11:00 – 12:45 PM	GPP55	Elnaz	Pezeshki	Natural Sciences

Graduate Student Virtual/Video Presentations (Asynchronous)

Available Online Throughout the Week

These are available on our website: **Link to Asynchronous Poster List**

V1 **Evvy Ponder,** *Relationship Between Attendance Rates and Math Achievement in Rural Middle School Math Classrooms*

V2 **Meredith Atkins,** *Students Disruptive Behaviors*

V3 **Joanna Cook,** *High Achieving Kindergarten Math*

V4 **Erin Dail,** *Strategies for Students with ADHD and Autism*

V5 **Jacob Denning,** *Beyond the Headcount: The Impacts of Large Class Size in Elementary Classrooms*

V6 **Jessica Dix,** *Equitable Education of Autistic Students- Educator Perspectives*

V7 **Margaret Gaskill,** *Differing SEL Needs of Gifted Students*

V8 **Margie Glisson,** *The Impacts of Positive Reinforcement on Student Motivation*

V9 **Francesca Gonzalez,** *Academic Success Relations with Social Emotional Learning*

V10 **Ashlynn Holloman,** *Middle School Teacher Perspectives on Critical Thinking in Mathematics*

V11 **Karley Hughes,** *Factors Contributing to Low Reading Comprehension*

V12 **Jacob Lolley,** *Educational Skills & Crucial Conversations*

V13 **Sarah McManus,** *Parental Involvement in Middle School*

V14 **Bonnie Ogden,** *Closing the Literacy Gap in African American Boys*

V15 **Joyce Oliver,** *The Impact of Reading Aloud*

V16 **Brenea Pugh,** *The Potential Impact of Departmentalization on Upper Elementary Achievement and Engagement*

V17 **Hillary Ross,** *Student Self-Efficacy in Tested and Non-Tested Subjects*

V18 **Amaris Smith,** *Parent Involvement and Student Success*

V19 **Molly Stecker,** *Investigating the relationship between student engagement and student disruptions*

V20 **Keeley Neal,** *Family Engagement through Reading Workshops*

V21 **Justin Finger,** *Analyzing The Use of Physical Activity Breaks in High School Classes*

V22 **Brittany Foster,** *Promoting Student Engagement Through Talk Moves*

V23 **Wendy Brautman,** *What is the Impact of Problem-Based Learning on Student Attitude in the Science Classroom?*

V24 **John Kachingwe,** *Enhancing Multiligual Larners' (MLs) Science Comprehension of Water Properties through Visual Aids and Modeling*

V25 **Vinita Sharma,** *Impact of Gizmo on Students' Attitudese Towards Learning the Greenhouse Effect*

V26 **Brenda Sharpe,** *Assessing the association between PFAS exposure, social determinants of health, and risk outcomes in adolescents and adults in the United States*.

V27 **Cassidy Hobbs,** *Parent Involvement in Title I Schools*

V28 **Donte' Perry,** *Optimizing Student Transfers with AI: A Visual Exploration of AI-Powered Advising and Prompt Engineering*

Water Resources Center Summit Poster Presentations - April 2

Competition Posters

Location **Session Time: 12:00 – 2:00 PM**

Community Engagement

WRC01 **Sammie Lawrence**, *Empowering Youth Through Community Science*
Co-Presenters: Lauren Holliman

WRC02 **Alec Armstrong**, *The Community Water Network: A Water Science Community Outreach Program*
Co-Presenters: Lindsay Arnette

WRC15 **Hannah Moore**, *Building Resilience Through Social Capital: Evaluating a Community Liaison Program in Coastal NC Communities*

Social Sciences

WRC03 **Alexandra Stevenson**, *Redefining Coral Restoration Success: Integrating Social and Ecological Perspectives*

WRC11 **Collin Ramirez**, *Public perception, Knowledge, and Plastic use of Greenville residents.*
Co-Presenters: Cmauri Hinton

Natural Sciences

WRC04 **Jessica Miller**, *The impact of hurricanes on larval fishes at Beaufort Inlet, NC*

WRC05 **Ashley Eakes**, *Prevalence of Black Gill Disease in Penaeid Shrimp in NC*

WRC06 **Mariela Garcia Vega**, *Assessing the human and natural drivers of mangrove habitat loss in Puerto Rico*

WRC07 **Camille Stewart**, *Insight on Plastic Waste in a Greenville River: An Examination of a Trash Trap*

WRC08 **Trey Blackwell**, *Baseline Survey of Blount's Creek: Assessing Ecological Conditions Prior to Limestone Mining Discharge*

WRC09 **Charlotte Bickley**, *Comparing population structure of a mud crab host and its parasitic barnacle to examine the spread of an invasive parasite*

WRC12 **Ulises Mendoza**, *Assessing Seasonal Impacts on Biodiversity of Crabs and Parasites*

WRC13 **Daystar Babanawo**, *Mapping Nearshore Bathymetry for Coastal Resilience in the Caribbean*

WRC14 **Blake King**, *Integrating Traditional Soil Testing with Electromagnetic Induction for Precision Mapping of Electrical Conductivity in Coastal NC Agricultural Fields*

WRC16 **Maximillian Skinner**, *Assessing the Relationship of Increasing Sea Surface Temperatures, Estuarine Hypoxia, and Wind on Red Drum Spawning Rates*

WRC23 **Nykeria Garvin**, *Investigating seasonal trends in reproduction of the non-native green porcelain crab (Petrolisthes armatus) in North Carolina*

WRC24 **Shalimar Moreno**, *Evaluating the physical and biogeochemical drivers of a reef community carbonate budget*

WRC26 **Giuliana Roccisano**, *Exploring the Effectiveness of Geoscience Education Methods: A Guideline for Future Outreach Strategies*

WRC27 **Jackson Rizzolo**, *Using electromagnetic geophysical methods to characterize subsurface salinity dynamics on Shackleford Banks, Cape Lookout National Seashore, North Carolina*

WRC28 **Cameron Bolles**, *Exploring host-parasite relationships of the parasitic isopod Aporoboyrus curtatus in green porcelain crab (Petrolisthes armatus) populations within the crab's invaded range from Florida to North Carolina*

WRC29 **Colin Finlay**, *Managing Microbiomes to Enhance Water Quality in an Urban Stream Ecosystem*

WRC30 **Brodey Lane**, *Balancing the Waters: Exploring the Water Quality in Lake Phelps*
Co-Presenters: Brian A. Ester

WRC31 **Caroline Pate**, *Identifying the minimum number of bacterial cells needed for metagenomic sequencing: Guidelines for fluorescence activated cell sorting*

WRC32 **Caid Menzel**, *Drivers of Species Community Dynamics in Pamlico Sound: A Multivariate Approach*

WRC35 **Lucia Wall**, *Linkages Between Discharge, Salinity and Nutrient Relationships*
Co-Presenters: Nikki Kasireddy, Sammie Lawrence

WRC36 **Autumn Robinson**, *Enhanced Biological Phosphorus Removal In Wastewater Treatment: Microbial Community Response To Disruptions And Stable Conditions*

Engineering

WRC10 **Stavros Boardman**, *Leveraging AI for Construction Quality and Safety Plans*

WRC19 **Davis Lambert**, *Evaluating the Application of AI in Construction Estimating and Scheduling*
Co-Presenters: Cole Languell

Interdisciplinary Innovation

WRC18 **Jennifer Fulcher**, *Integrated Analysis of Soil Water Content and Groundwater Level Trends: Impacts on Hydrologic Responses at an Agricultural Field Site in Eastern North Carolina*

WRC20 **Kyra Hagge**, *Connecting Human Behavior and Physical Systems Using Agent-Based Modeling: Individual Wastewater Treatment Systems in the Tar-Pamlico Watershed*

WRC25 **Allyson Ropp**, *Integrating Microbial and Water Chemistry Data with Archaeological Research*

WRC34 **Sarah Radel**, *Broadening Participation in Community Science by Leveraging Artificial Intelligence for Environmental Justice*

Human Health

WRC33 **Precious Esong Sone**, *Reducing Diabetes Distress by using the Diabetes Distress Screening-17 (DDS-17) among adults*

Technology & Computer Sciences

WRC22 **Majoie Ngandi**, *Enhancing Air Quality Visualization for Pitt County: Developing an Interactive Data Platform*

Water Resources Center Summit Poster Sessions – April 2

Order by Poster Number

Poster Number	First	Last	Title
WRC01	Sammie	Lawrence	Empowering Youth Through Community Science
WRC02	Alec	Armstrong	The Community Water Network: A Water Science Community Outreach Program
WRC03	Alexandra	Stevenson	Redefining Coral Restoration Success: Integrating Social and Ecological Perspectives
WRC04	Jessica	Miller	The impact of hurricanes on larval fishes at Beaufort Inlet, NC
WRC05	Ashley	Eakes	Prevalence of Black Gill Disease in Penaeid Shrimp in NC
WRC06	Mariela	Garcia Vega	Assessing the human and natural drivers of mangrove habitat loss in Puerto Rico
WRC07	Camille	Stewart	Insight on Plastic Waste in a Greenville River: An Examination of a Trash Trap
WRC08	Trey	Blackwell	Baseline Survey of Blount's Creek: Assessing Ecological Conditions Prior to Limestone Mining Discharge
WRC09	Charlotte	Bickley	Comparing population structure of a mud crab host and its parasitic barnacle to examine the spread of an invasive parasite
WRC10	Stavros	Boardman	Leveraging AI for Construction Quality and Safety Plans
WRC11	Collin	Ramirez	Public perception, Knowledge, and Plastic use of Greenville residents.
WRC12	Ulises	Mendoza	Assessing Seasonal Impacts on Biodiversity of Crabs and Parasites
WRC13	Daystar	Babanawo	Mapping Nearshore Bathymetry for Coastal Resilience in the Caribbean
WRC14	Blake	King	Integrating Traditional Soil Testing with Electromagnetic Induction for Precision Mapping of Electrical Conductivity in Coastal NC Agricultural Fields
WRC15	Hannah	Moore	Building Resilience Through Social Capital: Evaluating a Community Liaison Program in Coastal NC Communities
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WRC22	Majoie	Ngandi	Enhancing Air Quality Visualization for Pitt County: Developing an Interactive Data Platform
WRC23	Nykeria	Garvin	Investigating seasonal trends in reproduction of the non-native green porcelain crab (Petrolisthes armatus) in North Carolina
WRC24	Shalimar	Moreno	Evaluating the physical and biogeochemical drivers of a reef community carbonate budget
WRC25	Allyson	Ropp	Integrating Microbial and Water Chemistry Data with Archaeological Research
WRC26	Giuliana	Roccisano	Exploring the Effectiveness of Geoscience Education Methods: A Guideline for Future Outreach Strategies
WRC27	Jackson	Rizzolo	Using electromagnetic geophysical methods to characterize subsurface salinity dynamics on Shackleford Banks, Cape Lookout National Seashore, North Carolina
WRC28	Cameron	Bolles	Exploring host-parasite relationships of the parasitic isopod Aporoboyrus curtatus in green porcelain crab (Petrolisthes armatus) populations within the crab's invaded range from Florida to North Carolina
WRC29	Colin	Finlay	Managing Microbiomes to Enhance Water Quality in an Urban Stream Ecosystem
WRC30	Brodey	Lane	Balancing the Waters: Exploring the Water Quality in Lake Phelps
WRC31	Caroline	Pate	Identifying the minimum number of bacterial cells needed for metagenomic sequencing: Guidelines for fluorescence activated cell sorting
WRC32	Caid	Menzel	Drivers of Species Community Dynamics in Pamlico Sound: A Multivariate Approach
WRC33	Precious Esong	Sone	Reducing Diabetes Distress by using the Diabetes Distress Screening-17 (DDS-17) among adults
WRC34	Sarah	Radel	Broadening Participation in Community Science by Leveraging Artificial Intelligence for Environmental Justice
WRC35	Lucia	Wall	Linkages Between Discharge, Salinity and Nutrient Relationships
WRC36	Autumn	Robinson	Enhanced Biological Phosphorus Removal In Wastewater Treatment: Microbial Community Response To Disruptions And Stable Conditions

Order by Last Name

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WRC03	Alexandra	Stevenson	Redefining Coral Restoration Success: Integrating Social and Ecological Perspectives
WRC07	Camille	Stewart	Insight on Plastic Waste in a Greenville River: An Examination of a Trash Trap
WRC35	Lucia	Wall	Linkages Between Discharge, Salinity and Nutrient Relationships

ECU Water Resources Center Poster Session – April 2

Non-Competition Posters

Location: Reception and Gallery areas of the 2nd Floor, Main Student Center and Room 253
Session Time: 12:00 – 2:00 PM

WRCA Community Engagement
Emily Yeager, PhD, *Blue Economy Corridor*
Co-Authors: Emily Yeager, Jacquelyn Moore

WRCB Community Engagement
Dani Lin Hunter, PhD, *Communities Thrive in Strong Networks*
Co-Authors/Presenters: Chris Lamont Brown, PhD
Community Organization Name: North Carolina Environmental Justice Network (NCEJN)

WRCC Community Engagement & Natural Sciences
Lindsay Wentzel, *Salinity, Temperature, and Pressure Observations in the Outer Banks Sounds: Community-Driven Marine Energy Characterization through a Low-Cost, Open-Source CTD*
Co-Authors: Ryan Golden, Lindsay Wentzel, Trip Taylor, Mike Muglia

WRCD Natural Sciences
Matthew Sirianni, PhD, *You Can Lead a Horse to Water, But It Might Be Salty*
Co-Authors: (ECU): Matthew Sirianni, Jackson Rizzolo, Mike O'Driscoll, Sean Charles; (NPS): Sue Stuska

WRCE Community Engagement & Natural Sciences
Alex Manda, PhD, *Documenting Saltwater Intrusion and Soil Salinization in Low-lying Agricultural Fields of Coastal North Carolina*
Co-Authors: Matthew Sirianni, Stephen Moysey, Elnaz Pezeshki

WRCF Natural Sciences
Elnaz Pezeshki, *Application of Geophysics in Comprehending the Role of Drainage Ditches in Saltwater Intrusion and Soil Salinization in Eastern North Carolina, Case Study: Hyde County, NC*
Co-Authors: Elnaz Pezeshki, Matthew Sirianni, Stephen Moysey, Alex Manda

WRCG Natural Sciences
Boris Dessimond, PhD, *The Environmental Sensing Data Network*
Co-Authors/Contributors: Boris Dessimond, Stephen Moysey, Alex Manda, Rob Howard, Courtney Clarke, Char'Rese Finney, Hiba El'Shaer

WRCH Natural Sciences

Rob Howard, *Automated Delineation of Dry Detention Basin Boundaries Using Aerial LiDAR*

Co-Authors: Rob Howard, Michael O'Driscoll, Guy Iverson, Phil Van Wagoner, Joseph Abuarab

WRCI Natural Sciences

Michael O'Driscoll, PhD, *Saltwater Intrusion Events Along the Tar-Pamlico River: Evaluating Seasonality and Increased Risk During Drought Conditions*

Co-Authors: Michael O'Driscoll, Rebecca Asch, Bobby Bowser, Randall Etheridge, Stephen Moysey, Courtney Harris, Venkataraman Lakshmi

WRCJ Natural Sciences

Michael O'Driscoll, PhD, *Trash Deposition in Dry Detention Basins in Greenville, NC*

Co-Authors: Michael O'Driscoll, Austin Smith

WRCK Community Engagement

Yoshi Newman, PhD, *Trash Talk*

Faculty Mentor: Heather Vance-Chalcraft

WRCL Community Engagement

Courtney Clarke, *Hallowed Ground Hydrology: Understanding Fluctuation in Places of Permanence*

Faculty Mentors: Heather Vance-Chalcraft, Stephen Moysey

WRCM Community Engagement

Heather Vance-Chalcraft, **PhD**, *Two complimentary models for engaging vulnerable communities in building resilience*

Co-Authors/Contributors: Heather Vance-Chalcraft, Jermaine McNair, Samantha Mosier, Stephen Moysey, Tara van Niekerk, Emily Yeager, Courtney Clarke, Yoshi Newman, Alexandra Nolte, and B. Denise Thompson

WRCN Community Engagement

Tara van Niekerk, PhD, *Engaging Communities Through Youth Programs Focused on Participatory Science*

Co-Authors: Heather Vance-Chalcraft, Stephen Moysey, Natasha Bell, Lauren Holliman

WRCO Community Engagement & Natural Sciences

Katherine Foster, *Elucidating Biofilms and Their Impact on Rupestrian Rock Artwork in the Las Cabachuelas Nature Reserve - A Collaborative Community-Geoscience Perspective*

Co-Authors: Katherine Foster, Adriana Heimann Rios, Angel Acosta-Colón, José Santos Valderrama, Eduardo Leorri, Eric Anderson

Water Resources Center Summit Poster Sessions – April 2

Posters NOT in the RCAW Competition

***LOCATION*: Reception and Gallery areas of the 2nd Floor, Main Student Center and Room 253**

Session Time: 12:00 – 2:00 PM

Order By Poster Letter

Poster Letter	First	Last	Title
WRCA	Emily	Yeager	*Blue Economy Corridor*
WRCB	Dani Lin	Hunter	*Communities Thrive in Strong Networks*
WRCC	Lindsay	Wentzel	*Salinity, Temperature, and Pressure Observations in the Outer Banks Sounds: Community-Driven Marine Energy Characterization through a Low-Cost, Open-Source CTD*
WRCD	Matthew	Sirianni	*You Can Lead a Horse to Water, But It Might Be Salty*
WRCE	Alex	Manda	*Documenting Saltwater Intrusion and Soil Salinization in Low-lying Agricultural Fields of Coastal North Carolina*
WRCF	Elnaz	Pezeshki	*Application of Geophysics in Comprehending the Role of Drainage Ditches in Saltwater Intrusion and Soil Salinization in Eastern North Carolina, Case Study: Hyde County, NC*
WRCG	Boris	Dessimond	*The Environmental Sensing Data Network*
WRCH	Rob	Howard	*Automated Delineation of Dry Detention Basin Boundaries Using Aerial LiDAR*
WRCI	Michael	O'Driscoll	*Saltwater Intrusion Events Along the Tar-Pamlico River: Evaluating Seasonality and Increased Risk During Drought Conditions*
WRCJ	Michael	O'Driscoll	*Trash Deposition in Dry Detention Basins in Greenville, NC*
WRCK	Yoshi	Newman	*Trash Talk*
WRCL	Courtney	Clarke	*Hallowed Ground Hydrology: Understanding Fluctuation in Places of Permanence*
WRCM	Heather	Vance-Chalcraft	*Two Complimentary Models for Engaging Vulnerable Communities in Building Resilience*
WRCN	Tara	van Niekerk	*Engaging Communities Through Youth Programs Focused on Participatory Science*
WRCO	Katherine	Foster	*Elucidating Biofilms and Their Impact on Rupestrian Rock Artwork in the Las Cabachuelas Nature Reserve – A Collaborative Community-Geoscience Perspective*

Water Resources Center Summit Poster Sessions – April 2

Posters NOT in the RCAW Competition

***LOCATION*: Reception and Gallery areas of the 2nd Floor, Main Student Center and Room 253**
Session Time: 12:00-2:00 PM

Order by Last Name

Poster Number	First	Last	Title
WRCL	Courtney	Clarke	Hallowed Ground Hydrology: Understanding Fluctuation in Places of Permanence
WRCG	Boris	Dessimond	The Environmental Sensing Data Network
WRCO	Katherine	Foster	Elucidating Biofilms and Their Impact on Rupestrian Rock Artwork in the Las Cabachuelas Nature Reserve – A Collaborative Community-Geoscience Perspective
WRCH	Rob	Howard	Automated Delineation of Dry Detention Basin Boundaries Using Aerial LiDAR
WRCB	Dani Lin	Hunter	Communities Thrive in Strong Networks
WRCE	Alex	Manda	Documenting Saltwater Intrusion and Soil Salinization in Low-lying Agricultural Fields of Coastal North Carolina
WRCK	Yoshi	Newman	Trash Talk
WRCI	Michael	O'Driscoll	Saltwater Intrusion Events Along the Tar-Pamlico River: Evaluating Seasonality and Increased Risk During Drought Conditions
WRCJ	Michael	O'Driscoll	Trash Deposition in Dry Detention Basins in Greenville, NC
WRCF	Elnaz	Pezeshki	Application of Geophysics in Comprehending the Role of Drainage Ditches in Saltwater Intrusion and Soil Salinization in Eastern North Carolina, Case Study: Hyde County, NC
WRCD	Matthew	Sirianni	You Can Lead a Horse to Water, But It Might Be Salty
WRCN	Tara	van Niekerk	Engaging Communities Through Youth Programs Focused on Participatory Science
WRCM	Heather	Vance-Chalcraft	Two Complimentary Models for Engaging Vulnerable Communities in Building Resilience
WRCC	Lindsay	Wentzel	Salinity, Temperature, and Pressure Observations in the Outer Banks Sounds: Community-Driven Marine Energy Characterization through a Low-Cost, Open-Source CTD
WRCA	Emily	Yeager	Blue Economy Corridor

Abstracts

For all presentations, in alphabetical order, by primary presenter

Graduate and Postdoctoral Scholar Presentation Abstracts

Adams, Carrie

Faculty Mentor: Fadi Issa

Effects of Social Dominance on the Morphological and Functional Activity of the Diencephalic Posterior Tubercular Nucleus

Social dominance is prevalent among many social species. It allows animals to allocate limited resources according to social rank. However, social interactions during dominance formation are accompanied with aggression, anxiety and stress that may have significant impact on brain structure and function. However, our understanding of the neurophysiological consequences of social dominance remains poorly understood. Here we examined the effects of social dominance on the morphological and functional organization of the diencephalic Posterior Tubercular Nucleus (PTN) in zebrafish (Danio rerio). The PTN is dopaminergic and is implicated in modulating motivated behaviors and spinal motor circuits (startle escape and swim). Moreover, the zebrafish brain organization shares many of the mammalian brain organization, and they form stable dominance relationships with easily identified dominant and subordinate individuals. Thus, zebrafish are suitable organism to study the neurobiological bases of social dominance. Here show social status-dependent differences in PTN cell number and cellular activity. Dominant animals display higher number of PTN cells compared to subordinates and communal (control) fish. Similarly, dominants' PTN cells show higher biochemical activity compared to subordinates. These differences emerge between 7-14 days of social interactions. To examine the neural bases underlying morphological differences, we are testing the hypothesis that plasticity in PTN cell number is due to either neurogenesis by measuring expression in BrdU and PCNA activity, shift in cell neurotransmitter identity using genetic approaches, or an increase in cellular death because of apoptosis or elevated levels of oxidative phosphorylation. Preliminary results in communal animals demonstrate that PTN cells display enhanced levels of neurogenesis and oxidative phosphorylation suggesting that the PTN could be prone to socially induced cellular plasticity. However, our results do not show significant differences in a shift in cellular identity in socially dominant and subordinate fish. Results from this project provide new insights to help us understand the neural bases of social dominance on nervous system function the neurobiological principles of which might also be applicable to other social species.

Akorli, Ernestina Akorfa

Faculty Mentor: Wendy Sharer

The Rhetorical Agencies of Ghanaian Celebrity Women's Digital Engagement: Exploring How Instagram Fosters Unique Literacies for Ghanaians

Many different digital tools are impacting literacy development beyond academic and family literacy in this 21st-century digital age. Digital tools like social media platforms, mobile applications, and online communities act as literacy influencers that help to counter the literacy ideology that 'literacy cannot be attained in other ways'; hence, 'literacy stands alone as the independent and critical variable' essential for achieving particular outcomes (Graff and Duffy 2008). Currently in Ghana and the sub-West African countries, "contemporary practices of education have little to say about writing as a field" (Lamptey and Dumavor, 2021, p.133) due to colonial legacies in educational and literacy practices. This present presentation argues that the web of evolving digital technologies and platforms is a ripe moment to reconceptualize literacy as 'not an independent variable' by studying its nature and potential. This is because currently in Ghana, West Africa, many celebrities like Anita Akuffo and Berla Mundi are well-known in the Ghanaian media and digital space for their work in media, journalism, entertainment, and social advocacy, and they engage their audience via their posts through lifestyle, professional content, ambassadorial representations, and social-cultural discourse. These celebrities' Instagram posts and content provide an agency for their audience to participate in that discourse through the comment section, which impacts the audience's literacy practices. This presentation is interested in the kinds of literacies these celebrities, through their Instagram posts, help

sponsor among Ghanaian youths and how our attention to this offers new ways to conceptualize literacy in the context of this digital age. Through a strategic case study of these selected Ghanaian celebrity women's Instagram posts that reflect their identities and cultural values, which influence their audience through language, visuals, and interactive features like comment sections and hashtags, this study used a Transliteracy theoretical framework to answer this question: How do the rhetorical engagements of Ghanaian celebrity women offer agency that informs the literacy practices of Ghanaians in this digital age? The aim is to propose pedagogical implications of such study to Writing Studies instructors globally. As a way to help reconceptualize literacy in Ghana as influenced by cultural exposure and digital platforms, this study builds on the work of Browdy and Milu, who highlight that "Transnational Black language work that dialogs African languages with Diasporic languages, both ancient and modern, offers the field one pathway to understanding rhetorical practices from other traditions beyond African American" (2022 p. 233).

Alim, Mohammad Nazmul

Faculty Mentor: Regina DeWitt

Development of a CCD camera-based system for dose rate mapping of rock materials for OSL dating

When minerals or grains are exposed to ionizing radiation, energy is stored in their crystal structures as trapped electrons. Optical stimulation using LEDs, lasers, or IR light releases this stored energy, producing optically stimulated luminescence (OSL) signals proportional to the absorbed dose. By analyzing the emitted OSL and the dose rate, we can determine when the minerals were last exposed to sunlight or heat. Recently, researchers have aimed to create 2D OSL maps from rock surfaces. Since dose maps require corresponding 2D dose rate maps, we conducted experiments to evaluate Luxel dosimeters (Al_2O_3:C) for dose rate mapping in rocks and minerals.
We checked the linearity of the dose response by irradiating the dosimeter for different time periods. To determine the unknown dose received by the dosimeter from rocks or minerals, a dosimeter with a linear response is crucial. The absorbed dose is only a few mGy per year, so we aimed to measure the dose as precisely and accurately as possible while ensuring the dosimeter exhibited a linear response. We also determined the depth-dose relationship of the dosimeter. As radiation penetrates a medium, its intensity decreases. We analyzed the trend of dose reduction with penetration depth. Additionally, we obtained OSL decay curves, which show how trapped electrons are released over time under light stimulation. The luminescence intensity provides information about the initial signal strength and decay rate, both of which reflect the absorbed radiation dose. Furthermore, we determined the beam profile using pieces of Luxel and compared it with the beam profile measured by film. To generate a radiation map from rock samples, the stimulation light must be uniformly distributed across the sample area. Uniform beam profile and consistent radiation dose ensure the accuracy and precision of the system. Finally, we irradiated several rock samples with different radiation doses and obtained radiation maps. Background signals were eliminated using various image filtration techniques.
Our results showed a linear dose response up to 12 Gy (120 s irradiation) with a minimum detectable dose of 200 mGy (2 s irradiation). The depth-dose curve exhibited an exponential decrease, peaking at the dosimeter surface. OSL signals dropped sharply within 8 s, with steeper declines for longer irradiation times. The beam profile measured by film had a 3.78% deviation and 98.8% symmetry. Luxel film was less effective for beam profiling than standard film.

Alimi, Ayobami

Faculty Mentor: Nic Herndon

Predicting and Mapping the Geographic Distribution of Glaucoma in the United States: Examining Correlations with Environmental and Social Determinants Using the All of Us Dataset

Vision impairment and eye diseases are significant public health concerns in the United States and globally. Glaucoma, a chronic and progressive disease, is one of the leading causes of irreversible blindness worldwide. In the U.S., more than three million individuals are estimated to be affected, with projections indicating a rise as the population ages. Primary open-angle glaucoma (POAG), the most common form in the U.S., often remains undiagnosed until significant vision loss occurs, highlighting the critical need for early detection and prevention.
While clinical and genetic factors influencing glaucoma onset and progression have been extensively studied, growing evidence suggests that environmental exposures, socioeconomic status, and lifestyle factors also play a crucial role. Social determinants of health (SDOH) including income level, access to healthcare, and community environment are increasingly

recognized as key drivers of health disparities. For example, individuals living in areas with high pollution levels or limited healthcare access may face a higher risk of developing vision problems, potentially due to oxidative stress or chronic conditions linked to environmental exposures.
This study employs data science methodologies to investigate the intersection of environmental and socioeconomic factors in glaucoma prevalence. Using the All of Us dataset, we explore how geographic disparities, environmental influences, and social determinants correlate with glaucoma risk across the United States. Furthermore, we develop predictive models that integrate demographics, genetic predispositions, environmental variables, and SDOH to enhance glaucoma risk assessment and early detection strategies.
Beyond glaucoma, the methodologies applied in this study provide a scalable framework for examining other complex diseases. This work demonstrates the potential of large-scale, diverse datasets such as All of Us to uncover health-environment interactions, inform public health interventions, and ultimately reduce the societal burden of glaucoma and vision impairment.

Alston, Courtney

Faculty Mentor: Jeannie Golden

A Behavioral Observation System for Trauma-Informed Student-Teacher Interactions

This presentation will discuss the implementation of an eight-week trauma-informed teacher training course. During this course, teachers learned strategies to interact with students who have experienced trauma utilizing specific, operationally defined behavioral strategies. Six teachers participated in the eight-week course, and two completed all pre- and post-assessments. The pre and post-assessments included two role plays (challenging behavior & rapport building) and a survey of staff beliefs about students. The results of this project suggest that having a clear and operationally defined behavior observation system allows for meaningful detection of staff behavior during student-staff interactions.

Andersen, Clark

Faculty Mentor: Joi Walker

Social Network Analysis to Measure Trust and Learning in Three Undergraduate Organic Chemistry Laboratory Contexts

There are currently limited studies that utilize Social Network Analysis (SNA) to measure the community that forms from different teaching styles in the chemistry lab. In this paper we use SNA on the framework of social constructivism to measure the networks of trust and learning between course participants in three sections of an Organic Chemistry I lab course: a Standard Instruction (SI) section, an Argument-Driven Inquiry (ADI) section, and a Course-based Undergraduate Research Experience (CURE) section. Students, instructors, and teaching assistants are given a survey to measure whom they know, whom they trust, and whom they learn from at the beginning and end of the semester. Responses from these surveys are used to create social network diagrams. Quantitative network data includes the density (i.e., proportion of fullness), centrality (i.e., number of ties), and connectedness (i.e., proportion of pairs that connect). Additionally, correlation and regression testing are performed on trust and learn networks to test if those networks are correlated and if trust predicts learning. Results show that the densities of trust networks increase from pre-semester to post-semester, and the densities of the learn networks increase from SI to ADI to CURE. We found positive correlations between the trust and learn networks in all three courses. In the ADI and CURE sections, trust significantly predicted learning. These results imply that providing opportunities to build trust can increase learning among students.

Anderson, Lexi

Faculty Mentor: Thompson Forbes

Knowledge and Attitudes Towards Pain Management in Critical Care Nurses

Pain management is a fundamental aspect of critical care nursing. However, barriers such as knowledge gaps, inconsistent pain assessment practices, and variations in attitudes toward pain management can negatively impact patient outcomes. Despite well-established guidelines, disparities in adherence to evidence-based pain management persist. Understanding these challenges is essential for improving patient care and ensuring effective pain control strategies in the ICU. The purpose of this study was to evaluate the knowledge and attitudes of critical care nurses toward pain management to identify educational gaps, assess the impact of experience and demographics on pain practices, and explore interventions to improve patient outcomes. A cross-sectional descriptive correlational study was conducted at a large tertiary healthcare system. The Knowledge and Attitudes Survey Regarding Pain (KASRP) was distributed to bedside nurses in eight critical care units. Recruitment included email campaigns, QR code flyers, and in-person engagement. The survey assessed pain assessment tools, opioid pharmacology, and multimodal pain management. Descriptive statistics and chi-square tests analyzed knowledge levels and demographic influences. Of the 443 eligible nurses, 62 completed the survey (14% response rate). Most respondents were female and had varying years of experience in high-acuity ICU settings. Key findings revealed knowledge gaps in opioid pharmacology, pain assessment for non-verbal patients, and the application of standardized pain assessment tools. Nurses with over five years of ICU experience demonstrated significantly higher accuracy in opioid titration responses and pain reassessment protocols. Variability in pain management practices was observed across units, highlighting the influence of institutional policies on clinical decision-making. This study emphasizes the need for targeted educational initiatives and policy standardization to improve nurses' competency in pain management. Enhancing training on pain assessment tools, multimodal pain strategies, and opioid safety could bridge knowledge gaps and reduce practice inconsistencies. Implementing structured educational programs and reinforcing evidence-based pain management guidelines may optimize patient care and improve adherence to best practices. Findings highlight the importance of ongoing professional development and institutional support in facilitating consistent, high-quality pain management in critical care settings. Standardized training and policy alignment across units may reduce variability and enhance patient outcomes. Future research should explore system-wide interventions to strengthen nurses' confidence and competency in pain management.

Ao, Bonnie

Co-Authors: Bo Ao, Xuan Wang, Itzamná Sánchez-Moncada, Francis A.M Manno
Faculty Mentor: Michael Dingfelder

Structural Hemisphericity in Pediatric Hearing Loss: The Role of Twist and Torque

Structural hemisphericity, or left-right brain asymmetry, is essential for auditory and language functions. However, how sensory input loss affects brain asymmetry remains unclear. Twist and torque, key structural properties, may reveal how auditory deprivation reshapes cortical development. This study examines how congenital sensorineural hearing loss (SNHL) affects twist, torque, morphometry, and volumetry, providing insights into structural brain reorganization in pediatric patients.

Quantify twist and torque asymmetries in unilateral and bilateral hearing loss (UHL, BHL) patients versus controls.
Examine how sensory deprivation alters local brain twist, global brain torque, and volume asymmetry.
Assess the impact of hearing loss on morphometric and transcriptomic features in auditory and language networks.
High-resolution T1-weighted MRIs from 42 pediatric patients (UHL, BHL, and controls) were analyzed. MRI scans were processed using a structural parcellation pipeline, segmenting 287 regions to assess hemispheric asymmetry. Twist and torque were computed to quantify angular deflection and Yakovlevian shifts. Morphometric and volumetric analyses examined gyral-sulcal patterns, gray-white matter disjunction, and volume loss in auditory and language regions.

Hearing loss altered twist and torque, with increased clockwise rotation in affected hemispheres. UHL led to asymmetric cortical contraction, particularly in auditory and language-related regions, while BHL reduced normal hemispheric asymmetry. Volumetric analyses revealed significant volume loss in auditory structures, with gyral-sulcal expansion in BHL

patients. Transcriptomic analysis showed gene network reorganization, including links to Alzheimer's and autism, with altered expression in the sensory-restricted hemisphere.

Sensory input shapes structural hemisphericity through twist, torque, and volumetric shifts. Hearing loss-induced sensory deprivation reconfigures brain morphology, potentially affecting long-term auditory and cognitive development. Early interventions may help mitigate neurodevelopmental alterations in children with hearing loss.

Atkins, Meredith

Faculty Mentor: Kristen Gregory

Students Disruptive Behaviors

Students are losing academic instructional time each year while at school due to students' disruptions in the classroom. Teachers need to focus on having personal relationships with all students in the classroom to show that there is pure intention to improve students' disruptive behaviors. With the number of disruptions being caused in the classroom, students' academics are decreasing due to the loss of instructional academic time each day, week and year. The purpose of this study is to find the relationship between students' behavior and their academic achievement. This leads to the question: What is the relationship between first grade students' disruptive behaviors and their academic learning in a rural title one elementary classroom? During this correlational study, 21 first grade students from a rural title one school will be observed. Students' behaviors will be observed using a behavior protocol called educators handbook, used by the entire staff at our school for minor disruptions, such as blurting, and major disruptions such as aggressive behaviors. Students will also complete a series of assessments for 5 weeks, showing their academic success in the classroom. Then the relationship with students' behaviors and students' academics will be analyzed to see if there is a correlation.

Babanawo, Daystar

Faculty Mentor: David Lagomasino

Mapping Nearshore Bathymetry for Coastal Resilience in the Caribbean

The Caribbean is increasingly vulnerable to the socioeconomic and environmental impacts of cyclones, a risk further amplified by projected sea level rise. Accurate prediction and modelling of storm surges and cyclones in this region require accurate bathymetric data, especially in the nearshore zone where even small variations in underwater topography can significantly affect wave dissipation and current patterns. However, many developing and small island nations rely on coarse-scale global bathymetric datasets that fail to capture the complex coastal features critical for hydrological modelling. In-situ measurements that can provide accurate bathymetric data are costly and resource intensive at large spatial and temporal scales, hence this study presents a novel approach to mapping nearshore bathymetry across the Caribbean by integrating Ice, Cloud, and Elevation Satellite (ICESat-2) photon-counting lidar data with Landsat 8 OLI optical imagery to develop Satellite-Derived Bathymetry (SDB) models. The Classification of Sub-aquatic Height Extracted Photons (C-SHELPh) algorithm was employed to differentiate bathymetric photon returns from the other returns, which served as training and validation data for Landsat-derived bathymetric models. Leveraging the blue, green, and red bands of Landsat 8 OLI, which are sensitive to water penetration the study achieved wider coverage and higher accuracy in water depth predictions in the region using random forest classification models. The results were presented as median composite bathymetry maps with RMSE of ~0.3 m or RMSE% of ~7% across the region. These maps will be useful in modelling storm surges and cyclones in the Caribbean, enabling vulnerable areas in the region to prepare and implement adaptive measures. Additionally, these high-resolution data have the potential to inform coral reef structure and health assessment, further expanding its use in nature-based solutions, conservation and restoration practices for coastal resilience. The data and algorithms will be made available in an open-source format, thereby allowing for the democratization of bathymetric data.

Barnes, Jada

Faculty Mentor: Eric Anderson

Investigating the role of Periplasmic Binding Protein, Fat B, in the binding interaction of [Iron (III)-Siderophore] complexes in Brucella Abortus

Brucella abortus, an obligate intracellular gram-negative bacterium, is the causative agent of brucellosis in ruminants. As an intracellular pathogen, Brucella can survive inside macrophages or placental trophoblast cells (for pregnant cattle). Like most prokaryotes, Brucella strains require the micronutrient, iron, for their survival. Brucella abortus produces two siderophores, Brucebactin (BB), a di-catechol chelator, and 2,3-dihydroxybenzoic acid (2,3-DHBA), while proliferating in placental trophoblast to meet the higher iron demand. Previous genome profiling of Brucella Abortus has identified the fatBCDE genes, which includes a Bi-lobal periplasmic binding Protein (PBP) ,FatB, expected to bind the Fe(III)-Siderophore complex and inner-membrane ABC-type (ATP Binding Cassette) transporter of the Fe(III)-Siderophore complex into the cytosol. Homology modeling and bioinformatics of Fat B conducted by me, show an α-helical hinge, typical of Fe(III)-siderophore binding proteins. Interestingly, FatB conserves two residues (a tyrosine and a Histidine) on its C-lobe, similar to its structural homolog, CeuE, another Fe(III)-di-catechol siderophore binding protein. In this in vitro solution study, we expressed and purified recombinant FatB from E. coli BL21 and conducted spectroscopic studies (CD, DSC, Fluorescence, UV-Vis, etc) to determine its solution structure and interaction of with its siderophores. FatB, a proposed periplasmic siderophore binding protein and a part of an ABC-type transporter, binds with Brucella abortus siderophores (2,3-DHBA, and Brucebactin) using conserved amino acid residues (H197, Y259). The aim of my Masters research is to utilize the Bioinformatics collected and experimental design to quantitatively characterize Fat B and its ability to bind Fe(III)- Siderophore complexes, including 2,3 DHBA and Brucebactin.

Barrow, Chalyne

Faculty Mentor: Archana Hegde

Assessing North Carolina Pre-K Teachers' Knowledge, Confidence, and Experience on Trauma Informed Care

Adverse childhood experiences (ACEs) have been associated with negative outcomes such as internalizing and externalizing problem behaviors, social issues, and attention problems. In 2022 it was reported that approximately four in 10 children in North Carolina have experienced at least one ACEs, and one in five children experienced two or more ACEs. Research shows that early childhood exposure to ACEs affects internalizing and externalizing problem behaviors, social issues, as well as play and attention problems in childhood. This can be a cause for concern if left unattended, especially as children are transitioning into new environments like school. However, research suggests that teacher support decreases the likelihood of students displaying emotional and behavioral issues. As it relates to NC Pre-K teachers, their role in early childhood development is one of great importance as their interactions with children directly impacts children's social and emotional development in the classroom. To best support NC Pre-K teachers in their role, we need to gain an understanding of their current levels of knowledge, confidence, and experience with trauma-informed care (TIC).

Thus, utilizing a purposive sampling technique close to 68 NC Pre-K teachers associated with the University Early Educator Support (EES) Hub completed the online Primary Early Childhood Education Trauma-Informed Care Scale. We could assess teachers' knowledge related to trauma informed care, confidence in their own actions, experience working with children who have experienced trauma, training received on trauma, along with their own personal and professional background information. The results indicated that 48% of the teachers' identified as white, 40% black, 6% Latino and 3 % Native American and Bi-Racial respectively. All teachers were females, and all teachers had 4-year degree in early childhood or a related field. Teacher's knowledge related to trauma informed care and their confidence in their own action strongly correlated at $r(68) = .69$, $p < .001$. The top three training topics teachers were interested in were, Resources that are available within the community for children and families who are dealing with trauma (80%), Learning effective classroom strategies as teachers work with children experiencing trauma (54%) and How to support parents of children exposed to trauma (51%). Thus, it was encouraging to see that teachers' knowledge regarding trauma and confidence in their own action is correlated strongly, indicating that training on the topic of trauma is important for teachers. The knowledge on trauma does influence their actual practices with the children. Further, the information gathered on more training requirements can help professionals cater their training on the important topics as indicated by the teachers. This study has several more implications for pre-service and in-service training programs for teachers. These will be further discussed within the presentation.

Bensch, Elody

Faculty Mentor: Morgan Milton

Vibrio fischeri Biofilm Regulation: Uncovering the Structural and Functional Mechanism of SypA and SypE

Approximately 80% of all bacterial populations reside in biofilms – tightly regulated communities of matrix-associated bacteria. It is estimated that over 70% of all human bacterial infections are associated with biofilms. Our research focuses on the regulatory protein network governing biofilm formation in Vibrio fischeri, a symbiotic marine bacteria. To do this, we focus on two V. fischeri regulatory proteins, SypA and SypE. These proteins play an essential role in the symbiotic relationship between V. fischeri and its host, the Hawaiian bobtail squid. Based on sequence analysis, SypA is a single domain anti-sigma factor antagonist (STAS) protein. Single domain STAS proteins typically bind and are phosphorylated by their cognate anti-sigma factor to regulate various cellular functions. SypE is SypA's only known binding partner and contains an anti-sigma factor-like kinase domain, but also uniquely has a phosphatase and a receiver (REC) domain, suggesting a more complex regulatory function. Interestingly, these regulatory proteins appear to function differently from the canonical anti-sigma factor/anti-sigma factor antagonist proteins. Here, we use a structure-function based approach to understand the molecular mechanisms of SypA and SypE. Based on the presence of a REC domain, we suspected SypE oligomerizes. Through analytical ultracentrifugation, we confirmed SypE dimerization. Computational modeling suggests SypE dimerizes through its REC domain. Preliminary cryo-EM data suggested large amount of flexibility between SypE's functional domains which was confirmed by small angle x-ray scattering coupled with size exclusion chromatography and light scattering. This flexibility and dimerization points towards SypE having a complex regulatory mechanism. To better determine how SypA and SypE interact to regulate biofilm formation, we employed molecular dynamic simulations. Our simulations suggest SypA has uncharacteristic flexible regions compared to homologs. This may be imperative to protein-protein interactions beyond SypE. Therefore, we are working toward identifying additional binding partners using affinity purification and mass spectrometry. Together, these findings will allow us to reconstruct the regulatory pathway controlling V. fischeri's biofilm formation.

Bhandari, Anita

Faculty Mentor: David Hart

Evaluating Object Detection Algorithms for Crowded Sperm Microscopy Videos

When sperm move under a microscope, their rapid and unpredictable motion, combined with high density, creates a chaotic environment that complicates accurate analysis. Each sperm cell is essential for fertility assessments, yet tracking their overlapping and erratic paths presents a daunting challenge. Conventional object detection methods falter under these dense conditions. Cells vanish behind others, follow unpredictable trajectories, and create overlaps that confuse even sophisticated algorithms. Classical particle-tracking models and vision transformers optimized for sparse data struggle to maintain accuracy in such scenarios. To overcome these obstacles, our research compares advanced object detection algorithms—Trackpy, StarDist, and the Segment Anything Model (SAM). Trackpy uses centroid-based tracking, StarDist specializes in segmenting overlapping objects with star-convex shapes, and SAM offers versatility across diverse datasets. Together, these algorithms provide a toolkit designed to navigate the biological traffic jam in crowded sperm videos. We assess their performance using two categories of evaluation metrics. Unlabeled metrics, such as the average number of sperm detected per frame and tracking consistency across frames, offer a preliminary view of algorithm stability without ground truth data. Early findings show promising performance, with normalized averages exceeding 0.8, indicating high tracking reliability. Next, labeled metrics, including Acyclic Oriented Graph Matching (AOGM), Association Accuracy, and Target Effectiveness, will be applied to manually corrected data. These metrics will reveal how well each algorithm preserves the identity of sperm cells and minimizes tracking errors in dense environments. This study aims to establish a benchmark for algorithmic performance, improving automation in reproductive research and diagnostics. By enhancing sperm tracking methods, we contribute to the advancement of computer vision in biological research. Through open access, this work will serve as a resource for future innovations in data analysis and fertility treatment.

Brautman, Wendy

Faculty Mentor: Tammy D. Lee

What is the Impact of Problem-Based Learning on Student Attitude in the Science Classroom?

This study explores the impact of Problem-Based Learning (PBL) on student attitudes in a science classroom. PBL, a student-centered instructional approach, emphasizes real-world problem solving and collaboration, which may positively influence attitudes toward learning. According to Beers et al. (2005), collaborative learning environments can positively influence student attitudes. Research suggests that students with positive attitudes toward science often perform better academically than students who have a negative attitude toward science (Mao et al., 2021). This study examines how a PBL lesson affects 9th grade students' attitude toward science in an Earth Environmental Science classroom. The study uses a quantitative approach, collecting data through a pre- and post-intervention survey with Likert scale questions to measure changes in students' attitudes. It is expected that positive student attitudes will increase with the implementation of the PBL lesson. This action research study builds on the idea that students that have ownership over their learning process develop a positive attitude toward science because they perceive it to be meaningful (Ferreira & Trudel, 2012).

Brinkley, Collin

Faculty Mentor: Abdel Abdel-Rahman

Site-specific Connexin-43 Phosphorylation Contributes to Left Ventricular Dysfunction in Estrogen Treated Male Rats

Estrogen replacement therapy (ERT) has been well established for its cardioprotective effects in both surgical and physiological menopause. When compared to aged-matched males and premenopausal females, postmenopausal females who undergo ERT have lower rates of cardiovascular disease (CVD) and longer life expectancy. Despite the increasing rates of gender affirming therapy (GAT), the cardiovascular effects of chronic estrogen therapy (ET) in males remains largely unaddressed. The aim of this study is to identify functional and molecular differences between males treated with chronic estrogen therapy (ET) and controls. Specifically, we focused on the gap junction protein connexin-43 (Cx43) expression and post-translational modifications to determine whether its phosphorylation specific sites are cardioprotective or cardio-detrimental. Male Sprague-Dawley rats were divided into two groups. One group received daily estrogen (E2) treatment (20ug/kg body weight S.C.) in sesame oil and the other received the vehicle sesame oil for 8 consecutive weeks. Upon completion of the 8 weeks, animals underwent echocardiography, echocardiogram and invasive catheterization was performed to obtain blood pressure. Animals were euthanized and tissues were harvested for molecular analysis. Echocardiographic analysis revealed males receiving E2 exhibited lower cardiac output (CO), stroke volume (SV), left ventricular end diastolic diameter (LVEDD) and left ventricular end systolic diameter (LVESD). Hemodynamic data showed no significant changes in systolic blood pressure (SBP), diastolic blood pressure (DBP), or mean arterial pressure (MAP). However, during heart rate variability (HRV) analysis, males receiving estrogen displayed a higher LF/HF ratio when compared with the vehicle control. Additionally, males receiving E2 showed a reduction in dp/dt(max) compared to vehicle. Using western blot, we showed a downregulation in Cx43, phospho-Cx43(Ser373), and an upregulation in IL-6 in males receiving E2 compared to vehicle with no difference in the expression of phosphor-Cx-43(Ser368). Our results indicate that chronic estrogen treatment in male rats leads to significant cardiac dysfunction, as evidenced by reduced cardiac output, stroke volume, and left ventricular diameters. While blood pressure remained unaffected, the changes observed in heart rate variability and contraction dynamics suggest that estrogen treatment in males may adversely influence autonomic regulation and myocardial contractility. Downregulation of connexin-43 (Cx43) and post-translational changes in its phosphorylated isoform (Ser373), likely account for the E2-mediated cardiac deterioration. The upregulation of inflammatory cytokine IL-6 further establishes the molecular damage associated with E2 therapy in males.

Brisard, Benjamin

Faculty Mentor: Cameron Schmidt

Revealing Fertilization-Competent Sperm Subpopulations

Successful fertilization requires sperm to undergo capacitation, a post-ejaculatory maturation process regulated by both time-dependent and chemical cues. A central event in this process is the acrosome reaction (AR), which enables sperm to bind and penetrate the oocyte. Although the signaling pathways driving capacitation have been extensively studied, the inherent heterogeneity in individual sperm responses makes it difficult to predict which cells are fertilization competent. To better address this challenge, we propose incorporating population-level modeling that can be adapted to describe capacitation. By examining male infertility at the population level rather than focusing on individual cells, we can make more accurate predictions about fertility competence. To test our modified modeling approach, we conducted two spectral flow cytometry experiments—one capturing the time-dependent effects of capacitation and the other focusing on chemical cues. Using detailed measurements of intracellular calcium, viability, and acrosomal status at the single-cell level, we can directly validate our model. Our data reveal that in the CD1 mouse strain, capacitation unfolds in distinct waves, a phenomenon only discernible at the population level. At any given time, a subset of sperm gains fertilization competence, then quickly dies, only to be replaced by a new cohort steadily undergoing capacitation. This cyclical pattern continues until the entire sample eventually follows this pattern or dies before ever reaching the AR. Looking ahead, we will refine this population-level model of capacitation to boost fertilization rates and enhance zygotic development in standard IVF protocols, potentially improving outcomes beyond those achieved with current clinical practices.

Brown, Cat

Faculty Mentor: Joseph Houmard

Understanding and Addressing Health Disparities Amongst Eastern North Carolin Firefighters using Cardiometabolic Risk Scores

Cardiac events have remained the leading cause of on-duty deaths among US firefighters for the past five decades. Despite growing evidence, cardiac incidents have remained the leading cause of death each year since 1980. Northwestern states have conducted most of the research and interventions performed on firefighters, which have left Southeastern, specifically North Carolina, as an underrepresented population creating a gap in literature for a region known for higher morbidity rates and is often referred to as the “Stroke Belt”. To understand the relationship between cardiometabolic risk and sudden cardiac death this study explores health disparities faced by firefighters in Eastern North Carolina, with a focus on addressing cardiometabolic risks to better understand the predispositions of sudden cardiac death (SCD). I hypothesize that firefighters will have a higher relative risk for cardiovascular disease compared to the public and exhibit a dose-response relationship based on their estimated metabolic equivalence obtained during an exercise stress test conducted at the Human Performance Laboratory at ECU. I predict that firefighters of racial/ethnic minorities will have a higher relative risk of cardiovascular disease compared to their white, non-Hispanic counterparts. Modifiable risk factors associated with SCD were obtained through firefighters' annual assessments; which include diagnosed hypertension, diagnosed diabetes, dyslipidemia, tobacco abuse, adiposity, and metabolic equivalence. Cardiometabolic risk scores (CMR) are calculated using a combination of the risk factors.

Carrasquillo, Addison

Faculty Mentor: Sachiyo Shearman

Navigating Anxiety and Uncertainty: Cultural Adjustment of International Students at ECU

International students face unique challenges when transitioning to study in higher education in the United States. A few of the challenges include uncertainty and anxiety due to cultural differences. This research study looks closer into the adjustment experiences of international students at East Carolina University (ECU) by focusing on their use of campus resources, student involvement, and the role of communication in cultural adaptation. A primary research objective is to assess whether international students actively engage with campus resources and, if so, how these resources impact their social and academic adjustment. Additionally, this study examines the role of student involvement in organizations, services, and events in shaping their sense of belonging and self-perceived success. It also investigates whether high-performing international students experience a different adjustment trajectory compared to their peers. This study is based on the Anxiety-Uncertainty Management (AUM) theory, which explains that people communicate better in new cultural settings when they keep their anxiety and uncertainty at a manageable level (Gudykunst, 2005). When a person feels more comfortable and confident, they can adapt more easily and have more successful interactions. This mixed-methods research explores how international students navigate unfamiliar academic and social environments while coping with cultural barriers and pre-conceived expectations. The quantitative component of this study utilizes a survey distributed to ECU's international students who are on an F-1 Visa. Forty-two international students (male = 18, female = 24) participated in the current study. Key variables such as student involvement, challenges, uncertainty, anxiety, and perceived cultural distance were measured. Qualitative interviews were conducted with 10 selected participants (male = 5, female = 5) to gain deeper insight, allowing for a more in-depth understanding of students' experiences. By integrating both approaches, this study aims to identify patterns in student engagement, the effectiveness of support services at ECU, and the factors that contribute to successful adaptation. The findings from this research study will provide insight for university administrators, faculty, and support staff in designing more effective programs and communication strategies to enhance international student success. By having a better understanding of both the challenges and some of the effective coping mechanisms of international students, this study emphasizes the importance of creating an inclusive and supportive campus environment.

Cashwell, Kylie

Faculty Mentor: Cameron A. Schmidt

Beyond CASA: A New Framework for Sperm Motility Analysis

Male factor infertility accounts for 30–40% of infertility cases, with combined male and female factors adding another 20%. Because sperm function depends on reaching and fertilizing eggs, tracking motility is crucial for evaluating fertilization potential. IVF clinics commonly use Computer-aided Semen Analysis (CASA) for motility analysis, which typically relies on five-second microscopy snippet videos that often fail to capture extended, complex trajectories, path crossovers, and non-linear movements. This reliance on short tracking windows and abrupt velocity cutoffs leads to trajectory fragmentation and the loss of biologically relevant motility behaviors. To address these limitations, we developed a unified framework capable of tracking sperm for minutes at a time, performing advanced velocity analyses, resolving multi-path crossovers, and supporting more comprehensive measurements. We preserved the true sperm trajectories during crossover events by manually correcting mislabeled sperm identities, ensuring accurate CASA parameter outputs and reliable future measurements. This approach not only provides a better representation of standardized CASA parameters but also captures the complete sperm search mechanism. Subsequently, the unified framework will decompose head trajectories over extended durations allowing long-term motility measurements such as random walk properties and directional persistence lengths. We also intend to train a supervised machine learning model, such as a Recurrent Neural Network, using the manually corrected data to train complex tracking challenges like path crossovers and interactions with debris. By making the framework open-source and adaptable, researchers and clinicians can refine motility assessments, advance fertility diagnostics, and transcend current CASA limitations.

Clark, Natalie

Co-Presenters: Shawn Yeazell, Sean Parker, Michael McNally
Faculty Mentor: Shawn Yeazell

Distal Bicep Tendon Repair : Utilizing Knotless Retensionable All Suture Anchors Technique

The incidence of distal bicep tendon ruptures is low, yet surgical repair is important to restore function. The retensionable knotless distal biceps tendon repair with all suture anchor technique involves placing two knotless all suture anchors in the radial tuberosity. Repair sutures are passed through and around the distal biceps tendon and a tensioning strand is tightened to reduce the tendon down to the bone. One limitation to this technique is that the biomechanical strength utilizing a suture anchor technique have a lower load to failure compared to the classic cortical button technique (Mazzocca et al., 2007). Despite this shortcoming, the potential advantages should not be ignored. This includes the ability to place the repair in an anatomic position and the ability to retension the construct as many times as necessary. It also minimizes potential complications such as fracture and injury to the posterior interosseous nerve (PIN) (Reichert et al., 2018).

Cole, Tori

Faculty Mentor: Robert Hughes

Development of new anti-fouling coatings with improved environmental capabilities

Marine biofouling is the attachment and growth of micro and macroorganisms on surfaces immersed in the sea. This occurs through a process known as microfouling where a conditioning film forms from extracellular polymerics. These biofilms provide a hub for sticky surfaces on aquatic structures such as ships, fishnets, and aquaculture cages and intercellular communication amongst organisms like bacteria and diatoms. Thus causing an increase in hull resistance, fuel consumption, underwater noise, and ultimately the environment through the release of toxins and biocides. Previous strategies to prevent organisms from adhering to the surface include tar, pitch, heavy metals, and arsenic based coatings. However, these strategies have major limitations like safety, bioaccumulation, and toxicity. Current preventive strategies seek to use enzymes as antifouling and bilge coatings. In this proof-of-concept study, research will expand on the enzyme paints (enzyme-polymer hybrid materials) ability to tether enzymes to polymers via click chemistry. This project will test selectively modified commercially available enzymes such as xylanase, lysozyme, and protease proteins with two different polymer matrix linkers to identify a primary candidate to use for product testing. Various tests such as retention of enzymatic activity, immobilized enzyme activity in artificial water and brackish water under various time and storage conditions will be conducted. These tests will establish a lead candidate for an anti-biofouling coating.

Cook, Joanna

Faculty Mentor: Kristen Gregory

High Achieving Kindergarten Math

This study explores the relationship between kindergarten teachers' perceptions of mathematics and the math achievement of high-achieving kindergarten students in a suburban public school system. The purpose of this study is to determine whether kindergarten teachers' perceptions of mathematics correlate with the math performance of students identified as high achieving in math, according to benchmark data. A quantitative, correlational research design will be employed to examine this relationship. Data will be collected through a Likert Scale survey administered to kindergarten teachers to assess their perceptions of mathematics. In addition, math benchmark data from high-achieving kindergarten students will be gathered at the beginning and middle of the academic year to determine student achievement. The data will be analyzed to identify any correlations between teacher perceptions and student performance. The findings of this study are expected to provide insights into how teacher perceptions may influence the academic outcomes of high-achieving students in math during kindergarten. The results may inform instructional practices, professional development, and educational policies aimed at supporting high-achieving students in mathematics. Additionally, the study's outcomes will benefit teachers, administrators, policymakers, and researchers by offering data-driven recommendations that enhance math achievement in kindergarten.

Covington, Ciara

Faculty Mentor: Shahnaz Aziz

Unlocking Employee Well-Being: The Mediating Effect of Diversity Climate in an Inclusive Workplace

Within the current study, we aim to assess the relationship between employees' perceptions of inclusivity policies and employee well-being, as well as test diversity climate as a potential mediator. Diversity climate pertains to an employee's perceptions of how well their organization demonstrates support and promotion to diverse employees. The conceptualization of diversity climate is rooted in social identity theory, the interactional model of cultural diversity (IMCD), and the organizational justice theory. Social identity theory suggests that identification and membership within the organization impacts an employee's perception of inclusivity. The IMCD model is an extension of the social identity theory, which further explains how inclusive policies interact with organizational dynamics (i.e., individual-level, intergroup-level, and organizational-level factors) to shape the overall diversity climate. Organizational justice theory highlights the influence of perceived fairness when organizations create and manage inclusive work policies. We hope to add to the limited research on individual outcomes when assessing the influence of diversity climate. Various self-reported measures were used to investigate whether diversity climate mediates the relationship between perceptions of inclusivity policies and aspects of employee well-being, including psychological well-being, job satisfaction, turnover rates, social support, and work-life balance. The study sample consisted of randomly selected faculty and staff from a Southeastern university. If our results are significant, then we will provide future directions on how organizations can improve employee well-being by managing an inclusive work environment and strengthening the perceptions of their organization's diversity climate.

Dail, Erin

Faculty Mentor: Kristen Gregory

Strategies for Students with ADHD and Autism

Students with Attention-Deficit/Hyperactivity Disorder (ADHD) and Autism Spectrum Disorder (ASD) often face prolonged struggles in educational settings before receiving adequate support. This study investigates the strategies employed by teachers to help these students succeed academically and socially. The purpose of this study is to identify effective strategies that enable teachers to address the unique needs of neurodiversity students, ensuring their success in inclusive classroom environments. Using a quantitative methodology, this research employs a survey design to collect data from 4th and 5th-grade teachers, administrators, and special education teachers. The survey includes questions about the effects of food, sleep, and exercise, examining how these factors influence student behavior and learning. Descriptive statistics are used to analyze how frequency and mean scores summarize strategy use and perceived effectiveness. Findings aim to inform evidence-based practices and support systems that empower educators to better assist students with ADHD and ASD in achieving their full potential.

DeFeyter, Ellissa

Faculty Mentor: Rebecca Asch

Decadal Changes in Ichthyoplankton Community Composition along Inshore-Offshore Transects in Onslow Bay

Fish spawning is a life history stage that conveys both ecological and economic benefits to Onslow Bay, North Carolina, the site of an important fish spawning ground. From an ecological standpoint, fish spawning produces the next generation of fish, which serve in marine food webs as both predators and prey. This replenishment of fish stocks ensures that the fishes that make up the United States multi-billion-dollar fishing industry maintains healthy populations. A report carried out by NOAA estimated the fishing industry in the United States brought over 5.9 billion dollars of revenue. North Carolina's ocean occurs at a major biogeographic transition zone between subtropical Gulf Stream waters from the south and colder, temperate waters from the north. This unique feature promotes a highly diverse marine ecosystem. In order to study fish spawning dynamics in North Carolina, ichthyoplankton (i.e., fish eggs and larvae) are being studied across four surveys in Onslow Bay encompassing an approximately fifty-year time span to identify dominant species and analyze how community composition changed over time along an inshore-offshore gradient. Our primary analysis will examine the ichthyoplankton data collected during the

month of February for all four surveys. We will also examine the winter months of the four surveys, classified as November through March, in order to take into account, the potentially changing seasonality of the fish community due to climate change. We will calculate diversity indices separately for ichthyoplankton collected inshore and offshore areas of transects. We hypothesize that the species of eggs and larvae identified will overlap across life stages. Based on previous studies, we expect to see higher larval fish abundance values for all offshore locations across the different surveys, and expect to see the dominant species change over time. Results from this project will provide baseline data to compare with historical data to investigate whether the ichthyoplankton community has changed due to fishing pressure and climate change. In broader terms, this could help how fish spawning is changing in Onslow Bay, to help inform fisheries managers.

Denning, Jacob

Faculty Mentor: Kristen Gregory

Beyond the Headcount: The Impacts of Large Class Size in Elementary Classrooms

Imagine a classroom where there are 27 or more students, all of which possess distinct abilities while having multiple needs and hidden academic potential. In this vision, the class has only one teacher to lead it, having to support the individual learning styles of all students. This scenario illustrates the complexities of large class sizes and prompts research into how class size affects students and teachers. This study will investigate the impact of large class sizes on student achievement and teacher effectiveness in a Title One restart elementary school in the mid-Atlantic region of the United States. Restart schools, which are designated as low performing, are granted flexibility from some state regulations, such as class size mandates. The aim of this flexibility is to strengthen systems and structures to positively impact student outcomes. This mixed-methods action research study seeks to answer two vital questions: (1) What is the relationship between class size and third–fifth graders achievement? (2) What are third through fifth grade teachers' perspective on the impact of large class size on teacher effectiveness? To address these questions, the research design utilizes quantitative and qualitative methods, including two data sources: Math and Literacy Mastery Connect Predictive Assessments and a teacher survey via Google Forms. Mastery Connect Predictive Assessments are benchmark assessments that align with state standards and measure student progress and performance. The data analysis process includes separate methodologies for both data sources based on quantitative and qualitative approaches. For the Mastery Connect Predictive Assessment scores, a correlation data analysis will be used to determine the relationship between class size and third–fifth graders achievement. Open and axial coding will be used for the survey data to process the participants' responses and find overall themes and sub-themes. The findings from this research could provide valuable insight for educational leaders, policymakers, and educators working to improve learning environments in restart schools and develop policies that could enhance learning outcomes, possibly paving the way for more equitable educational opportunities.

Denning, Michael

Co-Presenters: Aaron Phillips
Faculty Mentor: Dmitry Tumin

Comparing prehospital time among pediatric poisoning patients in rural and urban settings

Barriers to healthcare in rural areas can delay treatment in pediatric patients who experienced poisoning. We compared emergency medical services (EMS) response times and EMS-reported delays in responding to pediatric poisoning incidents between rural and urban settings using the 2021 National Emergency Medical Services Information System (NEMSIS). Rural areas were defined as locations with a population of <50,000, not part of metropolitan areas, while all other locations were classified as urban (metropolitan) areas. Patients under 18 years of age transported by EMS with a provider primary impression of poisoning were included (N=11,911, 12% rural). Study variables were compared using rank-sum tests and Chi-square tests. Multivariable analysis of outcomes included quantile regression and logistic regression for continuous data and categorical data, respectively. The median total prehospital time by EMS was 40 minutes (interquartile range: 29, 57), and the most common type of delay was scene delay (6%). Patients transported by rural EMS agencies experienced 7 minutes (95% confidence interval: 5, 8, $p<0.001$) longer prehospital time than those transported by urban agencies. There were no differences between rural and urban EMS agencies in the occurrence of dispatch, response, scene, and transportation delays. These results elucidate the need for equitable allocation of resources and training to enhance rural EMS responders. The additional 6.6 minutes produces increased time for the human body to remain physilgoicaly unstable and not optimally

treated. Therefore, By integrating targeted interventions to rural pediatric populations, better care can be achieved across all geographic regions. Further research must be conducted to ascertain the specific factors, outside of delays, resulting in the disparity between rural and urban prehospital time.

Deshpande, Vedant

Faculty Mentor: Li Yong-Qing

Engineering and Biological Aspects of Microwave-Based Bacterial Spore Inactivation: A Case Study with B. subtilis

The proliferation of antibiotic-resistant bacterial strains necessitates the development of alternative sterilization methods. This study investigates the effects of high-power microwave radiation on Bacillus subtilis PS 832 spores through an integrated analytical approach. We have successfully designed and fabricated a specialized electromagnetic waveguide system operating in the microwave spectrum for controlled exposure of bacterial spores. Initial experiments with B. subtilis PS 832 spores have been completed under varying conditions to evaluate both thermal and non-thermal inactivation mechanisms. Our ongoing research employs optical microscopy for morphological characterization and micro-Raman spectroscopy for analyzing molecular modifications in spore architecture pre- and post-microwave exposure. This multi-modal analytical approach aims to elucidate the fundamental mechanisms underlying microwave-induced spore inactivation, with particular emphasis on structural and biochemical alterations across different moisture conditions. Preliminary results from waveguide characterization and initial spore exposure experiments will be presented, along with the projected timeline for comprehensive spectroscopic and microbiological analyses. This research contributes to the development of more efficient non-chemical sterilization methods and advances our understanding of microwave-biological matter interactions at the cellular level.

Dilioha, Jude

Faculty Mentor: Guy Iverson

Nitrogen Dynamics of Swine CAFO Waste in Groundwater and Surface Water located in North Carolina

Eastern North Carolina (ENC) is a significant producer of pork products in the United States, with most swine being raised at concentrated animal feeding operations (CAFOs). Swine wastewater is typically stored in lagoons and periodically applied to spray fields for soil amendment. Wastewater contains elevated nitrogen concentrations that can be used for plant uptake; however, nitrogen may leach into groundwater or runoff to streams, potentially resulting in water quality impacts in downstream waters. Few studies have characterized groundwater and surface water nitrogen transport on a swine CAFO. Thus, the goal of this study was to analyze nitrogen concentrations in wastewater and water resources located hydraulically downgradient from spray fields at a swine farm in ENC. Piezometers were installed to collect samples from the surficial aquifer in areas upgradient of a spray field, beneath a spray field, and underlying a riparian buffer downgradient from a spray field. Also, sample collection was conducted on four surface water locations named upstream, downstream, seep, and east creek. Six months sample were collected between July 2023 and February 2024, which were analyzed for total dissolved nitrogen (TDN) and nitrogen speciation. Results revealed that wastewater irrigation from the lagoon influenced nitrogen concentrations in water resources. Wastewater in the lagoon had a median TDN concentration of 1651.12 mg/L, which was significantly greater than ($p < 0.01$) all other groundwater sampling locations. Groundwater beneath the spray field contained the next highest TDN concentration (median: 13.82 mg/L), which was more than 5 times greater than downgradient groundwater (median: 2.34 mg/L). Background groundwater contained TDN concentrations that were substantially lower (median: 1.07 mg/L). Also, the median TDN concentrations of surface water upgradient of the farm is 1.25 mg/L, this value is about 12 and 13 times less than concentrations downstream (15.17 mg/L) and east creek (17.18 mg/L). The seep downgradient of the farm has TDN concentrations 50 times higher than the upgradient concentration. Groundwater and surface water located hydraulically downgradient from spray fields contained elevated TDN concentrations relative to water resources upgradient from wastewater application sites. These concentrations are higher than the uninfluenced upgradient locations. Thus, CAFOs are likely a significant source of nitrogen to nearby water resources, and more work is needed to evaluate the effectiveness of nitrogen management strategies to curtail nitrogen transport from CAFOs.

Dix, Jessica

Faculty Mentor: Kristen Gregory

Equitable Education of Autistic Students- Educator Perspectives

This research focuses on autism spectrum disorder (ASD), a developmental condition that affects communication, behavior and social interaction. The study addresses the research problem of how teacher perspectives, including personal biases, impact autistic students' ability to access an equitable education, particularly in a southern state in the USA. Despite existing efforts in inclusive education, gaps in services, teacher training, and understanding of ASD persist, often creating barriers such as unmet accommodations, social isolation, and inequitable disciplinary practices. The central research question asks: What perspectives and hidden biases do educators have about autistic students that might inadvertently restrict student access to an equitable education? Educators from across North Carolina will be invited to participate in the study, via Facebook educator groups, including those teaching K-12 grades, general education, special education and specialized subjects. It is essential to gain a comprehensive understanding of how the unique needs of autistic students are being perceived statewide. The study utilizes a mixed- methods approach, combining qualitative and quantitative data collection through a LIkert scale survey and open-ended questions to analyze teacher attitudes, assumptions, and their impact on autistic students. I will analyze the demographic data of participants using descriptive statistics to provide a clear overview of the study population. Survey responses will also be analyzed using descriptive statistics to identify patterns and trends in the data. For the open-ended survey questions, I will employ open and axial coding methods to systematically organize and interpret the qualitative data, allowing for the identification of key themes and relationships. The results will benefit autistic students by addressing barriers to equitable education and prompting better educational and life outcomes. Educators will gain insights to improve classroom inclusivity and reduce biases, while communities will benefit from decreased stigma and increased acceptance of neurodiversity.

Dixon, Jonicia

Faculty Mentor: Kristen Gregory

Unleashing Potential: Exploring Factors and Strategies to Enhance Student Motivation in the Classroom

This study will examine the research question: What is the relationship between classroom environmental factors—teacher-student interactions, instructional strategies, and student motivation—in 4th-grade students? Addressing the pervasive issue of low student motivation, particularly in Title 1 schools, this research explores how specific classroom dynamics influence engagement and academic performance. Using a mixed methods methodology, data will be collected through student surveys and questionnaires, focus groups, classroom observations, and academic performance metrics to identify key factors contributing to low motivation and effective engagement strategies, such as positive reinforcement, student choice, and collaborative learning. Qualitative data will be analyzed using open and axial coding to identify emerging themes and relationships between classroom environmental factors and student motivation. The findings are expected to provide educators, administrators, and policymakers with actionable insights for fostering classroom environments that enhance student motivation and achievement. Additionally, the results will serve as a valuable resource for teacher training programs, offering evidence-based approaches to improving instructional strategies and teacher-student relationships.

Dowson, DaiSha

Faculty Mentor: Kathrin Rothermich

Enhancing Linguistic Equity in Healthcare: Communication Accommodation in Patient Interactions

Effective communication is essential for equitable healthcare, yet language discordance between patients and providers remains a persistent barrier, particularly for minority populations. When patients must communicate in their second language (L2) with first-language (L1) healthcare providers, the risk of miscommunication increases, potentially compromising care. Communication accommodation, where speakers adjust their speech to enhance understanding, offers a strategy to bridge this gap. This study examines how L1 Physician Assistant (PA) students modify their communication when interacting with Hispanic L2 avatar patients of varying English proficiency. Using Mursion, a mixed-reality simulation platform, we analyzed 41

L1 PA students conducting standardized intake interviews, focusing on acoustic (speech rate, pitch modulation) and lexical (word frequency, contextual diversity) adjustments. Findings revealed significant accommodations: PA students slowed speech, narrowed pitch range, and used higher-frequency vocabulary with lower-proficiency L2 avatars. While these modifications can facilitate comprehension and rapport, their effectiveness depends on appropriateness. Over-accommodation, such as excessive simplification or unnatural prosody, may undermine interactions by making patients feel patronized. Integrating communication accommodation training into healthcare education can enhance patient trust and clinical outcomes by equipping providers to adapt speech effectively while respecting patients' linguistic competence. Future research will examine how these strategies influence patient perceptions, trust, and health outcomes, ensuring accommodation improves—rather than hinders—communication. Expanding this work to real-world clinical encounters will further refine best practices for linguistic adaptation in healthcare.

Edmondson, Daisy

Faculty Mentor: David Knox

Sensitive Topics in Romantic Relationships

264 undergraduates at 3 universities completed a 37 (quantitative and qualitative) item survey on the degree to which undergraduate students discuss "sensitive" topics in their romantic relationships. The topics included the number of previous partners, having been raped as an adult, having experienced child sex abuse, preferred sexual behaviors with a partner, sexual behaviors to avoid, previous participation in BDSM, previous participation in a threesome, attitudes toward consensual non-monogamous relationships, watching pornography frequently, having used sex toys, having had an abortion, desired frequency of sex, and sexual values. Foci included how frequently "sensitive topics" are discussed (or avoided), how soon these topics are discussed in the relationship, which partner initiates the discussion, and the reaction a partner might have to discussing "sensitive topics" with a romantic partner. Variations by gender, sexual orientation, and race will be assessed. Symbolic interactionism and social exchange theories will be used to explain the findings. Limitations of the research will be identified.

Elangovan, Aravind

Faculty Mentor: Nathan Hudson

Analysis of Fibrin Fiber Polymerization

Fibrin fiber networks form the structural component of blood clots. Fibrinogen, a protein found in blood plasma, polymerizes in the presence of thrombin into a network of fibrin fibers. In 1947, fiber branching was seen using an electron microscope. They were able to identify a singular point, called the nidus, where multiple fibers emerge from. Then later in the early 1990's, using a transmission electron microscope, trimolecular and tetramolecular junctions were established. Trimolecular junctions are when all fibers going into and out of that junction have approximately the same width. Tetramolecular junctions are when two fibers converge and laterally associate, creating a third branch. These studies, however, are of clots at the end of polymerization and at a single time. Hence, the mechanisms governing the transition from 2-D linear fiber strands to a 3-D, branched network remain unresolved. The goal of this project is to analyze the gelation process by looking at how the junctions between fibers form. Polymerization of the clots were recorded via time-resolved 3D fluorescence microscopy at 0.5 mg/mL fibrinogen + 0.1 IU/mL thrombin concentration. Using the Imaris software, the mechanisms of junction formation and the types of junctions formed will be interrogated and quantified. Understanding the gelation process has the potential to provide a mechanistic understanding of the fibrin networks in diseases such as diabetes since there are significant differences in structural properties. Preliminary results will be presented.

Eldridge, Jayson

Faculty Mentor: Adriana Heimann-Rios

Chemical Fingerprinting of Gahnite: Implications for Critical Mineral Exploration and Deposit Discrimination

Zincian spinel [Zn,Fe,Mg)Al2O4] is an accessory mineral in several rocks and geologic environments. Gahnite (ZnAl2O4), the zinc (Zn) end-member of the spinel series, commonly occurs in low- to high-grade metamorphosed massive-sulfide deposits (MMSDs), granitic pegmatites, skarns, marbles, and sulfide-bearing granulites. The chemical composition of gahnite can provide valuable insights into its petrogenesis, as well as serve as an indicator of the geochemical conditions during mineral formation. Gahnite is used as an exploration tool for Pb-Zn MMSDs due to its resistance to weathering and ability to retain the geochemical signatures of its host environment. In granitic pegmatites, gahnite is found alongside critical mineral deposits of Li and Ta, among others. Despite its significance in economic geology and mineral exploration, and the common use of gahnite as indicator for MMSDs, few detailed studies exist on the major- and trace-element chemistry of gahnite in granitic pegmatites. Further, due to the different geologic environments, there is a potential that chemical differences exist in the composition of gahnite between the two settings. This study aims to determine differences in the major- and trace-element chemical composition of gahnite in granitic pegmatites and MMSDs. This will help advance economic mineral exploration and refine current genetic and exploration models for economic deposits of Li. We hypothesize that gahnite from the two geologic settings will contain compositional differences which may provide insights into their formation conditions and its significance in exploration. Data are available from gahnite in granitic pegmatites worldwide and Proterozoic MMSDs in Australia, including the giant Broken Hill deposit, and Colorado. The major- and trace-element chemical compositions have been obtained via electron microprobe and laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS). The results from this study can potentially be used to establish a chemical guide for the discrimination of critical mineral and MMS deposits, contributing to improved mineral exploration strategies.

Elliott, Caitlin

Faculty Mentor: Kristen Gregory

The Impact of STEM Education

There is a growing need for STEM instruction at the elementary level. Student achievement has been a growing concern for all schools and differentiated instruction can encourage more of a focus on STEM subjects in schools. The purpose of this study is to measure the effects of differentiated instruction on first grade students' achievement at an urban elementary school. The following research question will be investigated: How does differentiated instruction in STEM-focused subjects affect student achievement at an urban elementary school? We will be able to determine students' knowledge of this science unit before teaching using a pre-assessment. Then, throughout the first-grade science unit, we will use three differentiation strategies during whole group and small group instruction before administering the post-assessment. To analyze the data that I am collecting, I will be using inferential statistics with an independent-measures t-test to compare the data from my study. It is anticipated that by using differentiation strategies such as think-pair-share, drawing and labeling diagrams, and small group instruction targeting specific learning needs, that we will be able to increase student achievement in STEM-focused subjects using differentiated instruction. It is also anticipated that this research study will benefit other teachers at the elementary level because it could encourage more teachers to learn more about how they can implement STEM into their own classroom.

Estes, Parker

Faculty Mentor: Angela Franks Wells

CTRL + ©

CTRL + © is an exhibition and body of research that is primarily about what it means to have ownership in an increasingly digital world where the lines of private and public ownership have become blurred. And secondly, the research presents an argument towards the persuasive power of graphic design techniques manifested through real world objects. Just as words and symbols hold considerable semiotic weight in how we make value judgements about the world around us, the objects we use and interact with throughout our lives too inform our identities, where we place ourselves in society, and what we believe about the roles of the consumer and the owner. There is value in imagining a world before and beyond our existing legal structures of copyright and ownership. Once upon a time, artists freely copied and iterated upon one another's work. This freedom advanced culture and was critical in establishing conventions also in innovating beyond the bounds of those conventions through experimentation free of fear from legal and financial penalty. While there is certainly merit to protecting an individual's right to intellectual property, there must also be a robust public domain, and protections for the free exchange of thought. And in a world where the majority of intellectual property is not owned by individuals but by multinational corporations that hoard IP like dragons on a pile of gold, it is more important than ever to be having a conversation about how we can engender intellectual generosity with one another and push back against the ever encroaching private enclosure on the realms of free thought and expression.

Evans, Kayla

Faculty Mentor: Fidy Rasambainarivo

Prevalence and Diversity of Plasmodium Parasites in Sympatric, Free-Ranging Lemur Species in Madagascar

Plasmodium species, mosquito-borne protozoan parasites responsible for malaria, infect a wide variety of mammalian, avian, and reptilian species. Nonhuman primates are infected by over 30 different species of Plasmodium across tropical and subtropical regions worldwide, but the diversity of species that infect lemurs is largely unknown. Given the zoonotic potential of primate malaria, characterizing the epidemiology and diversity of these parasites can inform our understanding of disease dynamics and the risks of Plasmodium infection for public health and wildlife conservation. This research provides insight into Plasmodium infections in endangered free-ranging lemurs by examining the prevalence and diversity of Plasmodium spp. in seven sympatric lemur species at two sites in Eastern Madagascar (Betampona Natural Reserve and Ambatovy/Analamay forest complex). Using semi-nested PCR targeting the cytochrome b gene, 254 whole-blood samples collected from 189

individual lemurs were screened for Plasmodium infection. Our study shows a high prevalence (83%) at both sites, which varied among the different host species. Based on phylogenetic analysis of cytochrome b sequences, our study reveals at least three new Plasmodium species infecting lemurs and possible cross-species infections in sympatric host species. This work extends previous efforts to identify and characterize the parasites of lemurs and provides further insights into the diversity, host specificity, and ecology of primate malaria.

Evans, Grace

Faculty Mentor: Matthew Walenski

Administering an Aphasia Test Battery

In research, aphasia batteries are used to standardize the assessment of language deficits, allowing for reliable comparisons between individuals and groups. This helps researchers study the effects of aphasia on language and cognition, as well as the impact of different types of brain damage on language function. Our research aims to assess how individuals with aphasia speak and understand language in real-time, with the goal of developing more effective treatment programs. This study utilizes a comprehensive battery of assessments to evaluate various aspects of language, cognition, and memory, helping to determine whether participants face difficulties in producing or understanding different types of words or sentences. The tests included in the battery assess expressive language, receptive language, cognition and memory, handedness, and motor speech abilities. The expressive language assessments include the Northwestern Assessment of Verbs and Sentences (Sentence Production Priming Section), the Northwestern Naming Battery (Confrontation Naming), and the Northwestern Assessment of Verb Inflection. For receptive language, the battery includes the Northwestern Assessment of Verbs and Sentences (Sentence Comprehension), the Northwestern Naming Battery (Auditory Comprehension), and the Psycholinguistic Assessment of Language Processing in Aphasia (Non-Word Minimal Pairs Test). Cognition and memory are assessed using the Cognitive Linguistic Quick Test and the Wechsler Memory Scale. The Edinburgh Handedness Inventory is used to assess handedness, while the Apraxia and Dysarthria section of the Revised Western Aphasia Battery evaluates motor speech functions. Finally, the Revised Western Aphasia Battery assesses a variety of language abilities across multiple domains. We are currently administering these assessments to participants with aphasia, to attain a fine-grained picture of the aspects of their language that may be spared or that may benefit from clinical interventions. Together, these tests provide a detailed analysis of language abilities in individuals with aphasia, with the aim of improving diagnostic accuracy and treatment outcomes.

Falohun, Tundé

Faculty Mentor: Xin-Hua Hu

Analytical Workflow for Evaluation of Traditional Medicine Protocols

This proposal aims to introduce biomedical analytical technology into public health research within regional communities and external areas of collaborative interest, in order to promote sustainability, empower community labor forces, and foster inter-institutional collaboration in the collective aim to address regional and national health priorities. The biomedical analytical technology, which includes a range of bio-imaging modalities capable of real time analysis on a system and sub-cellular level, have the potential to revolutionize public health by providing more accurate, timely, and cost-effective solutions for identifying issues attributed to health disparities and managing disease outbreaks. The integration of these technologies into modern public health research will enhance the ability of communities to monitor and respond to health challenges in real-time, thereby strengthening the health workforce's capacity to address emerging and persistent health issues. By promoting sustainability through training and efficient oversight, this initiative seeks to build long-term public health infrastructure which will not only provide immediate solutions but also ensure ongoing resilience for the future healthcare landscape. Additionally, empowering community labor forces with biomedical skills and knowledge will create a more robust, locally powered health workforce, capable of implementing region-specific solutions.
Inter-institutional collaboration between public health agencies, academic institutions, private sector organizations, and local communities will be instrumental to maximizing the effectiveness of this approach, driving innovation, and scaling successful interventions. Collaborative networks established will facilitate the sharing of resources, expertise, and data, to as to address both regional and national public health priorities, thereby ensuring a comprehensive and inclusive approach to improving population health outcomes. Through this integrated approach, this proposal envisions a future where technology, sustainability, and community engagement work with synergy to create healthier, more livable societies for humanity today.

Faridnejad, Homeira

Faculty Mentor: Regina DeWitt

Dosimetry calibration for low-energy protons (2-4 MeV) using Gafchromic film dosimeters

Purpose: To use Gafchromic film for measurement of the dose delivered by low-energy (2-4 MeV) protons to living cells.
Methods: Five different types of Gafchromic films were tested for dosimetry under irradiation with 2-4 MeV protons at the East Carolina University accelerator laboratory. We obtained calibration curves for correlation between dose and gray value in two different ways: (i) using a calibrated 320 kV X-ray source giving doses from cGy to kGy and (ii) irradiating films under vacuum with 2, 2.5, 3, and 4 MeV protons. 24 hours after irradiation, the samples were scanned with a high-resolution scanner, and the resulting images were analyzed with ImageJ to obtain the gray values in the red channel. Subsequently, we irradiated HDV-2 films in air at different energies, currents, times, and distances from the exit window to evaluate the beam profile, dose rates, and uncertainties.
Results: Of the five films tested, the Gafchromic HDV-2 film is best suited for low-energy protons since the active layer is directly exposed to radiation. Results from films that were irradiated by protons did not agree with X-ray irradiated films due to the different modes of dose deposition Films irradiated with different proton energies yielded similar calibration curves. Experiments with different thicknesses of air between exit windows and cells demonstrated a widening of the beam and a decrease in dose rate.
Conclusion: Gafchromic HDV-2 films are suited for determining the dose administered by low-energy protons. Calibration curves for low-energy proton measurement are best obtained by irradiating with known doses from protons of similar energy.

Finger, Justin

Faculty Mentor: Tammy Lee

Analyzing The Use of Physical Activity Breaks in High School Classes

High school classes are generally over one hour long, with many being closer to ninety minutes. In this long time frame, students may struggle to stay focused and productive for the entire class period. Teachers need tools for keeping students engaged and enjoying class. The purpose of this action research study is to test if applying a physical activity break to a ninety minute class will increase the engagement of the students and the enjoyment of class. In this quantitative study, students will complete a unit of high school physics with no breaks. They will then complete a second unit of high school physics with a physical activity break occurring in the middle of class. Students' percentage of classwork completed on time for each unit will be tracked and analyzed to study engagement. Students will complete a survey on their attitudes at the end of both units and their surveys will be scored and analyzed to study attitudes about the class. It is expected that students will become more engaged and have higher science class attitudes in the unit where the physical activity is applied. This will be useful in giving districts, administrators, and teachers a new tool to increase student engagement and enjoyment in a ninety minute class.

Finlay, Colin

Faculty Mentor: Ariane L. Peralta

Managing Microbiomes to Enhance Water Quality in an Urban Stream Ecosystem

Microbial nutrient uptake and processing at the sediment-water interface (e.g., denitrification), mitigates eutrophication in downstream waterways. But urbanization shrinks time and space for microbial nitrogen (N) processing. Nature-based solutions such as green stormwater infrastructure (GSI) attempt to restore ecosystem functions by incorporating plants and soil, however, microbial N cycling rates in GSI are rarely quantified. This study examined N processing and microbial composition in an urban stream before (2015) and after restoration (2023). The study was conducted at Town Creek, which runs through downtown Greenville, North Carolina, USA, and is part of the Tar-Pamlico watershed. Near the Town Creek-Tar River confluence, daylighting and installation of GSI were performed to mitigate nuisance flooding and nutrient inputs to the nutrient sensitive Tar River. Because denitrification occurs in hypo/anoxic conditions, we hypothesized that continuously saturated sediments will have greater denitrification potential than either fluctuating conditions or water, and diversity will be

positively correlated with function. We further hypothesized that stream restoration will enhance sediment denitrification potential due to increased residence time of water. Prior to restoration, the microbial community composition (16S rRNA amplicon sequencing) and denitrification potential (acetylene block method) of sediment and water samples were analyzed. Post restoration, we sampled sediment from GSI in Town Creek, and again performed denitrification potential assays and conducted shotgun metagenomic sequencing on a subset of samples with high denitrification potential. Pre-restoration results revealed greater taxonomic richness and denitrification potential in stream bank sediments compared to the water column. Post-restoration results revealed greater denitrification potential in continuously saturated GSI sediment compared to dry or fluctuating GSI sediment. Metagenomic sequencing of high denitrification potential sediment, from saturated and fluctuating GSI sediment yielded 14 metagenome-assembled genomes (MAGs) from saturated conditions and 3 MAGs from fluctuating conditions. This pre- and post-restoration sampling design provides a unique test of urban stream restoration impacts on microbial community structure and denitrification potential. To inform future GSI design, this study considers favorable conditions to maximize microbial ecosystem functions.

Foster, Katherine

Faculty Mentor: Adriana Heimann Ríos

Elucidating Biofilms in Cueva Ventana and Their Impact on the Preservation of Culturally Significant Rupestrian Rock Art – A Collaborative Community-Geoscience Approach

Caves are important for their cultural significance and often contain rich pieces of archaeological history, including rupestrian rock art (pictographs and petroglyphs). They are also a fragile and ecologically distinct home to specialized forms of life, with biofilms being of particular interest due to their extensive involvement in geochemical cycling. Biofilms are comprised of multiple taxa that are sensitive to environmental changes and their community composition may vary based on the dominant form of nutrient input. Previous studies conducted in select show-caves indicate that shifts in microbial and biofilm community compositions may occur in response to anthropogenic activity. Often, native community members are outcompeted and replaced by taxa that are capable of endolithic or biodegenerative metabolisms. Since eu- or auto-endolithic taxa acquire their nutrients from the host rock by altering it or directly degrading it, they are undesirable for the preservation of caves. However, their impact on rupestrian rock art remains poorly understood due to substantial complexities at the biofilm-rock interface – with prior research primarily focusing on community characterizations of discrete biofilm subtypes.

This interdisciplinary study is part of a partnership between East Carolina University, the University of Puerto Rico at Arecibo, community leaders from NGO Cabachuelas, and local community members in Puerto Rico. Sampling methodologies will be developed and evaluated alongside NGO Cabachuelas to ensure that the employed techniques are non-invasive (e.g. adhesive collection and swabbing versus scraping) and minimally affect native biofilm and microbial communities. The goal is to assess how ecotourism impacts biofilm community composition and subsequently discuss possible implications for rupestrian rock art preservation. Objectives include the characterization of host rock and biofilms from a heavily trafficked karstic cave (Cueva Ventana) and the identification of endolithic and biodegenerative taxa. This will be done by conducting 1) geochemical analyses of minerals within the host rock using SEM-EDS and electron microprobe, and 2) genomic and cultural analyses of the biofilm community members. If endolithic or biodegenerative taxa are identified, Cabachuelas and the local community will be able to utilize findings to evaluate existing ecotourism practices and mitigate future degradation of culturally significant rupestrian rock art. Conversely, if endolithic or biodegenerative taxa are not identified, this study will serve as a means of assessing how ecotourism impacts biofilm community composition in comparison to those located in seldomly trafficked areas of Cueva Ventana. An emphasis on community engagement serves to highlight the importance of collaboration with local communities in co-creating knowledge and providing long-term, sustainable solutions for education and ecotourism.

Foster, Brittany

Faculty Mentor: Tammy Lee

Promoting Student Engagement Through Talk Moves

This action research study aims to investigate how the use of talk moves impacts high school students' perceptions of engagement during science discussions. Talk moves are deliberate questioning and response strategies designed to foster critical thinking, collaboration, and participation. The study, conducted in a high school Earth and Environmental Science classroom, employs a mixed-methods approach. Qualitative data is collected through pre- and post-surveys, while qualitative insights are gained from teacher reflections. The interventions consist of six to eight lessons focused on atmospheric science topics, during which semi-structured discussions incorporate talk moves such as revoicing, prompting for evidence, and inviting peer responses. Data analysis includes paired t-tests for survey results and thematic analysis for qualitative data. Prior research suggests that talk moves will enhance students' perceived engagement by promoting deeper participation and collaboration. Findings will contribute to best practices for science educators and inform strategies to create dynamic, students-centered learning environments.

Fraccalvieri, Heather

Faculty Mentor: Scott Eagle

Narratives of Working Women

During my years working in the service industry, I have witnessed firsthand the effects of classism and the invisibility it imposes on workers. Customers often refuse to make eye contact or acknowledge those in uniform, reducing them to mere service roles rather than recognizing their humanity. The phrase "the customer is always right" has been used as a mantra to excuse a plethora of bad behavior and to further blur the line between providing a service and being a servant. While this treatment is fairly universal for blue-collar workers, women also have the added challenges of gender-bias. They must navigate preconceptions around emotionality, perform additional emotional and invisible labor, have their work deskilled or devalued, and are forced to conform to the feminine role of a nurturer—all while being paid less than a man for the same work. Either consciously or not, women must deal with these things every day. By making work inspired by conversations with women and the narratives of their unique experiences of navigating the workplace, I hope to create a dialogue around longstanding gender inequality. Through the telling of their stories, we might move closer to a reality in which women are treated equal.

Freeland, Fiona

Faculty Mentor: Heather Vance-Chalcraft

Identifying Changes in Team Formation Within CUREs Following Team Science Training Using Social Network Analysis

In recent years, employers across numerous disciplines have emphasized the importance of strong teamwork abilities among prospective hires. However, within undergraduate education, little explicit training exists for teaching students how to work effectively in teams. With collaboration having previously been outlined as a primary component of course-based undergraduate research experiences (CUREs) (Auchincloss et al., 2014), these courses can serve as an ideal setting for the incorporation of explicit team science training in order to further develop teamwork abilities within STEM undergraduate students. We incorporated communication and research planning tools developed from the field of team science within 8 biology CUREs and sought to determine: are teams formed within the CURE classes following team science training? In addition, we compared how teams within the CURE classes with team science training differed from an inquiry-based (IB) introductory biology lab course which completed group work but did not have explicit training in teamwork. To determine if any changes in team development occurred, a social network survey was administered to students at the beginning and end of the semester which asked students to identify with whom they had social connections. To address the research objectives, social network analysis was used to both visualize and quantify changes in the level of connectedness of individuals within these classes. The whole-network density, or number of total connections within the class divided by the total number of possible connections, was calculated for each individual course both pre- and post- survey completion. Mixed ANOVAs with post hoc

tests were then conducted to determine if differences existed both pre-/post- and between the CURE and IB courses. While there were no significant differences between the CURE and IB class networks with regards to density at the beginning of the semester, CURE classes that had incorporated team science training had significantly denser networks for the factors of psychological safety (p=.002), communication (p<.001), and social support (p=.004) than the IB courses at the end of the semester. This indicates that CURE students who had team science training developed a greater number of connections to individuals within their class over the course of a semester in comparison to IB courses.These results provide insight with regards to how explicit team science training can assist with the development of more cohesive and interconnected teams in CURE classes. With previous literature indicating that the number of connections within an organization is tied to information flow (Obstfeld, 2005) as well as research productivity within the sciences (Love et al., 2021), this suggests that the CURE classes have enhanced overall collaboration. As a result, the inclusion of explicit team science training within CUREs may improve student outcomes of CURE participation and project research outcomes.

Fulcher, Jennifer

Faculty Mentor: Alex Manda

Integrated Analysis of Soil Water Content and Groundwater Level Trends: Impacts on Hydrologic Responses at an Agricultural Field Site in Eastern North Carolina

The goal of this study was to evaluate the hydrologic response of soil water content (SWC) and groundwater levels (GW) to precipitation (P) events in an agricultural field in eastern North Carolina over a three-year period (2019-2022). SWC data were obtained from soil sensors deployed at different depths in the shallow subsurface, and GW data were collected from monitoring wells installed in the surficial aquifer. Precipitation data were acquired from a nearby weather station. The programming language Python was used to implement cross-correlation and autocorrelation functions to investigate relationships among SWC, GW, and P. Gradient Boosting (GB) and Support Vector Regression (SVR) machine learning models were then used to evaluate the importance of these relationships in forecasting future groundwater levels. The cross-correlation analysis at the daily timescale showed low to moderate correlation coefficients among the three parameters. Additionally, machine learning models indicated that SWC and precipitation had minimal influence on short-term groundwater level fluctuations, contributing ≤2%. These findings suggest that, due to saturated clay loam soils, excess precipitation likely leads to runoff into nearby surface waters rather than infiltration through soil layers. At the monthly timescale, cross-correlation analysis revealed higher correlation coefficients, emphasizing a delayed groundwater response to SWC and precipitation. This study's results will help inform stakeholders, such as local farmers and policymakers, about sustainable water management practices to enhance agricultural productivity.

Garas, Lydia

Faculty Mentor: Mark Bowler

Exploring Remote Work Intensity Influences: A Self Regulatory Focus Perspective on Job Demands and Resources Model

Job Demands and Resources Model (JD-R): The JD-R model explains how job demands and resources affect burnout, engagement. Excessive job demands, such as high workload or role ambiguity, lead to burnout and health problems, while job resources, like support or autonomy, enhance work engagement. Regulatory Focus Theory (RFT): RFT identifies two motivational orientations: promotion focus and prevention focus. Promotion-focused individuals, guided by aspirations, and strive for positive. Prevention-focused individuals aim to avoid losses. While regulatory focus is often stable, it can be influenced by contextual work factors. Remote Work Intensity: Remote work, defined as working outside a central office using technology has grown post-pandemic. Thus, understanding their long-term effects remains a key research priority Hypothesis 1 (H1): The relationship between job demands and burnout will be moderated by prevention focus and remote work intensity, such that higher prevention focus, and remote work intensity will strengthen the positive relationship. Hypothesis 2 (H2): The relationship between job resources and work engagement will be moderated by promotion focus and remote work intensity, such that higher promotion focus, and lower remote work intensity will strengthen the positive relationship. The study included 380 full-time U.S. employees working 35+ weekly hours, recruited via the Connect CloudResearch platform. Participants completed validated scales of Job Demands and Resources (Van Veldhoven & Meijman, 1994), Maslach Burnout Inventory (Maslach & Jackson, 1996), Utrecht Work Engagement (Schaufeli & Bakker, 2004), and Work

Regulatory Focus (Neubert et al., 2008). Findings partially supported H1: At low remote work intensity (e.g., 0), prevention focus stengthened the positive relationship between job demands and burnout. At higher remote work intensity (e.g., 0.5 or 1.0), prevention focus buffered the job demands-burnout relationship. H2 was not supported. On an indiviual level, results suggest that prevention-focused individuals are more susceptible to burnout in traditional or low-remote settings, whereas higher remote work levels mitigate these effects, indicating that individuals who are highly vigilant and focused on avoiding losses may experience lower burnout when their work environment includes some degree of remote work. On a systemic level, one key implication of our findings is the significant role of avoidance motivation (e.g., striving to avoid threats or mistakes) in remote work settings. Environments leveraging avoidance motivation to reduce errors can help individuals effectively manage the unique challenges of remote work.

Garcia Vega, Mariela

Faculty Mentor: David Lagomasino

Assessing the human and natural drivers of mangrove habitat loss in Puerto Rico

Mangroves are vital coastal ecosystems that offer essential resources and services that support both human and marine life. However, they face natural and anthropogenic drivers, such as sea level rise (SLR), tropical cyclones, and urbanization which can lead to habitat loss. Many conservation groups and natural resource managers use spatial analysis tools such as remote sensing and GIS to monitor mangrove habitat extent, but the data may not necessarily reflect why the habitats are being lost. This study aims to quantify the impacts of both natural and anthropogenic disturbances on mangrove cover in Puerto Rico. In order to identify the primary drivers and underlying factors contributing to habitat loss, I used satellite imagery and remote sensing techniques such as Random Forest Classification, NDVI Anomaly Analysis, and Continuous Change Detection. This combination of data and techniques allows for the differentiation of spectral characteristics that indicate several types of changes and helps to determine the timing of disturbances. I analyzed Landsat and Sentinel imagery to identify changes in mangrove cover before and after major disturbances, such as Hurricane Maria (2017) and the 2020 earthquakes. Additionally, spectral indices like the Normalized Difference Vegetation Index (NDVI) were used to assess the health, or greenness, of mangrove vegetation which can be an indicator of stress. A decision-tree workflow was used to categorize mangrove loss drivers and determine the primary causes of habitat loss. These analyses yielded land cover classifications that enabled the detection and assessment of mangrove loss, gain, and vegetation shifts over time. A comparison of the two classifications demonstrated a gain in mangrove cover with 20,085 hectares in 2015 and 21,652 hectares in 2023. The NDVI anomaly and Continuous Change Detection algorithms were employed to examine these changes in greater detail to delineate areas of gain and loss in both the short and long term. The results also include a comprehensive land use change map that categorizes mangrove loss based on specific drivers such as tropical cyclones, earthquakes, drought, and urbanization.

Gaskill, Margaret

Faculty Mentor: Kristen Gregory

Differing SEL Needs of Gifted Students

The topic of this research project is the social emotional learning (SEL) needs of gifted students while more specifically, the research problem examines the differing SEL needs of gifted students. Gifted students are a special group of students with special needs both academically and socially and emotionally that need to be addressed in schools. This research takes place in a rural school in a mainly rural county with about 8,000 students among 18 schools. The specific school the research is conducted in has less than 300 students. The majority of the students in both the county and in the school are white and receive free or reduced meals. The school only has one gifted specialist teacher to support the gifted students both academically and socially emotionally. The purpose of this qualitative study is to describe the differing SEL needs of gifted students in a fourth- and fifth-grade classroom in a rural, Title I elementary school. The study will use action research and data sources like observations, video recordings, and documents (student work samples) to answer the following question: What are the SEL needs of gifted students in a fourth- and fifth-grade classroom in a Title 1, small rural elementary school? The data will show the SEL needs of gifted students which will allow these students to get better SEL instruction in their school setting. Gifted students, teachers, gifted specialists, administrators, parents and even legislators will benefit from this study. The results of this study will provide insight into how gifted students are socially and emotionally different from their peers and help the aforementioned people learn more about the unique needs of gifted students. It is anticipated that gifted students can be better served in their school settings as a result of these findings.

Gay, Taylor

Faculty Mentor: Avian White

The Importance of Hearing Birthing Stories: What Surveys Don't Tell Us

Childbirth is a significant event that may be characterized as having both physiological and psychological intensity (Olza et al., 2018). Indeed, women often speak of the experience with strong emotions that may last a lifetime. This experience may be characterized as positive, empowering, negative, and/or traumatic. Impacts from the childbirth experience may affect both mother and child in a multitude of ways. Studies show that first-time mothers showed a positive experience led to more positive feelings for the baby and a smoother transition into motherhood. Studies have also shown that a negative birth experience may affect breastfeeding and postpartum visit attendance. Additionally, a negative experience may lead to or increase parental stress. Thus, knowledge of these experiences may be instrumental in improving birth outcomes for mother and child. Hospitals often use surveys to gather this information. While surveys are a valuable tool for gathering data, they may not capture the full complexity of women's childbirth experiences. To gain a more comprehensive understanding, healthcare providers may need to complement survey data with qualitative approaches. Providing a safe space for open dialogue and reflection will allow those to share their own experience. These insights are critical for improving maternal healthcare, developing supportive interventions, and ultimately enhancing the well-being of both mothers and babies.

Glisson, Margie

Faculty Mentor: Kristen Gregory

The Impacts of Positive Reinforcement on Student Motivation

This study examines teachers' perceptions on which strategies impact student motivation through an action research design utilizing interviews with two teachers as the primary qualitative data sources. My research methodology is qualitative and the research design is an action research design. The research question is "What are teachers' perceptions on which strategies impact student motivation?". By employing open and axial coding for data analysis, the research hopes to explore how positive reinforcement strategies influence student engagement, and academic performance. Anticipated results include a stronger connection between positive reinforcement and improved classroom environment, with findings suggesting that consistent positive feedback enhances student motivation and supports a supportive learning environment. The results will inform educators on best practices for implementing reinforcement techniques, contributing to more effective teaching strategies that promote student success.

Gonzalez, Francesca

Faculty Mentor: Kristen Gregory

Academic Success Relations with Social Emotional Learning

Social emotional learning is growing in schools today. While one of the goals of schooling is to provide an education for students, social emotional learning is different from traditional academic education. School is more than just teaching and learning reading, mathematics, science, and social studies. School also teaches students life skills such as the social emotional competencies that allow students to regulate and control their emotions on their own. This is important for teachers, students, and parents to think about and understand because emotional regulation or lack of knowledge on how to regulate emotions, is where most behavior issues start. The education on these competencies can help students limit those issues on their own, which can benefit teachers as well as the students. If students are taught social emotional learning competencies and skills in schools, there is a relation with the students' academic success. In this quantitative and correlational study, students are explicitly taught social emotional learning competencies and skills and practice those skills while looking at the growth of their academics and social emotional knowledge over the course of five weeks of the school year. Students took a survey at the beginning and end of the study about how they feel about their school, and their grades from common formative assessments during the five weeks were also collected and analyzed. This study aims to answer the research question: Is there a relation between social emotional learning and academic success that makes the two important to teach in school? It is anticipated that there will be a positive correlation between a student's social emotional knowledge and their academic grades.

Gorritz, Sam – Session CANCELLED

Faculty Mentor: Gabe Duggan

Synthesis of a Monster

Monstrosity is synonymous with otherness. In contemporary art and media, monsters are often used to reflect societal fears, such as disease, sexual behavior, womanhood, and queerness. A monster's job in mainstream media is to represent a "failing", and a scapegoat which must be appropriately punished. Despite this generally negative connotation, however, monstrosity can be used as a transformative protest and a way to break oneself from the confines of tradition. Looking through a lens of womanhood and queerness, I will be exploring the synthesis of the human body into monstrosity as a form of self expression, resistance to traditional gender roles, and an embracing of autonomy.

Green, Mary

Faculty Mentor: Christine Habeeb

How does the congruence of leader estimated self-efficacy and follower self-efficacy predict performance in a military setting?

Just like athletes, members of the military are similar in the sense that they tend to work together with other people such as coaches, teammates, and captains in performance environments.
It is important to understand the dynamic of a leader and follower in these settings, as it can affect performance. Bandura's (1977) concept of confidence in ourselves (i.e., self-efficacy) is one area of research important to the success of followers. More recently, researchers have acknowledged that leaders also estimate how confident followers are in themselves (i.e., estimated self-efficacy). In a leader-follower dynamic, especially in a high-performance setting such as the military, it is important to understand how these two efficacy beliefs align (i.e., congruence). More specifically, researchers have yet to figure out how the alignment of these two variables can predict how well a leader and follower perform together. The purpose of this study was to examine how congruence of a leader's estimated self-efficacy and a follower's self-efficacy predicts performance in a tug-of-war style rope-pull task. We hypothesize that when leaders' estimated self-efficacy and followers' self-efficacy beliefs are aligned (or congruent), individuals will have greater performance. Participants of the study will consist of 80 Army Reserve Officers' Training Corps (ROTC) members randomly assigned to groups. Each group of the rope pull task will include four participants: one freshman, one sophomore, one junior and one senior. The senior will be assigned as the leader of the group, and the others will be assigned as the followers. Self-reported measures will be implemented to measure both self-efficacy and estimated self-efficacy between all leader-follower pairs. Performance will be measured using electromyography (EMG) sensors attached to the forearm, quadricep, and lower back muscles. These sensors provide data related to how hard someone is pulling (or their muscle activation). So far, 5 groups have completed the study, and 15 additional groups are scheduled to participate this semester. Once all data is collected, analyses will include moderated hierarchical regression to investigate how the interaction of self-efficacy and estimated self-efficacy predicts individual performance. Results of this study will provide applicable knowledge to various areas of the military in addition to other leader-follow dynamics such as coach-player, teacher-student, boss-employee and many more.

Green, Noah

Co-Authors: Ashish T. Khanchandani, MD; Dmitry Tumin, PhD; Kristina Simeonsson, MD, MPH
Faculty Mentor: Kristina Simeonsson

Removing Barriers to School Health Assessments with Optimally Timed Clinic Events Leveraging Partnerships Across the Healthcare System in Pitt County

Many states, including North Carolina, have implemented mandatory health assessments for school-age children entering public school for the first time to identify and address health barriers to learning (HBLs). Despite the potential to identify children affected by HBLs, rigid annual deadlines have created a significant bottleneck before the start of school, resulting in unnecessary student suspensions. Several studies have highlighted barriers to healthcare access; however, few quality

improvement projects have created a sustainable and equitable solution to enhance screening and reduce demand in school districts and healthcare systems. ECU Pediatrics piloted a quality improvement initiative at the Pitt County Health Department in partnership with representatives from Pitt County Schools and School Health Services at ECU Health to offer school health assessments for children at risk of suspension. School personnel identified at-risk students and offered them appointments at the health department during the last week of September 2024. The stations include a review of medical history, a physical exam, mandatory screenings, immunization records, and tailored medication/authorization plans. Information from a retrospective chart review will include demographics, past medical history, insurance, school name, primary care provider, barriers to care, and last health assessment, which will be gathered to improve access and streamline future school health assessment initiatives. Preliminary data indicated that over 400 students were identified as being at risk of suspension. During two clinic days, the Pitt County Health Department served more than 125 students, all of whom were residents of Pitt County. The interprofessional team included two advanced practice providers, two faculty physicians, 12 residents, two medical students, three asthma team members, 6 ECU Health school nurses, 30 public health nurses, and support staff. Increasing access to school health assessments effectively addresses the bottleneck and reaches students at risk of suspension. The demand to accommodate a high number of students calls for a dynamic interprofessional team and a well-organized workflow. Future interventions may include adding more clinic sessions, implementing a prescreening process, and establishing a workflow for transferring health assessments from clinics to schools.

Guempel, Bishop

Faculty Mentor: Christine Habeeb

Behavioral Adjustments and Emergent Efficacy Beliefs in Team Performance During a Rope-Pulling Task

Within input-process-output models of team dynamics, efficacy beliefs (i.e., confidence) are described as emergent states that arise during performance and interact with behavioral changes. However, few studies incorporate both psychological and kinematic observations during team performance. An interdisciplinary approach would advance understanding of teams because observing how individuals move to coordinate with a teammate can reveal mechanisms in teamwork that psychology researchers cannot effectively test using surveys alone. The purpose of this study was to examine the presence of behavioral changes (i.e., kinematics) associated with emerging efficacy beliefs. Participants completed 5-second max effort tug-of-war style pulls on a rope as an individual, with a partner, and with a partner after bogus performance feedback. As part of a larger research study, bogus performance feedback was provided to participants to elicit low self-efficacy (i.e., confidence in oneself) and high other-efficacy (i.e., confidence in one's partner). All performances were video recorded. Video analysis of 2D body kinematics for trunk angle, elbow angle, heel-to-heel distance, and center of mass (distance measured from the floor) were observed via Kinovea for a subsample of 16 participants that faced towards the camera and could be compared. A repeated measures ANOVA indicated a significant difference for elbow joint angle $F(2,30) = 3.42$, $p = .046$ across conditions. Differences were observed between the individual pull ($M = 15.69$) and pull with partner after bogus feedback ($M = 9.80$). No other differences were observed to be significant. While these results did not demonstrate a holistic change in body position across all conditions, there was evidence for behavioral changes immediately after emergent efficacy beliefs. In addition, this study provides a foundation for interdisciplinary research in team dynamics. Specifically, an ability to integrate biomechanical information and survey-data to better test input-process-output models of team dynamics.

Hagge, Kyra

Faculty Mentor: Stephen Moysey

Connecting Human Behavior and Physical Systems Using Agent-Based Modeling: Individual Wastewater Treatment Systems in the Tar-Pamlico Watershed

In many human-environment systems individual actions influence community behavior and environmental outcomes. For example, regional wastewater management includes technologies that span individual households (i.e., septic systems) to community-scale sanitary sewer systems, all of which jointly impact environmental water quality outcomes. Accounting for the decisions of stakeholders across these scales can be difficult, making it unclear how environmental or policy influences might impact the overall system. This research investigates a potential framework for using an Agent-Based Model (ABM) integrated with Geographic Information Systems (GIS) to simulate the interconnectedness of human and natural systems in a wastewater management system. Grounded in the Tar-Pamlico watershed in Eastern North Carolina, we use the GIS plugin ArcNlet to represent nitrogen loading to water bodies from non-point sources. Agents in this system are individual

homeowners, who can either continue using traditional septic systems or invest in advanced treatment systems, which are more expensive and require collaborative decision-making but offer long-term abatement benefits. The social system in our proposed framework examines four components affecting the adoption of alternative treatment systems: system health, environmental attitudes, cost, and cooperation. Bayesian networks connect these components, capturing decision-making complexity. System health is related to the location-specific treatment efficiency of each household in the model, which is impacted by both management and natural factors such as groundwater fluctuations. Environmental attitudes influence adoption of green infrastructure, thus we use the New Environmental Paradigm (NEP) as an instrument to represent how environmental attitudes vary across demographic groups. The cost to switch treatment systems is represented using market research and discrete choice modeling that assesses willingness of individuals to pay for advanced treatment systems. Potential for cooperation is represented through social capital between agents, focusing on psychological metrics like social value orientation. The model is nested within a community framework, incorporating parameters like cohesiveness and trust. The first pilot survey results show significant differences in choosing to install advanced wastewater technologies depending on the respondents' mental models of cooperation, especially for respondents with a competitive mindset. Environmental attitudes also connect with cooperative mindset, respondents who are thinking about a decision in competitively expose a lower scale value on the NEP.

Harkess, Miranda

Faculty Mentor: Nathan Hudson

Fibrin Fiber Tension Dynamics During Fibrinolysis: Investigating the Impact of Pregnancy

Hemostasis is a regulated physiological process that supports blood fluidity while preventing excessive bleeding through clots. A key component of clot formation is this system known as fibrin, an insoluble protein network that provides structure to the clot. Fibrin fibers exhibit distinct mechanical properties such as tension, which can influence clot stability. During pregnancy, significant changes occur in the coagulation system, which is a complex enzymatic reaction responsible for formations of blood clots. These changes can cause pregnant women to be in a hypercoagulable state, where there is an increased risk of thrombotic events such as deep vein thrombosis (DVT) and pulmonary embolism (PE) to occur. While pregnancy-associated alterations in coagulation factors and fibrinolytic activity have been studied, the impact of the changes in the mechanical properties of fibrin remain unexplored. This study aims to develop protocols in to investigate the relationship between pregnancy-induced hemostatic changes and fibrin fiber tension, as well as how these changes influence the rate and efficiency of fibrinolysis. Creating standardized techniques to measure fibrin fiber tension and digestion rates, this study will provide critical insights into pregnancy-associated clotting mechanisms, potentially informing the development of targeted fibrinolytic therapies for managing thrombosis risk in pregnant women.

Harrison, Abby

Faculty Mentor: Kristen Gregory

English Language Learners' Parental Involvement

The purpose of this study is to examine the relationship between school outreach and relationships with families, as well as how these factors impact parental involvement of English language learners (ELLs). Specifically, it will focus on families of first-grade students in a Title I elementary school in rural Eastern North Carolina. In this study, the following research question will be addressed: What are parents and school personnel's perceptions of how a school's outreach, resources, and relationship with families affect parental involvement of English Language Learners? This qualitative case study will utilize a narrative research design to gather data through interviews with parents and school personnel. This study will utilize open and axial coding to identify key themes, relationships, and emerging trends within the data. The goal of this study is to provide insights that can strengthen communication and foster better partnerships between schools and families. It is anticipated that the findings will provide feedback and strategies to enhance parental involvement not only of English language learners but also of all families.

Heinemann, Constantin

Faculty Mentor: Zachary J Domire

The effect of fighter and helicopter helmets on cervical extensor muscle force in flight postures

Introduction: Military pilots exhibit elevated rates of neck pain1,2. Neck pain in military pilots has been associated with the modern helmet systems1. Helmet systems are associated with increased cervical muscle activity3. Muscle activity measures lack in analysis of deeper cervical muscles4. Shear wave elastography (SWE) has been shown to assess forces of deep cervical muscles5,6. The purpose of this study was to examine the effects of different flight helmets on cervical extensor muscle forces in flight postures. Methods: 20 participants (9f 11m, 24.5+/-3) participated in this study. SWE images were taken of the cervical extensor muscles in several positions; unloaded, seated neutral, seated flexed, seated turned, and seated check six. Images were taken with no helmet (NH), a helicopter helmet weight facsimile (HH), and a fighter helmet weight facsimile (FH). Force was estimated by subtracting the unloaded shear modulus from the active shear modulus and multiplying by physiological cross-sectional area. Results: In the neutral position both helmets caused a significant increase in CE muscle force from NH. FH caused a significant increase in CE muscle force from the HH. In the forward, turned, and 'check six' positions both helmets caused a significant increase in CE muscle force from no helmet. But no significant differences were seen between FH and HH. Conclusions: The FH produced greater CE muscle forces than the HH in the neutral position. However, in the forward, turned, and "check six" positions, both helmets significantly increased CE muscle forces relative to NH, but no significant differences were observed between the two helmet types. These findings suggest that while helmet weight contributes to increased cervical muscle forces, posture plays a key role in determining the overall muscle load. The absence of differences between helmet types in non-neutral positions may indicate head postures override the effects of helmet weight alone. Given the high prevalence of chronic neck pain in both fighter and helicopter pilots, these results emphasize the need for helmet designs that minimize cervical strain in postures that are commonly assumed during flight. References: 1. Lange et al. (2011). Avi, Sp, and Env Med. 2. Posch et al. (2019). BMC Musculoskelet Disord. 3. Sovelius et al. (2019) Aerosp Med Hum Perform 4. Felici & Del Vecchio (2020) Front Neurol 5. Dieterich et al. (2017) Eur J Appl Physiol. 6. Maïsetti et al. (2012) J Biomech.
Abstract disclaimer: This research is supported by the Office of Naval Research [N000142112649].

Hobbs, Cassidy

Faculty Mentor: Kristen Gregory

Parent Involvement in Title I Schools

Parent involvement is vital for children's academic success and motivation. Engaging parents early in their child's education fosters a positive attitude toward learning and enhances achievement. A parent's perception of their role and confidence influencing outcomes significantly impacts their engagement. However, minority parents often encounter barriers that hinder their participation in schools. Understanding these challenges, particularly in rural Title I schools, is crucial for educators aiming to boost parent involvement. Clear roles and expectations for parents can foster their engagement and support children's educational journeys. Enhancing collaboration between parents and schools is essential to promote better student outcomes and school success. Overall, finding ways to increase parent involvement is key to fostering student achievement and long-term success. Throughout this study, the question "What are the reasons why parents are or are not involved in their child's Title I school?" will be researched through a mixed methods approach. The specific environment for this study is in a rural community in Eastern North Carolina. The specific population that will be included in this research include parents involved in this particular K-1 school. I will be using a survey as my data source where I will be analyzing qualitative data through a coding scheme and quantitative data through descriptive statistics. Action research will allow myself to reflect on parent involvement in a school setting and identify certain areas where improvement can be made.

Hoffman, Talia

Faculty Mentor: Megan Perry

Vitamin D Deficiency during the prenatal and early infancy increases the risk of infant mortality versus VDD in later childhood.

Infantile rickets due to vitamin D deficiency (VDD) increases mortality during this critical period of growth. The relationship between infant mortality risk and the timing of skeletal rickets remains less understood. Analysis of a 19th century agropastoral Bedouin community in Jordan found a high frequency of rickets in those dying under 2 years of age (~60%, n=32). This study examines the infant mortality risk of VDD and impact of VDD timing on infant mortality in this community. Early life histories of rickets were assessed through documenting interglobular dentin (IGD) in dental dentin that primarily is linked to skeletal rickets. Histological analysis of deciduous teeth from 16 infants (< 2 years of age) and first molars and second molars of 23 non-infants (8+ years of age) reflected IGD development between 30 gestational weeks until death and birth until 10 years, respectively. Infants had a higher frequency of IGD prior to death (87.5% of infants, 69.5% of non-infants), and IGD developing before 2 years is associated with higher infant mortality risk (OR=3.3, 95% CI=0.2-1.41). In addition, more infants with IGD had prenatal IGD formation than non-infants with an M1 (X2=0.1; p=0.0031). These data demonstrate rickets in infancy, particularly prenatally, increases infant mortality risk. The study highlights the role of vitamin D deficiency in infant mortality and offers new perspectives on the long-term impact of maternal and childhood health on survival.

Holloman, Ashlynn

Faculty Mentor: Kristen Gregory

Middle School Teacher Perspectives on Critical Thinking in Mathematics

This qualitative study dives into the topic of critical thinking with a focus on the implementation process. The context is based on middle school teachers who teach mathematics in grades sixth through eight in a rural, Eastern North Carolina county. The participants of this study will be three middle grade mathematics teachers, one representing each middle school grade level (sixth, seventh, and eighth). The purpose of this study is to investigate mathematics teacher perceptions about the impact critical thinking has in the mathematics classroom in a rural, public middle school located in North Carolina. The following research problem will be investigated: How do mathematics teachers describe the impact of implementing critical thinking in a rural middle school mathematics classroom? The methodology of this study represents a qualitative approach with the research design being a survey. The survey will be administered digitally through a safe and secure link where participants can agree or disagree to participate. Open and axial coding will be used to identify themes subthemes from the data. The results of this study will inform mathematics teachers of any grade level on the topic of implementing critical thinking in the mathematics classroom.

Horvick, Savannah

Faculty Mentor: Nancy Dias

Identifying Barriers & Facilitators to Inpatient Palliative Care: Perspectives from Surgical Critical Care

In the surgical trauma intensive care unit (STICU) setting, palliative care increases patient and family satisfaction, improves symptom management, and decreases the length of stay. This is significant given the unique profile of a STICU patient, who is younger, sicker, and with vastly different pathophysiology than other specialty intensive care units. STICU patients are frequently admitted for rib fractures, brain injuries, and hemothorax/pneumothoraxes, with an increased prevalence of surgery and hemorrhagic shock. The literature shows that palliative care improves patient outcomes in STICU, however, the barriers and facilitators to palliative care in STICU are unclear. The purpose of this study is to understand the barriers to receiving palliative care in an inpatient surgical trauma critical care unit.
This study will collect both quantitative and qualitative data. The quantitative data will include two aspects: a) a retrospective chart review and b) survey data, which includes demographic data and a needs assessment survey. The qualitative data will include a) the retrospective chart review from January 2022 to December 2023 will evaluate the patients who received care on

a STICU at a hospital in NC, 1) the number of palliative care consults 2) the indication for these palliative care consults 3) the number of deaths 4) the presence or absence of palliative care consults in patients who died. A palliative care assessment (The Palliative Care Attitudes and Knowledge Tool) will evaluate the state of inpatient palliative care from the perspective of the care team. A demographic survey of the multidisciplinary care team to assess their education, experience, etc. Additionally, a semi-structured interview guide will be used to interview healthcare professionals regarding the barriers and facilitators to providing inpatient palliative care. Convenience and snowball sampling will be used to enroll participants for the demographic survey, PCAK, and semi-structured interview. This research study is still in progress. Results are pending.

Hu, Yongtao

Faculty Mentor: Robert M. Hughes

Organic catalytic and improved cell delivery potential of beta cyclodextrin derivative

Cyclodextrin (CD) is a type of cyclic oligosaccharide that commonly contains 6 to 8 glucopyranose forming a hollow truncated cone-like structure with a lyophilic surface on the outside and a hydrophobic cavity inside the cone. Because of its unique structure and easy complexation with many biomolecules, it has played a significant role in water solubility improvement, slow-release, and transportation of hydrophobic molecules, especially drug molecules. After receiving approval for usage from the FDA, drugs like hydrocortisone, prostaglandin, nitroglycerin, itraconazole, chloramphenicol, ibuprofen, and Albendazole often include cyclodextrin to increase the solubility and bioavailability of the active molecule. However, natural beta-cyclodextrin has its limitations in water solubility and target cell specificity. Therefore, many derivatives of cyclodextrin have been synthesized for specific conditions. In this project, derivatives of cyclodextrin were synthesized by azide-alkyne click chemistry to explore the potential of organic catalytic activity and improved delivery potential of beta cyclodextrin. The clickable beta cyclodextrin, 6A-Azido-6A-deoxy-beta-cyclodextrin, was synthesized from natural beta cyclodextrin with Mono-6-O-(p-toluenesulfonyl)-beta-cyclodextrin as the intermediate. For organic catalytic activity screening, the clickable beta cyclodextrin was attached with some amino acid derivatives to observe the effects of cyclodextrin amino acid conjugate. For improved cell delivery, halogen-containing ligands are attached to the beta cyclodextrin to interact with surface-integrated Halo proteins. Current results showed that modified cyclodextrin combined with Halo proteins were able to improve the cell delivery efficiency for some drugs.

Hughes, Karley

Faculty Mentor: Kristen Gregory

Factors Contributing to Low Reading Comprehension

This study investigates the factors contributing to low reading comprehension scores among 3rd grade students in a Title I school, where declining reading skills have become increasingly evident. It emphasizes foundational reading skills-such as phonological awareness, decoding, phonics, and word recognition-an essential for comprehension. Students often struggle with understanding texts due to difficulties in mastering these skills, resulting in dysfluent reading and cognitive energy being spent on word identification rather than meaning, adversely affecting their academic performance. This qualitative research aims to explore what teachers believe to be the factors that contribute to low reading comprehension scores among 3rd grade students at this Title I school. The research question asks: What factors do teachers perceive as factors contributing to low reading comprehension? This study utilizes action research design. Teachers will be given an open-ended survey to figure out what they perceive as the factors contributing to low reading comprehension. The data will be analyzed using axial coding. The research identifies gaps in existing literature regarding the impact of socio-economic backgrounds and differentiated learning needs on comprehension scores. By providing insight into the challenges faced by students, this study aims to equip educators with targeted instructional strategies and interventions. It also to seeks policymakers with evidence based recommendations to enhance literacy education and ensure equitable resource access. Ultimately, this research aspires to foster a culture of literacy and improve outcomes for diverse communities.

Ihuka, Victor

Faculty Mentor: Dennis McCunney

Pitt Perspectives – A Model for Rural Economic Development: Leveraging Culture and a Strong Sense of Place

Rural communities across the United States face persistent economic challenges. Some of these challenges include stagnating job growth, population decline, and limited infrastructure for entrepreneurship and investment (Partridge & Weinstein, 2020). These regions often struggle to attract tourism, retain local talent, and create sustainable economic ecosystems. Despite these challenges, rural areas possess unique cultural assets—local traditions, heritage, arts, and small businesses—that remain underutilized in economic development strategies (Goetz, 2018). This research explores Pitt Perspectives, a culture and media-driven economic development model that leverages cultural identity, storytelling, and digital connectivity to enhance economic resilience in rural areas.

Pitt County, North Carolina, exemplifies the challenges and opportunities of rural economic development. Although the county benefits from a rich cultural landscape, diverse communities, and proximity to academic institutions like East Carolina University (ECU) and Pitt Community College (PCC), these assets are often overlooked in traditional economic planning (Brookings Institution, 2023). Pitt Perspectives provides a community engagement platform that highlights local businesses, promotes cultural tourism, and fosters a strong sense of place. The platform connects residents with global audiences, positioning rural identity as a driver of economic sustainability and innovation.

This study situates Pitt Perspectives within the existing literature on rural development, community and media engagement, and place-based economic strategies. Research indicates that integrating cultural storytelling into economic frameworks fosters local pride, drives visitor interest, and supports entrepreneurship (American Progress, 2023). Enhancing digital access and global connectivity can also bridge economic disparities, allowing rural communities to engage in broader markets (Cleveland Fed, 2023). By analyzing Pitt County as a case study, this research presents a replicable model that other rural regions can adapt to strengthen local economies through community and media-driven cultural engagement.

Irby, Austin

Faculty Mentor: Angela Wells

The Ghost of You: Self-Portraiture as a Site of Memory, Trauma, and Medical Intervention

This research investigates self-portraiture as a method of exploring the fractured dialogue between body, memory, trauma, and medical intervention, positioning the body as both a physical and psychological landscape. Photography operates as both witness and intervention, capturing the ways illness and trauma inscribe themselves onto the body, reshaping identity, perception, and the continuity of selfhood. The body, in this context, becomes an archive marked by scars, medical imaging, and the psychological residues of survival while self-portraiture acts as both an act of reclamation and a confrontation with the instability of memory itself.

Ultimately, my research contributes to the expanding discourse of photography as a tool for self-inquiry, advocating for visual practices that challenge dominant narratives of illness and trauma. By embracing the impermanence and instability of the self-portrait, this study proposes that photography serves not only as documentation but as an active process of negotiation, resistance, and re-embodiment.

Jabbour, Hoda

Faculty Mentor: Mark Mannie

A Novel Platform for Antiviral Therapy that Synergistically Combines the Antiviral Activities of a Viral Host Receptor and an Immune Modulator

The COVID-19 pandemic highlighted our need to respond quickly to emerging viruses that may pose a severe threat to global human health. To address this need, we developed a novel antiviral therapeutic platform with a modular design that enables targeting of distinct viral species. For proof-of-concept, we created a fusion protein that targets human coronaviruses NL63, SARS-CoV, and SARS-CoV-2, which share specificity for the ACE2 host receptor. This antiviral fusion protein combines

interferon-beta (IFN-β) as the N-terminal domain and the soluble extracellular domain of angiotensin-converting enzyme 2 (ACE2) as the C-terminal domain (IFNβ-ACE2). Both domains retained the predicted bioactivities in that the IFN-β domain exhibited potent antiviral activity and the ACE2 domain exhibited binding to the transmembrane SARS-CoV-2 Spike protein. This study showed that the ACE2 domain of IFNβ-ACE2 partially neutralized infectious virions to blunt ongoing infection while anchoring the IFN-β domain to the viral surface so that each virion presented an outward array of IFN-β. The strategy of decorating virions with a surface array of IFN-β ensured that robust IFN-β signaling elicited antiviral defenses before subsequent viral infection. In in vitro infection studies, IFNβ-ACE2 exhibited enhanced antiviral activity against NL63 compared to soluble ACE2, IFN-β, and the unlinked combination of ACE2 and IFN-β. Additionally, targeting studies were performed in which NL63 virions were incubated with IFNβ-ACE2 and then washed to remove unbound proteins. These 'wash' experiments showed that the IFNβ-ACE2 fusion protein had antiviral activities that were qualitatively superior compared to soluble ACE2, IFN-β, or the unlinked combination of ACE2 and IFN-β. The main conclusion is that the pool of IFNβ-ACE2 targeted to the virion surface has potent antiviral activity based on partial viral neutralization combined with preemptive targeting of antiviral IFN-β activity to the exact site and time of imminent viral infection. Virus-targeted IFN-β is a new concept and a novel antiviral platform technology for treatment of established and emerging viral disease.

Jaiswal, Saumya

Faculty Mentor: David Hart

AI-Driven Innovation for Next-Generation Vision Healthcare": A First Step Toward Intelligent and Proactive Eye Care Solutions

Artificial Intelligence (AI) is revolutionizing eye care by enabling automated detection and monitoring of diseases such as diabetic retinopathy, glaucoma, and age-related macular degeneration. Traditional deep learning models, such as convolutional neural networks (CNNs), have demonstrated success in classifying retinal diseases, but they often lack interpretability and the ability to track disease progression over time. Vision Transformers (ViTs) offer a promising alternative by capturing long-range dependencies in retinal images, making them well-suited for analyzing complex pathological features. However, ViTs are computationally expensive, making them difficult to deploy in real-world clinical settings.
In this work, we focus on implementing Vision Transformers (ViTs) and ResNet architectures for diabetic retinopathy classification using publicly available datasets such as APTOS 2019 and EyePACS. Since these datasets do not include temporal sequences, we generate synthetic disease progression data by applying augmentation techniques, such as contrast enhancement and distortion, to simulate changes in retinal structures over time. We then evaluate the effectiveness of hybrid approaches, integrating spatial feature extraction (ViTs) with temporal tracking (LSTMs), to improve disease progression prediction. Our goal is to assess whether combining attention-based models with temporal modeling can enhance accuracy and interpretability in eye disease detection.
The results of this project will contribute to improving automated eye disease diagnostics, providing clinicians with more reliable AI-assisted screening tools. Future directions include optimizing these models for real-time inference and exploring lightweight architectures, such as MobileViT, for potential deployment in wearable or telemedicine applications. By refining AI-driven ophthalmology solutions, this research aims to bridge the gap between deep learning advancements and clinical usability, paving the way for more accessible and efficient vision healthcare.

Jakobowski, Andrew

Co-Presenters: Mia Verdugo
Faculty Mentor: Adam Offenbacher

Allosteric Regulation of Human 15-Lipoxygenase-2 by Calcium and Heavy Metal Interactions

The lipoxygenase enzyme catalyzes the oxygenation of polyunsaturate fatty acids, such as arachidonic acid, which regulate normal homeostasis, lipid metabolism, and cell signaling in humans. However, if an excess of or aberrant peroxidation products are formed, this can promote inflammation. For example, the activity of human epithelial 15-lipoxygenase-2 (15-LOX-2) has been linked to atherosclerosis, a common form of cardiovascular disease (CVD) – a leading cause of death in North Carolina. 15-LOX-2, like other human LOXs, can bind divalent calcium ions (Ca2+) and translocate from the cytosol to the membrane surface. In vitro measurements have shown that 15-LOX-2 activity is accelerated at the phospholipid interface, suggesting that the interactions with membranes and lipids alter the LOX structure. In this research, we have explored the

thermodynamics of Ca2+ binding to 15-LOX-2 by isothermal titration calorimetry (ITC) and the impact on structure by circular dichroism and differential scanning calorimetry. Using a series of strategic site-directed mutations to the protein, we have isolated where the calcium ions bind. Further, we have begun examining the impact of heavy metal ions, such as cadmium (Cd2+), on 15-LOX-2 structure and function as these environmentally accessible metals can displace Ca2+ in proteins, disrupt lipid metabolism, and contribute to CVD. Understanding the binding affinities of metals such as Ca2+ or Cd2+ to 15-LOX-2 is the aim of this research to understand how toxic heavy metals may inhibit lipid metabolism through the lipoxygenase enzyme.

Johnson, Morgan

Faculty Mentor: Avian White

How Neighborhood Community Centers Map play a role in improving maternal health outcomes

The United States has the highest maternal mortality rate among developed countries, with Black women facing the highest rates—69.9 deaths per 100,000 live births, 2.6 times higher than for White women. Black women are also 3-4 times more likely to die from pregnancy complications and twice as likely to experience severe morbidity. Those living in low-income neighborhoods face even greater risks due to chronic conditions like diabetes, obesity, and hypertension. Research suggests physical activity (PA) during pregnancy can reduce health disparities and improve outcomes. However, lack of access to community centers and green spaces limits PA, contributing to worsened health outcomes for both mother and baby. This study aims to pilot an intervention using neighborhood community centers in Pitt County, North Carolina, to increase physical activity and improve maternal health outcomes among pregnant women, using focus groups and program evaluations. Participants were recruited by Blue Cross Blue Shield for the Birth and Bloom Healthy Pregnancy Initiative program through flyers and word of mouth. Seven individuals who met the inclusion criteria of being at least 18 years old and enrolled in the program were surveyed via REDCap. The survey included demographic questions on gender, race, ethnicity, income, education level, and weeks of pregnancy. The remaining questions focused on physical activity levels and frequency. The racial demographic of the surveyed participants was primarily Black women (72%), with the remaining participants being White (14%) and Hispanic (14%). Seventy-one percent of participants engaged in physical activity during pregnancy, while 29% did not. Analysis of responses from the final evaluation forms showed that 100% of participants found the program enjoyable and informative. They believed it would help them remain physically active and increase their confidence in staying active. Themes from the focus group discussion included experiencing fellowship and social support, building new relationships, and feeling confident in their pregnancy education. The implementation of this program at the Eppes Community Center addresses the barrier of limited green space and outdoor areas by providing women with a safe, accessible space to engage in physical activity and receive education without financial strain. An intervention combining physical activity and education, while utilizing the neighborhood and built environment, would better equip pregnant women with the tools for a successful pregnancy and may help reduce maternal mortality and morbidity rates.

Johnson, Rachael

Faculty Mentor: Lauren Anllo

Defining mechanisms that regulate cell divisions in a stem cell niche

Stem cells are important for tissue repair, enabled by their ability to both self-renew and differentiate into adult cell types. They are maintained by signals from their niche, a cellular microenvironment that is often regionalized to specific tissue locations. Tissue homeostasis is reliant on cell cycle control within the stem cell niche. To ensure stem cells do not over-proliferate, niches must tightly regulate their own cell cycle as well as that of the stem cells. Our lab leverages the Drosophila testis niche as a model to understand this regulation. These niche cells remain quiescent, a state where the cells are not dividing. Inappropriate divisions have been shown to produce ectopic niches, or to result in niche cell loss. Previous work from our lab identified that the transcription factor and FoxF ortholog, Biniou, is required for establishing the testis niche. Biniou is necessary to form neighboring visceral muscle that directs assembly of the testis niche. In these mutants, the niche cells fail to enter quiescence (Anllo & DiNardo, 2022). This data, along with the known role of cell contacts influencing the cell cycle, suggests that niche assembly is required to enter quiescence. To test this hypothesis, I will assay for niche quiescence in other Drosophila genetic conditions that disrupt assembly. The transcription factor Islet is expressed in the testis niche and is also required for niche assembly. I will assay niche quiescence in islet mutants. Upon dissecting mutant embryos, I will immunostain gonads with markers for S phase or mitosis. If the niche is labeled in these experiments, then it is not quiescent. In this outcome, I will identify if cell contact resulting from assembly enables quiescence entry through adhesion molecules. To test the role of adhesion proteins in quiescence entry, these proteins can be overexpressed in mutants with dispersed niche

cells. I hypothesize that this manipulation would rescue quiescence entry. If I instead detect unaltered quiescence entry in other assembly mutants such as islet, I will identify whether Biniou plays a direct role in initiating niche quiescence. Understanding how Drosophila niches establish and maintain quiescence will unveil mechanisms required for tissue homeostasis and repair in all stem cell niches.

Jones, Heather

Faculty Mentor: Kristen Gregory

Bridging the Literacy Gap: Analyzing the data of CFA and mClass Assessments in Rural, Low-Income Communities

This study examines the impact of low-income environments on third-grade literacy achievement in rural, socioeconomically disadvantaged communities, where limited resources and lower literacy rates contribute to long-term academic disparities. Many students from these backgrounds experience persistent challenges due to economic and educational inequities, widening the achievement gap between social classes. Using a quantitative correlational design, this research analyzes the relationship between Common Formative Assessments (CFA) and mClass data to evaluate literacy outcomes, focusing on foundational skills such as vocabulary, phonological awareness, and comprehension. Data from eight participants, ages 8-9, will be collected and analyzed using descriptive statistics and correlational analysis to determine the relationship between students' foundational literacy skills (measured by mClass) and their CFA performance. The findings aim to identify patterns that can inform targeted interventions and provide actionable strategies to bridge literacy gaps. This study seeks to promote literacy equity in underserved populations and enhance the effectiveness of assessment tools in supporting early literacy development.

Jones, Spencer

Faculty Mentor: Michelle Malkin

Rolling the Dice: The Alarming Rise of Gambling Among Emerging Adult Men

Gambling has become an increasingly concerning public health issue, yet it often goes unnoticed. The purpose of my poster is to examine the gambling behaviors of American men aged 18-24. This study explores their motivations, impacts, and prevalence. This poster combines data from studies, document reviews, and secondary data analysis. Statistical methods will identify patterns, relationships, and trends between key factors. It is vital to understand what influences gambling behaviors in this age group, to help shape future public health efforts. This research can help create policy changes, prevention/intervention programs, a groundwork for future studies in this discipline. This age group is the future of our country and as more states legalize gambling it is crucial to understand how deep gambling affects them.

Kachingwe, John

Faculty Mentor: Tammy Lee

Enhancing Multilingual Learners' (MLs) Science Comprehension of Water Properties through Visual Aids and Modeling

This action research investigates the effectiveness of visual aids and modeling in enhancing the science comprehension of water properties among Multilingual Learners (MLs) in an Earth and Environmental Science class. The study involved 56 students, including 22 MLs across three classes. Analysis was concentrated on one class—Block 2—which has the highest number of MLs (11 students) and serves as a representative sample of the larger cohort. Over a four-week period, a mixed-methods approach was employed, collecting data through pre- and post-assessments, student-generated diagrams, structured reflections in manuals, and surveys. This study examines how visual aids and modeling can enhance MLs' science comprehension, engagement, and learning by addressing language barriers in science education. A projected 20% improvement in post-assessment scores is anticipated. Additionally, qualitative analysis of student-generated diagrams and structured reflections will provide insights into conceptual science comprehension, informing evidence-based instructional strategies for science educators working with MLs. Findings from this study will guide curriculum adjustments and teacher training, helping to bridge linguistic and conceptual gaps in diverse science classrooms.

Kalogeromitros, Maria

Co-Authors: Dr. Robert J. Feczko
Faculty Mentor: Robert J. Feczko

Distraction Osteogenesis in Syndromic Pierre Robin Sequence: Case Study of Koolen De Vries Syndrome

Pierre Robin Sequence (PRS) is a rare birth defect commonly characterized by micrognathia, glossoptosis, and upper airway obstruction, often requiring complex multidisciplinary management. Although the majority of PRS cases are nonsyndromic, those that are syndromic present additional care challenges as a result of multisystem anomalies. While distraction osteogenesis (DO) is a standard treatment for correcting mandibular hypoplasia in PRS, abnormal bone consolidation following hardware removal has not been reported in Koolen de Vries Syndrome (KdVS).
A comprehensive literature search was conducted using the East Carolina University library and PubMed databases. The search terms included “distraction osteogenesis”, “bone consolidation”, and “Koolen de Vries Syndrome”. None of the articles discussed micrognathia or concomitant PRS and KdVS diagnosis. Clinical data for this case were obtained from a review of electronic health records. We report the case of an infant with PRS and KdVS (17q21.31 microdeletion) who underwent mandibular DO at four weeks of age. Virtual surgical planning guided bilateral osteotomies and optimized device placement, achieving 15 mm of mandibular distraction. Despite routine distraction, the bone had not consolidated at time of hardware removal. The patient was monitored for an extended period to assess consolidation with repeat CT imaging but ultimately necessitated open reduction and internal fixation with a bone graft to restore mandibular stability. KdVS is a rare genetic syndrome with a prevalence of 1:55,000 individuals, characterized by distinctive craniofacial and musculoskeletal features. This case represents the first report of a patient with syndromic PRS and KdVS, exhibiting abnormal bone consolidation following mandibular distraction osteogenesis. It underscores the need for improved understanding of bone healing dynamics in syndromic conditions, tailored surgical planning, and extended follow-up. By sharing our challenges, we aim to inform others and pave the way for optimizing outcomes in this high-risk population or rare conditions previously unseen. Further research is essential to optimize DO outcomes in syndromic PRS and most importantly osteogenesis in the setting of KdVS.

King, Justin Tyler

Faculty Mentor: Timothy Lazure

BY ANY MEANS OF MAKING

The act of making beyond the constraints of conventional means is an act of Punk, which rallies us to become autonomous from the systems that bind us. We are told that we are bound to industry standards, that we are sequestered to stations that do not serve us, and we should be commodified in our efforts to free ourselves from our given roles. These sanctions seek to oppress individuals, deceiving them into believing that they are incapable of making without paying into the greed of a money baron.

By Any Means of Making is an intention to create with any resources we have available and democratize the knowledge to do so. Whether it be zines printed from local libraries or rubber eraser stamps step-and-repeated into a mosaic, these acts part us from the systems that deem that we need more to be found adequate.
By working within communities founded in democratized learning we reclaim our ownership in education. Our intention should not be dependent on a single form of making but an ethos of producing by any means necessary. The individual cannot be bound by fiscal barriers or economic status. The independent will create whether they have access to equipment or not.

King, Blake

Faculty Mentor: Alex Manda

Integrating Traditional Soil Testing with Electromagnetic Induction for Precision Mapping of Electrical Conductivity in Coastal NC Agricultural Fields

Saltwater intrusion is affecting coastal communities worldwide damaging both fresh groundwater supply and soil productivity. When soil salinity values reach certain thresholds, plants are not able to effectively uptake the nutrients they need from the soil, thereby reducing crop yields. Traditional groundwater/soil monitoring techniques are effective for collecting high accuracy data but require extensive amounts of time to implement and often provide low spatial density data. The purpose of this study is to use the EC1:5 soil/water mixture method to calibrate a portable electromagnetic induction (EMI) sensor, to map soil electrical conductivity at different depths (0-20cm, 40-60cm, and 60-80cm) in an agricultural field site in coastal North Carolina. Analyses of EC1:5 and EMI measurements reveal that the highest frequency of 40,050Hz (frequency range = 1,050Hz-40,050Hz) provides the highest correlation coefficient at all depths of measurement. Results from monthly EMI surveys that were conducted across the field site show that high soil salinity is mostly concentrated around drainage ditches, with minimal changes in salinity over a 5-month survey period. These results highlight the utility of the proposed technique in determining the spatial and temporal distribution of salts in vulnerable agricultural fields. This research study will be useful for improving our understanding of how seasonal environmental changes may affect soil dynamics in salt-affected agricultural lands in low-lying coastal areas.

Kinkead, Jude

Faculty Mentor: John Cavanagh

Molecular Recognition in Bacterial Transition State Regulators

Precise control over bacterial populations relies on our ability to target and manipulate their regulatory systems. A critical regulatory system utilized by numerous nefarious bacterial species from Clostridium dificile to Bacillus anthracis is transition state regulation. The transition state is a period for evaluation that bridges the shift from planktonic state to stationary phase. In this period, the bacterial populations survey everything from nutrient availability, presence of competing bacterial species, antibiotic assaults, as well as environmental factors including pH and temperature. Bacteria possess myriad defense strategies, sporulation, biofilm formation, cannibalism, antibiotic production, transformation, and more, that allow them to respond appropriately to assorted insults. These strategies promote their survival in disadvantageous settings, however, engaging these defense systems requires significant energetic commitment and are not engaged frivolously. To aid in the decision-making process, a protein class termed transition-state regulators are employed to repress the defense strategies at the transcriptional level until their deployment is required. These proteins achieve a remarkable feat – exhibiting hierarchical specificity for hundreds of DNA targets, without having an obvious consensus sequence. To leverage control over this regulatory system, it is critical to understand the mechanism underlying their methods for DNA recognition. Doing so would provide tremendous improvements in our ability to combat foodborne illnesses, hospital acquired infections, as well as treat biofilm-based disease-states from cystic fibrosis to endocarditis and chronic wounds. To determine the mechanisms underlying transition state regulator DNA recognition, we utilized two well-studied transition state regulators from the model organism Bacillus subtilis, AbrB and AbH. These proteins share 74% identity in their DNA-binding domains and exhibit hierarchical binding but to different pools of DNA-targets. In addition, they possess exchangeable C-termini that restrict the source for differences in DNA-binding characteristics to the DNA-binding domain. Through a series of single-point mutations, computational approaches, and biomolecular interaction analysis, we have determined critical features underlying DNA-recognition in AbrB-like transition state regulators. Nature has provided us with a model from which we can develop therapeutic interventions. AbbA is an anti-repressor protein in Bacillus subtilis that alleviates transcriptional repression by AbrB, allowing biofilm-formation and sporulation to occur. Through computational approaches, we have also elucidated likely residues mediating their interaction, as well as designed putative therapeutics that mimic the AbrB interaction interface.

Klemm, Elizabeth

Faculty Mentor: Zachary Domire

The reliability and validity of ultrasound elastography to quantify muscle tension

Quantifying individual muscle forces has traditionally been difficult due to the limits of technologies such as surface and fine wire electromyography and functional MRI. Additionally, determining the parameters for musculoskeletal models proves challenging because of the over determined nature of muscle anatomy. Shear wave elastography (SWE) offers a promising solution for measuring individual muscle tension in both passive and active states, including deep tissues. A shear wave signal is sent out and tracked into the soft tissues to estimate in vivo shear elastic modulus. A muscle's active tension can be multiplied by its physiological cross-sectional area (PCSA) to then calculate individual muscle forces. SWE is a non-invasive and accessible technology, but it is heavily reliant on the technician's skill. The purpose of this study is to measure the inter- and intra- rater reliability and validity of SWE to calculate individual muscle forces. 30 healthy adults will complete submaximal isometric plantarflexion contractions at 10-30% of their maximum voluntary isometric contraction in five different positions on a dynamometer. These positions are neutral, 15° of plantarflexion, and 15° of dorsiflexion in prone and neutral and 15° of dorsiflexion while kneeling with the knees at 90° of flexion. Resting and active SWE images of the plantarflexors (medial gastrocnemius, lateral gastrocnemius, soleus) will be taken by two raters in each position and contraction level. The protocol will be repeated on a second visit, with one rater taking images to test intra-rater reliability. Inter- and intra-rater reliability will be calculated. B-mode ultrasound will be used to determine the length and physiological cross-sectional area of the muscles. Each muscle's active shear modulus in each position and contraction level will be multiplied by the muscle's PCSA to calculate individual muscle forces. Ankle joint torques will be calculated by measuring the participant's Achilles tendon moment arm using motion capture assisted with ultrasound. The sum of the muscle forces will be multiplied by the moment arm to calculate ankle joint torque. Validity will be determined by comparing the calculated plantarflexor moments to the dynamometer's measurements. It is anticipated that there will be high inter- and intra-rater reliability and validity of the SWE measurements. It is anticipated that the soleus will contribute more to plantarflexion due to the flexed knee shortening the gastrocs beyond their optimal operating length. Understanding individual muscle forces can be invaluable for understanding how the body responds to internal and external forces.

Kleutgens, Ponette

Faculty Mentor: Stefan Clemens

Dopaminergic and Opioid Combination Drug to Treat Peripheral Nerve Injury

Neuropathic pain (NP) affects millions globally, with current treatments often relying on opioids, leading to risks of tolerance, addiction, and reduced quality of life. This study explores the efficacy of combining pramipexole (PPX), a dopamine D3 receptor agonist (1mg/kg/day), with low-dose morphine (1 mg/kg/day) in managing peripherally induced NP as a function of treatment onset. Using a sciatic nerve ligation (SNL) model in male C57BL/6 mice, thermal pain reflex latencies were measured to evaluate the effectiveness of the different treatment scenarios. Three treatment paradigms were tested and compared to non-treatment (saline treatment only after SNL) control animals: "early onset" (treatment initiated one day after SNL, Group 1), "pre-SNL onset" (treatment initiated 3-5 days before SNL, Group 2), and "late onset" (treatment initiated two weeks post-SNL, Group 3). The control group showed significant and sustained reductions in reflex latencies in the injured limb, with no recovery over the experimental 3-week timeline, thus serving as a comparative baseline against the three drug-treated groups. Treatments for Group 1 animals led to restored reflex latencies in the injured legs close to those of the uninjured controls within 2-3 days of treatment, and this effect was maintained over the 3 weeks tested post-SNL. This data confirms our earlier findings, and they indicate that the drug combination may be useful to treat pain in an acute setting. In Group 2 animals, the drug treatment slightly increased reflex latencies prior to SNL, and, following the injury, the reflex latencies of the injured limb mirrored those observed in Group 1 animals. In contrast, reflex latencies of the injured legs from Group 3 animals remained significantly below the corresponding values of the contralateral uninjured legs. These findings suggest that the PPX-morphine combination may be beneficial in alleviating NP in the acute injury phase, but that its effect in the chronic phase of NP may be limited. We are currently probing for the potential mechanisms of action of the drug combination in acute and chronic phases after peripheral nerve injury.

Landis, Eliza

Faculty Mentor: Tim Lazure

Transformation: Finding the Wild in Liminal Spaces

My research explores where and how anxiety is felt in the body, articulating a prevalent lived experience that has until recently been repressed or denied by society at large—one which societal conversations are now open enough to explore—giving voice to underrepresented stories. Using materials such as charred wood, found objects, metals, ceramics, & animal fibers I visualize the sensory impressions of the anxious individual. Through the use of hot & cold connections, patinas, enamel surfaces, and pierced metal I present the viewer with symbols and metaphors meant to communicate the physical manifestations of anxiety. How the material is treated, where the objects are worn on the body, and the textures applied to the material will reinforce these visceral realities.

Larsen, Eric

Faculty Mentor: Christy Walcott

Dynamic Predictors of Posttraumatic Stress in Adolescent and Young Adult Cancer Survivors

Adolescent and young adult survivors of cancer encounter unique challenges associated with their health status. These challenges are often lifelong and persistent, including medical and psychosocial late effects. Current literature indicates posttraumatic stress to be a significant late effect. Utilizing a model of predicting the risk of posttraumatic stress in childhood cancer survivors (Bruce, 2006), the proposed study is designed to analyze the potential dynamic predictors in this broader population, including social support, family stressors, and mental health symptoms related to posttraumatic stress. Using a sample of adolescent and young adult cancer survivors (McGrady et al., 2022), my aims are to (1) determine dynamic predictors of posttraumatic stress symptoms, (2) determine the relative importance of each predictor, and (3) identify which dynamic predictors are consistent with clinically significant levels of posttraumatic stress.

Lawton, Darius

Faculty Mentor: Bhibha Das

Exploring the Roles of Societal Influences on Black Men's Lifeloong Physical Activity Behaviors

Background: Black men are less likely to engage in physical activity than any other demographic. Prior research points to finances and other physical barriers as to why this is the case. However, limited research exists examining the impact social factors (e.g., culture, social class, etc.) play in the disengagement of physical activity throughout the lifespan.
Purpose: To explore the ways in which social factors influence Black men's physical activity behaviors.
Methodology: This study will recruit Black males ages 18-32 using social media, word of mouth, and personal connections. Participants will complete an Informed Consent Document, a Demographic questionnaire, and quantitative measures to assess factors such as physical activity, feelings of physical activity, motivation, etc. One-on-one interviews will also be conducted to further understand the interpersonal aspect. These interviews will be a semi-structured interview guide; participants will respond to questions about social aspects that pertain to physical activity behaviors. Sample questions will include "Would Physical activity be easier for you if you engaged in it in a group setting?" and "Do you have someone, if you were to ask, that would be physical activity with you?". Descriptive statistics were completed for demographics. Qualitative data was analyzed using content analysis. The university's Institutional Review Board approved all study protocols.
Anticipated Results: Based on prior research, it can be hypothesized that the social impact of Black men's physical activity behaviors may be due to 1) decreased social support/case as more life duties increase, 2) physical activity is no longer emphasized by authorities or as enjoyable, 3) everyday social injustice prohibits that want to be active.
Discussion: By understanding social and cultural barriers to lifelong physical activity in Black men, programs and policies have the potential to be developed and improve social factors that arise around physical activity. This is of importance because of the lack of research within this community at the interpersonal level. Potential interventions may include working with black youth to understand more about the role of physical activity in later life, as in middle age and beyond, to prolong the lifespan. For Black men, more emphasis on physical activity post-high school ages is desperately needed. Some potential solutions may include physical activity programming tailored to this population to benefit quality of life.

Lee, Jennifer

Faculty Mentor: Kristen H. Gregory

Teacher-Mentors Impacting Today's Middle School Students with Organization Strategies

An unusual number of students in the school classroom are unprepared for the organizational skills needed for educational success, especially those transitioning from elementary to middle school. This phenomenon begs the question, who teaches organization today? The researcher will analyze how teacher-mentors assist sixth graders in organizing homework, organization, and planning strategies. The teacher-mentor role offers a hands-on, inside look into the class student's organization and has the position to help encourage students to be more organized. Furthermore, teacher-mentors have an existing skill set to differentiate and accommodate each student's organizational needs. This study uses a mixed methods approach, both qualitative and quantitative methods, to study this concept. Using a student questionnaire, observation notes, and student work samples from school agendas, I will explore the potential benefits of organizing students to boost their academic confidence and school success. I will use descriptive statistics to analyze quantitative data and open and axial coding to analyze qualitative data. It is possible that teaching middle school students organizational skills will additionally impact other areas of their lives, including home life and extracurricular activities.

Li, Kai

Faculty Mentor: Tomoyuki Murakami

Fibroblastic Reticular Cells And HIV Latency Establishment

Human Immunodeficiency Virus-1 (HIV-1) is the causative agent for acquired immunodeficiency syndrome (AIDS). HIV-1 primarily targets CD4+ T cells, and HIV-1 infection renders the host immune system to a weakened state and causes opportunistic infections and HIV-related death. In the past decade, antiretroviral therapy (ART) has decreased new HIV-1 infections and the number of HIV-related deaths by lowering viral loads to undetectable levels and lowering transmission rates. However, since ART can only affect the HIV lifecycle, viral reservoir cells persist even under ART. These stable reservoir cells, including CD4+ T cells, harbor the HIV genome and can be in a latent state where no viral particles are produced as well as unrecognized by the host immune system. If treatments were to halt, these reservoir cells could come out of latency and produce viral particles, thus causing the proliferation of HIV and the progression of AIDS. Currently, there are no methods of eliminating these latent viral reservoir cells, presenting a major challenge in curing HIV/AIDS. The lymph nodes play a significant role in HIV spread and latency. In the lymph node paracortex, stromal cells called fibroblastic reticular cells (FRCs) secrete cytokines and chemokines to regulate T cell physiology. However, it is unknown if FRCs have a role in HIV latency of CD4+ T cells. To determine if FRCs have a role in HIV latency, we co-cultured FRCs and resting CD4+ T cells. Our results indicated that when resting CD4+ T cells were co-cultured with FRCs and separated for HIV infection, the percentages of productively and latently infected CD4+ T cells increased compared to CD4+ T cells that were cultured alone. This suggests that factors derived from FRCs enhance HIV infection of CD4+ T cells. Our study aims to identify the unknown factors derived from FRCs that efficiently establish HIV latency of CD4+ T cells. One potential factor that we are investigating is galectins. Galectins are a family of proteins that bind to galactose-containing glycans and are expressed by a variety of cells. In immune cells, galectins modulate immune cell functions. Lactose can inhibit galectins by binding to the carbohydrate-binding domain of galectins. When lactose was added to the co-culture system of FRCs and resting CD4+ T cells, we observe a reduction in HIV-infection. This suggests that galectins derived from FRCs have a function to promote HIV infection to CD4+ T cells. Further studies to understand FRCs and their role in HIV latency will provide more information on how HIV latency is established and maintained with the goal of curing HIV/AIDS.

Lolley, Jacob

Faculty Mentor: Kristen Gregory

Educational Skills & Crucial Conversations

Some educators walk in unsure of how to communicate with parents when it comes to having a crucial conversation. The study seeks to identify and define educational practices currently in use by elementary educators to communicate with students' parental units. This study will investigate the following question: What are the conversation skills educators use to communicate with families and caregivers? This study will consist of elementary educators from around North Carolina who teach various grade levels on various levels. These educators will receive a digital survey via an email campaign. The principal investigator will be analyzing qualitative data, via open and axial coding, and educators' responses in a cross-sectional survey. The results of this study will give educators both new and current, who are practicing within their classroom, practices and methods for communicating with parents.

LoVerme, Kaitlin

Co-Presenters: JaNae Buckner, Olivia Rose

Faculty Mentor: Joe Stock

The effect of the cold pressor test on arterial wave reflection amplitude and timing in young healthy adults

Sympatho-excitatory stimuli, such as the cold pressor test (CPT), increases microvascular resistance and brachial blood pressure. Cardiovascular responses to the CPT can predict cardiovascular risk. Previous research has demonstrated that surrogate measures of wave reflection (augmentation index) are increased during the CPT. However, this measure does not differentiate the effect of wave reflection magnitude vs. return time of the reflected waves. The purpose of this study was to test the hypothesis that the CPT would increase the amplitude of the backward pressure wave and result in an earlier return of wave reflection. Methods: Nine non-obese, non-hypertensive, healthy adults between the ages 18 – 40 years participated. For the CPT, participants submerged their hand in ice water for three minutes. Brachial blood pressure and arterial pressure waves were measured via applanation tonometry at baseline and during the last minute of the CPT. Wave separation analysis was performed to determine the maximal amplitude of forward and backward pressure waves as well as the reflected wave transit time using the centroid method. Reflection magnitude was calculated as ratio of backward relative to forward pressure wave amplitude. Results: In agreement with previous research, there was a significant increase in aortic systolic and diastolic blood pressure, as well as augmentation index (all, $p<0.05$). The novel finding was that despite no changes in the forward pressure wave amplitude (26±5 vs. 26±6 mmHg, $p=0.81$), there was a significant increase in the backward pressure wave amplitude (10±2 vs. 12±3 mmHg, $p<0.05$) as well as reflection magnitude (36±7 vs. 45±5%, $p<0.01$). Lastly, there was a trend for a shortened reflected wave transit time (316±55 vs. 246±60 ms, $p=0.09$). Conclusion: A sympatho-excitatory stimulus (i.e. CPT) in young healthy adults increased the amplitude of the reflected wave and tended to lead to an earlier arrival of wave reflections to the proximal aorta.

Lowman, Rachael

Faculty Mentor: Angela Wells

Resilience Through Textile Arts

Resilience comes in many forms for everyone. Most people define it as toughness, an elasticity of mind and soul, and an ability to withstand and overcome difficult challenges and come back stronger. My life has been marked with events that required resilience to withstand. These events, the lessons learned, and spiritual fortitude formed by them bless me with a deeper understanding and appreciation of the world around me. I find resilience through my faith and art practice. Through the use of weaving, crochet, and knitting, these experiences where I endure and find renewed strength are brought to life. As I wrap up my second year of graduate school, my research in both conceptual and physical points are coalescing in a beautiful way. In this presentation, I invite you to embark on a journey through resilience as expressed in my artworks, where each piece serves as a testament to endurance, growth, and transformation.

Lyman, Karie

Faculty Mentor: Chelsea Passwater

Turn2Care: Staff Driven Initiative to Increase Turning and Repositioning Compliance for Patients with BMAT Scores of 1 & 2

Consistently turning and repositioning patients is an effective strategy for reducing the occurrence of pressure injuries (PIs) among hospitalized patients. Redistributing direct pressure on targeted skin enhances blood perfusion to affected areas therefore decreasing the likelihood of breakdown. Healthcare workers can greatly decrease the occurrence of PIs by consistently repositioning patients. A significant barrier to consistent turning practices is the absence of standardized practice. Implementation of a staff-driven turn team comprised of nurses and nurse techs, working together in teams of two, to ensure that all patients in need of assistance with turning to avoid pressure injuries are consistently repositioned every two hours. Patients targeted for repositioning will be those scoring either a 1 or a 2 on the Bedside Mobility Assessment Tool (BMAT), as those patients are often unable to effectively reposition themselves without staff assistance. Staff education on the Turn2Care initiative was rolled out during mandatory staff meetings via instructional PowerPoint presentation with voiceover. Interactive in-person coaching was provided to unit champions and charge nurses. A phase approach was adopted, insuring gradual and comprehensive integration on the turn team initiative. Continual feedback methods were established to address staff concerns, pros and cons, and practice adjustments needed based on post-implementation insight. A pre-implementation survey was sent to all staff to gauge turning and repositioning practices and perceptions on the unit. Pre-implementation charting audits to assess repositioning compliance were performed on selected unit and a similar unit for comparison. PI data was analyzed, unit-specific and system-wide, over a 3-year period prior to implementation of turn team practice. Preliminary results indicate a significant increase in staff teamwork and frequency in repositioning patients. Post-implementation survey will be conducted after one month of implementation to gauge staff satisfaction and practice efficiency. Post-implementation charting surveys are ongoing but show a marked improvement. PI data will be gathered throughout the year and compared with pre-implementation data to hopefully reveal a decrease or elimination in PIs on the unit. This graduate project aims to reveal that with staff collaboration, teamwork, and a standardized practice approach, patients in need of assistance with turning and repositioning can consistently and efficiently have that need met. Therefore, the risk of developing skin breakdown and PIs from ineffective tissue perfusion is significantly decreased.

Maayah, Yara

Faculty Mentor: Juan Beltran-Huarac

Remote magnetic actuation of anisotropic ND-PEG coated iron oxide nanoparticles as a cytoskeleton targeted breast cancer therapy

Cancerous cells are in compromised states that deviate from healthy cell homeostasis and normal function. By targeting components in compromised cells, a specific approach to cancer therapeutics can be achieved. In this study the compromised integrity of the actin cytoskeleton is targeted to induce cell death in breast cancer cells and spare healthy breast cells, demonstrating a selective approach to cancer therapeutics. A healthy cytoskeleton is dynamic, reorganizing and repairing itself constantly to provide structural support and cell mobility, and to transport proteins within the cells. Cancerous cells have a compromised cytoskeleton that is stagnant and unable to self-repair, making the cell much more rigid and brittle. Recently, it was reported that magnetically actuated iron oxide nanoparticles can induce cell death via different interactions with subcellular components, however the proposed cell death mechanisms are explorative and remain inconclusive. In this project, we aim to demonstrate that the mechanical motion of starlike iron oxide nanoparticles (SNPs) actuated by low-frequency alternating magnetic fields (AMFs) can disrupt compromised breast cancer cytoskeletal actin filaments to induce cell death. This study provides compelling evidence that cytoskeletal disruption can occur from the magnetic-mechanical actuation of SNPs. Physicochemical characterization indicates that SNPs are superparamagnetic at corporal temperature and remain colloidally stable up to 24 hr in cell culture media. When exposed to breast cells (MCF-10A, MCF-7, MDA-231, and LCC-6) for 24 hr, SNPs were internalized through micropinocytosis as assessed by ICP-MS. The toxic response of SNPs at different concentrations was conducted via PrestoBlue and Live/Dead assays in absence and presence of AMFs. Prior to magnetic exposure, the parameters of AMFs were optimized to 80 mT, 65 Hz, 30 min of exposure time at pulsed mode. Cell lines underwent no significant cell death until the full magnetic treatment (cells with SNPs plus AMFs) was applied, which

depleted viability in only cancer cell lines down to 50 %. To study the mechanism of cell death, we conducted confocal microscopy, which demonstrated the actin filaments were drastically disrupted when magnetic energy is converted in mechanical agitation. This study represents a step forward to nanomedicine ruling out the use of drugs or ionizing radiation in cancer treatment.

McClendon, Aaliyah

Faculty Mentor: Katrina DuBose

Physical Activity Levels in Black and White women during early pregnancy

Limited research exists examining physical activity levels during the early stages of pregnancy, especially in different races. Thus, the purpose of this study is to investigate the physical activity levels between Black and White women in early pregnancy. Methods: We recruited healthy pregnant women between 18-40 years old, <16 weeks' gestation. Participants wore an ActiGraph Link on their non-dominate wrist for 7 consecutive days to measure physical activity. Data were analyzed to determine minutes per day (min/d) spent in light, moderate, and vigorous-intensity physical activity. Student t-tests was used to compare physical activity levels between races. Results: We analyzed physical activity levels of 8 pregnant women (4 Black; 4 White). On average, participants were 28.5 ± 3.35 years, with a BMI of 30.77 ± 7.22 kg/m2 and wore the Link for 15 hours/day. Light-intensity physical activity was similar (p=0.69) between Black (628.5 ± 238.9 min/d) and White women (686.07 ± 175.7 min/d). Moderate-intensity physical was also similar (p=0.82) between Black (280.3 ± 142.6 min/d) and White women (254.53 ± 69.7 min/d). None of the women engaged in vigorous-intensity physical activity. Conclusions: The intensity and amount of physical activity are similar between the two racial groups in early pregnancy. During early pregnancy, both Black and White women were meeting physical activity recommendations. Future research should examine physical activity levels in Black and White women through all trimesters of pregnancy to see if they remain stable. Funded by: NIH-R01DK129480

McCrary, Sam

Faculty Mentor: Samuel Sears

ICD Support Groups: Are They Still Relevant Now?

Implantable cardioverter defibrillators (ICDs) save lives in patients at risk for potentially life-threatening arrhythmias, but the experience of ICD shocks may prompt fear, anxiety, and potential psychological trauma in patients. Since the beginning of the broad use of the ICD, healthcare professionals recognized the unique demands and experiences associated with this therapy. Some clinics responded by initiating patient-focused meetings broadly referred to as “ICD support groups” to address the mental health challenges in this patient population. Decades of research have now underscored the importance of psychological and behavioral processes of ICD patients and their associations with adverse health outcomes. ICD patients frequently report disease-specific mental health symptoms, including ICD shock anxiety, poor device acceptance, body image concerns, and decreased physical activity that require clinical attention, but would be unfamiliar or idiosyncratic to most healthcare professionals. The original impetus for ICD support groups persists, but relatively few ICD support groups remain active. Online offerings via social media may have taken on some of these functions. We suggest that ICD support groups remain a strategic intervention to address patient psychological and lifestyle concerns in some form. This paper reviews the value of ICD support groups in the United States, Australia, and Canada and analyzes the current state and potential value of ICD support groups.

McCutcheon, Brannon

Faculty Mentor: David Hart

A Super Patching Transformer

Transformers have revolutionized Computer Vision, offering robust performance across diverse tasks. However, their reliance on uniform pixel patching presents limitations, including computational inefficiency for larger images, suboptimal handling of local features, and an inability to process non-uniform patches. Addressing these constraints allows for the advancement of their utility in demanding fields, such as medical imaging.
This work proposes a novel architecture combining Convolutional Neural Networks (CNNs) and Transformers to leverage superpixels, clusters of pixels with shared characteristics that capture local feature boundaries effectively. We propose an architecture that segments images into a collection of superpixels, vectorizes these superpixels using a CNN, and passes the resulting tokenized vector representations to a standard Transformer. By removing the uniformity constraint in patching, our approach aims to enhance Transformer performance on tasks requiring large-scale image analysis and fine-grained local feature understanding, potentially opening a way for broader Transformer applications in Computer Vision.

McDowell, Ryan

Faculty Mentor: Tim Lazure

Trail and Error, An American Experience

My research explores the importance of the National Park System's mission to preserve and educate the nature and history of America. I learned what it is like to live in America from other perspectives. We should learn about our history at the places where it happened—walking the trails of our ancestors who carved the way to where we are today. I am researching my genealogy and the paths of my ancestors and their American experience To compare, contrast, and add specific insight as to why we came here, how we developed, and how our culture influences us.
There are a few ways to display three-dimensional artwork. Following the acceptable art protocols, I want to present this body of work in a diverse way to represent America using new and creative means.

McFee, Charlie

Faculty Mentor: Charlie Humphrey

Impacts of Inflow and Infiltration on the Nitrogen Removal Efficiency of Three Wastewater Treatment Plants in Eastern North Carolina

Excess nitrogen (N) in the Neuse and Tar Pamlico Rivers can lead to harmful algal blooms, hypoxic conditions, and other water-quality issues. Wastewater treatment plants (WWTPs) must be efficient at lowering concentrations of N prior to discharge or downstream water quality may be negatively impacted. In many regions, aging or poorly sealed sewer collection networks allow stormwater infiltration during rain events, potentially overloading WWTPs and reducing their capacity to remove nitrogen. The primary goal of this project is to better understand how inflow and infiltration of rain water affects the N treatment efficiency of WWTPs that discharge to the Tar River and Neuse River. Effluent discharged from WWTP plants (L/day) along with concentrations of NH_4, TKN, and TDN will be analyzed along with daily rainfall for areas surrounding three WWTP in Eastern North Carolina. Correlation analyses will be used to determine if statistically significantly relationships exist between effluent discharge rates and rainfall amounts and between effluent discharge rates and N treatment efficiency. By evaluating these factors, the aim is to pinpoint how hydraulic variations and collection system integrity may affect the broader nitrogen-removal performance at each facility.

McGahhey, Eryn

Faculty Mentor: Kristen Gregory

Internship Insanity: An Investigation into the Stress Levels and Coping Strategies of Preservice Teachers

Internships are known to be the starting place for many beginning teachers' experiences in the classroom. These experiences, while full of learning, can also be stressful for the interns as they must manage course work, lesson planning, teaching, and testing in one sitting. This paper will break down the edTPA time period in relation to the stressors that interns face, how these stressors affect them, and how they cope with stress. A mixed methods research methodology is used to ensure that both numerical and anecdotal data is properly represented. The data source for this study is a survey that includes both Likert scale questions and short response questions. The research question for this study is: What are interns' perceptions of their coping strategies during their edTPA through ECU and how will they change post-graduation? The results of this study will inform teacher preparation programs on stressors and coping strategies their preservice teachers are using with the goal of improving stress levels for the students.

McManus, Sarah

Faculty Mentor: Kristen Gregory

Parental Involvement in Middle School

Parental involvement in middle schools is critical for student success, but achieving balance can be challenging. As children transition from elementary to middle school, they encounter significant developmental changes that impact their academic experiences. Research shows that parental engagement can enhance academic performance, foster positive attitudes toward school, and strengthen relationships between families and educators. However, middle school presents unique obstacles, as students seek greater independence and school structures often limit direct parent-teacher interactions. Additionally, factors such as time constraints, financial limitations, and miscommunication can hinder parental involvement. This study investigates the following research question: Why are some parents less involved than others in their child's middle school education? The research is based on a mixed-methods design, utilizing an online survey posted in Facebook groups of middle school teachers to gather data from teachers who interact regularly with parents. For my data analysis I will be checking for incomplete responses, duplicates, or any outliers. I am using descriptive statistics for my quantitative data as well as open and axial coding for my qualitative data. By exploring these challenges, the study aims to identify strategies that schools can adopt to overcome barriers to involvement. This includes providing clear, accessible information and creating inclusive, welcoming environments for parents. Ultimately, fostering strong partnerships between parents, students, and schools contributes to students' academic and personal development, leading to their overall success.
Keywords: college teaching, student evaluations of teaching, online administration, response, rate, assessment, involvement.

Menzel, Caid

Faculty Mentor: James Morley

Drivers of Species Community Dynamics in Pamlico Sound: A Multivariate Approach

Myriad forces from rising water temperatures to increased fisheries pressures can alter community assemblages in estuaries. These complex systems are characterized by dynamic interactions among both biotic and abiotic factors. To effectively manage estuaries, a better understanding of the intricate factors driving community dynamics is necessary. Unlike other major estuarine systems, the aquatic community of the Pamlico Sound has not been described using multivariate approaches, which serve to digest the massive amounts of data available, in both numbers of variables and length of the time series. Such analyses provide novel understanding of the most important drivers of community change. Non-metric multidimensional scaling (NMDS) was used to compare annual and seasonal communities across time and identify factors most important in regulating species assemblages. Large changes have been seen across the time series, which resulted in notably different communities.Notably, some conclusions are not easily distinguished as estuarine dynamics are extremely intertwined and many factors are confounding, however, there are clear trends in some dynamics. Since the early 1990s, both abundance and biomass of invertebrates and fishes has increased. Species richness has also increased since the late-90s, while diversity has steadily decreased, due to increased dominance from certain species. Bolstering our conclusions, estuaries across the Atlantic coast exhibit similar changes to the major transitions within the Pamlico Sound in the past 30 years.

Miller, Jessica

Faculty Mentor: Rebecca Asch

The impact of hurricanes on larval fishes at Beaufort Inlet, NC

In eastern North Carolina, hurricanes and marine fishing activity wield substantial influence over both living marine resources and the socio-economic well-being of the coastal communities that are reliant on them; however, there is currently sparse and contradictory information on the effect of strong storms on coastal fish populations. This project aims to intentionally examine population responses in North Carolina state waters by combining an existing, long-term ichthyoplankton dataset with publicly available meteorological and stream data to assess the impact of hurricanes on abundance of larval fish at Beaufort Inlet. Utilizing Principal Component Analysis (PCA) and Generalized Linear Models (GLMs), the first goal of this research is to determine if there are changes in fish abundance correlated with hurricane activity. In addition, we aim to determine the largest drivers of any abundance changes, analyzing the effects of several storm-related variables, such as rainfall, atmospheric pressure, hurricane category at landfall, and wind direction. We hypothesize that large hurricanes will have an overall negative impact on ichthyoplankton abundance, driven predominantly by rainfall amounts. If successful, this methodology could contribute to a vital facet of economic and ecological emergency response planning for regional fisheries management.

Miller, Cambria

Faculty Mentor: James Morley

Invasive species blues: Investigating trophic impacts and distribution of blue catfish in Albemarle Sound

Aquatic invasive species can wreak havoc on ecosystems by outcompeting or consuming native species, reducing biodiversity, and eventually causing economic impacts to fisheries. Blue catfish (Ictalurus furcatus), native to the Mississippi River Basin, were introduced into Atlantic coast drainages by state agencies to enhance recreational fishing. Their populations have since expanded in many watersheds, becoming invasive. This study is providing essential insights into the extent of this invasion and effects on native organisms in the Albemarle Sound. Dietary habits are being investigated through analyzing stomach contents of blue catfish caught by gill netting and electrofishing. Also, we combined routine-annual data from a long-term fisheries independent survey with gill net sampling from the present study to discern patterns in spatial distribution over time. Blue catfish rank the second most captured species in terms of catch per unit effort (N=617) in our gill nets after white perch. Blue catfish have ranged from 164 to 771 mm in total length. They have been found in the Roanoke, Chowan, Perquimans, and Pasquotank Rivers as well as Bull Bay, across salinities from 0 to 9.1 ppt. Diet analysis shows that filter feeding bivalves including clams (Corbicula fluminea and Rangia cuneata) and mussels are primary prey, which could be indirectly impacting water quality and may be partially responsible for the uptick in harmful algal blooms in the Albemarle Sound in the last decade. Other economically important species have also been observed in their diet, including blue crabs, shrimp, and river herring.

Milteer, Margaret

Faculty Mentor: Charles R. Ewen

“Shorty Your Silence Was Golden:” What Grave Markers Can Tell Us Beyond the Epitaph

Burial practices have long been understood to vary both temporally and culturally. However, little research has been conducted using cemetery trends to compare contemporary historic African American cemeteries in different communities. Ayden and Princeville are two towns in Eastern North Carolina separated by only thirty-five miles and the Tar River. Despite the towns’ proximity, their stories are vastly different. Ayden has been home to both white and African American individuals, often separated by social and economic divisions. Princeville was founded by previously enslaved African American who had flocked to the relative safety of a Union Army encampment and is the oldest continually occupied town in the United States founded by African American individuals. Though they are similar in size today, both communities have historically existed in these very different environments. This research seeks, by comparing trends in gravemarker construction and design, to show how these patterns can represent unique aspects of communities that may otherwise be missed.

Milter, Megan

Faculty Mentor: Sachiyo Shearman

How Murals Illustrate Northern Ireland's Political and Sectarian Conflict Through Political and Non-Political Messages

Belfast, Northern Ireland murals have become a significant form of expression in their community over the past few decades and reflect historical tensions between Loyalist and Republican communities in the region (Jarman, 1998). This study examined how murals in Belfast serve as visual representations of the political and sectarian conflict, particularly focusing on Loyalist, Republican, and non-aligned murals. Using a purposive sampling method using the 'Murals of Northern Ireland' collection from 'The Claremont Colleges Digital Library' database (Crowley, 2021), 93 murals (Loyalist n=30, Republican n=31, and non-aligned n=32) are sampled. Using IBM SPSS Statistics (Version 29), the dataset was able to be entered and coded. To ensure intercoder reliability, two independent coders coded these murals to find common themes, symbols, and messages. The location of each mural was contrasted to the ratio of Catholic representation in specific regions, using the 'Religious Distribution in Belfast' map (Johnson, 2001). Based on the location of the mural, this study found that there was fairly consistent representation of political and non-political messages in highly Catholic and highly Protestant areas. The key findings of this study revealed that Loyalist murals predominantly focus on British identity and Northern Ireland's union with the United Kingdom while Republican murals focus on their strong connection to the Republic of Ireland, emphasizing resistance and commemorating fallen members. In contrast, non-aligned murals address broader themes of peace, reconciliation, and cultural expression. This research demonstrates that murals in the city of Belfast serve both as a reflection of Belfast's historical divisions and a medium for post-conflict reconciliation, with a clear movement toward reducing overtly political content in favor of more inclusive, peace-oriented messages. By analyzing 93 murals, the results show that while the majority of the murals created during the Troubles (1968-1998) are political and reflect the deeply rooted conflict between Loyalist and Republican communities, post-Troubles murals have shifted towards non-political messages, with an emphasis on peace, community, and cultural expression. This movement from highly political to non-political murals reflects larger societal initiatives to ease historical tensions and promote a more inclusive future for Belfast and Northern Ireland.

Minier, Sam

Faculty Mentor: Juan Beltran-Huarac

Improving MRI Contrast in Breast Cancer: The Role of Iron Oxide Nanoparticle Morphology in Contrast Enhancement

Cancer has consistently remained the second leading cause of death globally, with the World Health Organization estimating that 10 million people die from cancer every year. These values are only expected to grow in the years to come. To combat this growing trend, new diagnostic and therapeutic agents are being developed to create more effective means of detecting cancer at earlier stages and treating it more effectively. One of the most common modalities used to assess soft cancerous tissues is through MRI, which has the power to visualize with certain detail the extent to which tumors may have spread. To improve the quality of the images and discrimination of healthy and cancerous tissues, many different contrast agents (CAs) have been developed and approved by the FDA for clinical purposes. One such material that is used as MRI CA is based on iron oxide nanoparticles (IONs). Even though IONs have been used for decades, they face some challenges primarily related to poor contrast enhancement, lack of target specificity, and short circulation time. Our research aims to address these challenges by developing PEGylated IONs with anisotropic morphologies and superior magnetic properties. These anisotropic PEG-IONs show similar core size (12-15 nm). In this project, we compared hexagonal, cubic, and spherical PEG-IONs to a commercially available CA, ferumoxytol. FTIR spectroscopy confirmed that IONs were properly coated with PEG. DLS indicated that PEG-IONs were colloidally stable over 24 hours in cell culture media. Hexagonal PEG-IONs exhibited stronger values of saturation magnetization when compared to other morphologies. MR phantom images showed that anisotropic PEG-IONs had greater contrast enhancement than ferumoxytol as the particle concentration increased up to 1 mM. When exposed to T11 breast cancer cells, neither anisotropic nor commercial SPIONs showed no changes in cell viability at different particle concentration for 24 hr. In vivo studies conducted on T11 murine breast cancer mice indicated most of IONs were deposited in the spleen and liver, with a comparable amount ending up in the tumor. These studies revealed that anisotropic PEG-IONs remained in the blood for up to 24 hr with improved contrast enhancement, which is in consonant with the outer sphere theory for CA design. This piece of research represents a step forward in the development of innovative CAs for nascent-stage cancer detection.

Mitchell, Adrianne

Faculty Mentor: Dmitry Tumin

A Viewpoint on Medical School Electives: Post-USMLE Step 1 Changes

Medical education continues to evolve, with significant changes in assessment and evaluation systems, such as the transition of USMLE Step 1 to pass-fail and limitations on ERAS experience submissions. These shifts reduce traditional avenues for student differentiation, heightening the importance of clinical exposure, mentorship, and extracurricular activities. Electives, whether clinical or non-clinical, provide valuable opportunities for career exploration, skill refinement, and mentorship connections. Despite their significance, the structure, timing, and accessibility of electives vary across institutions, necessitating deliberate planning and guidance to optimize their benefits. This project examines the role of electives in career development for medical students, highlighting their structure and impact across different institutions, from the perspective of medical students and established literature. Examples include two-week clinical electives offered during third-year rotations at rural MD-granting institutions and one-week "selectives" integrated into research-focused curricula. Non-clinical electives, such as leadership and wellness programs, complement traditional clinical experiences. The research emphasizes the necessity of early student engagement, mentorship networks, and individualized career counseling through student affairs professionals. While quantitative outcomes are pending, initial observations suggest electives provide insight into the four Cs: career exploration, career solidification, career advancement, and career longevity. These avenues are represented via critical exposure to specialties, mentorship opportunities, and avenues for professional development. Electives are pivotal in equipping medical students for the evolving landscape of residency applications and career progression. They enhance career decision-making, foster professional growth, and mitigate burnout. Medical school leadership and student affairs professionals play an integral role in guiding students to leverage electives for maximum benefit. By promoting career exploration, solidification, advancement, and longevity, electives can significantly enhance student success and institutional reputation. Strategic elective planning and mentorship integration are essential for addressing the dynamic needs of future medical professionals.

Moore, Hannah

Faculty Mentor: Heather Vance-Chalcraft

Building Resilience Through Social Capital: Evaluating a Community Liaison Program in Coastal NC Communities

Social capital is the value derived from the networks of relationships between people who work together to address complex societal challenges. Social capital can play a critical role in fostering the multi-scale relationships necessary for proactive disaster response and recovery. However, social capital is often overlooked as a foundational element of resilient communities, that is, communities that can organize and effectively respond to natural hazards that influence water resources. This research examines the Community Liaison Program, an initiative aimed at addressing water inequities in coastal North Carolina communities. The program recruited individuals from various coastal communities, (Princeville, Greenville, Hyde County, Nags Head), facing environmental and water quality challenges, offering them short-term, paid positions to collaborate with researchers to design and implement community-driven projects while aiming to build social capital and resilience in their communities. Following the completion of the program's first iteration, I conducted one-on-one interviews with the community liaisons and analyzed the transcripts using Nvivo software to identify key themes related to their experiences. Parent codes include themes such as liaison perception of the program, social capital, program implementation issues, and future directions as identified by liaisons. This analysis contributes to a deeper understanding of how the Community Liaison program promoted resilience-building in coastal regions. The findings highlight both the successes and challenges of the Community Liaison Program's initial phase, offering areas for program growth and insights into the design of other community-based resilience initiatives.

Moreno, Shalimar

Faculty Mentor: David Lagomasino

Evaluating the physical and biogeochemical drivers of a reef community carbonate budget

Coral reef carbonate budgets are an important health metric that can indicate changes in community assemblages and reef complexity. In the Atlantic, a region-wide decline in coral cover and reef complexity has resulted in decreased carbonate production. This study investigated the carbonate budget of a Bermuda coral reef system within their northernmost extent in the Atlantic. Hydrochemistry and census-based approaches were used to quantify carbonate budgets. The water chemistry was evaluated using Eulerian flow respirometry to assess changes in total alkalinity between two fixed locations of known coral assemblages to estimate the net ecosystem calcification (NEC). For the census-based approach, the benthic community was quantified using orthophoto mosaics derived from video surveys. In this presentation, we compare the two approaches for measuring carbonate cycling and note the challenges in determining water residence time. These chemistry techniques are valuable in capturing temporal variability in NEC such as seasonality or changes due to disturbance events which may shift the coral community to a non-framework building taxa, reducing calcification rates. Bermuda's reef system experiences higher seasonal variability in NEC and a reduced aragonite saturation state that limits the conditions for CaCO3 precipitation compared to tropical regions. Studying the interactions and feedback between coral biogeochemical processes and oceanic carbonate chemistry changes is challenging but crucial to detect and predict carbon cycling changes in response to future climate change.

Morin, Gabriella

Faculty Mentor: Gregory Kearney

Assessing COVID-19 Mortality Hot Spots and Healthcare Disparities Across North Carolina During the Pandemic Period: A Novel Metric and Spatial-Scan Statistic Approach

The COVID-19 pandemic exacerbated existing disparities in healthcare access, particularly in underserved and socio-vulnerable communities. Adequate access to healthcare providers is a critical determinant of pandemic outcomes, influencing testing availability, treatment access, and overall health system resilience. This study introduces a Physician Access Z-score (PAZ), a standardized metric assessing physician availability at the county level and integrates it into an existing Socio-Vulnerability Index. This composite measure enables the identification of counties at highest risk of poor COVID-19 outcomes due to both social vulnerability and physician shortages. COVID-19 mortality data for NC (2020–2022) were obtained from NC Department of Health and Human Services, where COVID-19 (ICD-10: U07) was listed as primary cause of death. Physician workforce data, including county-level counts of active physicians, were obtained from the Cecil G. Sheps Center for Health Services Research. Socio-vulnerability data were derived from the Centers for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI), which assesses community-level resilience based on socioeconomic and demographic indicators. A spatial-temporal clustering analysis was conducted using SatScan Poisson probability model to identify COVID-19 mortality hotspots in relation to socio-vulnerabilities and healthcare access disparities. The final Physician-Adjusted Socio-Vulnerability Z-score was mapped to visualize geographic disparities in healthcare access. The analysis accounted for variations of SES, race/ethnicity, transportation and housing characteristics. Significant ($p<0.05$) clusters were identified in areas Alleghany, Sampson, Robeson, and finger counties near the Outer Bank counties. Counties with higher COVID-19 mortality and higher disparities tended to have higher z scores, indicating combined socio-vulnerability and physician shortages. The analysis identified clusters of high-risk counties where low physician access correlated with elevated mortality. Several counties with severe physician shortages (Z-Physician Access < -1.5) exhibited high mortality.
The Physician Access Z-score provides a novel metric for assessing healthcare disparities and pandemic vulnerability. Counties with high socio-vulnerability and low physician access experienced worse COVID-19 outcomes, underscoring the need for targeted interventions such as provider deployment, telemedicine expansion, and mobile health units. This approach enhances risk assessment by integrating healthcare availability into vulnerability models. Policymakers can use these findings to optimize resource allocation and strengthen emergency preparedness, ensuring equitable healthcare access during future crises.

Murray, Will

Faculty Mentor: Stephanie Richards

Efficacy of Oil- and Water-Based Mosquito Control Formulated Products Evaluated Against Mosquitoes in a Novel Compact Wind Tunnel

Insecticides are important tools in an integrated mosquito management program to protect public health from vector-borne disease. Mosquito control programs (MCP) often use adulticides for targeted control. However, mosquitoes can develop resistance to active ingredients (AI) in formulated products (FP), thereby reducing efficacy. Some FP are offered with either oil- or water-based options to offer greater flexibility and suit different operational needs. Duet® (oil-based) and AquaDuet® (water-based) contain the same dual action AI (sumithrin and prallethrin), but further testing is needed to identify potential differences in efficacy for FP with different diluents.
Caged Aedes albopictus and Culex pipiens/quinquefasciatus were exposed to aerosolized Duet®, AquaDuet®, or air (control) for 10 s in a novel compact wind tunnel. Both laboratory and wild populations of each species were tested. Knockdown was measured at 2 h post-exposure and mortality was measured 24, and 48 h post-exposure. Resistance/susceptibility status was determined based on mortality observed at the final time point.
Chi square tests ($P<0.001$) showed significantly higher mortality rates in lab compared to wild Culex for both FP at all time points. For wild Culex, knockdown at 2 h was significantly higher after exposure to Duet® (49%) compared to AquaDuet® (11%). At 48 h, lab Culex exhibited resistance to AquaDuet® (79% mortality) but not Duet® (97% mortality). At 48 h, wild Culex exhibited resistance to AquaDuet® (6% mortality) and Duet (16% mortality). Conversely, both Aedes populations (lab and wild) tested here were susceptible to Duet® and AquaDuet® (100% mortality) at 48 h.
Different FP formulations may be useful for different mosquito control program needs. However, efficacy of oil- and water-based FP may vary between different mosquito populations, and this should be evaluated before widespread use. These results highlight the importance of mosquito surveillance efforts and ongoing IR testing to guide FP selection to maximize efficacy of targeted control.

Nagy, Jarrett

Faculty Mentor: Regina DeWitt

Dissertation Plan on The Analysis of Silicate Minerals for elemental composition using PIXE, and Correlation to luminescence reading for geological provenance determination.

In my dissertation I plan to use two methods to investigate emerald, quartz and other silicate materials. PIXE (Proton induced x-ray emission) will be used for elemental composition analysis. Optically and thermally stimulated luminescence (OSL and TL) properties will then be compared with the elemental composition and other known information. Overall goal is to investigate, if luminescence - a non-destructive and comparatively easy and cheap method - can be used to better understand the correlation between color and the trace elements within gemstones such as emeralds. PIXE measurements will be carried out in the ECU accelerator lab. Each element in a mineral, such as Oxygen, and Silicon, has characteristic x-ray peaks. These peaks can be seen after irradiating samples with protons, which induce the release of different shell (K, M, L) electrons. The software GUPIXWIN is used to analyze the measured X-ray spectrum. Based on the number of counts in the channels and comparison with reference spectra, the elemental composition of each sample can be determined. The data gathered from elemental analysis will then be sorted into a data-base and the same emeralds whose composition had just been found will then be tested for luminescence. In luminescence a mineral is first exposed to radiation under controlled conditions and then stimulated with light or heat. The minerals emit light (aka. luminescence). Each minerals luminescence reading is different from another due to the varying trace elements within the mineral. These trace elements will cause changes in the mineral's energy band gap levels. Electrons after being excited will get stuck in these band gap levels and upon stimulation, they will release the energy as luminescence. The luminescence and PIXE data will be correlated for each type of silicate material tested. This information will help to create the correlation between color and the trace elements within a mineral. It will also aid in provenance studies and the search for additional sources of tested minerals.

Neal, Keeley

Faculty Mentor: Kristen Gregory

Family Engagement through Reading Workshops

The purpose of the qualitative study is to understand family's perceptions of learning
about mCLASS (a tool educators use to measure their students reading ability) and strategies to improve student growth in a 2nd Grade classroom through a guided reading workshop at an urban elementary school. In this study, I will investigate the following question: How do families describe their involvement in implementing the knowledge gained through a provided reading workshop? At the reading working families will be guided in understanding mCLASS and resources that will help benefit their students' reading scores. The families will be offered a survey to complete after attending the reading workshop. I will gather the completed survey
from the families and then use open and axial coding. Open and Axial coding will help identify themes and sub themes within the responses from the surveys. the completion of this study students, educators, and families will benefit from the knowledge learned through the data collection.

Newton, Jarah

Faculty Mentor: Bhibha Das

The Effects of a Yoga Intervention on Female First-Year College Students' Anxiety, Resilience, and Quality of Life

Adjusting to independent life, rigorous coursework, and the many social pressures of college life, students are faced with a higher risk of developing a mental health disorder, ranging from anxiety to eating disorders. Previous research has shown the benefits physical activity has on mental health concerns, specifically anxiety and ability to cope. Knowledge is needed on the ability that yoga interventions have in reducing anxiety and increasing resilience in first-year, female college students in relation to their college adjustments. PURPOSE: The purpose of this study is to examine the effects of a yoga intervention on the mental health of female, first-year college students, specifically in the areas of anxiety, resilience, and quality of life as they transition to college. METHODS: The yoga intervention will be held twice a week, in-person, over the course of 8 weeks during the Fall 2025 semester with participants required to attend at least one session per week. All intervention meetings will use a standardized yoga protocol including breathwork, warm up, posture flows, cool down, and savasana. Participants will complete a demographics questionnaire before the beginning of the intervention program. Participants will also complete a survey with a modified survey including information from the Hospital Anxiety and Depression Scale, Brief Resistance Scale, and SF-12 pre- and post-intervention. Descriptive statistics will be used to organize the data from the demographics questionnaire. Outcomes including anxiety, resilience, quality of life, and happiness will be measured via their respective scales both pre- and post-intervention. Results of these outcomes will be analyzed using t-tests through SPSS software.

Norman, Mina

Faculty Mentor: Myon Hee Lee

PUF-8 and CYB-3 Promote Germline Stem Cell Proliferation and Tumorigenesis by Inhibiting CED-4-Mediated Apoptosis

Pumilio/FBF (PUF) RNA-binding proteins are essential for maintaining stem cells by regulating mRNA targets involved in development, differentiation, and cell cycle progression. Among the 11 PUF genes in C. elegans, PUF-8 is the most similar to human PUF proteins and collaborates with multiple regulators to control germline stem cell (GSC) proliferation, differentiation, and cell fate decisions. However, the interplay between PUF-8 and cell cycle regulators in regulating GSC proliferation and tumorigenesis has not been thoroughly explored.
To investigate this, we conducted a small-scale RNA interference (RNAi) screening in the puf-8 mutant background to identify potential cell cycle regulators. We found that cyb-3 RNAi in puf-8 mutants dramatically abolished GSC maintenance, leading to a complete loss of germ cells at a permissive temperature (20ºC). Previously, we demonstrated that PUF-8 and LIP-1 (a dual-specificity phosphatase) are required for preventing dedifferentiation-mediated tumorigenesis, as puf-8; lip-1 double

mutants develop germline tumors at a restrictive temperature (25ºC). Interestingly, cyb-3 RNAi in puf-8; lip-1 double mutants, starting from the early larval stage (L1), suppressed the initiation of dedifferentiation-mediated tumorigenesis at 25ºC.
We further investigated the roles of PUF-8 and CYB-3 in maintaining GSCs and tumor cells by depleting cyb-3 expression by RNAi in adult puf-8; lip-1 mutants with both GSCs and germline tumors. Remarkably, cyb-3 RNAi eliminated both GSCs and tumor cells through a CED-4 (Cell death protein 4)-dependent apoptotic pathway.
These findings reveal that PUF-8 and CYB-3 work together to promote GSC proliferation and tumorigenesis by inhibiting CED-4-mediated apoptosis, highlighting a critical regulatory network in reproductive biology and tumor development.

Ochoa, Carlos

Faculty Mentor: Ding, Qin

Investigating the Role of pH-sensing G Protein-Coupled Receptors GPR4 and GPR132 in Colorectal Cancer: Multi-Statistical and Survival Analysis Approach

Colorectal adenocarcinoma (COAD) is one of the leading causes of cancer-related morbidity and mortality worldwide. Understanding the molecular mechanisms underlying its progression is critical for identifying therapeutic targets. GPR4 and GPR132, pH sensing G protein-coupled receptors (GPCRs), have been linked to tumor progression, tumor microenvironment, and molecular signaling pathways. However, despite this, the roles these GPCRs play are still not filly understood. This study aims to investigate the expression and clinical significance of GPR4 and GPR132 in COAD using gene expression analysis, statistical testing, and survival modeling. Gene expression and clinical data were collected from The Cancer Genome Atlas (TCGA) and analyzed using various statistical methods. Statistical summaries and t-test were performed to compare expression levels between different groupings such as tumor and normal samples, tumor stage, age, race, etc. Additionally, integrating gene expression data with clinical data allows to explore Kaplan-Meier survival outcomes, preform pairwise testing to evaluate differential expression across different groupings, and apply ANOVA models to refine the statistical significance. Since this study is currently ongoing, we plan on adding other aspects such as generating three dimensional structures to analyze how different mutations affect structural changes and simulating different pH levels to analyze how these changes may affect tumor progression and signaling pathways. Initial results indicate that the gene expression level of GPR4 is higher in the COAD tumor samples (n=481) than in the normal samples (n=41; p=5.195e-14), while there is no significant difference in GPR132 gene expression between COAD and normal samples (p=0.8157). Within the COAD samples, GPR4 expression is further increased with the progression of cancer stages (stage 1 vs stage 2-4). Moreover, patients with lower levels of GPR4 expression in COAD have a better survival rate over 10 years. The data suggest that GPR4 may be explored as a potential biomarker and therapeutic target for colorectal cancer.

Ogden, Bonnie

Faculty Mentor: Kristen Gregory

Closing the Literacy Gap in African American Boys

The topic of this paper will be about the falling literacy rates among African American males. This study will seek to identify the various factors impacting this demographic and the impending challenges contributing to their lack of success in literacy which snowboards into the educational career. This study will be using a mixed methodology with an action research plan. The question I will investigate is why are there racial achievement gaps in education, primarily literacy? The data sources used will be various surveys that will invite participants such as teachers, students and parents to contribute to. The structure of the questions on the surveys will range from open-ended questions to Likert-scaled questions as well. I will be using descriptive statistics and open and axial coding to analyze the data. The benefit of the findings will be not only for teachers and school officials to adjust their current approaches that may not be working but also for students and families to identify the problem and their own personal responsibilities to not be a mere statistic and change the course of their educational experiences.

Ogle, Jodi

Faculty Mentor: Marty Roop

A Stealthy Pathogen's Hidden Talent: A Look into How a Novel Exopolysaccharide Contributes to Brucella Virulence

Brucellosis is one of the world's most prevalent zoonoses causing major impacts on the agricultural industry and public health. In the natural animal host, brucellosis is marked by spontaneous abortion and infertility. In humans, brucellosis causes a chronic flu-like illness characterized by an undulant fever. Brucella species are members of the α-proteobacteria. Despite differences in host preference and pathogenicity, members of the α-proteobacteria often share genes and pathways that contribute to successful interactions with their eukaryotic hosts. Many members of the α-proteobacteria produce exopolysaccharides that are critical to their life cycles and host interactions. Agrobacterium tumefaciens, a close relative of Brucella spp., employs a Wzx-Wzy-type polysaccharide biosynthetic pathway to produce a unipolar polysaccharide (UPP). This structure is crucial for surface attachment and biofilm formation by A. tumefaciens. Interestingly, Brucella spp. are not known to produce exopolysaccharides. However, heterologous genetic complementation has shown that Brucella possess functional homologs of the A. tumefaciens upp genes, suggesting that Brucella has the genetic potential for UPP or exopolysaccharide production. Strikingly, a B. abortus mutant lacking two of these genes (uppC and uppE) displays an attenuation in both cellular and mouse infection models. These results implicate Brucella UPP involvement in virulence. However, precisely how the Brucella putative UPP biosynthetic pathway contributes to virulence remains unclear. This presentation delves into the many hypotheses we have concerning exopolysaccharide production by Brucella. There are many critical points of the Brucella infectious cycle in host macrophages that may be impacted by an exopolysaccharide. Also, the genes encoded in the predicted exopolysaccharide production pathway may have other potential roles including altering Brucella cell envelope integrity and lipopolysaccharide (LPS) structure, both of which are critical for pathogenicity. Experiments are presently underway using lectin staining, microscopy, and mass spectrometry analysis to determine the cellular localization and chemical composition of the putative Brucella UPP. Cellular and mouse models are also being used to define the precise stage of the infectious process at which this exopolysaccharide contributes to virulence.

Ohanaka, Okey

Faculty Mentor: Zi-Wei Lin

Calculating the Shear Viscosity for a Multi-Component System of Quarks and Gluons

I investigated the shear viscosity for a quark-gluon plasma under perturbative Quantum Chromodynamics (pQCD) at finite temperature with Boltzmann statistics. I started from a previous work where the viscosity was calculated with pQCD cross sections for two body scatterings of quarks and gluons, but made corrections and adjustments to the cross sections for compatibility with other calculations of the shear viscosity. I then extended the derivation to obtain the shear viscosity of any quark gluon system under two body interactions. I then examined the analytical results in various limits and the effects of the inelastic collisions on the shear viscosity.

Oliver, Joyce

Faculty Mentor: Kristen Gregory

The Impact of Reading Aloud

In this research, an investigation was conducted to focus on the Impact of Reading Aloud. Reading Aloud is an important part of a child's literacy skill, through the benefits and the importance of reading aloud in Pre-K-1st grade. The study will investigate the following research question: How do rural Title One Pre-K-1 parents and teachers describe their perceptions of reading aloud? Reaching this topic will positively affect how teachers and parents understand the importance of reading aloud to enhance children's early literacy. Using mixed methods through surveys and open-ended questions the research question will be answered. Through the survey answers from my student's parents and teachers within my school, the data will be collected to understand the benefits and importance of reading aloud. The students will benefit from this research being conducted. The findings in this research will impact how people in the educational field understand the importance of reading aloud beginning in early childhood.

Ostadi, Lee

Faculty Mentor: David Marvin Hart

An Autoencoder for 3D Gaussian Splatting: Enabling Transformations of 3D Scenes Through a Learned Latent Space

My research aims to develop an autoencoder for 3D scenes represented as Gaussian splats. An autoencoder is an unsupervised neural network that learns to encode data into a more compact “latent space” of values, then decodes can decode it back into original form. This learned form of compression maximizes the retention of high-level features of the data needed for reconstruction. Gaussian splats are fully parametrically defined 3D shapes representing both geometry and radiometric properties (e.g. color) of objects and even entire scenes containing multiple objects. Creating an autoencoder capable of learning an embedding for Gaussian splats, would enable the manipulation of entire 3D scenes at a latent feature level. Such manipulations should correlate to meaningful "visual" or "conceptual" alteration to the reconstruction. For example, an "average" between two completely distinct 3D objects or environments could be reconstructed (e.g. a skyscraper and a flower garden painting), or entirely new content could be generated through the use of Generative Adversarial Networks. These are two of the many capabilities that become available once a properly functioning Gaussian splat autoencoder is created. An autoencoder for Gaussian Splats would provide a powerful latent representation for scene editing, enabling high-level control over geometry and color distributions. In practice, this will enable more creative control and accessibility for 3D content.

Osusky, Grace

Faculty Mentor: Ryan Schacht

Social Stress and Age at Death: The Role of Legislative Change on Survival

While global life expectancy dramatically increased across the 20th century, these gains were not uniformly experienced across individuals and populations. Public health researchers, who have sought to better understand these life expectancy gaps, have demonstrated a clear relationship between chronic stress and a heightened risk of premature death due to health conditions tied to inflammation, obesity, and cardiovascular disease. Broadly speaking, chronic stress accelerates the biological clock, wearing down bodily systems such as immune and heart function. Therefore, individuals who experience a disproportionately high burden of social stress are expected to suffer from both poorer health outcomes across the life course and a lowered life expectancy. Consequently, health is increasingly recognized as being, in part, socially constructed. That is, adverse social conditions result in distinct lived experiences and resultant divergent health outcomes across individuals and groups. However, as social conditions improve, life expectancy gaps are expected to narrow in response. To examine this predicted relationship, I target demographic data sourced from death certificates (n=7,544) from a small southern town across a 100-year time period (1915-2015). During the first half of this dataset, Jim Crow laws (1865-1965) resulted in policies that limited access to medical care, education, and employment for African Americans. However, following civil rights legislation, segregation ended, allowing for more equal access to resources and opportunities tied to increasing quality of life. Nonetheless, there is very little primary research on life expectancy gaps in the early 20th century, with most research in the southern U.S. targeting the post-Jim Crow period. Therefore, this work seeks to fill this knowledge gap through a longitudinal analysis of the survival probability of individuals during and after segregation. Results from Cox Regression modeling in R reveal statistically significant associations between an individual’s sex, race, and year of death with their age at death. At the beginning of the 20th century, there was a clear race-based rather than gender-based gap in life expectancy, with White individuals (during Jim Crow n=1179, post Jim Crow n=3050) living, on average, 10 years longer than Black individuals (during Jim Crow n=1160, post Jim Crow n=2155). However, following desegregation, while life expectancy increases for all groups, the race-based gap in life expectancy narrows with Black women, in particular, experiencing the most dramatic increase in age at death, surpassing that of White men (~69 to 67 years respectively). What is clear from our findings is that survival probability is malleable and influenced by social pressures present in a given time and place. Ultimately, this research highlights how the social environment, here shaped by legislative change, can positively, or negatively, impact a person’s health and resultant life expectancy.

Pacilio, Emily

Faculty Mentor: Jeannie Golden

Increasing On-Task Behavior in a Fourth Grade Student Using the MotivAider

This study evaluated the effectiveness of self-monitoring using the MotivAider to improve the on-task behavior of a fourth-grade male student. The intervention included self-monitoring, providing regular feedback, and monitoring progress through whole interval recording. During each session, the student self-monitored on-task behavior using a recording sheet. Throughout the intervention, the student demonstrated significant improvements in his ability to remain on-task and complete assignments. Additionally, the student consistently applied strategies discussed after feedback sessions, suggesting skill generalization and maintenance. Communication with the student's parent and teacher indicated high engagement and satisfaction with the outcomes. Based on these findings, it was determined that the intervention could be successfully concluded, with confidence in the student's sustained progress. These findings suggest that the MotivAider can influence a student's on-task behavior in the classroom

Padhye, Ankur

Faculty Mentor: Willson, John David

Impact of Exertion and Load Carriage on Metatarsal Bone Stress in Physically Active Females

The high volume and intensity of physical training among military Service members promotes a high incidence of lower extremity injuries, particularly in females. Metatarsals (Met) are a commonly reported injury site for Service members and may be linked with a proximal shift in force under the toes to the metatarsal region during military tasks like prolonged rucking. This shift is thought to increase metatarsophalangeal (MTP) joint contact forces (JCF) and metatarsal bone stress. However, bone and joint load patterns in the metatarsals during prolonged military training activities remain poorly understood. Therefore, we aimed to compare peak MTP JCF, metatarsal bending moments, and 2nd metatarsal bone stresses at the start and end of 5 km walk and ruck tasks in active females.
Subjects: 22 physically active females (22.4 yr, 1.65 m, 58.2 kg). Synchronized left foot 3D marker data (200 Hz), ground reaction forces (GRF) (2000 Hz), and plantar pressure data (100 Hz) were recorded before and after separate 5 km walking and rucking tasks (22.7 kg), performed at 1.5 m/s. Plantar pressure informed GRF were input to foot and toe regions of a MTP joint model to estimate MTP joint moments and joint reaction forces using inverse dynamics and toe flexor muscle force using subject-specific moment arms. Resultant JCF (RJCF) were calculated at the 2nd MTP joint and were used as inputs in an elliptical beam theory model for bone stress calculations over 5 stance phases. Peak MTP JCF, metatarsal bending moments, and 2nd metatarsal bone stresses measured before and after the walking and rucking tasks were compared using 2-factor repeated measures ANOVA (α=.05).Consistent with prior work, peak dorsal surface stress was compressive (M = -49, SD = 17 MPa) and tensile on the plantar surface (M = 43, SD = 16 MPa) which by task and distance. Rucking increased peak dorsal compression by 17% ($p<.01$) and peak plantar tension by 14% ($p<.01$) relative to walking. With exertion and regardless of task, compression and tension increased 10% ($p=.03$) and 12% ($p=.02$), respectively. No interaction effects were present. Rucking increased Met 2 RJCF (20%, $p<.01$) and increased the dorsal-plantar bending moment (15%, $p<.01$) compared to walking. However, the resultant Met 2 MTP JCF decreased with exertion across both tasks (7%, $p<.01$), while the dorsal-plantar bending moment increased (13%; $p<.01$). Thus, the reduction in MTP JCF after 5 km, likely due to reduced toe flexor forces after exertion, was offset by a greater bending moment resulting in higher exertion-related bone stresses. Biomechanical changes with added load and neuromuscular changes related to exertion during military-relevant training tasks increase bending moments at the mid-shaft of the 2nd Met and increased bone stress and injury risk. Toe flexor endurance training could be relevant to both injury prevention and treatment efforts for this common injury site in females.

Papavasilis, Terry

Faculty Mentor: Rebecca Asch

The Science of Shipwrecks: Diving into the Ecology of the Graveyard of the Atlantic

The North Carolina Department of Marine Fisheries has developed 43 artificial reefs that are strategically located and designed to maximize access to anglers for sport fishing and recreational divers while also serving valuable ecological roles. Artificial reefs are important because they provide structure and hard bottom habitat for numerous marine organisms. In addition, artificial reefs are structurally complex, providing ideal niche habitats promoting heterogeneity of reef inhabitants. This study aims to understand how reef community composition and biodiversity are influenced by the structure of the reef, proximity to shore, temperature, and depth. Artificial reef community composition and biodiversity were investigated through diver surveys where reef inhabitants were identified in the field and documented using Reef Environmental Education Foundation (R.E.E.F.) protocols. R.E.E.F. is a citizen science organization that promotes education and diver surveys to help scientists make more informed decisions. Standard methodology in underwater videography surveys were also used to document the artificial reefs. In addition to documenting the organisms inhabiting the reefs, in situ temperatures were taken of the air temperature, sea surface temperature, and bottom temperature using a Shearwater Perdix Dive Computer. This study demonstrates that inshore and offshore artificial reefs are different based on their community composition. Inshore reefs such as the USS Indra and the Ario had greater biodiversity than offshore wrecks such as the Atlas and the Papoose. Coincidentally, the Papoose and Atlas had the lowest biodiversity, but the highest lionfish populations. This study will be useful to fisheries managers for making decisions about where to place future artificial reefs to facilitate fisheries management goals such as supporting commercially important fish species including grouper, snapper, and southern flounder.

Perry, Donte'

Faculty Mentor: Sohan Gyawali

Optimizing Student Transfers with AI: A Visual Exploration of AI-Powered Advising and Prompt Engineering

Navigating the transfer process between community colleges and four-year institutions can be a complex challenge for students, often resulting in credit loss, delayed graduation, and gaps in advising services. Traditional advising systems frequently struggle to provide scalable and personalized support, leaving students without the necessary resources to make informed transfer decisions. This research examines how Generative AI and prompt engineering are revolutionizing student advising by enhancing AI-powered interactions and improving institutional efficiency. This poster presentation will highlight how AI-powered advising tools deliver real-time academic guidance and course equivalency evaluations, helping students make more informed decisions about their transfer pathways. A key focus will be on AI prompt engineering, demonstrating how structured queries improve chatbot accuracy, refine advising responses, and create a more seamless user experience. The presentation will also provide best practices for integrating AI-driven tools into advising workflows, helping institutions streamline student support services effectively. The poster will feature visual representations of AI-enhanced advising workflows, comparative chatbot response analyses based on optimized versus non-optimized prompts, and data-driven insights on AI's impact on student transfer success. Additionally, a QR code will link to a recorded demonstration of AI-driven advising tools, allowing attendees to explore real-world applications beyond the session. This presentation will provide library and academic professionals with a deeper understanding of how AI can be integrated into student advising workflows to improve transfer success and institutional support.

Pezeshki, Elnaz

Faculty Mentor: Stephen Moysey

Using Hydrological Modeling and Geophysical Methods to Enhance the Understanding of Saltwater Intrusion and Soil Salinization Dynamics in a Coastal Watershed

Saltwater intrusion (SWI) is a critical problem that negatively impacts coastal environments. The dynamic interaction between seawater and freshwater ecosystems is increasingly imbalanced due to climate change. Excessive SWI into coastal watersheds leads to soil salinization, creating negative impacts on ecosystems and agriculture. Understanding the dynamics of saltwater movement is crucial, especially concerning drivers of SWI and soil salinization. In this regard, hydrologic models can provide valuable insights to the complexity of SWI dynamics in coastal environments. This study uses GMS with

MODFLOW6 to simulate density dependent flow and boundary condition effects on SWI in a heterogeneous freshwater environment proximal to an agricultural drainage ditch. The model is tested under two scenarios:1) SWI due to inland saltwater transport along the ditch, and 2) SWI due to land inundation by storm surge. Unsurprisingly, the first scenario shows high concentrations of salt accumulation beneath the channel, whereas the latter shows a more uniform concentration of salt across in topsoil. A sensitivity analysis of the model is performed to evaluate how different rainfall, ET, and regional groundwater flows impact the depth, magnitude, and overall areal distribution of salt transport at the study site. We compare these simulations to electromagnetic induction (EMI) and electrical resistivity tomography (ERT) surveys collected at an agricultural site in eastern North Carolina where artificial channels allow periodic bidirectional flow from a nearby estuary. Time-lapse ERT revealed plume-shaped high concentration beneath the ditch that migrates to one side and dilutes during summer, reappearing during winter; this is partially similar to the results from the SWI model's first scenario. While groundwater models help identify the source of salt and enhance our understanding of the mechanisms driving and extending saltwater intrusion, they do not provide insights into initial salt concentrations, heterogeneous geology, or microtopography. Geophysical methods fill this gap. The alignment of hydrological modeling with geophysical data suggests that this complementary approach could offer valuable insights into studying saltwater intrusion (SWI) across various geological settings.

Pierce, Elizabeth

Faculty Mentor: Travis Lewis

Boosting Skills & Confidence: The Power of Peer Tutoring in High School Math

Multiple factors contribute to schools nationwide having an increasing number of teacher vacancies at the start of each school year. Pay dissatisfaction, high workload, increased expectations with paperwork, and concerns with educational policy are among the reasons that teachers indicate regarding why they leave the profession. With high levels of teacher departures and a diminished pipeline of incoming teachers to fill vacancies, school administrators must explore other strategies to maintain quality instruction. Peer tutoring is one such strategy that involves high-performing students assisting their peers in providing academic support. Often, peer tutoring can have social-emotional benefits as well. At Traditional High School, following the COVID-19 pandemic, math scores were trailing behind the state average. A peer tutoring program was identified as a viable strategy to improve math scores, address the math achievement gap at the school, and place another person in the classroom to help remediate struggling students. This inquiry aimed to examine the effects of this peer tutoring program framework on student attitudes, math achievement, and self-confidence. Using a mixed-methods approach, data from state testing, student surveys, and teacher and peer tutor interviews were collected and analyzed to evaluate how peer tutoring impacted growth and academic success. Findings indicate that peer tutoring increases student attitudes toward math, student self-efficacy, and student achievement in mathematics. The framework implemented for peer tutoring may be replicable in other content areas and similar instructional settings. The findings also offer important insights for improving math performance outcomes and easing the strain caused by teacher shortages in similar schools.

Polishchuk, Simon

Faculty Mentor: David Hart

Transformer Network for Brain Activity Source Localization in EEG Measurements

An electroencephalogram (EEG) is an electrical measurement of brain activity using electrodes placed on the scalp surface. After EEG measurements are collected, numerical methods and algorithms can be employed to analyze these measurements and attempt to identify the source locations of brain activity. These traditional techniques, however, often fail for measured data that are prone to noise. Recent techniques have employed neural network models to solve the localization problem for various use cases and data setups. In this work, we present a transformer-based model for single-source localization. Hundreds of thousands of simulated EEG measurement data are generated from known brain locations to train this machine learning model. We establish a training and evaluation framework for analyzing the effectiveness of the transformer model. The accuracy scores of the transformer model are consistently higher than the classical and baseline approaches. Additionally, we perform a thorough ablation study on the network configuration and training pipeline.

Ponder, Evvy

Faculty Mentor: Kristen Gregory

Relationship Between Attendance Rates and Math Achievement in Rural Middle School Math Classrooms

Rural students face many challenges both inside and outside of school that impact both math achievement and student discipline. These students are involved in discipline practices that remove them from the classroom, giving them unequal access to the content as they are missing instruction. These students are more likely to have Adverse Childhood Experiences. This research study will use action research and aim to implement social emotional and AVID, or Advancement Via Individual Determination, strategies in seventh grade math classrooms to provide students with strategies to keep their attendance in class. This research will investigate the question, "What is the relationship between attendance rate and achievement in middle school math and what AVID or SEL strategies can teachers put into place to overcome these gaps?". The data sources used for this research will be student surveys, teacher surveys, attendance records and discipline records. Correlation analysis will be used to describe the relationship between their attendance and discipline and this will be compared to their math grades. Open and axial coding will be used to analyze the qualitative survey responses. It is anticipated that this research will target the discipline and achievement gaps of rural education students, to support students in mastering content and teachers to effectively be able to teach content.

Pugh, Brenea

Faculty Mentor: Kristen Gregory

The Potential Impact of Departmentalization on Upper Elementary Achievement and Engagement

This study will examine the potential impact of departmentalization on student achievement and teacher-student relationships in elementary education. The research addresses the potential effect of different classroom models on academic outcomes and relational dynamics, particularly in fourth-grade classrooms. The purpose is to explore how departmentalized instruction compares to self-contained models in supporting student performance and teacher-student connections, addressing the research question: How does departmentalization potentially affect academic outcomes and teacher-student connections in upper elementary school? This study will use a mixed-methods exploratory design to analyze both quantitative and qualitative data. Quantitative data will come from two to three standardized test scores and surveys, while qualitative data will be gathered from interviews and a focus group. Data collection will occur once. Specifically, three teachers will each participate in a separate interview, three students will participate in a focus group, and the parents of these students will complete a survey. Data analysis will involve identifying patterns and relationships using a dependent t-test analysis for the quantitative data and thematic analysis to interpret qualitative responses. The findings aim to provide actionable insights for educators, school administrators, and policymakers seeking to enhance instructional practices and classroom environments.

Qin, Yonghong

Faculty Mentor: Xin Hua Hu

Comparison of blood pressure waveforms in a model of palmar artery tree for hemodynamic simulations

Blood pressure wave (BPW) propagates in artery and its waveform signals carry important information for assessing risks of cardiovascular diseases (CVDs). Here we report a model of the palmar artery tree for hemodynamic simulation of BPW which can prepare a solid foundation for modeling of photoplethysmography (PPG) data by wearable devices for development of novel biomarkers. Using an open-source software of SimVascular we have constructed a three-dimensional deformable arterial model that accounts for variations in vessel size, branching geometry, and wall elasticity. The Navier–Stokes equations for incompressible Newtonian fluids are solved to simulate BPW waveforms and their variations under different conditions of blood flow rates, arterial wall stiffness and artery sizes. A comparative analysis of blood pressure waveforms across different arterial segments, including the radial and ulnar arteries and their distal branches, is conducted to assess the influence of vascular compliance and wave reflections. Our results provide important insights into the spatial-temporal variations of BPW waveforms within the palmar artery that enables a deeper understanding of biomechanics in the microcirculation, which have important clinical implication for extraction of biomarkers from PPG data for diagnosing and monitoring of CVDs.

Radel, Sarah

Faculty Mentor: Stephen Moysey

Broadening Participation in Community Science by Leveraging Artificial Intelligence for Environmental Justice

Artificial intelligence (AI) has gained significant attention in recent years due to its wide range of valuable applications, spanning from sustainable land management practices to education and areas of basic research. AI holds great promise for addressing environmental justice (EJ) issues, particularly in disadvantaged communities.
Marginalized communities are disproportionately affected by pollution and resource inequities, highlighting the urgent need for effective tools to support them. One specific challenge faced by underrepresented communities is access to crucial environmental information and resources due to technological challenges, digital literacy, and background knowledge. The primary aim of this research is to assess ChatGPT4+'s potential to bridge the digital divide that people face when a usability gap limits access to valuable and publicly available education materials, data, and other institutional resources. The goals and objectives of this research are to evaluate the effectiveness of ChatGPT4+ in providing meaningful, accurate, understandable, and culturally reflective responses to environmental justice issues, investigate ChatGPT4+'s reliability in delivering relevant and understandable information to users, identify potential improvements for more inclusive use, and to explore how ChatGPT4+ can be leveraged to enhance digital equity and support environmental justice initiatives. This research is crucial in investigating the capabilities, reliability, accessibility, and equity of the large language model ChatGPT4+ in addressing these barriers. The product of this research provides an enhanced understanding of how well current large-language models, i.e., ChatGPT4+, represent information about environmental justice.

Reid, Ansleigh - CANCELLED

Faculty Mentor: Tonya N. Zeczycki

The Redox Environment Influences Transglutaminase 2's (TG2's) Conformational Ensemble

Transglutaminase 2's (Tissue transglutaminase, TG2's) physiological and pathological functions include both canonical Ca2+-dependent transamidase and G-protein/GTPase activities. TG2's transamidase activity is completely abolished when the enzyme is oxidized, while the impact of the redox environment on TG2's GTPase/G-protein activity has yet to be fully explored. Even though these two mutually exclusive activities are known to be allosterically regulated, the mechanisms linking the redox environment with the enzyme's structure and allosteric regulation are poorly understood. Previous crystal structures suggest TG2 predominately exists in either an elongated ("open") or compact ("closed") conformation. However, numerous studies, including preliminary data from our lab, indicate that TG2 samples many more functionally relevant conformations in its ensemble. TG2 has been shown to be sensitive to changes in the redox environment leading to changes in the conformation. Considering previous studies showing TG2 forms redox-sensitive, allosteric disulfide bonds, we postulate that the conformations TG2 are sensitive to the redox environment and influenced by the formation or oxidation of these disulfide bonds. The Cys270-Cys370-Cys371 triad is particularly sensitive to the redox environment and may control TG2's conformational landscape and function. Here, using biochemical and biophysical assays we probed the impact both oxidizing and reducing environments have on TG2's conformation to understand how redox conditions regulate the functional activities of TG2. Considering TG2's physiological roles in inflammation, wound healing, and a multitude of other biological processes and its pathological G-protein/GTPase activity in cancer or transamidase activity in neurodegenerative diseases, these results will have implications for the future development of mechanistic-based TG2 inhibitor design.

Rizzolo, Jackson

Faculty Mentor: Matthew Sirianni

Using electromagnetic geophysical methods to characterize subsurface salinity dynamics on Shackleford Banks, Cape Lookout National Seashore, North Carolina

Shackleford Banks is a barrier island located along the Outer Banks of North Carolina that faces growing challenges from saltwater intrusion due to droughts, sea-level rise, and increasing coastal flooding events. Understanding the impacts of these challenges on freshwater resources is essential for promoting the health of the island's feral horse population as well as other flora and fauna. To better our understanding, ongoing research on Shackleford Banks aims to establish baseline hydrogeological parameters and investigate the spatiotemporal variability of groundwater salinity dynamics using hydrogeophysical and hydrogeological methods. This work presents preliminary data collected from: 1) an array of groundwater and surface water monitoring stations installed across the island, 2) hydrogeophysical data collected along cross-island transects and proximal to monitoring stations, 3) sediment grain size and loss on ignition analyses, and 4) nearby hydrometeorological and tidal monitoring stations. The findings will offer valuable insights into saltwater intrusion processes on barrier islands and help to guide strategies for managing critical freshwater resources.

Robinson, Autumn

Faculty Mentor: Erin Field

Enhanced Biological Phosphorus Removal In Wastewater Treatment: Microbial Community Response To Disruptions And Stable Conditions

Excess phosphorus in wastewater can cause harmful dead zones in water bodies. Many Wastewater treatment plants (WWTPs) remove phosphorus via enhanced biological phosphorus removal (EBPR). They often experience poor phosphorus removal because the microbes responsible for EBPR are sensitive to changes in environmental conditions. These conditions and their microbial responses are rarely studied in full-scale WWTPs and thus poorly understood in this context. I hypothesize that microbial communities differ between EBPR+/- periods due to seasonal shifts, with temperature and precipitation being primary drivers. To test these hypotheses, I took microbial samples and environmental data from the aeration basin of the Greenville Utilities Commission (GUC) WWTP during periods when EBPR was running optimally (EBPR+) and sub-optimally (EBPR-) through Spring and Fall of 2023. The environmental data included temperature, pH, and dissolved oxygen. We conducted RNA (126 samples) and DNA-based (219 samples) amplicon sequencing on the microbial samples to compare EBPR+/- periods. Analyses of environmental effects on the microbial community are ongoing. RNA and DNA-based amplicon sequencing reveals significant differences in the microbial community between EBPR+/- periods. Analyses showed that indicator species differ between EBPR+/- samples and RNA and DNA datasets, with the DNA-based EBPR- dataset containing a uniquely diverse array of indicator species. DNA-based sequencing shows significant differences in the microbial community between seasons, but this pattern was not observed in the RNA dataset. The most abundant taxa in both the RNA and DNA datasets were Proteobacteria, followed by Bacteroidota. The third most abundant were Nitrospiratora for the DNA-based samples, and Myxococcota for the RNA-based samples. These results show that the microbial community changes significantly between EBPR+/- periods. Contrasting RNA and DNA results between seasons may highlight differences between the active and overall communities. Understanding microbial responses to EPBR+/- periods will reveal methods to stabilize EBPR to prevent phosphorus-related environmental harm.

Roccisano, Giuliana

Faculty Mentor: Adriana Heimann-Rios

Exploring the Effectiveness of Geoscience Education Methods: A Guideline for Future Outreach Strategies

The geosciences play a critical role in addressing global challenges such as climate change and resource acquisition. However, recruitment into the field remains disproportionately low. At East Carolina University (ECU), only 0.17% of students major in geology, with geology majors comprising just 7.5% of all physical science majors (geology, chemistry, and physics). This low enrollment reflects broader trends in higher education, where geoscience programs struggle to attract and retain students due to limited early exposure, misconceptions about career prospects, and a lack of diversity in the field. This study investigates which geoscience education method—formal (classroom-based learning), nonformal (museum partnerships and workshops), or informal (peer-led engagement through student organizations) is most effective in increasing student interest, engagement, and positive perceptions of geoscience among ECU students and Pitt County residents. While previous research has identified challenges in geoscience recruitment, few studies have systematically compared these educational approaches within a university and community setting. To address this gap, the study will employ pre- and post-surveys in introductory geoscience courses, evaluate attendance and engagement at museum-based activities, and track participation in informal peer-led events. Survey responses will be quantitatively analyzed to assess shifts in interest and perceptions. By developing a data-driven framework for evaluating geoscience outreach, this research intends to provide actionable insights to guide future recruitment initiatives. The findings will contribute to broader efforts to expand the geoscience field and improve public understanding, ultimately informing more effective educational and outreach strategies.

Rodgers, Stacy

Faculty Mentor: Timothy Lazure

Poignant Disarray

Our hearts are messy. They are a landscape of desire, longing, vulnerability, love, fear, pain and suffering. Our humanity is beautiful in its turmoil of bittersweet emotions. Embracing what matters most to our complex souls in the deepest way can mean living in a constant state of happiness and regret, joy and sorrow. In my work I seek to embody the poignant disarray of life. I utilize the typical “heart shape” in combination with anatomical details of a heart to create intricate pierced three-dimensional forms. I then take these forms and physically cut them apart and then splice the pieces together again to symbolize existing in a tangled balance of opposing emotions.

Ropp, Allyson

Faculty Mentor: Nathan Richards

Integrating Microbial and Water Chemistry Data with Archaeological Research

Wooden archaeological sites are found submerged in aquatic environments around the world. Shipwrecks make up a significant portion of these sites. The specific environment, including the local biological components, influences many processes affecting their preservation. Archaeologically, these formation processes are regularly studied independently, including cultural versus natural processes and natural versus natural processes. This separation leaves space for further research to evaluate how these processes may work collectively to preserve or degrade a shipwreck site. By understanding these processes' interactions, researchers and managers can better work toward holistic site resiliency in changing aquatic systems. This project used a wooden shipwreck case study site in the Mallows Bay – Potomac River National Marine Sanctuary to characterize and evaluate these relationships. Monitoring took place seasonally over two years, following the initial data collection in the first year. The team collected measurements related to the microbial community composition on and around the shipwreck site, the local water chemistry data, observations of cultural processes on the site, including burning and other salvage, and the density of the structural timbers of the shipwreck. This presentation presents the preliminary results of this study, highlighting the interplay between the microbial communities, water chemistry, spatiotemporal patterns, and use and salvage cultural processes on the overall density of the wood.

Ross, Mason

Faculty Mentor: Zi-Wei Lin

Numerical Evaluation of the Shear Viscosity of the Quark Gluon Plasma

Abstract: The extracted shear viscosity values of the quark gluon plasma generated in heavy ion collisions at RHIC and LHC are indicative of a near perfect fluid. We use a Monte Carlo parton cascade model to simulate various systems of partonic matter. We have introduced QCD process-specific cross sections to the simulation to allow the system to evolve according to its constituent particle interactions. Using the Green-Kubo relation, we relate the time correlation of the numerically evaluated stress energy tensor to the shear viscosity of the system. We then compare these results with theoretical expectations to identity potential problems with the theoretical results.

Ross, Hillary

Faculty Mentor: Kristen Gregory

Student Self-Efficacy in Tested and Non-Tested Subjects

This study explores students' perceptions of reading self-efficacy in subject-specific contexts, focusing on English/Language Arts and Social Studies classes. It also investigates the extent to which standardized tests may or may not impact student self-efficacy. Using a mixed-methods approach, data will be collected from 8th grade students at a rural, public, Title I charter school. The study will employ survey design, utilizing a mixture of Likert-scale and open-ended questions. Quantitative data will be analyzed using descriptive statistics to compare and contrast self-efficacy scores in ELA and SS. Open and axial coding will be employed to analyze students' detailed responses regarding their experiences in each subject and the role of standardized testing as it relates to their self-efficacy. It is anticipated that survey results will indicate a discrepancy in student self-efficacy in English/Language Arts versus Social Studies, with SS having higher reported self-efficacy than ELA. The research hypothesizes that the presence of standardized tests in English/Language Arts has had a negative impact on student self-efficacy, whereas Social Studies does not have a state-mandated standardized test and is therefore a more low-stakes reading-related subject. The results of this study will inform teacher practices and efforts related to building student confidence, specifically in literacy.

Rottenberk, Lizzy

Faculty Mentor: Sieg Baluyot

Zeros of moments of characteristic polynomials of random matrices

This project specifically explores the zeros of moments of characteristic polynomials of random matrices. These moments are studied because they provide important information about the eigenvalues of random matrices and the Riemann zeta-function. The zeta function is an important tool in mathematics because its zeros have a direct relationship to the prime numbers (numbers only divisible by 1 and itself). This function also played a key role in the original proof of the Prime Number Theorem from the 19th century. In recent years, it has been found that the zeta-function shares many properties with random matrices. This connection has led to new techniques, and we are exploring an unknown subject that could bring new information in both the theory of the zeta-function and random matrix theory. Back to the specific research, I was shown a moment function that maps to the complex plane via the second moment (k=1 case) where any queries were already answered. Then, I was given the fourth moment analog (k=2 case), where not a lot of information is known about the zeros of the moment. The main driving question is: do the zeros of this moment approach certain curve(s) as N approaches infinity? N is a variable in the natural numbers that our moment depends on. We wanted to explore how the zeros changed between N values and how the zeros are distributed, specifically as N goes to infinity. We have formulated several conjectures for this case and have proven theorems, mainly about the real roots. Our next steps are to analyze the complex roots of the k=2 case and find an explicit expression for the k=3 analog, which has yet to be found as it is much more complex and harder to compute by hand. Through this process, tools like Python and Mathematica have helped us carry out complex calculations and visualize the roots in the complex plane.

Ruffin, Tanner

Faculty Mentor: Mark C. Bowler

I've Lost My Appetite For Work

Little research currently exists regarding the effect of hunger on the behaviors and cognitions of individuals within the workplace. In an attempt to address this gap in the literature, a correlational study examining the effects of hunger on several occupational factors was conducted. Data was collected from N = 274 individuals currently employed in the United States. We attained Information regarding participants' typical experiences with hunger at their place of work for examination alongside 4 additional factors: occupational fatigue, turnover intent, job performance, and withholding of effort. Data were analyzed via a series of hierarchical regression analyses, that screened for the presence of significant associations between hunger and the 4 aforementioned occupational factors. Results indicated the presence of significant correlative relationships between experiences of workplace hunger, and all 4 examined factors which ranged from small to large in effect size. The role of perceived supervisor support as a moderating factor on the relationship between hunger and each occupational factor was examined, however no evidence was found to support its significance. The implications of these findings, recommendations for practice, and future research directions are discussed.

Saud, Roshan

Faculty Mentor: Steven M Richter

Fine Scale Measurement of Urban Shade Patterns for Urban Heat Resilience

Urban Heat Island (UHI) intensifies over time, mounting pressure on social, ecological and economic and infrastructural systems. The combined impact of rapid urbanization and climate change is expected to accelerate the UHI severity, causing immense threat to urban dwellers. Among the implemented solutions, shade has been widely recognized as a one of the most effective solutions. However, methodologies for accurately measuring shade in complex urban environments remain underexplored. This study introduces a novel approach of creating realistic 3D digital representation of buildings, trees and ground by utilizing LiDAR data and advanced modeling techniques for shade detection. The generated vertical and horizontal shade are quantified by subarea and analyzed different dimensions along an urban-to-suburban transect. Combined scenario generates highest amount of shade and follows the pattern of dominant factor, but averages when contributions are similar. Building shade predominates the built environments, occurring mostly on facades, while tree shade prevails in relatively rural landscape primarily on ground, exhibiting contrary pattern. Except Urban Core and Suburban, all transect zone have inconsequential roof shade. The sensitivity examination indicates that shade detection is steady till 5m, minor discrepancies (mostly below 10%) emerge at 10m. Beyond 10m, significant deviations is expected, particularly for ground and roof surfaces, with 30m resolution showing substantial inaccuracies. Roof shade in all scenarios and ground shade in building scenario are the most volatile to resolution. These findings provide valuable insights for urban planners, geospatial scientists, scholars and policymakers to optimize street level intervention for enhancing human thermal comfort and UHI mitigation strategies.

Schaaf, Noah

Faculty Mentor: Isabelle Lemasson

The Role of Myoferlin in the Metabolism of HTLV-1 Infected Cells

Human T-cell leukemia virus (HTLV-1) is a retrovirus that infects mainly CD4+ T-cells. Infection with HTLV-1 can led to either adult T-cell leukemia, a fatal cancer, or a form of HTLV-associated myelopathy, a disease that affects the host nervous system. As a retrovirus, HTLV-1 uses its reverse transcriptase to turn its genomic RNA into DNA, and then the viral integrase allows the viral DNA to integrate into and become part of the host cell genome. After the viral DNA has been integrated, several viral proteins are transcribed. One of this viral protein, HBZ, has been shown to be important for the maintenance of HTLV-1 infected cells. HBZ can regulate the transcription of several cellular genes, and we previously reported that HBZ strongly upregulate the expression of a gene known as myoferlin. Myoferlin is mainly expressed in muscle cells but has also been reported to be abnormally expressed in pancreatic and triple-negative breast cancers. In these cells, myoferlin plays a role in endosomal trafficking and cellular metabolism. In T-cells infected with HTLV-1, we found that myoferlin increases HTLV-1

infectivity by inhibiting the lysosomal degradation of the envelope protein. Another aspect of our research is currently trying to understand if myoferlin also plays a role in the metabolism of HTLV-1 infected T-cells and, more specifically, is important for mitochondria function. We have established HTLV-1 infected cell lines where the myoferlin gene is knocked-down by small hairpin RNA (shMYOF), and another cell line carrying a shRNA control (shGFP). Two types of staining were used to observe the mitochondria presence and measure their activity in shGFP and shMYOF cell lines. First, we labeled the mitochondria with a TOM20 antibody, TOM20 is part of the TOM complex found on the outer membrane of the mitochondria. Second, we use MitoTracker Deep Red FM, a compound that measures the oxidative phosphorylation of the mitochondria. Preliminary data shows that staining with TOM20 antibody was similar between the two cell lines. However, staining with MitoTracker Deep Red FM was significantly reduced in cells depleted of myoferlin. Overall, these results suggest that HTLV-1 infected cells expressing myoferlin have a higher metabolic activity than those without myoferlin. A better understanding of the role of myoferlin in the metabolism of T-cells could potentially lead to development of antiretroviral therapies to help those treated with retroviral infections such as HTLV-1.

Scott, Emily

Faculty Mentor: Fadi Issa

Examining astrocyte development and plasticity in zebrafish (Danio rerio)

Astrocytes constitute nearly 40% of the total number of cells of the human brain yet our understanding of their function remains poorly understood. Astrocytes have been implicated in several neurophysiological functions that include neuroprotection, regulation of neuronal metabolism, homeostasis, and synapse formation. However, their structural and functional development during embryogenesis and how social factors influence astroglia in adulthood remain largely unknown. Zebrafish have emerged as a powerful model organism to study brain function due to flexibility in genetic manipulation, rapid and external embryogenesis, optical clarity that permit prolonged in vivo imaging, and diverse behavioral repertoire that can be readily studied. Zebrafish are social animals; they fight and form stable dominance hierarchies consisting of dominant and submissive fish. The neural bases underlying zebrafish aggression have been studied extensively with a well characterized network of neuromodulatory nuclei that constitute a decision-making network that regulate zebrafish aggressive and motivated behavior. However, the role astrocytes have in this neuromodulatory network within zebrafish is less understood. This study aims to understand how astrocytes develop structurally and functionally during embryonic development; how astrocyte structural development is coordinated with dopaminergic nuclei implicated in social motivation and aggression, and how social dominance affects astrocytes' structural and functional plasticity within the decision-making neural networks. Preliminary data in a DAT/Astrocyte double transgenic line (DATe:GFP x Vo1080:RFP) indicates that astrocytes develop tangentially with neurons during zebrafish development, with astrocytic branching most visible after 3 days post fertilization. Interestingly, these astrocytes also innervate with dopaminergic (DAT) neurons within the hypothalamus, diencephalon and the striatum brain regions, indicating they may be involved in social behaviors in adult zebrafish. Confocal imaging in adult double transgenic fish shows continued innervation between DAT neurons and astrocytes which highlights the significance in examining astrocytes as potential modulatory glial cells in various social behaviors (i.e., aggression, stress) in adult zebrafish.

Sedaghat, Narges

Faculty Mentor: Cat Normoyle

The Role of Iranian Immigrants in Enriching America's Cultural Tapestry

This study examines the contributions of Iranian immigrants to the U.S. cultural and artistic landscape, focusing on the integration of their visual identity with contemporary American aesthetics. Through an analysis of Persian and American design motifs, cultural events, artistic contributions, and design elements, along with a review of Iranian artists' works and brands in the U.S., the research explores how Iranian immigrant artists reshape their heritage through artistic practice, rather than merely preserving it. Drawing on Erik Erikson's concept of identity as an evolving process and Pierre Bourdieu's theory of cultural capital, the study highlights how Iranian immigrant artists negotiate power, belonging, and hybrid cultural forms within the American context. I designed an A-to-Z letter set inspired by Persian heritage, specifically the Hakkhamaneshi Lotus motif, and developed animated event posters. By merging traditional Iranian elements with American motifs, I created new hybrid visuals that represent a fusion of cultural identities, encouraging dialogue between the two artistic traditions. This conceptual exploration highlights how design can bridge cultural identities and encourage a greater understanding of their

interconnections. While the long-term goal of this project is to create an interactive typographic experience where users type their names and generate Persian-inspired motifs using my custom font, the current phase focuses on showcasing these newly created hybrid designs and their role in visualizing cultural fusion. This work lays the groundwork for transforming these ideas into an interactive experience in future phases.

Sharma, Vinita

Faculty Mentor: Tammy Lee

Impact of Gizmo on Students' Attitudes Towards Learning The Greenhouse Effect

Virtual labs (VL), such as Gizmo, provide an engaging, interactive gamified learning environment for students to explore complex concepts like the greenhouse effect in Earth Science. VL enhance understanding by visualization and manipulation of scientific phenomena that might otherwise be abstract or challenging to grasp in traditional settings (Makransky & Mayer, 2017; Toth et al., 2014). They have shown promise in Biology, Physics, Chemistry, and Medical Science for improving conceptual understanding and motivation (Chang et al., 2015), but there is limited research on their impact on student attitude and interest in environmental science related high-priority issues like climate change (Schroeder et al., 2013). Earth Science educators report a growing challenge in maintaining positive attitude amongst students, with declining course success rates and fewer students pursuing STEM careers despite environmental literacy need (National Research Council, 2013). VL offer a potential solution by fostering curiosity and enhancing motivation to learn through interactive simulations (Rutten, van Joolingen, & van der Veen, 2012). Considering these trends, this research aims to explore the effectiveness of VL and provide insights to inform teaching practices & develop strategies aimed at reversing the decline in STEM interest among high school earth science students.

Sharma Bastakoti, Naina

Faculty Mentor: Stephanie Richards

Occupational Hazards Among Mosquito Control Personnel

The rise of mosquito-borne diseases is a serious public health concern. Mosquito control employees work within municipal/county health departments, public works, private companies, and other agencies. These outdoor workers encounter various occupational health and safety hazards, including exposure to arthropods (e.g., stinging or biting insects, pathogen vectors), pesticides, physical demands of carrying/lifting heavy equipment, heat stress, and solar ultraviolet (UV) radiation. Mosquito control employees may take part in employer-provided training sessions and workshops focused on pesticide safety, appropriate application, and exposure reduction. Nevertheless, additional training may be required to improve workplace health and safety risks. We conducted a survey of members of the North Carolina Mosquito and Vector Control Association (NCMVCA) and the Virginia Mosquito Control Association (VMCA) (N=60 respondents, 28.2% response rate). The survey showed that mosquito control involves professionals from various agencies, including but not limited to environmental health and vector control. Backpack sprayers (average weight=18.6 kg) were utilized by 41.7% of respondents. Individuals who reported using a backpack sprayer were significantly ($p=0.015$) related to those experiencing a slip, trip, or fall at work. Most respondents (76.7%) participated in health and safety training organized by their employer. Training and personal protective equipment (PPE) can mitigate the risks from occupational safety hazards. Mosquito control employees protect public health from mosquito-borne diseases by reducing mosquito populations. Here, results indicate that these outdoor workers encounter various potential hazards, such as heavy/loud equipment, pesticide exposure, heat stress, and irregular terrain. Personnel utilize several forms of PPE, yet safety issues may still occur. Routine and effective training can help prevent occupational exposures and reduce worker risks.

Sharpe, Brenda

Faculty Mentor: Lok Pokhrel

Assessing the association between PFAS exposure, social determinants of health, and risk outcomes in adolescents and adults in the United States.

Per- and poly-fluoroalkyl substances (PFAS), aka forever chemicals, are known for their eco-persistence, resistance to degradation, and longer half-life. Emerging studies have linked PFAS exposure to various adverse health effects, including cancer, liver damage, immune system disruption, reproductive issues, and endocrine disruption. By evaluating PFAS blood serum concentrations (n=4,444) using complex logistic regression and the USEPA deterministic risk assessment framework, this research aimed at elucidating the role of social determinants on PFAS exposure and estimate potential health risks among adolescents and adults from drinking contaminated water. Males showed higher odds of detecting pefluorodecanoic acid (PFDA), perfluorohexane sulfonic acid (PFHxS), perfluorononanoic acid (PFNA), and branched PFOA than females. PFDA and 2-(N-Methyl-perfluorooctane sulfonamido) acetic acid (Me-PFOSA-AcOH) and Perfluoroundecanoic acid (PFUA) detection in blood was significantly associated with adolescents (12-15 and 16-20 years) and adults (21-40 and 41–60 years). Adults aged 21-40 years had 33% lower odds of detecting PFNA in blood compared to adults aged 61 years and older. Detection of PFAS in blood was chemical-specific for Race/Ethnicity. Non-Hispanic Asians had significantly higher odds of blood PFDA (p=.007, OR=2.39) and PFUA (p<.001, OR=2.482) compared to Other Races; whereas Mexican Americans, Other Hispanics, and Non-Hispanic Asians had 32%, 44%, and 46% lower odds of blood Me-PFOSA-AcOH detection compared to Mixed or Other Race, respectively. Individuals with higher income-to-poverty ratios had significantly higher odds of blood Me-PFOSA-AcOH (p<.001, OR=1.705). Furthermore, estimated non-cancer risks based on drinking water PFAS concentrations were highest for PFHxS, PFNA, PFUA and PFOA across various age groups and exposure scenarios. These findings support the hypotheses that social determinants (gender, age, race/ethnicity, and income) are associated with higher PFAS exposure and that adolescents may face a higher risk of adverse non-cancer health effects from PFAS in drinking water compared to adults. While the study identified potential role of sociodemographic factors for PFAS exposure, future studies should focus on additional factors, such as occupational exposures, geographic location, and lifestyle behaviors.

Siegel, Paige

Faculty Mentor: Rachel Gittman

Evaluating the role of landscape context and species interactions between seagrass and oyster settlement within North Carolina estuaries

The American oyster (Crassostrea virginica) is a foundational species that provides essential ecological services such as water quality enhancement, carbon storage, habitat provision, and shoreline protection. Globally, oyster reefs have experienced over an 80% decline relative to their historic populations due to anthropogenic impacts. Restoration of oysters is common; however, efforts prove to be challenging and vary in success. Recent restoration approaches utilize positive species interactions, to enhance success. In North Carolina, intertidal oyster reefs and seagrass, a type of submerged aquatic vegetation (SAV), co-occur within estuaries. While previous studies have examined their interactions, the relationship remains complex and requires further investigation to understand underlying mechanisms that may be leveraged in restoration. To investigate how initial oyster settlement and post-settlement survival vary over time with respect to seagrass characteristics and configurations, field surveys and experiments were conducted at two North Carolina sites. Preliminary results indicated significant site differences in oyster settlement and survival. The position relative to seagrass played a minor role in oyster settlement compared to other abiotic factors (e.g., elevation, shoreline position, etc.). This study contributes to the broader literature by informing managers on site characteristics and species interactions that may impact oyster settlement and thus restoration success.

Simon, Abigahill

Co-Author: Perla Morales, Fadi A Issa
Faculty Mentor: Fadi A Issa

Social Regulation of the Parathyroid Type II Neuropeptide System in Zebrafish (Danio rerio)

Social dominance is prevalent among social species. It allows group members to divide limited resources according to social rank. However, social dominance is often accompanied by social stress and anxiety as animals fight for social dominance. However, the neurobiological mechanisms underlying social anxiety remain poorly understood. This project examines the physiological consequences of social dominance on the thalamic parathyroid system using zebrafish as a model organism. Zebrafish are social animals and form stable dominance relationships consisting of dominant and submissive fish. As with other vertebrate species, the parathyroid hormone type II (PTH2) expressing nucleus is in the thalamus, and it is involved in modulating social activity, and it plays an anxiolytic role during social interactions. However, the neurobiological mechanisms examining the role of PTH2 in information processing and stress induced by social dominance remain poorly understood. Here we examine the morphological and functional effects of social dominance on the thalamic PTH2 nucleus during two weeks of social interactions. We show that PTH2 neurons innervate the retinal ganglion cells suggesting potential modulation of visual sensory processing. Secondly, our results show that social dominance influence the number of PTH2 expressing cells: After one-week of social interactions the number of PTH2 cells is higher in dominants compared to subordinates and communals (control), but this difference is abolished after two-weeks of interactions. Thirdly, we show that the cellular activity of PTH2 neurons is significantly enhanced in dominants compared to subordinates after one-week of social interactions. Our results suggest that social interactions influence the parathyroid system, and socially dominant zebrafish are likely better in managing social stress as indicated in elevated numbers of PTH2 cell number and likely higher PTH2 release to serve as an endogenously released anxiolytic mechanism to cope with stressful social interactions.

Slade, Raven

Faculty Mentor: Stephanie Richards

Droplet Distribution of Formulated Products on Mosquitoes Exposed via Wind Tunnel

Mosquito control programs (MCP) typically use methods like the Centers for Disease Control and Prevention bottle bioassay to monitor insecticide resistance, but these tests are designed for technical grade active ingredients (AI), not formulated insecticide products (FP). Field trials using ultra-low-volume (ULV) FP applications are impacted by environmental factors such as wind and temperature and must occur at inconvenient times (dusk/dawn). Consequently, the current laboratory study used a novel compact wind tunnel to provide a more controlled environment for FP testing for mosquitoes. Standardizing this process could improve mosquito-borne disease control strategies. This method development study investigated droplet distribution patterns on several mosquito populations exposed to different FP in the wind tunnel and how this relates to mortality. Droplets were counted on different mosquito body parts (proboscis, antennae, head, thorax, wings, legs, abdomen) for all FP. Two wild and two laboratory populations of Aedes albopictus and Culex pipiens/quinquefasciatus were exposed to four FP (oil-based: ReMoa Tri®, Duet®, Biomist®; water-based: AquaDuet®) for 10 s per replicate. Knockdown was monitored at 2 h and mortality was measured at either 36 h or 48 h post-exposure. A subset of replicates were exposed to FP mixed with fluorescent dye and frozen immediately after exposure to evaluate droplet distribution using a UV filter attached to dissecting microscope. There were no significant differences in log-transformed total droplets per mosquito between FP, indicating homogeneous droplet distribution. Droplet distribution varied by body part, with the abdomen receiving the most droplets ($P = 0.025$). Droplet count did not predict mosquito mortality ($P > 0.05$) under the conditions of this laboratory test. Mortality rates varied significantly between mosquito populations and FP, ranging from 6% to 100% at 36 or 48 h post-exposure. The compact wind tunnel could serve as a preliminary screening step before field trials or when field trials are not feasible. Homogeneous droplet distribution across FP tested here is encouraging and shows consistency in application rates. The higher droplet counts observed on the abdomen here were likely due to the large surface area of this body part compared to others to collect droplets. Future studies will compare these results with field trial data to further explore the relationship between droplet distribution and mosquito mortality.

Smith, Anna

Faculty Mentor: Charles Humphrey

Preliminary Assessment of Nitrogen Treatment Efficiency of a Retrofit Stormwater Wetland

Urban runoff has contributed to excess nitrogen concentrations in the Tar River and Tar-Pamlico Estuary resulting in algal blooms, eutrophication, and impairment of water resources. Efforts to reduce total nitrogen (TN) loading from various sources including urban runoff have been suggested in watershed restoration plans. Dry detention basins (DDB) were one of the first stormwater control measures used to slow the delivery of runoff from developing areas, however their TN treatment efficiency is typically limited (~10%) relative to other measures such as stormwater wetlands which remove an estimated 44% of TN. A DDB on the campus of ECU was recently converted into a stormwater wetland in an effort to reduce the exports of TN leaving the campus. The goal of this study is to determine the TN removal efficiency of the stormwater wetland retrofit. Water from the inlet and outlet of the wetland was sampled during 6 separate storms for TN concentration analysis. Preliminary data show that there is a 39.42% reduction of TN as water passes through the wetland to the outlet. Most of the loss of TN can be attributed to a reduction in dissolved inorganic nitrogen species (nitrate and ammonium). A reduction in dissolved organic nitrogen has not been observed. Additional sampling and analyses is planned to provide a more comprehensive assessment of the processes occurring in the wetland responsible for contributing to the nitrogen removal efficiency.

Smith, Amaris

Faculty Mentor: Kristen Gregory

Parent Involvement and Student Success

This study will look at the correlation between parent involvement and student success to see if there is a relationship between the two. Student success in this study will be defined as those who perform on grade level according to the standardized test. The study will be conducted in a second-grade classroom of a Title 1 school in Eastern North Carolina. There will be a total of 21 students invited to participate in this study. This is a quantitative research method that will use standardized testing and a parent questionnaire to collect the necessary data. Based on the data, I will be able to analyze the data using correlation analysis and see the relationship between parent involvement and student success to increase parent involvement in the classroom. Teachers and parents will be able to see the impact that parent involvement has on the students success.

Sone, Precious Esong

Faculty Mentor: Ramirez Francesca

Reducing Diabetes Distress by using the Diabetes Distress Screening-17 (DDS-17) among adults

Diabetes is a chronic disease significantly affecting individuals, families, and communities globally. According to the CDC, the total cost of diagnosed diabetes has surged to $327 billion, up from $188 billion in 2012 (CDC, 2020). The struggle to meet recommended behavioral goals may lead to a new or worsened psychosocial issues, with diabetes distress (DD) being the most prevalent which is intensified by the daily requirements of managing type 2 diabetes (Beverly et al., 2022). The American Diabetes Association recommends screening for DD to address these issues effectively. Despite this, many primary care providers lack awareness and training to implement these screenings.
This project aims to reduce DD in adults with Type 2 diabetes through distress screening and an intervention toolkit in a primary care setting focusing on adult patients with hemoglobin A1c levels of 8% or higher in Greenville, NC. The project involves the implementation of a Diabetes Self-Management Education (DSME) toolkit delivered via weekly telephonic sessions over eight weeks. The DD Scale (DDS-17) will be used to screen and measure distress levels pre- and post-intervention. Implementing the DSME toolkit and DDS-17 screening in a primary care setting will significantly reduce DD among adults with Type 2 diabetes. This structured education and support approach will improve diabetes management and patients' quality of life. Sustaining this initiative will require ongoing commitment from clinic staff and potential expansion to other primary care settings. The project's promising outcomes underscore the importance of integrating psychosocial support into diabetes care.

Spence, Robyn

Faculty Mentor: Kristen Gregory

Attendance Patterns at a Title I Elementary School

The purpose of this study is to investigate elementary students' attendance rates, at a Title I school, to determine the reason behind these absences. The elementary school is located in a rural community in North Carolina. I will be investigating the question: Why are students missing so many days of elementary school, and are these absences considered unexcused or excused based on the ability of the child to attend school? With students being of a young age, approximately eight years old in third-grade, these students do not have a reliable way to attend school without the assistance of an adult in their life. Therefore, if an adult is not present to escort them to school or to the bus, the student may not be able to attend school that day. I will be using quantitative research methodology and action research design to obtain my data and information. To gather data, I will be using a deidentified attendance sheet based on third-grade students from the elementary school. To identify any trends or patterns that may occur from this research, I will be using descriptive statics test to analyze the data results. School districts, schools, and teachers will all benefit from this research to better assist students with attending school.

Standbridge, Autumn

Faculty Mentor: Gerald Weckesser

Exploring Devotional Practice

My work explores the intersection of faith, family, and hard work. I am deeply influenced by my upbringing on a farm in the Blue Ridge Mountains. In a culture where prayer was integral to everyday life, my art been has shaped by these values. Prayer is a means of connection, healing, and guidance, it is the rituals of mindfulness. My artistic process embraces slow, repetitive techniques that echo the meditative nature of prayer, turning the act of creation into a spiritual practice of contemplation and devotion. As a textile artist, I create tactile, dimensional works that speak to the interconnectedness of life, faith, and the land. My visible hand stitching speaks to the slow, intentional craftsmanship, akin to prayer, which defines my practice. Through the integration of natural materials in my work, I seek to reflect the connection between humans and nature. At its core, my work is tangible representations my spirituality, relationships, and memories.

Stecker, Molly

Faculty Mentor: Kristen Gregory

Investigating the relationship between student engagement and student disruptions

This study explores the relationship between student interest and engagement and the frequency of student disruptions in elementary classrooms, using a mixed methods approach. The research combines quantitative data from student surveys, including Likert scale questions and observational data on classroom disruptions, with qualitative insights derived from open-ended survey responses. The aim is to determine whether a correlation exists between the level of student engagement and the occurrence of disruptions, the goal of improving classroom management strategies. The study will be conducted in three fifth-grade classrooms in a rural elementary school in Central Virginia, involving 65 students. The action research design integrates both qualitative and quantitative data, allowing for a better understanding of how students' enjoyment and participation in lessons and activities may influence classroom behavior. Data analysis will involve using a correlational analysis to discover any potential relationship between engagement and the number of disruptions. Additionally, open and axial coding will be used for the qualitative data to gain a deeper understanding of student perceptions of their engagement in each lesson. It is anticipated that higher levels of reported engagement will correlate to a lower number of student disruptions. The findings of this study are expected to inform the development of more effective classroom management strategies that reduce disruptions.

Stengrim, Matthew

Faculty Mentor: Teresa Ryan

Application of Monin-Obukhov Similarity Theory to a Near-Shore Atmospheric Acoustic Model: A Measurement Informed Evaluation

An understanding of sound propagation from industrial activities, airports, wind farms, and a variety of other sources can be assisted by acoustic modeling. Modeling airborne sound propagation over long distances usually requires making a number of assumptions pertaining to the state of the atmosphere and terrain in addition to those in the governing equations and numerical methods. One such assumption pertaining to the lower atmosphere is Monin-Obukhov Similarity Theory (MOST)--a set of relations used to estimate vertical profiles of air temperature, humidity, and wind speed. In this work, MOST air temperature profiles are compared against long-term measurements of air temperature profiles from surface to seven meters in elevation over water and marsh grass surfaces. In addition, the Crank-Nicholson Parabolic Equation (CNPE) method is used to compare acoustic sound pressure level predictions between MOST-informed and measurement-informed sound speed profiles. Applications of MOST meeting the conventional stability parameter condition for validity were found to be about as successful over land as over water. However, at night over the marsh, MOST was 35% less likely on average to meet the validity condition whereas over the water it was only 13% less likely. Acoustic model predictions using MOST temperature profiles diverge from those using measured profiles under negative temperature gradients as a result of a sharp increase in the predicted temperature below 1 m in elevation.

Stevenson, Alexandra

Faculty Mentor: Cynthia Grace-McCaskey

Redefining Coral Restoration Success: Integrating Social and Ecological Perspectives

Climate change along with various other anthropogenic influences pose significant threats to vital coral reef ecosystems across the globe. To address this widespread degradation, restoration practitioners adopted strategies that prioritize ecological metrics and guide coral restoration efforts. However, by focusing on ecological goals and objectives, restoration practitioners overlook the social benefits of equitable approaches that enhance social-ecological resilience. Research indicates that establishing a shared understanding of restoration goals among practitioners and local stakeholders is essential for effective and sustainable outcomes. In this presentation, I will share a codeveloped definition of coral restoration success, derived from interviews and surveys conducted in the U.S. Virgin Islands in summer 2024. The findings highlight the importance of a comprehensive framework that integrates social dynamics and benefits into coral restoration efforts.

Stewart, Kelsey

Faculty Mentor: Kristen Gregory

Comparing Classroom Engagement Strategies between Native English Speakers and English Language Learners

With classroom engagement essential to academic success, this quantitative research study focuses on English Language Learners (ELLs) and their lower levels of classroom engagement in a rural Title One middle school mathematics class. This quantitative research aims to compare classroom engagement between Native English Language speakers and ELLs at a Title One middle school. This research will examine the question: How do Native English Language speakers compare to ELLs in response to researched engagement strategies used in the curriculum to increase student engagement in the classroom? The four researched engagement strategies that will be used in this study to increase engagement are open-ended tasks, hands-on learning using manipulatives, project-based learning, and connecting math to the real world. In this quantitative research, data will be collected through surveys. The survey questions will address the three parts of engagement: behavioral, cognitive, and emotional engagement. Descriptive statistics will be used to analyze the engagement levels of all four instructional strategies used in the classroom. The results of this study will benefit students and provide teachers with information on how to best engage ELLs in the classroom, along with other students.

Surabhi, Keerthana

Co-Author: Maelee Becton, Lizzie Phipps, Noah Mann, Robert Hughes, Erzsebet M. Szatmari
Faculty Mentor: Erzsebet M Szatmari

Identification of actin mutants with neurodegenerative disease-like phenotypes via mutagenesis of the actin-ATP interface

Abnormal neuronal cytoskeleton dynamics is a common feature of neurodegenerative disorders including Alzheimer's disease (AD). Hirano bodies (composed of filamentous actin and actin-binding proteins) are neuronal inclusions associated with aging and universally present in the AD brain. This study focuses on understanding the involvement of actin-ATP interactions in cytoskeletal anomalies and their role in neuronal inclusion formation. DNA constructs: Point mutations (G158L, S14V, K18A, and D154A) were introduced into Actin in a pNic28 plasmid using site-directed mutagenesis. Primary neuron cultures and transfections: Dissociated cortical neurons were prepared from E18 mouse embryos (CD1) and cultured in 6-well plates with coverslips at 500K/ml density. Neurons were transfected with 5 µg plasmid/well on DIV5 using Lipofectamine LTX reagent. Fixed neuron experiments: 48-72 hours post-transfection neurons were immunostained for MAP2 or tau. Imaging: Confocal images were obtained on a Zeiss LSM 800 microscope with Airyscan. Particle analysis: Images were analyzed using FIJI, which was equipped with the BioFormats package. Distinct cytoskeletal phenotypes were associated with specific mutants. G158L and S14V lead to cofilin-actin rod phenotype with structural destabilization reminiscent of pathological actin-cofilin rods, while K18A and D154A exhibited large cluster phenotypes, similar to Hirano bodies. These results highlight the critical role of the actin-nucleotide binding pocket in regulating actin function. This work provides insights into the role of actin-ATP interactions in cytoskeletal anomalies observed in neurodegenerative diseases and lays the groundwork for further biochemical characterization and potential therapeutic strategies targeting aberrant cytoskeletal dynamics.

Swyers, Madi

Faculty Mentor: Li Yang

The Effect of GPR4 and GPR68 knockouts on B16F10 Subcutaneous Tumor Growth and Modulation of the Tumor Microenvironment

GPR4 and GPR68 are shown to be possible therapeutic targets in various cancers. We wanted to understand the effect of these G-Protein Coupled Receptor (GPCR) knockouts (KOs) in the host and the influence it would have on the development of B16F10 melanoma subcutaneous (SC) tumors. We then wanted to gain further knowledge of how GPCR KOs in the host affect immune cell infiltration and angiogenesis in the tumor microenvironment (TME) using immunohistological techniques. Four different genotypes of mice were used in this study: Wild-type (GPR4 WT), GPR4/GPR68 KO (DKO), GPR4 KO, and GPR68 KO. We then injected B16F10 melanoma cells subcutaneously into the mouse flank. Our results demonstrated that the knockout of both GPR4 and GPR68 in the mice significantly reduced the growth of subcutaneous B16F10 melanoma whereas the tumor growth was modestly decreased in the mice lacking either GPR4 or GPR68. Using immunohistochemistry techniques, our preliminary results demonstrated that the GPR4 KO did not significantly reduce the immune cell infiltration into the TME, while the GPR68 KO and the GPR4/GPR68 KO increased immune cell infiltration into the TME. Continuing with the immunohistological analysis, we determined that all the KOs had decreased angiogenesis in the TME as compared to the WT mice.

Tiralla, Gillian

Faculty Mentor: Nicholas Broskey

Skeletal Muscle Fiber Type Distribution May Predict Phenotype at Risk of Developing Metabolic Syndrome

Skeletal muscle fiber type has been associated with metabolic health. Individuals with a high proportion of type II fibers have a greater body mass index (BMI); but subjects with obesity, and a higher proportion of type I fibers, experience the greatest weight loss. Thus, we hypothesize that skeletal muscle fiber type may predict the metabolic phenotype of individuals at risk of developing the metabolic syndrome even in non-obese individuals.
Purpose: To determine if fiber type distribution associates with markers of the metabolic syndrome in subjects classified as overweight. A skeletal muscle biopsy from the vastus lateralis and blood samples were taken from overweight (BMI 25.0-29.9 kg/m2), but otherwise healthy individuals (free from cancer, hypertension, and diabetes) after an overnight fast. HOMA-IR was calculated from fasting glucose and insulin. Visceral adiposity was measured by DXA. Participants were subject to a graded exercise test to determine VO2max. Skeletal muscle fiber type (myosin heavy chain) distribution was assessed via immunohistochemistry. In the absence of normality, bias corrected and accelerated bootstrap Pearson correlations and associated p-values were used.A total of 38 participants (20 female, 18male), aged 29 ±8 years, were included in the study. Participants were type II fiber dominant (65.1±12.9%) and sedentary (VO2max 31.3±8.1 mL/kg/min). No differences in fiber types existed between the sexes (p=0.14). Visceral adipose tissue (VAT) (r=0.48, p=0.004), android:gynoid (r=0.46, p=0.005), and HOMA-IR (r=0.45, p=.01) were positively associated and HDL (r=-0.33, p=0.05) and VO22max (r=-0.37, p=0.03) negatively associated with type II skeletal muscle fibers. Additionally, fasting lactate, an early predictor of metabolic disease risk, positively associated with type II fibers (r= 0.44, p=0.009). Young, overweight individuals with a high proportion of type II fibers may already be developing visceral obesity and risk factors of the metabolic syndrome. Thus, having a high percentage of type II skeletal muscle fibers may be an innate driver of metabolic disease.

Tucker, Kaitlyn

Faculty Mentor: Kristen Gregory

Growth of Gifted Learners

The topic of this research is gifted learners, and it investigates the problem of a lack of growth shown in gifted learners. The context of this study is an elementary school that serves grades kindergarten through fifth grade in an urban community in eastern North Carolina. The purpose of this qualitative study is to investigate teachers' perceptions about the ways gifted learners' growth is shown in the elementary classroom. This study focuses on the research question: What are the perceptions held by elementary teachers of ways that gifted learner's growth is shown in the classroom? This study is a qualitative study that uses a survey research design with open ended questions seeking teacher perceptions. In this study there were a total of 18 teachers invited to participate. It is anticipated that many of the participants in this study do not have the tools they need to show adequate growth in gifted learners. Teachers of gifted learners will benefit from this study as they will better understand how to meet the specific learning needs of these students in their classrooms. Gifted students will also benefit from this study as teachers will better understand how to meet the specific learning needs of gifted learners to show their growth in the classroom.

Umozurike, Godgive

Faculty Mentor: Hugh Lee

Production and Implementation of a Medical Student-led Pediatric Palliative Care Module

Pediatric palliative care is an ever-evolving field with minimal education for clinical learners across the spectrum, leaving them feeling unprepared to perform palliative conversations with pediatric patients and their families. With this, although often overlooked, undergraduate medical students are the target audience to equip with these foundational skills. A medical student-produced 20-minute virtual educational module about pediatric palliative care for medical students. Pre- and post-assessments were used to evaluate participants' comfort level and knowledge acquisition. Content and format were student-driven and supported by interdisciplinary faculty. Module objectives centered around definitions, differentiation of pediatric care, review of indication, and external resource review.Early education and exposure to pediatric palliative care concepts are critical to developing competent, compassionate, and confident clinicians. Medical schools are challenged to integrate this material at appropriate times and at appropriate educational levels for learners. Our module addresses these concerns in a tailored format.

Valladarez Cuestas, Rolando

Faculty Mentor: Tom Raedeke

Physical Activity Adherence in Former High School Athletes: A Comparison with Non-Athletes and the Role of Burnout and Enjoyment

A common belief is that high school sport participation may result in continued physical activity participation in subsequent years. While some studies support that former athletes are more active than their peers, most studies have been conducted outside the United States and therefore it is unclear whether those findings generalize to the experience of interscholastic athletes. In addition, researchers recognize that the extent to which former athletes had positive sport experiences potentially impacts whether high school sport participation translates to continued activity involvement following high school. It is possible that high school athletes who recall higher burnout symptoms including exhaustion, sport devaluation, and a reduced sense of accomplishment may report lower exercise enjoyment and physical activity levels compared to those who recall lower burnout symptoms. Therefore, the current study has two aims. (1) To examine whether physical activity levels differ between former high school athletes and non-athletes. (2) To examine whether there is a relationship between the recall of burnout symptoms in former high school sport athletes and exercise enjoyment and self-reported physical activity in college. Methods: Participants in this study were N = 464 ECU students enrolled in Lifetime Physical Activity and Fitness courses. Following IRB approval, students were invited to complete a survey on their phone via Qualtrics during a regularly scheduled class. Participants completed a series of questionnaires assessing their high school sport involvement, sport burnout experience in high school, current enjoyment of exercise, and current physical activity level. When completing questions about burnout, the former high school athletes were asked to recall their feelings and experience from when they were an active athlete. Anticipated Results: The data is currently being analyzed, but this study seeks to understand the relationship between high school sport participation and future physical activity participation. We hypothesize that former athletes will report higher levels of self-reported physical activity than non-athletes. We also hypothesize that within the former athlete group, those athletes who recall higher burnout symptoms will report lower physical activity level and exercise enjoyment compared to those reporting lower burnout.

Vitti, Thomas

Faculty Mentor: Alexander M. Schoemann

Frequentist and Bayesian Measurement Invariance: Comparisons with Ordinal Indicators

Establishing measurement invariance (MI) is a preliminary step for formulating cross-group comparisons. In the structural equation modeling (SEM) framework, this process involves fitting models to different groups and progressively adding equality constraints. Issues in this process arise when indicators with fewer than five response categories, common in social science research, are treated as continuous. Doing so results in biased parameter estimates and inaccurate results. Process recommendations from Wu and Estabrook (2016) for ordinal MI testing involve estimating threshold invariance before advancing to additional parameter constraints. While this is typically completed in multi-group categorical confirmatory factor analysis (MG-CCFA), Bayesian structural equation modeling (BSEM) shows promising benefits by implementing priors, creating a full probability model, and evaluating model fit through the posterior distribution. The present study tested MI using MF-CCFA and BSEM approaches following the Wu & Estabrook (2016) recommendations of baseline, threshold, factor loadings, and intercepts utilizing the 12-item Brief Problem Checklist (BPC) grouping by gender using the lavaan and blavaan packages in R. Data was collected from third (n=520) and fourth (n=510) grade students across sixteen schools in North (n=514) and South Carolina (n=516; N=1168). A majority of the sample identified as non-Hispanic (n=903), and genders consisted of female (n=507) and male (n=523) students. BSEM methods were conducted using Monty Carlo Markov Chain (MCMC) estimation and compared using log Bayes Factors (logBF). Priors were set to default except for thresholds, which were set as “normal(0.5),” allowing for exponentiation of each threshold. MG-CCFA demonstrated equivalent fit between the configural and threshold models $x^2(108)=276.36$, $p<.001$, CFI=.933, TLI=.916, RMSEA=.056, SRMR=.082. Further constraining factor loadings provided evidence for weak invariance $x^2(10)=6.25$, $p= .794$. Constraining intercepts indicated a noninvariant parameter, which was identified and relaxed. Subsequent model comparison provided evidence for partial invariance $x^2(9)=14.62$, $p=.109$. BSEM models indicated that more constrained models resulted in a better overall fit when comparing the configural to threshold (logBF=-35.91), loadings (logBF=-45.05), and intercepts (logBF=-11.11) models. BSEM modeling

continuously preferred more constrained models when using logBF. Results from the MG-CCFA provide evidence of partial invariance between male and female groups. BSEM differed in preferring more constrained models. However, using simple fit measures such as logBF has notable limitations. Future implementation of more complex options such as WAIC and LOO can provide further insights. Future research should continue to evaluate Bayesian approaches to take advantage of flexibility and informed strategies as software evolves.

Warren, Alexandria

Faculty Mentor: Elizabeth Ables

Convergence of Ecdysone signaling and BMP signaling on germline stem cell maintenance and differentiation in the Drosophila ovary

Ovarian germline stem cells (GSCs) are essential to maintain oocyte production and fertility in adult females. GSCs depend on both steroid hormones and local paracrine signals to regulate their proliferative ability and long-term maintenance. Signaling by Bone Morphogenetic Protein (BMP) ligands via the receptors Thickveins (Tkv), Saxophone (Sax), and Punt (Put) repress transcription of the differentiation gene, bag of marbles (bam), allowing for GSC self-renewal. Concurrently, the steroid hormone ecdysone promotes BMP signaling in GSCs, but the molecular mechanisms by which this regulation is achieved are unknown. Ecdysone regulates the transcription of target genes through two nuclear receptors, Ecdysone Receptor (EcR) and Ultraspiracle (Usp). To elucidate the role of EcR in germ cells, we built germ-line compatible tools to manipulate levels of EcR. Over-expression of EcR in germ cells blocked germ cell differentiation, resulting in masses of undifferentiated cells phenotypically resembling bam loss-of-function and Tkv constitutive activation. To identify nodes of functional similarity, we compared gene expression in these three genetic models using single cell RNA sequencing. Here, we provide evidence that EcR-expressing germ cells most closely resemble germ cells with constitutive activation of Tkv, with only a few genes differentially expressed between the two models. We found no differential expression between EcR-expressing and Tkv-expressing germ cells in either BMP signaling components or ecdysone-responsive genes, and both lead to repression of bam transcription. We demonstrate that EcR over-expression increases Tkv expression at the mRNA and protein levels. Finally, comparison between the three genetic models allowed us to separate six independent transcriptional states of undifferentiated cells, identifying novel points of regulation downstream of BMP signaling, ecdysone signaling, or both. We propose that steroid hormones from adjacent escort cells are received by GSCs, resulting in a transcriptional program that converges on BMP signaling in a feedback loop to promote GSC proliferation and regulate differentiation. Together, these data show a strong autonomous role for ecdysone signaling in GSC maintenance and differentiation and reveal putative novel regulators of germline development.

Weiss, Tori

Faculty Mentor: Charles R. Ewen

Do Patterns Matter? Testing the Spanish Colonial Pattern on Charles Towne, North Carolina

In 1983, Kathleen Deagan defined the Spanish Colonial Pattern from material recovered from early St. Augustine, which was later refined at Puerto Real, Haiti. It states that the Spanish adapted to the Americas by retaining Spanish traits in male-dominated areas of high social visibility, while incorporating Indigenous traits in female-dominated utilitarian areas. Does this apply to other nations' early colonial efforts? An analysis of the material recovered from the 17th century site of Charles Towne, North Carolina examines whether the English followed a similar pattern of colonization.

Wiggins, Kylar

Faculty Mentor: Tonya N. Zeczycki

The Role of Amyloid Beta Peptides in the Innate Immune System: Antimicrobial Properties and Contributions to Alzheimer's Disease Onset

Alzheimer's Disease (AD) is the most prevalent neurodegenerative disease, accounting for roughly 60-70% of dementia cases globally. As previous studies have shown, the gut microbiome may have a profound influence on the onset, development, and progression of AD and other related dementias. Bidirectionally linked through the vagus nerve, inflammation and infections in the gut are proposed to be relayed to the brain, however the underlying molecular and cellular mechanisms facilitating this transfer is currently unknown. The gut microbiome is comprised of numerous types of commensal and pathogenic types of bacteria. In order to maintain gut homeostasis, the innate immune system must be able to differentiate between these "good" bacteria and "bad" bacteria". One of the first line of defenses in the innate immune system in the gut is the release of antimicrobial peptides, or AMPs. AMPS mimic bacterial amyloids and activate the innate immune system. These properties allow it to influence macrophage activation and inflammation. Amyloid β1-40 and Amyloid β1-42 (Aβ1-40 and Aβ1-42, respectively) are not only the pathogenic protein responsible for AD, but are also two AMPs thought to have an important role in the innate immune system in the gut. Derived from the cleavage of APP, Aβ1-40 and Aβ1-42 is shown to have both antimicrobial and neuromodulatory properties. To establish the role Aβ1-40 and Aβ1-42 plays in the innate immune system, its antimicrobial properties, and its role in AD onset, we determined the minimum inhibitory concentration and employed untargeted proteomic analysis using Escherichia coli and Listeria monocytogenes as model gram-negative and gram-positive gut-dwelling bacteria. These analyses will provide clarity in understanding how chronic inflammation and gut health can contribute to the pathology of neurodegenerative diseases such as Alzheimer's.

Williams, James

Faculty Mentor: Gyawali Sohan

Deep learning in cyber security

With the increasing complexity of cyber threats and traditional security measures, we are struggling to keep pace with the ever-evolving tech world and attack methods. Deep learning, in particular large language models, have emerged as a powerful tool for cybersecurity, offering a way to detect malicious network activity through packet captures. By leveraging a LLM's ability to detect complex patterns in text we can use this to detect anomalies in packet capture data as well as live network traffic. By training on various datasets of network logs and packet captures, LLMs can enhance intrusion detection, provide better security and real-time threat detection, and provide more secure systems overall. This study aims to highlight the accuracy, advantages, adaptability, and scalability of LLMs in cybersecurity and demonstrate that deep learning can significantly increase cybersecurity defenses and provide a forward-looking solution against emerging cyber threats.

Williams, Savanna

Faculty Mentor: Jacques Robidoux

Epicardial Adipose Tissue Promotes Atrial Fibrosis via Cytokine Modulation

Cardiac fibrosis is a pathological hallmark of nearly all major cardiac diseases, contributing to impaired electrical conduction, reduced myocardial compliance, and disease progression. The activation of cardiac fibroblasts into a pro-fibrotic myofibroblast phenotype is regulated by a complex interplay of signaling pathways. Epicardial adipose tissue (EAT), which is in direct contact with the myocardium and shares its coronary blood supply, is a paracrine modulator of myocardial inflammation and fibrosis. While EAT-derived pro-fibrotic factors have been implicated in cardiac fibrosis, the exact cytokines involved, and their mechanistic roles are mostly unknown.
To investigate the relationship between EAT-derived cytokines and atrial fibrosis, we analyzed right atrial appendage (RAA) tissue from patients undergoing coronary artery bypass graft (CABG) surgery. Using ELISA, we identified 11 cytokines that correlate with increased RAA fibrosis. The capability of cytokines to induce fibroblast activation was evaluated using in vitro testing of human cardiac fibroblasts. Of these cytokines, IL-34 was observed to partially induce fibroblast activation but does

not result in complete myofibroblast differentiation. Furthermore, IL-27 does not independently activate fibroblasts, suggesting a potential reliance on paracrine signaling. To further elucidate the contribution of these cytokines to the fibrotic cascade, we are investigating the role of cardiac endothelial cells and macrophages in mediating fibroblast activation. Additionally, we are characterizing the activation potential of the remaining nine cytokines to better understand the secretory impacts of EAT on atrial fibrosis.
Our findings provide insight into the paracrine crosstalk between EAT and the myocardium, highlighting novel cytokine-mediated mechanisms of atrial fibrosis. Targeting these signaling pathways may offer novel therapeutic strategies for mitigating fibrosis-associated cardiac dysfunction.

Zhou, Kexuan

Faculty Mentor: Michelle L. Malkin

Does a higher prevalence of mental health challenges (e.g., anxiety or depression) correlate with increased gambling behavior in individuals?

The prevalence of mental health challenges, such as anxiety and depression, has been identified as critical factors influencing various unhealthy behaviors, including gambling, substance use, heavy alcohol consumption, binge eating, and smoking. These behaviors are often employed as coping mechanisms to manage emotional distress. However, gambling, as classified within the DSM-V-TR, has not received as much research attention, particularly in its association with mental health concerns. This study aims to examine the relationship between mental health symptoms such as depression and anxiety and gambling behavior. This study focuses on exploring how participants engage in gambling behaviors as a coping mechanism. Data were collected from the National LGBTQ+ Online Survey, measuring both mental health symptoms and gambling behaviors. The results of this study provide an understanding of the interplay between mental health, gambling, and for developing more effective prevention and intervention strategies to mitigate gambling-related harm.

Ahmed, Syed Anees
Faculty Mentor: Abdel A. Abdel-Rahman

Estrogen-Dependent Exacerbation of Ethanol-Induced Cardiac: Role of Circadian Clock Protein Period 2 Suppression and Ferroptosis Augmentation

Alcohol exacerbates cardiovascular dysfunction in females in an estrogen (E2)-dependent manner. While E2 confers cardioprotection in premenopausal women and experimental menopause models, its interaction with circadian clock proteins and ferroptosis in the female heart under ethanol (EtOH) exposure is still unexplored. We tested the hypothesis that suppression of the cardioprotective circadian protein Period 2 (Per2) contributes to E2-mediated exacerbation of EtOH-induced cardiac oxidative stress and dysfunction. Female Sprague-Dawley rats (n = 6–8) underwent bilateral ovariectomy (OVX) and received either EtOH (5% liquid diet) or a control diet, with or without E2 supplementation, for 8 weeks. Cardiovascular function was assessed using radiotelemetry and echocardiography, while the biochemical and molecular analyses evaluated underlying mechanisms. E2 treatment reduced the gain body weight and fat mass in OVX rats but lowered blood pressure in OVX+E2 and increased it in OVX+EtOH+E2. Echocardiography showed improved cardiac function in OVX treated with E2 alone vs. exacerbated cardiac dysfunction when EtOH was added to E2. Molecular analyses revealed higher Per2 expression, redox enzyme activity, GPX4 and cardioprotective microRNAs (1, 133a, 208a, 499) levels in OVX+E2, while suppressed Per2, glutathione depletion, GPX4 degradation, reduced cardioprotective microRNAs and ferroptosis markers were increased in OVX+EtOH+E2. E2 preserves cardiac function under physiological conditions but exacerbates EtOH-induced dysfunction via Per2 suppression, oxidative stress and ferroptosis. The loss of E2-mediated Per2 upregulation plays a critical role in ethanol-induced myocardial ferroptosis in E2-replete rats. These findings highlight a potential cardiovascular risk for menopausal women consuming ethanol while on E2 replacement therapy.
Keywords: estrogen, radiotelemetry, bilateral ovariectomy, blood pressure, cardiac circadian protein Per2, Ferroptosis, hemeoxygenase-1. Supported by NIH grant 2R01 AA14441-15

Asowata, Osahon
Faculty Mentor: Jessica Cooke Bailey

Sex and Race\Ethnic Differences in the Effect of Comorbidity on Glaucoma among Older Adults in the United States: Findings from the Health and Retirement Study

Glaucoma remains a major public health concern, with different risk factors affecting various demographic groups. While several studies have looked at individual risk factors related to glaucoma, none have explored the combined effects of multiple comorbid conditions on glaucoma, especially across different ethnic groups and between sexes. This study aims to assess sex-specific differences in the association of various comorbidities with glaucoma among different ethnic groups. This research utilized the multi-wave Health and Retirement Study conducted from 1995 to 2020. Participants aged 50 and older who had at least two follow-up waves of data and were glaucoma-free at baseline were eligible for the study. A total of 23,340 participants were eligible for this study. Participants self-reported their demographic characteristics, glaucoma status, and comorbid factors. The comorbid factors assessed in this study were diabetes, hypertension, stroke, arthritis, heart condition, and lung condition. We employed an adjusted time-dependent Cox proportional hazards regression model to evaluate the risk factors for glaucoma, considering a significance level of $P<0.05$. The mean age of the participants was 70.1±6.6, and 42.2% were male. At follow-up, the prevalence of diabetes, hypertension, stroke, arthritis, and heart and lung-related issues among participants with glaucoma was 31.6%, 71.4%, 14.6%, 71.9%, 37.4%, and 13.7%, respectively. Age was consistently associated with an increased risk of glaucoma across all groups. Comorbidity burden significantly influenced glaucoma risk, with variations by race and sex. Among White/Caucasians, risk increased at five comorbidities for females (HR: 1.44, 95% CI: 1.04–2.00) and six for males (HR: 3.62, 95% CI: 1.86–7.04). Black/African Americans showed elevated risk at four comorbidities for females (HR: 2.07, 95% CI: 1.18–3.63) and five for males (HR: 2.33, 95% CI: 1.21–4.47). Hispanic females had the highest risk at four comorbidities (HR: 3.02, 95% CI: 1.54–5.92). Glaucoma risk increases with comorbidity burden in all of the race/ethnicity and sex. Hispanic females with multiple comorbidities exhibit the highest risk. These findings highlight the importance of targeted screening and prevention strategies for high-risk populations.

Bench, Tristan

Faculty Mentor: Regina DeWitt

Luminescence Dating the Deposition Timelines of Alluvial Fan Sediments in Antarctica as a Proxy for Glacial Melt

The McMurdo Dry Valleys in Antarctica hosts a terrestrial record of glacial melt activity that can be used to research how glaciers in the region responded to past climate fluctuations in Antarctica. Such information can serve as a useful analog for contemporary glacial melting events and help better determine future glacial melt scenarios under a changing climate. Alluvial fans, which are sediment deposits that form at the end of streams and rivers, can help reconstruct glacier meltwater events by establishing a timeline of sediment deposition from glacial meltwater streams. To determine the timeline of sediment deposition from glacial meltwater events in the Dry Valleys, sediments were collected from alluvial fans in Taylor, Wright, and Victoria Valleys during the autumn 2024 semester. These samples will be analyzed using luminescence dating, a technique that measures the time since the sediments were last exposed to light, providing an estimate of their deposition age. Comparing these calculated dates of sediment deposition to past climatic information of the region can offer insight on how glaciers responded to past climate change and highlight the temporal significance of climate change on the landscape.

Bitzer, Graham

Faculty Mentor: R. Martin Roop

Characterizing the regulation of the genes encoding the Type IV secretion system in Brucella abortus by the quorum-sensing regulators, VjbR and BabR, with the H-NS-like gene-silencer MucR

Brucella abortus, the causative agent of brucellosis, is a Gram-negative bacterium that establishes chronic infections in cattle and humans. In cattle, B. abortus thrives in placental trophoblasts, which causes spontaneous abortion and infertility leading to economic loss. In humans, B. abortus establishes a replicative niche in monocytes and causes a prolonged febrile disease. B. abortus is a stealthy pathogen, able to evade destruction by the immune system leading to a chronic disease state. In order to establish prolonged infection, the bacteria are phagocytosed into an endosome within host cells, which becomes acidified leading to expression of a Type IV secretion system, which is encoded by the virB operon. The T4SS then allows the release of effector molecules, which promote trafficking to the endoplasmic reticulum for replication. The spatiotemporal regulation of the virB genes is key for wild-type virulence as overexpression, under-expression, and mistimed expression leads to attenuated virulence in mice and cultured mammalian cells. In a system where timing is critical, we expect there are multiple layers of regulation. Previous data from our lab and others have identified a repressive histone-like nucleoid structuring-like protein, called MucR, which acts as a global regulator of the B. abortus genome and repressor of the major virulence determinants to avoid their mistimed expression. We have previously observed MucR binding to the promoter of virB1 and the intergenic space between virB1 and virB2. In addition, others have previously observed the LuxR-like quorum sensing regulators VjbR and BabR binding upstream of the promoter of virB1. Currently, two promoters are suggested to control the expression of the virB operon. One lies upstream of virB1, the other upstream of virB2. Multiple regulators have been observed to control the activity of the virB1 promoter, however less is known about regulation of the virB2 promoter. We aim to build upon the evidence reported in the literature and experiments performed in our laboratory that suggest that MucR, VjbR, and BabR are working in concert to regulate expression of the virB genes in B. abortus 2308. We are currently employing biochemical and genetic approaches to determine the differential impacts of these regulators on the expression of virB1 and virB2 and how these regulatory relationships influence the virulence of this strain in experimental models.

Dale, Katherine

Faculty Mentor: Rebecca Asch

Eastern Pacific fish spawning patterns demonstrate mixed spatiotemporal tradeoffs in response to environmental changes

In response to changing ocean conditions, marine fishes may shift where they are (geography) and/or when they are present (phenology) during climatically-sensitive periods, such as spawning. Understanding the distribution and seasonal timing of larval fish occurrence is especially important, because small changes in mortality rates during the early life stage can lead to large changes in subsequent recruitment. In a changing ocean, these effects can become even more stark. We examined how fish with three adult habitat use patterns (groundfish, coastal pelagics, and mesopelagics) balance the tradeoff between shifting their geography or phenology in response to oceanic conditions during their early life history. We assembled larval fish abundance data from six long-term sampling programs covering the region between Baja California Sur, Mexico and the Gulf of Alaska. A unique aspect of this work is that it allows for range-wide modeling even though no single survey covers the distribution range of many of the target species. We modeled species distributions using a generalized linear mixed effects model that considers spatiotemporal autocorrelation (i.e., sdmTMB). Models examined salinity, sea surface temperature, spiciness, sea surface height, and bottom depth as potential environmental covariates. Analyses indicate that species tend to either shift both their spatial distribution and timing. Several life history characteristics predicted different phenological/geographic tradeoff metrics. With these results, we build capacity to assess climate vulnerability of marine fish species and determine the adaptive distributional capacity of commercially exploited and ecologically important fish to changing ocean conditions.

Swami Vetha, Berwin Singh

Faculty Mentor: Rukiyah Van Dross

Optimization and Evaluation of Pluronic F127 Micelles for Cancer Drug Delivery Applications

The development of efficient drug delivery systems is critical for improving cancer treatment outcomes. Pluronic F127 micelles offer a promising platform due to their unique properties and biocompatibility. 15d-deoxy, Δ12,14-prostaglandin J2-ethanolamide (15dPMJ2) is an investigational small molecule therapeutic with potent anti-cancer activity. However, its therapeutic efficacy is limited by neutralization by glutathione and sequestration in adipose tissue. The current study seeks to optimize and evaluate Pluronic F127 micelles to enhance the delivery and effectiveness of 15dPMJ2 in cancer treatment. To examine whether Pluronic F127 formed micelles efficiently the critical micelle concentration (CMC) was determined by performing fluorescence spectroscopy. To examine if Pluronic F127 was cytotoxic against cancer cells, its biocompatibility was assessed in cytotoxicity assays. Our findings demonstrate that the CMC of Pluronic F127 was 0.87 mg/mL, a value indicative of efficient micelle formation. We also observed that Pluronic F127 was not cytotoxic against B16F10 melanoma cells at concentrations of 10uM? or lower, suggesting its favorable biocompatibility. This study highlights the potential of Pluronic F127 micelles as a delivery system for 15dPMJ2 in cancer treatment. Future research will assess the efficiency of 15dPMJ2 drug loading and encapsulation to determine the feasibility of utilizing 15dPMJ2-loaded Pluronic F127 in animal tumor studies.

Adams, Kelly

Faculty Mentor: Christine Kowalczyk

Perceptions of AI-Generated Content: How College Students Feel about AI-created Content in the Field of Marketing

Artificial Intelligence (AI) is a tool that has become heavily integrated into the lives of many. Due to AI's popularity, its impact on marketing, specifically digital content creation, has become a topic of significant interest. The rapid advancement of AI technologies has enabled the creation of sophisticated graphics and content that can sometimes be indistinguishable from content produced by a human. This technological advancement presents a question in the field of marketing: do consumers care to know if the content they engage with is AI-designed? This study aims to investigate consumer perceptions and preferences regarding AI-designed marketing content, particularly whether consumers care to know if the content they engage with is AI-created. Through one-on-one interviews with 10-15 college students, this research will assess their awareness, trust, and preferences regarding AI-generated content in marketing. By examining consumer attitudes toward AI disclosure, this study may be able to provide insights for marketers to maintain transparency and ethical responsibility in AI-assisted content creation.

Adams, Lulea

Faculty Mentor: Fidisoa Rasambainarivo

Molecular Surveillance of Babesia sp Infection in Lemurs of Madagascar

Tick-borne diseases, particularly babesiosis, are an increasing health concern that threaten both wildlife conservation and public health. Babesiosis is caused by a tick-borne protozoan parasite from the genus Babesia that affects a wide range of vertebrate hosts. The parasite targets red blood cells, causing symptoms that can range from mild to severe and can lead to mortality. Babesia infections were recently described in endemic lemur species in Madagascar. However, little is known about the ecology and the epidemiology of Babesia in Madagascar's endangered primate community. This study investigates the environmental and host factors that may affect the distribution of this parasite in sympatric lemurs, with a focus on seasonal and species-specific variation. Coinciding with increased tick activity during dry seasons, we hypothesize that Babesia prevalence will be highest from October to March and lower in female and older individuals due to behavioral factors. Blood samples from seven different lemur species were collected over three years and screened for the presence of Babesia by molecular methods (qPCR). Preliminary results indicate a high prevalence of infection in lemurs. These findings highlight the importance of disease surveillance in wildlife, not only to support the persistence of lemur populations but also to evaluate the risk of potential pathogen spillovers across species.

Alkins, Scott

Faculty Mentor: Adam Offenbacher

Substrate-Induced Conformational Changes in Animal LOX's

Lipoxygenases (LOXs) are a family of iron enzymes that catalyze the peroxidation of polyunsaturated fatty acids to generate oxylipins, which in animals play essential roles in signaling. Human LOXs can also contribute to inflammation; as one of the six encoded LOX enzymes, epithelial 15-lipoxygenase-2 (15-LOX-2), is involved in the pathophysiology of atherosclerosis, a common form of cardiovascular disease characterized by a buildup of plaque along the walls of arteries. While the structures of many animal LOXs, including 15-LOX-2, have been solved, questions remain unanswered in understanding the mechanism of LOX catalysis due to conformational changes that may influence its activity. Calcium is an allosteric effector of animal LOXs that induces conformational changes promoting the translocation of the LOX to the phospholipid membrane. This allosteric effector increases activity by 4-fold. Differential scanning calorimetry was used to determine that, in the presence of calcium, the transition temperature increases by 1 ˚C, indicating that the calcium-dependent structural change stabilizes the 15-LOX-2 structure. To further probe these conformational changes, we performed limited proteolysis experiments in both the absence and presence of lipids. Limited proteolysis of 15-LOX-2 showed no impact of lipids on degradation. However, another animal LOX, coral 11R-LOX, which requires lipids present for activity, revealed a lipid-dependent increase in digestion of the enzyme. The data support a lipid-dependent change in conformation from a closed to an open conformation. Our results strongly support that protein flexibility, which is regulated by lipids and Ca2+, is essential for controlling LOX catalysis.

Armstrong, Alec

Co-Presenters: Lindsay Arnette
Faculty Mentor: Tara Van Niekerk

The Community Water Network: A Water Science Community Outreach Program

Water quality is a growing environmental concern (Boyd, 2019). Members of the public who are not scientifically trained often lack the tools and information to perform water quality testing themselves, leaving community members ill-equipped to participate in scientific and legal conversations (Burgos et al. 2013). The Community Water Network (CWN) is working to bridge the gap by engaging communities, specifically in Eastern North Carolina, on water quality issues by providing educational materials, free training, and resources that empower the people to become environmental stewards. The CWN is a part of a grant awarded to the East Carolina University's Water Resources Center, which is funded through the National Science Foundation's Coastlines and People (CoPe) project. We will determine the success of our citizen science model by tracking our membership metrics over time. These include the number of members over time and how often they report data. The CWN is open to adults and youth with permission and assistance from a guardian. We also host quarterly meetings where members can connect and share their findings. The CWN raises awareness and builds community capacity by supporting community members in gathering information and sharing their results with other members through various platforms. Interested individuals can apply through an online survey (powered by ArcGIS Survey123) to monthly training sessions to teach them how to collect and analyze water samples using CWN test kits. These kits measure key parameters such as pH, dissolved oxygen, nitrate, phosphate, and chloride. We test for these parameters because they are essential indicators of the health of a water body (Gorde and Jadhav, 2013), and they can convey clear and actionable information to community members (Burgos et al. 2013). All data received is recorded, stored, and reviewed. If a participant's results show significant deviations from environmental standards, they will receive feedback and may be advised to advance to a higher screening level. In its first 13 months, the CWN has successfully recruited seven members, many of whom report water quality data regularly. While the program has made notable progress, challenges remain, as the initiative is still in its early stages. We continue to refine and expand the program, working closely with our members to ensure its growth and effectiveness. Through their dedication to understanding and sharing local water quality issues, our members have played an essential role in advancing our mission to empower communities and promote environmental stewardship.

Arruza, Sophie

Faculty Mentor: Teresa Ryan

Cloud Coverage Estimation for Improved Atmospheric Acoustic Predictions

Weather is an important factor in atmospheric acoustic transmission loss over moderate distances, 1-10 km. One critical issue is cloud cover. This work focuses on measuring the cloud coverage at a costal location that also has permanent temperature logging masts and a wind speed profiling LIDAR which characterizes the coastal meteorological conditions. Improving cloud coverage estimates improves surface heat flux estimates, which in turns supports acoustic propagation modeling. The cloud cover is determined from photos which are analyzed in MATLAB using RGB filtering. Photographic data collected throughout July of 2023 will be presented. These photos were taken at intervals of 2 minutes, over the course of a day, under changing weather conditions. The simple RGB filter was successful for cases without rain throughout most of the day with the exceptions primarily occurring near sunrise and sunset. This work was supported by the Robert W. Young Award for Undergraduate Student Research in Acoustics.

Arthur, Elayna

Co-Presenters: Karigan Zaferatos
Faculty Mentor: Mi Hwa Lee

College Students' Perceptions of Older Adults

Research suggests that ageist beliefs may decrease college students' interest in gerontology. This is significant as we face a growing aging population in the United States. This study explored college students' perceptions of older adults and ways to improve negative perceptions of older adults and aging. A secondary data analysis was conducted using 120 photos and written reflections from undergraduate Introduction to Gerontology courses in Fall 2023 and Spring 2024. Students submitted two photos and narratives at the start of the semester reflecting their views on aging and older adults. Toward the end of the semester, students revisited their submissions to reflect on any changes they had in their thoughts on aging. Students also suggested ways to reduce negative stereotypes about aging/older adults. Thematic analysis identified key themes, including physical changes in aging, late-life activities, emotional well-being, relationships, and strengths of older adults such as wisdom. While most students reported that their overall perceptions did not change, they did report a deeper understanding of aging and older adults. To promote more positive views, students recommended increasing accurate media representation, expanding gerontology education, and encouraging intergenerational interactions. Suggestions for improving the assignment will also be discussed.

Atkinson, Aniah

Faculty Mentor: Brittany Baker

Nursing Student's Well-Being While In Nursing School

This study explores the primary sources of stress and burnout among students in a baccalaureate nursing program, investigates the relationship between stress, personal characteristics, and academic performance, and evaluates the effectiveness of coping strategies in mitigating academic stress. Nursing students face unique academic pressures, balancing rigorous coursework, clinical placements, and personal responsibilities, which may contribute to heightened stress and burnout. Common sources of stress identified in previous studies include workload demands, clinical expectations, time management challenges, and the emotional toll of patient care. In addition, personal characteristics such as self-efficacy, coping styles, and social support systems play a significant role in how students experience and manage stress. The study aims to provide insights into how individual differences, such as personality, resilience, and coping strategies, influence student outcomes in nursing education. Research suggests that students with high levels of perceived stress often report lower academic performance, leading to feelings of inadequacy, self-doubt, and burnout. Stress not only affects cognitive ability but can also impair emotional regulation and physical health, which interferes with students' ability to meet academic expectations. By understanding the connections between stress and personal characteristics, educators and institutions can better support nursing students by using teaching strategies and interventions that address both academic and emotional challenges. In response to academic stress, coping strategies have been shown to play a critical role in reducing the negative impacts of stress. This study examines the effectiveness of various coping mechanisms, for reducing stress and evaluates which strategies are most effective for nursing students in enhancing their academic performance and well-being. Ultimately, the findings of this research aim to inform interventions aimed at reducing stress and burnout, promoting resilience, and improving overall academic success in baccalaureate nursing programs. Through a deeper understanding of the stress process and how students can effectively manage it, nursing schools can create environments that foster both academic achievement and student well-being.

Azam, Sofia

Faculty Mentor: Nic Herndon

Breast cancer recurrence prediction with machine learning

The Oncotype DX test is a gene-expression test that gives the recurrence score to patients with breast cancer in order to help pathologists determine if intensive treatments such as chemotherapy would be beneficial. However, this genetic test is expensive. An alternative is to use whole slide images (WSI) of breast cancer biopsies to determine the recurrence score. These can be analyzed through machine learning models to construct these predictions. The biopsies can be hematoxylin and eosin (H&E) stained, a common method used to understand the morphological features of the tissue and used by machine learning models to extract and examine specific features. Indications of how recurrence scores are calculated can be found in these morphological and textual features extracted from the nuclei of the tumorous cells or can be found in the general regions in the tumor of the H&E WSI. One study used patches only from the cancerous region of the WSI to feed into a convolutional neural network (CNN) in order to predict a discriminative score (DS). This score represents how likely this patch will output a direct label of high risk or low risk. The patches with higher DS are then used to represent their respective WSI and used as input for a multi-instance learning model to get an overall prediction score for the entire image. Other parts of a biopsy from a breast cancer patient, however, such as the microenvironment and the non-cancerous cells of the tissue, could be essential in determining the prediction scores as well and increase the accuracy of models doing so. For example, there can be cases such as lobular carcinoma in situ or hyperplasia breast cancer in which cells can appear normal but are actually cancerous. Therefore, the cells of these non-cancerous regions are not analyzed by machine learning models that assign prediction scores to WSI breast cancer biopsies. We propose that including non-cancerous regions of WSI be used for analysis in machine learning models that predict breast cancer recurrence to increase the accuracy of predicting the recurrence scores.

Backues, Bryana

Faculty Mentor: Katrina DuBose

Influence of mom vs sibling on preschool-aged children's physical activity levels

Preschool-aged children (3-5 years) are not meeting the recommended physical activity levels. Families play a significant role in a child's physical activity. Previous studies have shown that parents and siblings impact children's physical activity levels. However, it is not known the contribution they have on the preschool-aged child's physical activity levels. This study aims to determine if mother or older sibling produces more physical activity in preschool-aged children. Further this study will quantify the types of activities preschoolers do when playing with either mother or older sibling and if the amount of activity is different. Twenty-six, mothers with at least two children participated in the study. The preschool-age child was between the ages of 3 to 5 years old and the older child was no more than 4 years older than the preschool-aged child. The preschool-aged child played with their mother for 20 minutes and after a short break they played with the older sibling for 20 minutes. The order of which the two dyads (preschool child:mother [PM] and preschool child:older sibling [PO]) played together first was counterbalanced. The play options were: a tunnel, padded obstacle course, combination tunnel/obstacle course, soccer, catch, ladder & polly spots, and sedentary items (books, coloring, Legos, or puzzles). During the play sessions everyone wore an ActiGraph accelerometer to measure physical activity levels. Also, direct observation was completed to determine which play options were occurring. The average age of the mothers was 37.0 ± 3.4 years, the preschooler was 3.6 ± 0.8 years, and the older sibling was 6.0 ± 1.4 years. The activity that both dyads spent the most time on was the tunnel/obstacle course and the amount of time was similar between the two dyads (PM: 794.50 ± 1383.07 seconds; PO: 563.04 ± 338.54 seconds; $p>0.05$). The sedentary activities were the 2nd play option that both dyads spent a lot of time at, but again there was no difference between the two dyads (PM: 543.06 ± 322.15 seconds; PO: 447.72 ± 302.92 seconds; $p>0.05$). When comparing the number of steps taken between the two dyads and the different play options, the step count was the similar between PM and PO for all the different play options ($p>0.05$). There were no significant differences in total steps per second or total time in seconds when the mom was playing with the preschool-aged child versus the oldest child playing with the preschool-aged child. Thus, the mom and oldest child have the same impact on the preschool-aged child's physical activity levels.

Bass, Coleman

Faculty Mentor: Bhibha Das

PIKE Performance: Fraternity Health Initiative

The health of college students is not an untouched topic; however, many previous studies look at the university as a whole or target subpopulations that are not focused on the population of fraternities. This discrepancy in research led to a question of the current standing of fraternity members within physical activity, nutrition, sleep, and substance use. These have been identified as indicative factors of rates of morbidity and mortality. PURPOSE: The primary goal of this study aims to examine the effects of peer-led interventions on physical activity, nutrition, sleep, and substance use behaviors. The Transtheoretical and Health Belief Model will be used to encourage the participants to promote physical activity, healthy nutrition, sleep, and limited substance use, utilizing peer influence to encourage positive health behaviors. The study will take place over an 8-week process, recruiting volunteers from the Pi Kappa Alpha Fraternity on the East Carolina University Campus. Our outcomes of interest will be changes in physical activity habits, eating habits, sleep hygiene/patterns, and reduced substance abuse. HYPOTHESIS: The study is predicted to produce an increased amount of physical activity; improvements in nutrition; enhanced sleep quality and a decrease in substance use among participants. This study could provide valuable insights into the health behaviors of fraternity members and the effectiveness of peer-lead interventions. If the hypothesized results come to fruition, this study can assist professionals with building tailor-made behavior change programs for college students - that utilize peer influence to encourage healthier behaviors. This study may also aid in highlighting the need for more research that addresses similar health effects from within fraternity members and campuses.

Benson, Naomi

Co-Presenters: Arhemy Franco-Gonzalez
Faculty Mentor: Robert Hughes

Optimizing Arginine for enantioselectivity in a Warfarin Synthesis

Warfarin is an important pharmaceutical compound that is characterized by its anticoagulant properties. The production of warfarin is vital to mitigate the symptoms and conditions of individuals who suffer from heart attacks, strokes, tachycardia, and other disorders caused by blood coagulation. The goal of this research is to investigate the capacity of commercially available arginine derivatives for the enantioselective synthesis of warfarin. This experiment is expanding on the work from 2023-24 Organic Chemistry CURE lab which found success of natural Arginine catalysts in enantioselective warfarin production. Methods used were designed to follow “green chemistry” ideology; meaning a focus on reduction of waste, conservation of energy, and developing new eco-friendly reactions. Using 9 L-arginine derivatives, separate warfarin reactions were created and allowed to run for a week. Thin Layer Chromatography (TLC), Flash Chromatography, and High-Performance Liquid Chromatography (HPLC) to determine, isolate, and assess the production of warfarin in each reaction. Chiral HPLC chromatography results were used to calculate the enantiomeric excess (ee) to determine the enantiomeric preference of each catalyst. While results from TLC and HPLC show that 5 of the derivatives are successful at warfarin synthesis, none showed significant or better production and/or selectivity for R-warfarin than unmodified L-arginine. Following this, an additional study with acetic acid was completed to see if changing the conditions of the reaction could enhance ee and/or the yield. Results from the acid study did not present any significant improvements.

Bickley, Charlotte

Faculty Mentor: April Blakeslee

Comparing population structure of a mud crab host and its parasitic barnacle to examine the spread of an invasive parasite

As a result of water temperatures increasing, many marine species have expanded their ranges northward. One example is the invasive marine parasitic barnacle, Loxothylacus panopaei, which has recently spread to Long Island Sound. This parasite infects the mud crab Eurypanopeus depressus, an essential mesopredator in marine ecosystems and vital to estuarine food webs. When infected, these crabs become castrated, preventing them from reproducing and rendering them "biologically dead". This parasite was accidentally introduced to the east coast in the 1960s, and due to rising water temperatures, has recently been able to establish further northward, thriving in areas that were formerly physiologically inaccessible. Population genetics is a powerful tool in invasion biology because it allows us to determine how a parasite becomes successfully established, track and assess the risks of the spread of an invasive species, and develop effective management strategies. To study this parasite-host interaction, we performed DNA extractions, PCR, and sequenced the mitochondrial marker COI of infected crabs and their barnacle parasites from 26 sites (10 in the native range and 16 in the introduced range). We compared the haplotype networks in both the host and the parasite to compare host and parasite population genetic structure. We found that the parasite showed evidence of a bottleneck, as expected due to its invasion history, while the host showed more potential evidence of gene flow than had been expected. Interestingly, our data showed surprisingly low diversity in Connecticut crabs (the northernmost community) when they were infected by the parasite. In addition to comparing host and parasite population structures, we have also investigated whether this observed trend in Connecticut is unique to that site or part of a larger pattern by additionally sequencing uninfected crabs from multiple sites. These techniques have allowed us to explore how host and parasite population structure differ, which will provide information regarding coevolution, how the parasite has successfully established in multiple populations, and any possible genetic isolation present in the different regions.

Blackwelder, Jay

Faculty Mentor: Michelle Malkin

Understanding differences in gambling behavior between sports wagers and other forms of gambling

It is evident that popular sports events, such as March Madness or the Super Bowl, attract large consumerism in Americans. Yet, there is little to determine the impact these events have on individuals and their wellbeing during these times, in relation to gambling. The rise in sports betting and other more traditional forms of gambling, such as card games and slots machines, has attracted a vast number of individuals to begin to participate more frequently in gambling activities. The impulse of sensation-seeking can cause individuals to potentially risk more money on bets, as well as affect other personal factors in their lives. By continuously enabling individuals with increased advertising of winning large by betting big, individuals can be persuaded to place large monetary contributions on acts that have small chances of winning. Studying these trends and impacts on citizens across all ages and demographics can show how mass media and pop culture can push individuals into acting on desires to achieve large payoffs. This will inform media advertisement on how to reduce or safely market gambling during sports events, while also allowing citizens to recognize the dangers of extensive gambling and learn how to gamble in a healthier manner during these addicting and attractive events in American culture.

Blackwell, Trey

Faculty Mentor: Michelle Henderson

Baseline Survey of Blount's Creek: Assessing Ecological Conditions Prior to Limestone Mining Discharge

Blount's Creek is an undisturbed waterbody in eastern North Carolina designated by the state as a nursery for salt-water species and a critical habitat for aquatic life. Blount's Creek is freshwater near its headwater, and due to the tides into the Pamlico River the lower portions are brackish-saline. This unique characteristic provides habitat for anadromous fish, salt water and freshwater organisms that produce offspring in this system. Recently, a company submitted plans to begin an open pit limestone mining operation in southern Vanceboro detailing the discharge of 6-million gallons of water each day (MGD) into two narrow tributaries of Blount's Creek totaling 12 MGD. The public has criticized this new operation for its potential to alter stream characteristics and ecological composition.
Sound Rivers requested that ECU WaterCorps survey flow, water quality, benthic species diversity, and stream morphology to have a record of Blount's Creek characteristics before the mining operation begins discharging water. We conducted flow measurements with a handheld flow meter using the 6/10 method. We measured water quality with YSI ProDSS handheld multiparameter meter and collected data on specific conductivity, turbidity, dissolved oxygen and pH monthly. During sampling we measured the water quality at the top and bottom of the water column at each site. We collected benthic macroinvertebrates and habitat assessments using the Swamp-Stream method outlined by the NC Department of Environmental Quality standard operating procedure during February 2025. Previous macroinvertebrate sampling occurred 3 different times in 2011, 2012 and 2018. The next sampling that is planned will be 5 years after the end of the permit (2030) leaving a 12-year gap between benthic macroinvertebrate samplings. It is important to record baseline data of the creek conditions before the discharge from the mine into the upper tributaries to understand any effects of the mining operation.

Boardman, Stavros

Faculty Mentor: Daniel Perrucci

Leveraging AI for Construction Quality and Safety Plans

The construction industry is labor intensive and requires significant human investment during the pre-bid and post-bid phases of construction, even if accounting for the technological advancement in construction software in the 21st century. If effectively implemented, the application of artificial intelligence can reduce labor requirements through the automation of the construction process, especially during the pre-bid phase. Quality plans and safety plans for construction projects are important processes to ensure compliance with government regulations. These safety and quality deliverables rely on specialized labor to commit work hours to develop holistic and accurate plans. This study aims to reduce the labor hours required to complete holistic safety and quality plans by leveraging AI to establish initial drafts of each plan for review and finalization. Furthermore, using AI to jumpstart the process of quality and safety, the labor allocated towards the initial drafting of these plans can be reallocated to increase efficiency in other aspects and phases of the project. The application of AI during the pre-bid phase of construction requires verification for effective implementation, especially for quality and safety plans where consequences can be significant governmental fines or significant human injury/loss. This study utilizes Chat-GPT to create a quality and safety plan for a residential construction project and evaluates the conclusiveness of the developed plans with industry standards. The results will detail the accuracy and depth of the created plans enabling recommendations for implementing the technology.

Boger, Claire

Faculty Mentor: Sandra Morris

Nursing Retention Strategies in the Acute Care Setting

The ongoing nursing shortage presents a critical challenge to healthcare systems globally. The aim of this study was to identify the retention strategies discussed in literature that had the greatest impact on nursing retention. Increased patient loads, occupational stress, and burnout contribute to nurse retention, further exacerbating staffing shortages and financial costs. This integrative literature review examines the primary factors influencing nursing turnover and identifies effective retention strategies to mitigate this issue. Key determinants of turnover include lack of organizational support, compassion fatigue, and inadequate onboarding. The review identifies preceptorship and mentorship programs as the most effective strategies for mitigating turnover intention. Adjustments in leadership styles and enhanced organizational support rank next as the most influential factors in improving retention. Additionally, it finds that promoting professional networking and social support can alleviate compassion fatigue and enhance job satisfaction. Organizational healthcare leaders can use this information to combat the issue of nursing retention.

Bolles, Cameron

Faculty Mentor: April Blakeslee

Exploring host-parasite relationships of the parasitic isopod Aporoboyrus curtatus in green porcelain crab (Petrolisthes armatus) populations within the crab's invaded range from Florida to North Carolina

The green porcelain crab (Petrolisthes armatus) has a wide geographic range, spanning the eastern Pacific (Gulf of California to Peru), the western Atlantic (Florida to Brazil), and the eastern Atlantic (Senegal to Angola). These subtidal/intertidal filter-feeding crabs inhabit oyster reefs, salt marshes, mangroves, and rocky substrates. Since the 1990s, P. armatus has expanded northward due to warming waters caused by climate change. This species is one representative of the "Caribbean creep," which describes the poleward movement of tropical marine species in the western Atlantic. By 2018, its non-native range extended from south Florida to mid-coast North Carolina. Nonindigenous, range-expanding species can alter host-parasite dynamics in invaded ecosystems, including amplifying existing parasite populations by serving as competent hosts. This highlights the importance of exploring parasitism trends in P. armatus by the marine bopyrid Aporobopyrus curtatus, which is present in the crab's native and non-native range. In summer and fall 2024, P. armatus samples were collected from Florida, Georgia, South Carolina, and North Carolina. My research aims to investigate the prevalence of A. curtatus in non-native porcelain crab populations and determine the size and sex of hosts most frequently infected. We have found that infection prevalence is lower in populations at the leading edge of the range compared to those in the cryptogenic range (southern FL). Based on previous findings in native populations, we expect mature crabs under 6 mm carapace width to have higher infection rates. This research will enhance our understanding of host-parasite interactions in P. armatus from a biogeographic perspective.

Bond, Colbie

Faculty Mentor: Eric Wade

Drivers of Support for Marine Energy Development in North Carolina

North Carolina is rapidly moving towards the development of renewable energy sources, including marine energy. However, there is limited understanding of the variables that contribute to the public's support or opinions about marine energy. In North Carolina, there is very little research on the variables that may influence stakeholders' support for the development of marine energy. If we do not understand the drivers behind stakeholders' support, it may affect their acceptance of marine energy. Therefore, this project sought to explore how and to what extent demographics may influence North Carolina resident's support for marine energy introduction. We asked, "How the concerns of North Carolina residents towards marine renewable energy impacted support for development." This project used surveys of residents and visitors to the Outer Banks, North Carolina during the summer of 2024. Analyses were conducted to explore the relationship between types of concerns and participants' support for marine energy. Preliminary results showed that political orientation was the strongest demographic factor influencing support for development of marine renewable energy in North Carolina. It also showed that whether participants were visitors or residents of the Outer Banks did not have a significant relationship with their support for marine energy development. Through the understanding of stakeholder opinions policies and regulations can be created that consider concerns for marine energy development. Without knowledge of stakeholder opinions, policies and regulations would be flawed, hindering the development of marine energy in North Carolina.

Boyd, Keifer

Faculty Mentor: Davidson Gillette

Exploring High School Athletics through an Accounting Perspective

High school athletics play an important role for students, encouraging teamwork, physical and mental development, and community involvement with the school. Nevertheless, there can be challenges with the accounting and internal controls of high school system athletics. This project examines several financial settings of importance in the high school athletic environment through an accounting lens, including funding for high school athletics, budgeting, the profitability in athletics, assets, and internal controls. The project will investigate how these high schools get the funding (internal and external), the allocation of the funding, and sustainability of the program. Drawing on personal experience, secondary research, and other sources, this project seeks to study the application of accounting principles and funding strategies that ensure success and accessibility of high school athletic programs. The findings from this study will help with an overall understanding of how accounting concepts work in high school athletics and provide suggestions for improvements.

Brockman, Kendall

Faculty Mentor: Bhibha Das

Barriers to Resistance Training in College Women

This study examined the barriers college women faced in engaging in strength training at fitness facilities. Participants were recruited through email, flyers, and social media across multiple universities (N = 33). Demographic measures taken included age, race, grade classification, university currently attended, weight, height, zip code, Greek life affiliation, first generation, residential category (on-campus, off-campus, or commuter), major, and career goals. In the previous exercise experience section, participants were asked if they currently exercised, as well as how many times per week they utilized a fitness facility. In the barriers to strength training section, participants rated 12 questions (adapted from Peters et al., 2018) on a scale from 1 to 5, with 1 being strongly disagree, and 5 being strongly agree. These statements covered social, time, physical, and experiential barriers. Data was analyzed using SPSS. Demographic measures were analyzed using descriptive statistics. The barriers to strength training data was analyzed using mean and standard deviation of total responses. It was found that time barriers as a category were the most prominent among participants. The largest individual barrier was "I feel uncomfortable in a crowded gym" (4.1 ± 1.1). The least impactful category of barriers was experiential. The least impactful single barrier was "my friends will think I'm weird" (1.7 ± 0.8). The mean and standard deviation of each barrier type was measured. Social barriers had a mean and standard deviation of 3.2 ± 1.4. Time barriers had a mean and standard deviation of 3.5 ± 1.0. Physical barriers had a mean and standard deviation of 3.3 ± 1.2. Finally, experiential barriers had a mean and standard deviation of 2.9 ± 1.4. Resistance training has several benefits regarding mental health, cardiovascular health, body composition, and other significant health markers. By understanding that time, or perceived time, is the most prominent barrier for college aged-

women resistance training, more effective interventions could be staged to create a healthier community. Creating new ways to get women more involved in resistance training begins with understanding the needs of the population. From this research, a better understanding of the current barriers to RT in college women can allow for changes in the way Universities market their fitness facilities. By focusing on the positive impact short bouts of exercise and resistance training have on mental and physical health, more women may be encouraged to use the facilities for resistance training. The least perceived barrier from this study was experiential. Currently, funds and marketing efforts are largely spent on experiential barriers. By redirecting some of these funds and efforts to education regarding shorter bouts of exercise, and how to fit them into a working day, a greater impact could be achieved.

Brooks-Farrar, Savannah

Faculty Mentor: Virginia Driscoll

The Effects of Music Relationship on College Musicians and Athletes Over Time

Musicians and athletes both have a dynamic relationship with music that changes over time, especially at the collegiate level. Both populations have music present in their collegiate lives, from training to rehearsals. Music has a positive and negative impact on both musicians and athletes. For athletes, music has been effective in increasing performance power and reducing exertion, but it has also been countered that music can decrease perceived effort (Boolani et al., 2019). Music students develop numerous skills and a strong relationship with music during their time at a university, but they also experience increased stress and burnout from their workload (Jääskeläinen, 2023). The purpose of this study was to compare how the participants' relationship with music evolves over time at the collegiate level, where musicians and athletes spend most of the time in their respective fields. Participants include musicians and collegiate athletes (not club/intramural teams) at East Carolina University. Participants completed in a 15-minute survey to develop an understanding of their relationship on a basic level by using a 5-point Likert scale as well as questions about their relationship with their sport or instrument. Participants were also invited to engage in a focus group based on their respective category to allow for a deeper understanding of their relationship with music, using an explanatory design.

Brown, McKyrah

Faculty Mentor: Xian Wu

Impact of micro- and nanoplastics on heart development in an in vitro testing battery

Micro- and nanoplastics (N-MPLs) are present everywhere in our environment and have a long-lasting effect on human health. Plastic waste breaks down into N-MPLs. N-MPLs are found in the placenta and fetal meconium and can cross barriers in the placenta and the brain. Previous research suggests that N-MPL exposure is linked to congenital heart failure. However, the mechanisms of the size-dependent effects are not clear. Since animal models have limitations for replicating human heart development, we will use human stem cells for cardiomyocyte differentiation and organoid formation to mimic human early-stage heart formation. This study investigates the size-dependent effects of polystyrene N-MPLs on key cellular and molecular events during prenatal heart development using 2D and 3D human induced pluripotent stem cell (iPSC)-derived cardiac models. Cells were exposed to different sizes (0.08, 0.8, and 8 μm) and concentrations (0-100 μg/mL) of polystyrene N-MPLs at the different stages of cardiac development. In the 2D cultures, the impact of N-MPLs on mesoderm formation, cardiomyocyte differentiation, proliferation, and maturation were assessed. In 3D cardiac organoids, the effects of N-MPLs on the beating frequency and amplitude will be analyzed using video from live cell recording. The data indicated that 0.08 μm N-MPLs suppress NKX2-5 and TBX5 expression in 2D iPSC-derived cardiomyocytes, while different N-MPL sizes exhibit size-dependent effects on proliferation. The research provides insights into the mechanisms by which N-MPLs disrupt early human prenatal heart development. This will contribute to a better understanding of the potential risks of N-MPL exposure during pregnancy.

Bryant, Tyler

Faculty Mentor: Chuck Tanner

EPOC Substrate Metabolism AT/RT

This study investigates the effects of aerobic and resistance exercise on excess post-exercise oxygen consumption (EPOC) and substrate metabolism. EPOC refers to the elevated oxygen uptake and metabolic rate that occurs after exercise as the body works to return to its resting state, including replenishing energy stores, repairing tissues, and clearing metabolic byproducts. As a result, EPOC leads to increased calorie burn and changes in how fats and carbohydrates are utilized by the body. This process is particularly relevant for designing exercise interventions that improve metabolic health and performance. Prior research has suggested that resistance exercise often results in a larger and more prolonged EPOC compared to aerobic exercise, likely due to the greater physiological demands of muscle repair and recovery. However, there are inconsistencies in the literature, and further investigation is needed to better understand these dynamics. In addition to EPOC, respiratory exchange ratio (RER) and fat oxidation are important markers of substrate metabolism. Aerobic exercise is often linked to a faster recovery of RER, indicating a quicker shift back to fat metabolism after exercise, while resistance exercise has been associated with higher fat oxidation during recovery. This study aims to measure and compare the EPOC responses, RER, and fat oxidation rates following both aerobic and resistance exercise bouts. Advanced metabolic analysis tools will be used to assess these factors in order to provide a more complete understanding of how different exercise types influence post-exercise recovery and energy utilization. The research addresses gaps in current knowledge, as previous studies have focused on either aerobic or resistance exercise in isolation without directly comparing their effects. Furthermore, many studies have not fully explored how EPOC and substrate utilization differ in response to various exercise modalities, especially among individuals with different fitness levels or health goals. By comparing these two exercise types, this research aims to clarify the mechanisms behind EPOC and substrate metabolism, which could help improve exercise recommendations for a variety of populations, from those aiming for weight loss to athletes seeking performance gains. Ultimately, the study seeks to refine exercise programming to enhance the effectiveness of training interventions and contribute to a better understanding of exercise-induced metabolic recovery.

Buford, Aaliyah

Faculty Mentor: Christyn Dolbier

College Students' Interest, Barriers, and Preferences for Trauma-Sensitive Yoga Programs based on Trauma Type

Trauma is broadly defined as exposure to actual or threatened death, serious injury, or sexual violence, which can lead to post-traumatic stress disorder (PTSD; American Psychiatric Association, 2022). Examples of events that are often considered to be traumatic include natural disasters, transportation accidents, physical and sexual assault, life-threatening illness or injury, sudden violent death, and combat exposure. Approximately 67-85% of college students report experiencing at least one potentially traumatic event (Cusack et al., 2019), with PTSD prevalence among this population increasing from 3.4% in 2017-2018 to 7.5% in 2021-2022 (Zhai & Du, 2024). Most college students are in the developmental period of emerging adulthood (ages 18-29), marked by uncertainty, instability, and identity development. It is a period of mental health vulnerability due in part to exposure to various stressors. Despite the availability of mental health services on college campuses, barriers such as stigma, long wait times, and limited tailored treatment options remain of concern (Johnson et al., 2023). Trauma Center Trauma-Sensitive Yoga (TCTSY; Emerson et al., 2009) is an evidence-based clinical intervention designed to support individuals who have experienced trauma by integrating gentle movement, breath awareness, and invitational language. The practice emphasizes creating a sense of safety, reconnecting with the body, easing the physiological impacts of trauma, and promoting overall well-being and fostering self-agency. TCTSY has been increasingly recognized as a complementary approach to traditional trauma treatments. To our knowledge, little research exists about college students' interests, barriers, and preferences for trauma-sensitive yoga (TSY) programs, and no research has examined differences in these outcomes based on trauma type. Therefore, we plan to explore college students' interests, barriers, and preferences for TSY programs based on trauma types. This research is important to not only explore additional types of mental health support for college students but to design programs tailored to the specific needs of different trauma survivors. This presentation reports on a secondary analysis from a study examining how college students' interests, barriers, and preferences for TSY programs. Participants were undergraduate students at a southeastern public university. They completed an online survey. Trauma exposure was assessed

using the Life Events Checklist for DSM-5 (Weathers et al., 2013). Interest, barriers, and preferences for TSY programs were assessed with items based on previous literature. Results will be provided during the presentation. Findings may help inform universities about diverse mental health options.

Burchett, Jordan

Faculty Mentor: Jeannie Golden

The Effects of Systemic Racism: How the Behavioral Perspective Can Facilitate Prevention and Intervention

Systemic racism contributes to marginalized status for students of color and often results in a disproportionate number of students of color receiving discipline referrals. The behavioral perspective includes consulting that empowers teachers to improve behavior and dealing with challenging behavior through functional assessment and function-based intervention. Using behavioral strategies, marginalized status can be avoided, and students of color can thrive and be successful in school

Butcher, Madison

Faculty Mentor: Dr. Matthew Walenski

Semi-automated measurement of vowel formant centralization to assess acquired apraxia of speech from narrative samples.

Adult-onset apraxia of speech is an acquired motor speech disorder that disrupts the motor planning of the articulators needed for speech. One method that has been applied to detect apraxia of speech in children is based on the measurement of Vowel Formant Centralization. Formants are acoustic properties of vowels and are related to the position of the articulators when producing speech. When articulation is impacted by certain cognitive and speech disorders, vowels become less distinct, in a phenomenon known as vowel formant centralization (VFC). In this study, we use semi-automated processing of the narrative samples of 17 healthy individuals, 10 individuals with aphasia, and 4 individuals with known apraxia of speech to attempt to assess the presence of speech apraxia. These samples came from larger datasets of healthy individuals (Wright and Capilouto, 2017) and individuals with aphasia and apraxia of speech (MacWhinney et al., 2011). Processing of additional samples is ongoing. To measure the position of each vowel within the narrative sample, we used advanced technology called the Montreal Forced Aligner (Montreal Forced Aligner 3.0.0 Documentation, 2018). The Montreal Forced Aligner is an AI-based speech timing system, to collect precise timing information for the onset and offset of every vowel in the narrative sample, and then used Praat to measure the first and second formants at the midpoint of every instance of /i/, /ɑ/, and /u/ that each participant produced. We average the values for the 1st and 2nd formants for these three vowels and compute their formant centralization ratio (FCR; a measure of the degree to which the formants are centralized in vowel space). Based on prior research, we expect that the FCRs for the participants with acquired apraxia of speech will be higher than those of the healthy individuals or the individuals with aphasia, consistent with impaired articulatory planning. We also predict that the variability among the formant measurements should be higher for each vowel in individuals with apraxia of speech than in the other two groups, consistent with the variable nature of planning deficits in speech apraxia. Data analysis is currently in progress for these 31 narrative samples. Through this research, we hope to provide a novel method to assess the presence of speech apraxia in naturalistic speech samples using semi-automated measurement techniques.

Butler, Brooke

Faculty Mentor: Dr. Randall Etheridge

Wetland Design Tool for Wastewater Treatment

Excess nutrients in wastewater pose environmental risks but conventional methods of removal are expensive and not available in underdeveloped parts of the world. Constructed treatment wetlands offer a more accessible, affordable, and sustainable solution for nutrient removal. This study explores the development and application of a spreadsheet-based design tool to optimize wetland cell sizing and efficiency that does not require formal training in wastewater treatment. The tool utilizes the first-order P-k-C* equation to model nutrient removal efficiency, calculate hydraulic loading rates, and determine cell dimensions required for effective treatment. A case study application demonstrates the tool's practicality for evaluating the use of wastewater treatment wetlands for addressing environmental challenges.

Byrd, Myles

Faculty Mentor: Kelli Russell

Enhancing Vision Care: The Critical Role of Retinal Imaging for Women and Children

When it comes to eye care, there are multiple key features with many of these being at the back of the eye, also known as the retina. These features include the fovea centralis, macula, optic nerve, etc. But how is a healthy retina differentiated from an unhealthy one if it is not able to be seen with the human eye? This is what makes retinal imaging so important. Retinal imaging includes procedures such as OCT scans and Fundus photography that can clearly see the back of the eye and detect any irregular development or activity. The retina has no pain receptors, so if a disease such as macular degeneration begins to develop it could go undetected for years, and the patient would not be able to notice until it starts to affect their vision which in some cases can be irreversible. In women, ocular diseases are more prevalent than they are for men with a lot of these diseases being age related. According to an article published by BMC Public Health, cataracts are among the leading causes of visual impairment across the globe and are directly correlated with age. Ocular diseases can occur within children as well; an example of this would be Retinopathy of Prematurity (ROP). ROP is an eye disease that can occur when babies are born premature, or if they weigh less than 3 pounds at birth, which results in growth of abnormal blood vessels in the retina. These ocular diseases are just two examples that can be easily detected with retinal imaging.

Campbell, Emma

Co-Presenters: Ava B. O'Neill, Labdhi A. Shah
Faculty Mentor: Mitzi Pestaner, Susan Lally, Candice Jenkins

Equine Assisted Learning to Reduce Burnout, Perceived Stress, and Promote Resilience

Nursing students and professionals frequently experience decreased resilience due to the demanding nature of their academic and professional responsibilities. The transition from nursing school to professional practice does not alleviate these stressors, as nurses continue to face significant emotional and physical challenges, including high workloads, resource limitations and difficulty coping with patient hardships. These conditions contribute to anxiety, depression, and job dissatisfaction, ultimately affecting patient care. Resilience has been identified as a key factor in mitigating stress and burnout, making it essential to implement resilience-building interventions early in nursing education. Equine-Assisted Learning (EAL) has shown promise as an effective strategy for stress reduction and resilience development. This study aims to examine the impact of a six-week Resilience Equine Assisted Learning (REAL) intervention on stress, burnout, and resilience among Bachelor of Science in Nursing (BSN) students. Using a quantitative research design, senior BSN students (n=16) enrolled in a mental health clinical rotation participated in the intervention. The intervention consisted of six non-riding EAL sessions designed to enhance resilience and coping strategies. Quantitative data was collected using the Connor-Davidson Resilience Scale, Maslach's Burnout Inventory for Students, and the Perceived Stress Scale. Analysis is ongoing and results are pending. Existing literature supports the effectiveness of outdoor experiences and animal-assisted interventions in promoting well-being and reducing stress. Studies indicate that EAL fosters mindfulness, emotional regulation, and problem-solving skills, which may enhance resilience in nursing students' mental health and professional longevity. The findings of this

research will inform future educational interventions aimed at reducing burnout and improving student well-being. Addressing stress and burnout early in nursing education through EAL may result in a more resilient nursing workforce, ultimately benefiting both healthcare professionals and patient outcomes. Implementing resilience-focused strategies has the potential to improve job satisfaction, reduce turnover rates, and enhance the sustainability of the nursing profession.

Cannon, Kaitlyn

Faculty Mentor: Courtney Baker

Could I be High Potential? The Role of Perceived Learning Agility in Different Aged Workers

As the population in the workforce continues to grow and more people stay within the workforce longer (Cummins et al., 2015), additional research is needed regarding how perceptions of age may impact an employee's promotability. Many workplaces use high potential programs to deliver career mobility to those who may have otherwise not received it (Juhdi et al., 2012). High potential employees are those who have consistent great performance, and whose skills are high in value, and bring a unique perspective to their organization (Juhdi et al., 2012, Lewis & Heckman, 2006). While age discrimination is not a new issue in the workplace, attention is still needed on how age discrimination affects older workers based on negative stereotypes (Davey, 2018). Learning agility and cognitive ability are often used to determine an employee's suitability for high potential programs. However, these criteria may unintentionally contribute to age discrimination. Learning agility is the ableness and willingness to learn from an individual's experiences and the ability to apply learned knowledge to different situations (Handayani et al, 2021), while cognitive ability is how effectively someone can learn, process, and use the information in their role (Finkelstein et al., 2015). Older workers who perceive low levels of discrimination report higher learning agility (Deepa et al., 2021) and as people get older their cognitive abilities; such as their processing speed and capacity for work decrease, making it more difficult for older workers to think about situations in their work setting like problem solving (Handayani et al., 2021). Drawing on future directions from prior studies (Finkelstein et al., 2015), this study explores how participants may designate someone to a high potential program based on age-based assumptions when presented with scenarios that include varying characteristics that demonstrate high or low levels of learning agility and cognitive ability.

Cannon, Chloe

Faculty Mentor: Dr. Alice Richman

Enhancing Digital Equity in Eastern North Carolina

In Eastern North Carolina (ENC), there is a disparity in technology access, with fewer than 25% of households having broadband internet in 18 of ENC's 29 counties. This project aims to address this disparity through a digital equity initiative targeting 18 counties in ENC. Through partnerships with community organizations and community health workers, the program delivers digital literacy training sessions and initiated digital library lending programs to improve digital literacy and access to digital technology among residents. By improving digital literacy and access, residents should have improved opportunities and the knowledge to navigate healthcare services and find/use the proper resources. The purpose of this study is to evaluate the effectiveness of the training session through quantitative analysis using pre-and post-surveys provided before and after each training session. Participants' responses will be analyzed to assess knowledge and self-efficacy in using technology before and after the training sessions. These trainings are expected to increase participant skills in using digital technologies and higher comfort levels in accessing resources. Findings from this study will provide valuable insights into the effectiveness of these training programs in rural communities.

Carroll, William

Faculty Mentor: Nathan Hudson

The effects of hypofibrinolytic defects on the digestion of blood clots.

When blood is exposed to the air, the injured area starts to form a blood clot also, referred to as a thrombus. This is to prevent blood loss, and entry to any dangerous microbes. The formation of the thrombus starts with the enzyme thrombin which reacts with fibrinogen, a soluble protein, to it turn into fibrin, an insoluble protein, these fibrin molecules then link together to form fibers. These fibers form a structural gel that traps platelets and other blood cells to form the rest of the clot. When the thrombus is no longer needed a process known as fibrinolysis starts. Fibrinolysis starts with plasminogen being activated and becoming plasmin. This plasmin cleaves the fibers and digests the clot. However, some individuals have hypofibrinolytic defects. A hypofibrinolytic defect is a condition where fiber digestion is halted by resistance in some part of the lysis process. The specifics of how this halts fibrinolysis is still unknown. This research aims to understand the specifics of the effect that hypofibrinolytic defects have on fibrin fibers. To analyze these fibers clots of plasma from patients with hypofibrinolytic pathologies are formed on microscopic ridges by combining thrombin, plasma, and Alexa-488 dyed fibrinogen. To speed up fiber linkage the sample will be incubated at 37 C. The clot will then be removed, to leave only the fibers close to the ridges. Then plasmin will be added, and the fibrinolysis process will be recorded using an inverted fluorescent microscope. This recording is then analyzed to determine the digestion mechanisms. Preliminary results will be presented.

Carte, Hannah

Faculty Mentor: John Reisch

AI and the Detection of Deceptive Speech in Fraudulent Behavior

Deception is a critical element in fraudulent activities, which often leads to psychological stress known as cognitive dissonance. This research explores the connection between deception and cognitive dissonance, examining how the mental discomfort associated with deceit presents itself in vocal irregularities. By reviewing psychological studies on cognitive dissonance and its impact on speech patterns, such as pitch variations, speech hesitations, and changes in vocal tone, this study aims to establish a link between deception and measurable vocal cues. It also examines the potential of artificial intelligence (AI) to detect these irregularities and identify deception. By reviewing AI-driven speech analysis tools and their ability to recognize deceptive speech patterns, this research aims to assess their effectiveness in fraud detection. The findings will contribute to the development of more advanced AI-driven fraud prevention systems by demonstrating how vocal changes linked to deception can serve as reliable indicators of fraudulent behavior.

Chan, Christine

Faculty Mentor: Rebecca Asch

Microplastic settlement across a salinity gradient in the Pamlico Sound

Microplastics are found in almost all ecosystems on Earth. They pose a threat to organisms through accidental ingestion, bioaccumulation, or by concentrating toxins in the water, such as endocrine disruptors. While it is known that rivers transport a great amount of microplastic into the ocean, microplastic movement and settlement in estuaries is not well understood. Increased salinity can increase the benthic accumulation of microplastics due to flocculation, where the ionic activity in the water causes microplastics and suspended material to form dense clumps that settle to the bottom of the water column. We collected surface water and benthic sediment samples across a salinity gradient (2-7 psu) during two research cruises at the juncture of the Tar-Pamlico River and Pamlico Sound in April 2024. Our goal was to determine if increased surface salinity led to increased benthic microplastic due to settlement. Microplastics were isolated through wet peroxide oxidation, density separation, Nile Red dying, fluorescence microscopy, and counted using ImageJ with the MP-VAT2.0 macro. Preliminary analysis of surface microplastic revealed that microplastic particles of sizes <250 µm in ferret diameter ranged between densities of 0.6-7.3 pieces/m3 with no correlation between salinity and microplastic at the surface. Benthic microplastic analysis is still underway. We hypothesize that other factors, such as rainfall, speed of water flow, and depth, may also impact microplastic accumulation in the Pamlico Sound. This research combines several methods of microplastic isolation and

provides insight into the quantity of microplastic that moves through the Pamlico Sound. These findings may guide future efforts to remove microplastic from estuaries.

Christman, Gillian

Faculty Mentor: Courtney Baker

More than a phase: The impact of sexual orientation, age, and prescriptive stereotype violation on coworker perceptions

As LGBTQIA+ (people attracted to same-sex persons or possess diverse sexual orientations and gender identities) employees gain visible workplace representation, more research is needed to explore how workplace relationships change when employees are open about their sexual orientation (Alvarado et al., 2023). Based on the tenets of expectancy violation theory (Burgoon, 1978), prejudice may be attached to those without traditional sexual orientations at work because of violated expectations from other employees that do not match the view of a "stereotypical worker". Despite increasing acceptance of LGBTQIA+ identities (Eagly et al., 2020), workers open about their identities may still face a backlash. Understanding the ramifications of such backlash is imperative to fostering inclusive workplace environments. Research indicates that individuals' social cues that seem "gay" might impact promotion opportunities or being placed into stereotypical roles (Barrantes et al., 2018; Fasoli et al., 2020). Diverting from norms of society through perceived violations of gender roles such as gay men being more feminine or lesbians being more masculine (Lehavot et al., 2007), these expectations may be a function of the employee's age. Younger "out" workers may be perceived as less violating of stereotypes compared to older workers (Hanrahan et al., 2023). Prescriptive stereotype theory suggests that workers engaging unexpected behaviors based on their social identities, may receive negative reactions towards their character (seeing them as less competence and less warm), which may subsequently lead their coworkers to ostracize them. Replicating and extending Hanrahan and colleagues (2023) and evaluating a new outcome of ostracism (Liu, 2019), the current study will evaluate the extent to which these violations further impact employees. The study examines how age and sexual orientation affect coworker perceptions via age-prescriptive stereotypes. Drawing on prior research (Hanrahan et al., 2023; Barrantes et al., 2018), we hypothesize that sexual orientation interacts with prescriptive stereotype violations, and target age to influence perceptions of age-prescriptive stereotypes and target perceptions of warmth, competence, and ostracism intentions, with stereotype violations being exacerbated or minimized by diverse sexual orientations. Utilizing CloudResearch's Connect, 500 full-time workers will respond to a vignette adapted from Hanrahan et al. (2023) in a 2 (age: young versus old) x 2 (sexual orientation: gay versus straight) x 2 (violating prescriptive stereotypes: yes versus no) experimental design. Data will be collected from participants of diverse age groups and full-time employees to generalize to broader workplace environments. Results from this study will be a helpful addition to manager's knowledge of working with and supporting diverse groups of employees.

Cimmerer, Aryn

Faculty Mentor: Mitzi Pestaner

Honors College Students in Nursing School: Exploring the Cause of Attrition Rates

The nursing profession faces a critical shortage of registered nurses, exacerbated by a high national dropout rate of 20% in nursing programs and an aging workforce. The demand for nurses is projected to increase by 6% from 2022 to 2032, adding over 177,000 nurses to the workforce, but this will not be enough to fill nearly one million open positions. This shortage leads to compromised patient care, including errors, higher morbidity and mortality rates, reduced patient satisfaction, and increased nursing turnover. Among nursing students, those enrolled in Bachelor of Science in Nursing (BSN) programs who are also in Honors College programs may be at a higher risk of attrition. First-semester Honors College students often struggle with social challenges, emotional stress, and unrealistic expectations, which may contribute to their higher dropout rates. These issues, although not specific to nursing students, are also relevant for nursing students, who may face similar difficulties, such as a lack of psychological resources to manage the demands of the program, high academic expectations, limited support from faculty, and misconceptions about the nursing profession. The overlapping challenges faced by both Honors College and nursing students suggest a unique set of pressures that may contribute to higher attrition rates for those who belong to both categories. This intersection warrants further investigation to better understand the specific challenges these students face and to develop strategies to improve retention rates in nursing programs, ultimately addressing the

broader issue of the nursing shortage. The purpose of this study is to explore the perspectives of senior BSN Honors College students about barriers and facilitators to completing a BSN program while enrolled in the Honors College program.
This will be a qualitative study in which one 45-minute focus group will be conducted consisting of a convenience sample of 5-7 senior Honors College BSN students, with oversite by the faculty mentor, Dr. Mitzi Pestaner. Students will be asked about barriers and facilitators of being enrolled in the Honors College program in completing their nursing curriculum. If awarded URCA funding, students will receive a $25 gift card for participation. De-identified focus group transcripts will be analyzed with in vivo and focused coding.

Coates, Trinity

Faculty Mentor: Abdel, Abdel-Rahman

Does HERS2 Upregulation Contribute to Ethanol-Induced Cardiotoxicity?

Human epidermal growth factor receptor 2 (HER2) is overexpressed in 20-30% of individuals with breast cancer (BC), making it a critical target for therapeutic intervention.[1,8] HER2 overexpression is linked to tumor growth and poor prognosis.[1] Trastuzumab (TZB), an antineoplastic monoclonal antibody, targets and inhibits HER2 signaling to suppress tumor progression.[7] However, a common and detrimental side effect of TZB is cardiotoxicity, which is primarily driven by increased oxidative stress and downregulation of cellular autophagy.[9,10,11] Recent studies have highlighted the rising prevalence of alcohol consumption among individuals undergoing cancer treatment in the United States.[2] Additionally, correlational studies have revealed a significant association between alcohol intake and TZB-induced cardiac toxicity.[3] Despite these observations, no research has specifically explored how ethanol affects HER2 expression and oxidative stress within cardiomyocytes.bThis study aims to elucidate the underlying mechanisms of the toxic interplay between ethanol and HERS2. Specifically, we seek to investigate how ethanol influences HER2 expression and oxidative stress within cardiomyocytes. By establishing this mechanism, we ultimately aim to provide valuable insights into potential strategies for mitigating the adverse cardiovascular consequences of trastuzumab therapy in patients who consume alcohol. In this study, H9c2 cardiomyoblasts were treated with 1% ethanol for 24 hours. Following the treatment, immunofluorescence (IF) staining was performed to assess HER2 expression, and western blot analysis was conducted to measure the expression of heme oxygenase-1 (HO-1), a key stress-responsive antioxidant enzyme. Ethanol treatment resulted in a significant upregulation of HER2 expression compared to the control group, while concomitantly downregulating HO-1 expression. These findings suggest that this molecular mechanism might explain ethanol-induced cardiotoxicity in HERS2 positive patients. Future studies will determine if ethanol-evoked upregulation of HERS2 might reduce trastuzumab's efficacy, thereby exacerbating the cardiotoxic effects of trastuzumab along with worsening cancer prognosis. Our study highlights the significant impact of ethanol on HER2 expression and oxidative stress pathways in cardiomyocytes, offering new insights into ethanol-induced cardiotoxicity. The upregulation of HER2, alongside the downregulation of the antioxidant enzyme HO-1, suggests that alcohol-induced increases HER2 receptor levels might potentially compromise the therapeutic benefit of trastuzumab. These findings emphasize the need for further investigation into the full extent of ethanol's effects on HER2-mediated signaling and the development of strategies to mitigate heart risks in cancer patients who consume ethanol.

Coll, Sydney

Faculty Mentor: William Allen

Collagen, interrupted: Analysis and application of fluorescent collagen capsules

Collagens, vital proteins in the human body, are comprised of three polypeptide chains that are non-covalently bound into a right-handed triple helix. This research utilizes collagen mimicking peptides (CMPs) to explore the stability and rigidity of the collagen triple helix when non-native fluorescent amino acids (naphthalimides) of various lengths are introduced into a Pro-Hyp-Gly (POG) peptide sequence, specifically between (POG)n repeats. This has the potential to create a "capsule-like" space. Synthesis of (POG)7 CMP systems with naphthalimide "interrupters" allows for the monitoring of triple helix folding kinetics via fluorescence spectroscopy in addition to melting temperature (Tm) determinations via circular dichroism (CD) spectroscopy. A set of multiple isomeric CMP systems were synthesized where a single long interrupter was incorporated at different locations to monitor differences in folding kinetics, Tm values, and protein interactions. These results are compared to a second set of multiple isomeric CMPs with a shorter interrupting group incorporated at the same locations. Evidence for enthalpy-entropy compensation was found for systems with long vs. short naphthalimide interrupters. Results for the CMPs with long interrupters show that the placement of the naphthalimide within the peptide sequence does not effect Tm values of systems containing at least five sequential (POG) repeats.

Cooper, Rashanda

Faculty Mentor: Alice Richman

Closing the Gaps and Increasing Community Involvement in Child and Maternal Health: Results of the 2024 North Carolina Title V Needs Assessment

During my 2024 summer internship with North Carolina's Title V Program, I collaborated with state agencies and community partners to conduct focus groups and analyze data for the 2025 Needs Assessment. We aimed to assess the current state of MCH services in North Carolina and identify barriers, strengths, and actionable solutions for improving care. Through this experience, I gained invaluable insights into the systemic challenges faced by diverse populations across the state, particularly in maternal health, adolescent health, early childhood social-emotional health, and children and youth with special health care needs (CYSHCN). Our research employed a mixed-methods approach, analyzing both qualitative and quantitative data from partner surveys and focus groups. We identified significant challenges, such as limited transportation options, language barriers, insufficient mental health services, and inadequate care coordination. Among the key findings, we highlighted the critical need for culturally responsive care, trauma-informed practices, and better integration of services. In maternal health, barriers to postpartum visit attendance were linked to transportation and financial constraints, while the CYSHCN focus group emphasized the importance of individualized care plans and improved provider communication. Youth Health Advisors identified mental health services as a top priority, stressing the importance of peer-driven support and reducing stigma.

Focus groups were conducted virtually with participants from five key population domains of the Title V MCH Services Block Grant. The data collection process involved recorded Zoom sessions, thematic coding, and narrative synthesis of qualitative responses. The partner survey, distributed statewide, provided additional context and quantitative data to support focus group findings. Findings will inform North Carolina's 2026–2030 Title V State Action Plan, with recommendations focusing on improving access to care, expanding peer navigation programs, enhancing transportation services, and promoting equity-centered care practices. Our work also underscored the value of community engagement in identifying gaps and tailoring solutions to meet the unique needs of diverse communities.

This internship strengthened my desire to enhance MCH outcomes while broadening my comprehension of the complications of the healthcare system. This initiative provides a road map for tackling systemic issues and promoting health equity in North Carolina by elevating family perspectives and encouraging cooperation among community partners as a future social worker committed to providing equitable care for everyone.

Crawford, Lydia

Faculty Mentor: Deirdre Larsen

Shouting for Success? Examining Voice Changes, Hydration, and Professional Help-Seeking in Athletes

An increased prevalence of voice disorders has been found in athletes. Athletes use their voice for effective communication and interaction between other players and coaches during practice and games. Prior research has also demonstrated use of intense vocal effort to improve perceived athletic performance. Voice misuse and abuse, or activities such as yelling, screaming, and talking over loud background noise can stress the vocal folds and impact vocal health and quality. While the vocal folds can withstand some amount of stress, hydration can help mitigate the negative impact of intense vocal effort by supporting pliability and elasticity of the vocal folds. Prior athletes have demonstrated that voice changes following a game were reflective of performance. Voice effort to improve perceived athletic performance has been shown to not relate to voice complaints. These findings indicate that additional variables, such as hydration practices, may influence voice changes in athletes. Athletes, particularly at the college level, are reported to not hydrate well. Yet no studies have examined if voice changes occur in college athletes after performance, their hydration practices, nor their influence on seeking professional voice help. The purpose of this study is to determine (a) if athletes who use intense vocalizations to enhance performance believe that changes in voice quality during games reflect their athletic effort, and (b) if intense vocalizations and hydration practices lead athletes to seek professional voice help. A prospective Qualtrics survey was distributed to athletes over 18 years old and participating in ECU Athletics football, basketball, soccer, baseball, volleyball, tennis, and lacrosse following IRB

approval. Demographic data was analyzed using descriptive statistics. Due to limited sample size, observational insights were used to determine study outcomes. Subjects included six of twelve college athletes participating in East Carolina University (ECU) Athletics. The remaining participants were excluded due to incomplete surveys. Subjects were females (median = 19y). Half of athletes (n = 2 of 4) that use intense vocalizations believe voice changes reflect athletic effort. Use of intense vocalizations and negative hydration practices do not lead athletes to seek professional voice help. Findings do not support that vocalizations and hydration practices relate to seeking professional voice help. Ongoing analysis of survey results may illuminate specific vocal hygiene habits of college athletes. This research can be applied to further understand athletes' habits, providing data to better support vocal health for athletes in their respective sports.

Cross, Lawson

Faculty Mentor: Karen Mruk

Effect of housing conditions on larval zebrafish spinal cord regeneration post spinal cord injury (SCI)

Spinal cord injury (SCI) is a major public health burden. There is currently no cure for SCI and approximately 30-45% of people with SCI will develop anxiety. Regenerative models, like the zebrafish, may be our best resource for finding new treatments. Our lab previously demonstrated that when given a food source that is alive and moves (rotifers), a larger percent of larval zebrafish form a glial bridge and recover motor skills after SCI than larvae given a pellet diet. However, it was unclear whether increased motor recovery was from a difference in nutrition or the visual stimulation of moving prey. Further, whether the zebrafish exhibited anxiety-like behavior after SCI and during recovery, particularly in the presence of live food, was never determined. In this study, we test whether larvae individually housed or housed together affect motor recovery post SCI. Measuring both total swim and thigmotaxis (an anxiety assay for larval zebrafish), we observed no difference between housing conditions for uninjured animals. However, swimming increased with time after SCI. We are currently looking at the thigmotaxis and regeneration in injured larvae, to determine whether housing conditions affect recovery and anxiety after SCI.

Crumpler, A'riana

Faculty Mentor: Alice Richman

Menstrual Stations at Carol G. Belk

Managing menstruation safely and with dignity is a fundamental human right (Casola et al., 2023). However, many college students face challenges in accessing affordable menstrual products, a phenomenon known as "period poverty" (Cardoso et al., 2021). At East Carolina University (ECU), the Carol G. Belk building lacks menstrual product dispensers, creating accessibility barriers for students. This initiative aims to install a menstrual product dispenser providing free and accessible hygiene products, aligning with ECU's mission to foster an equitable and supportive campus environment. The initiative involves securing funding for the purchase and installation of a menstrual product dispenser in the Carol G. Belk building. Collaboration with ECU's Women and Gender Office ensures a consistent restocking plan, while approval from ECU Facilities has been obtained for securing the dispenser to bathroom walls. The project seeks to address period poverty by eliminating accessibility challenges for students in this building.
The implementation of the menstrual station is expected to increase access to essential hygiene products, reducing instances where students must miss class or experience discomfort due to lack of resources. This initiative aims to promote academic engagement, well-being, and inclusivity among students, particularly those from low-income backgrounds who may struggle with the financial burden of purchasing menstrual products. The project requires a menstrual product dispenser, an initial stock of menstrual hygiene products, and necessary materials for installation. Financial support will be allocated for the procurement of these items, with the ECU Women and Gender Office overseeing the continuous supply of products. By installing a menstrual station in the Carol G. Belk building, ECU can actively reduce barriers related to menstrual product access, enhancing students' academic experiences and overall well-being. This initiative reflects the university's commitment to fostering inclusivity and ensuring that no student's education is compromised due to a lack of essential resources.

Crumpler, Sydney

Faculty Mentor: Megan Dillon-Spruill

Anesthesia Awareness and Repercussions

Awareness under anesthesia is the recall of events that happened during general anesthesia. Researchers have tried for years to interpret risk factors that make patients more inclined to be affected. There are certain ramifications that this can cause like mental health issues and further issues of distrust in healthcare professionals. This research addresses intraoperative awareness, the risk factors, and potential resulting repercussions. The literature included articles about the causes, risk factors, management, and effects of anesthesia awareness. The current findings show that there is hope that these new risk factors and detection methods can prevent and decrease this prevailing complication. As we have found out some of the reasons that people experience awareness are medication's being ineffective, neuromuscular blocking agents, obesity, cesarean sections, equipment failures, comorbidities, heart operations, prescription of amnesic medications, and human error. This topic does need to be researched further and more in-depth to hone in on preventative measures to reduce this surgical complication.

Keywords: anesthesia awareness, surgical complications, intraoperative awareness, risk factors

Dail, Joshua

Faculty Mentor: Carmen Cuthbertson

Associations of HPV infection with cardiovascular health (CVH): Findings from the National Health and Nutrition Examination Survey (NHANES)

Evidence has shown a possible association between human papillomavirus (HPV), a sexually transmitted disease, and increased risk of cardiovascular disease (CVD). These studies, however, are limited to women in South Korea. It is unclear if adults with HPV have worse cardiovascular health (CVH) that may put them at risk of CVD. We examined the associations between HPV infection and poor CVH among the 2016-2018 National Health and Nutrition Examination Survey (NHANES), an US-based survey of Americans. During NHANES, adults aged 18-59 years old gave a genital or oral biospecimen that was genotyped for HPV. We included 2,151 participants with an oral sample and 1,655 with a genital sample. CVH was measured using the American Heart Association's Life Essential 8 (LE8). This metric included health factors associated with CVH, including diet, physical activity, nicotine use, sleep, body mass index (BMI), blood lipids, blood glucose, and blood pressure. A CVH score was calculated using the mean across the 8 items and ranged from 0-100. CVH scores <25 were classified as poor CVH. We examined the association between HPV infection and poor CVH with frequencies, means, odds ratios (OR) and 95% confidence intervals (95% CI)., We used complex survey weights to account for the NHANES study design. Among participants with an oral sample, the average age was 44 years, 51% were female, 65.8% were non-Hispanic white, and 31.8% had at least a college education. Demographics were similar among participants in the genital sample. The prevalence of HPV was 6.3% and 40.1% in the oral and genital samples, respectively. The average LE8 score was 65.4 and 66.2 in the oral and genital samples, respectively. Participants who tested positive for HPV had lower LE8 scores than those without HPV. Among the oral sample, those with HPV had an average score of 61.7 (58.4, 65.1) compared to 65.8 among those without HPV. Among the genital sample, those with HPV had an average of 62.4 (59.6, 65.1) compared to 68.8 for those without HPV. For each LE8 component, the average was similar for those with and without HPV except for smoking. Participants with HPV had an average smoking score of 42.5 compared to 60.4 for those without HPV among the oral sample. Among the genital sample, those with HPV had an average smoking score of 46.5 compared to 65.2. Among the oral site, participants with HPV had 1.38 (95% CI 0.68, 2.81) times the odds of poor CVH compared to those without HPV. Among the genital site, participants with HPV had 2.06(95% CI 1.45, 2.88) times the odds of poor CVH compared to those without HPV. Participants with HPV had worse CVH than those without HPV, with the association stronger among participants in the genital sample. The poor CVH among those with HPV may be due to differences in smoking behavior.

Daniel, Reagan

Faculty Mentor: Christine Habeeb

Males vs. Females: Physical Strength, Confidence, & Effort in ROTC

Leaders with stronger physical attributes are preferred in high pressure environments like war (Murray, 2014). This poses a challenge for female officers, who make up 20% of officers in the military (Department of Defense, 2023). This is because males generally have greater BMI and muscle mass, leading to perceptions that males are physically stronger and, therefore, are better leaders. Another concern is that some males report integrating females into their unit will interrupt cohesion and performance (Miller, 2024). To combat this problem, we need to understand how males' perceptions of females relate to confidence and effort on team tasks in the military. Twenty groups (three males and one female) will compete in a 4-person tug of war task. Confidence felt by each participant will be ranked on a scale of 0 (not at all) to 10 (completely) prior to the task. Team performance will be measured objectively with a force gauge on the rope. Twelve participants have participated and an additional 68 are scheduled to participate. Analyses will include t-tests to compare males' reports about physical strength and confidence of female versus male teammates. We will also examine correlations between these perceptions: assigned standing order and team performance. These findings will give us insight on how male perceptions of females affect confidence and performance in demanding environments. Understanding the dynamics can help change strategies that will then improve cohesion of teams and leadership opportunities for females.

DeBruhl, Sophia

Faculty Mentor: Ariane L. Peralta

Effects of Plant-Growth-Promoting Bacteria on Plant Salinity Stress

Environmental stressors, including climate-induced saltwater intrusion and sea level rise, are challenging coastal agricultural production. The increasing intensity of saltwater intrusion contributes to crop yield declines. Salt stress causes water to leave roots through epidermal cells, ultimately decreasing plant growth. Plant-microbe mutualisms, species interactions where both partners benefit, can be harnessed to enhance crop production. For example, plants benefit from metabolites and nutrients that microbial mutualists release, while microbes benefit from plant-derived organic carbon resources. However, it is unknown how salt-tolerant soil bacteria with plant-growth-promoting potential influence plant growth under excess salt conditions. Therefore, this experiment evaluates how plant-growth-promoting bacteria (PGPB) can buffer or protect plants from salinity stress. We tested how a simplified salt marsh bacterial community influenced Scarlett rice (Oryza sativa) seedlings that were exposed to a saltwater gradient. We isolated soil bacteria Priestia aryabhattai, Streptomyces misionensis, Streptomyces violarus, Bacillus hominis, Bacillus paramycoides, and Pseudomonas composti from a coastal North Carolina salt marsh. These bacteria have the potential to provide growth-promoting metabolites that could help protect the plant host against salt stress. To test whether these bacteria protect rice plants from salt stress, we set up a replicated (n=10) factorial experiment where we added a simplified PGPB community (seeds treated with bacteria or no addition) across four salt levels (freshwater 0 PSU, 2 PSU, 5 PSU, 10 PSU using Instant Ocean) to total 80 experimental units. We will measure plant height each week, and after 60 days, we will measure above and below-ground plant biomass. We expect the plants treated with the PGPB in 0 PSU to have the highest above and below-ground biomass, and the plants treated with no PGPB in 10 PSU salt water to have the lowest above and below-ground biomass. This work is important for understanding sustainable approaches to enhancing crop resilience against climate change-induced salinity stress.

Dedakia, Dhanushi

Faculty Mentor: Juan Beltran-Huarac

Magneto Mechanical Actuation to Treat Brain Cancer

Glioblastoma, a highly aggressive and lethal brain cancer, remains resistant to conventional therapies due to its invasive growth and complex tumor environment. In 2023, there was an estimated number of ~2 million new cases of brain cancer in the world with over 25,000 new cases of malignant brain tumors in the United States alone. Current treatment options, such as ionizing radiation therapy, are associated with high costs—~$82k per course—and detrimental side effects, including cognitive impairments, which limit their therapeutic efficacy. This study draws on a unique, completely non-invasive therapeutic modality that relies on magneto-mechanical actuation to enhance the potency of chemotherapy medications, such as paclitaxel and doxorubicin, for targeting glioblastoma cells. This modality is based on the remote actuation of magnetic nanoparticles by non-heating alternating magnetic fields. One critical component is to maximize the conversion of magnetic energy into mechanical agitation of intracellular nanoparticles. Our initial studies are centered on optimizing drug parameters, including exposure times (0-72 hours) and concentrations (0-100 μM), using two colorimetric assays CCK-8 and PrestoBlue to assess cell death. Preliminary data indicate that at desired drug exposure, an increase cytotoxic response against human glioblastoma cells (U87) can be induced. U87 cells will be subsequently exposed to magnetic nanoparticles, which will be stimulated by alternating magnetic fields. This will allow us to study the synergistic effect of chemotherapy and magneto-mechanical actuation. Future studies will attempt to determine the molecular mechanism through which magneto-mechanical actuation induced apoptotic pathways. This modality has the potential to advance the field of cancer nanotechnology and magnetic therapy.

Denis, McKenzie

Faculty Mentor: Alice Richman

Digital Equity Outreach

Background: East Carolina University is aiming to improve access to digital technology and digital literacy for communities within Eastern North Carolina. In more populated areas such as Greenville, about 40% of households have no cable or fiber optic; in more rural areas of Eastern NC fewer than 25% of households have cable or fiber optic. Extending the outreach of this program is important for the counties in Eastern NC because they face many barriers including a lack of telehealth services and basic computer skills. These barriers being faced are the reason that my goal for my spring semester internship with the Digital Equity Grant is to grow the outreach of the program and increase the amount of people that attend the Digital Literacy trainings and take advantage of the Library Lending that is available in their county. Methods: We are currently holding digital literacy training sessions for community members in 18 Eastern North Carolina counties that will improve their knowledge and confidence for their basic technology needs; this can include using telehealth, searching any medical or non-medical questions, using technology safely and effectively, and more. We have reached out to local newspapers within our targeted area to share program details and increase awareness. Alongside the digital skills training session, there is a Library Lending program that offers free iPads and/or hotspots for check out at the local library. To promote this aspect of the program, we have created flyers for schools to distribute, specifically targeting parents who might benefit from the program.
Expected Results: The expected outcome of the program is to increase the knowledge and skills of community members within Eastern North Carolina to improve their technology skills that they can apply to their everyday life. We hope to grow the amount of confidence and knowledge for attendees looking to better their technology use and provide easier access to this technology. With this being said, we are looking to see an increase of 20% of attendees at the digital literacy skills trainings.
Conclusion: This program will contribute to the field by working from an empirical approach driven to address and make a change to the digital equity seen in Eastern North Carolina by providing the necessary resources that are lacking within these counties.

DiAugustine, Hana

Faculty Mentor: Ian Hines

Influence of Glucose Concentration on Macrophage Polarization in Vitro

Background: An essential component of total immunity, the innate immune response triggers the body's rapid response to a range of conserved antigens that are known to cause a wide range of illnesses. Macrophages, a diverse population of immune cells produced from monocytes, are essential to the innate response because they may both immediately kill bacteria and coordinate a more intricate innate and adaptive immune response. Macrophages possess both inflammatory responses to help rid the body of bacteria and help the body control inflammatory responses through the production of immune regulators, such as interleukin 10 and transforming growth factor beta. Growing evidence suggests that a variety of environmental factors may tip this balance of inflammatory (M1) and regulator (M2) macrophages. Purpose: This study will investigate the impact of glucose concentration on in vitro polarization of murine macrophages. Hypothesis: With data suggesting that hyperglycemic levels are causative factors of a variety of low-grade inflammatory conditions in humans, it is hypothesized that macrophages curated in hyperglycemic conditions will experience an increased M1 macrophage marker production (tumor necrosis factor alpha, TNFa; macrophage chemotactic protein 1, MCP-1; inducible nitric oxide synthase, iNOS) upon activation with inflammatory stimuli (lipopolysaccharide, LPS; interferon gamma, IFNg). In addition to increased M1 marker production, it is also hypothesized that M2 responses are suppressed following treatment with interleukin 4 (IL4) including decreased mannose receptor expression, interleukin 10 (IL10),and transforming growth factor beta (TGFb) expression. Methods: Murine macrophages were cultured in either normal glucose levels (100 mg/dL), or high glucose (450 mg/dL) levels in the presence or absence of M1 or M2 activating stimuli. After 3 hours of exposure to stimuli, macrophages were harvested and RNA was isolated for quantitative PCR analysis. Results: High glucose conditions were found to have enhanced the expression of TNFa, MCP-1 and iNOS in response to M1 stimuli when compared to normal glucose conditions. M2 responses were impaired in the high glucose group when compared to normal glucose conditions, as determined by gene expression for TGFb and IL10 and mannose receptor.
Conclusion: The growth of regulatory M2 macrophages is inhibited by high glucose levels alone, which also seem to have the ability to modify macrophage responses by increasing inflammatory responses to conserved stimuli such as LPS. Among other illness states, diabetes-related chronic health disorders may benefit from the use of therapies that inhibit M1 responses.

Disser, Peyton

Faculty Mentor: Dr. Kathrin Rothermich

tDCS and Social Language Processing: Investigating the rTPJ's Role in Sarcasm and Teasing Interpretation

We are investigating the role of the right temporoparietal junction (rTPJ) in understanding nonliteral language, such as sarcasm and teasing. The rTPJ is critical for verbal irony perception, particularly through its involvement in theory of mind (ToM) and cognitive empathy. Previous research using transcranial direct current stimulation (tDCS) suggests that cathodal stimulation of the rTPJ impairs ToM and empathy, but its specific role in social language processing remains unclear. To explore this, we use 96 dynamic video-based stimuli depicting positive and negative verbal irony, sarcasm, and sincerity. Participants (N=17) identify whether the speaker is being sarcastic, teasing, or literal, with accuracy as the outcome measure. We apply cathodal tDCS (1.5 mA or sham for 20 minutes) to inhibit rTPJ activity and assess reaction time as an indicator of processing efficiency. Eye-tracking is recorded during video presentation to quantify how brain stimulation affects social scene processing. Participants also complete questionnaires on personality traits, anxiety, empathy, psychopathy, and sarcasm use. Preliminary results indicate that tDCS effects on social language processing depend on speech condition. Reaction times were slower for sincere speech under tDCS, while sarcasm and teasing were largely unaffected. Accuracy showed a slight overall decrease with tDCS, though sincere and teasing conditions exhibited minor improvements. Appropriateness ratings were strongly influenced by speech condition, with sarcasm rated as the least appropriate. tDCS had a small negative effect on overall appropriateness ratings. These findings suggest that the rTPJ plays a nuanced role in processing sincerity and social appropriateness rather than broadly impairing nonliteral language interpretation. We are expanding the sample (target N=30) to refine these effects. Future work will extend this research to clinical populations with social cognitive deficits, such as individuals with Autism Spectrum Disorder, Schizophrenia, or Parkinson's Disease.

Donahue, Ella

Faculty Mentor: Lauren Turbeville

Enhancing Sensory Development in Early Childhood Through Innovative 3D-Printed Sensory Boxes

Sensory processing is one of the most critical aspects of development in early childhood as it helps in motor, language, and emotional development. This project examines the effectiveness of customized sensory bins with 3D-printed elements aimed at enhancing the sensory development of children at the Nancy W. Darden Child Development Center (NDCDC). Tailored toward developmental levels from infancy into early childhood, these sensory bins integrate tactile, visual, and auditory activities designed to foster developmental milestones. The bins are categorized into four age-specific categories: The Little Explorer's Box (0-12 months), The Little Learner's Box (12-24 months), The Little Discoverer's Box (2-3 years), and The Little Imaginator's Box (4-5 years). Materials like kinetic sand, playdough, fabric swatches, and magnetic playboards are included alongside interactive 3D-printed elements such as color-matching puzzles and imaginative toys. Produced at East Carolina University's Isley Innovation Hub, 3D-printed components provide customizable and cost-effective sensory tools. Handbooks were created for each sensory box, highlighting the developmental benefits of each toy, acting as a guide for teachers, parents, and caregivers in engaging children with the toys. The design of this project was informed by research supporting the benefits of sensory play for cognitive, motor, and social-emotional development, especially beneficial for those with developmental delays. With our backgrounds in psychology and communication sciences and disorders, we could apply the knowledge we've gained in child development, somatic processing, and therapeutic interventions to contribute to the design and implementation of the project. Dr. Lauren Turbeville, MSOT, OTD, OTR/L, mentored us in creating inclusive and developmentally appropriate sensory toys.

Two observational visits were conducted at NDCDC to assess the bins' effectiveness. These visits focused on children's engagement with the materials, problem-solving abilities, and peer collaboration. The continuing feedback from teachers via survey indicates that implementing our developmental packages will foster a collaborative and hands-on learning environment. This positive impact suggests that integrating resources tailored toward a child's development will encourage deeper engagement among children and provide innovative teaching approaches.

Sensory play is necessary in early childhood development, strengthening motor skills, cognitive growth, and social interaction. Customized sensory boxes with various 3D printed materials, provide children with hands-on opportunities to explore, problem-solve, and connect.

D'Rozario, Melina

Faculty Mentor: Jason Pudlo

A Comparative Case Study on the United States Government and Military Response: 2010 Haitian Earthquake and Hurricane Maria in 2017

This research will analyze the responses of the United States government and military to natural disasters. The main guiding question will ask how the United States government and the military respond to disasters differently based on whether they occur in foreign nations or United States territories. The sub-questions for this topic will be looking more into how the recent disasters have influences current United States disaster response policies. The lessons that can be learned from past responses to disaster can be utilized to improve future strategies in disaster management. Finally, what are the overall impacts of speed in aid between foreign nations and United States territories. The research will be conducted by using a comparative case study approach to the United States government and military's response to an earthquake in Haiti in 2010 and Hurricane Maria which hit Puerto Rico in 2017. Understanding disaster response is vital for future policymakers. It is necessary to improve how the United States government and military respond to disasters, especially with the rapid increase in climate change which causes more frequent and severe natural disasters. This can be achieved by examining how policies and changes in disaster management strategies have evolved in response to past events. The focus will be on both effective and ineffective responses by the United States government and military. The expected outcomes from this research aims to provide insights into how being a United States territory or not includes certain military disaster response strategies. Understanding the responses taken in Puerto Rico and Haiti is important to understanding United States disaster management practices and military aid roles in both domestic and international contexts. By comparing these events and focusing on the relation of speed and efficiency of military aid and territorial location, this research also seeks to highlight the effective responses for future disaster management strategies.

DuBois, Kara

Faculty Mentor: Karen Litwa

STORMing the Synapse: A Developmental Timeline of Synapse Formation in Autism Spectrum Disorders

Synapses mediate communication between neurons of the brain. This communication supports cognitive functions, such as learning and memory formation. Synaptic alterations contribute to numerous neurodevelopmental disorders, including autism spectrum disorders.The Litwa Lab uses human brain models to research the molecular mechanisms of synapse formation. Using these human brain models, they can visualize the development and maturation of individual synapses to determine whether initial events in synapse formation are altered in autism spectrum disorders.In our present study, it is hypothesized that autism brain models will express altered association between pre- and post-synaptic compartments when compared with neurotypical models, as measured by proximity of pre- and post-synaptic compartments. Immunostaining and STORM super-resolution microscopy were used to visualize and analyze individual synapses between human neurons. Specifically, primary antibodies were used to detect pre-synaptic protein VGLUT1 and post-synaptic protein PSD95, followed by detection with fluorescently labeled secondary antibodies. STORM super-resolution imaging has allowed us to acquire the position of thousands of individual pre- and post-synaptic molecules and measure the proximity of the pre- and post-synaptic compartments at developing synapses after 25, 43, 71, and 98 days of differentiation of the human brain model. It will be assessed whether the distance between pre-synaptic and post-synaptic compartments differs from the developmental timeline established in control patient brain models, where we observed closer spatial proximity of pre- and post-synaptic compartments with longer developmental time. These studies will address whether initial events in synapse formation are altered in developing neural circuits of autistic individuals, allowing us to assess whether interventions at specific periods can restore normal synapse formation and neural communication.

Dutta, Neesha

Faculty Mentor: Xiaoping Pan

Investigating the role of miRNAs in nicotine-dependent behaviors and transgenerational mechanisms in Caenorhabditis elegans

Nicotine, a psychoactive alkaloid found in tobacco, drives addiction by binding to nicotinic acetylcholine receptors (nAChRs), altering cholinergic signaling, and promoting receptor overexpression. The overexpression of nAChRs has been linked to drug dependence, making nicotine addiction a leading cause of preventable deaths worldwide, largely due to tobacco use and secondhand smoke exposure. The nematode Caenorhabditis elegans, with its conserved nAChR subunits and well-characterized nervous system, exhibits behavioral responses to nicotine similar to those in mammals, including tolerance, acute stimulation, withdrawal, and sensitization. These traits allow for it to be an ideal model for studying the molecular and genetic mechanisms of nicotine addiction. The role of miRNAs in regulating nAChRs, nicotine-dependent behaviors, and the epigenetic effects involved in transgenerational inheritance will be explored in this study, with a focus on miRNA inhibition of cel-miR-80 to knock down miR-80 implicated in addiction pathways. Behavioral assays demonstrate nicotine dependence, withdrawal-like effects, and transgenerational inheritance, with F2-generation worms, which are never directly exposed to nicotine, but exhibit increased locomotion on nicotine-free plates. Experimental protocols begin with the cultivation of synchronized C. elegans populations (F0 generation) and chronic (24-hour) exposure to 61.7μM nicotine in K-medium. Behavioral assessments are performed using the WormLab software, revealing changes in addiction-related behaviors and suggesting miRNA regulation of nAChRs as a key molecular mechanism. Molecular analyses, such as PCR and RNA sequencing, are utilized to assess changes in miRNA genes and nAChR expressions following nicotine exposure and miRNA knockdown. Statistical analyses, such as ANOVA and regression modeling, are further used to evaluate gene expression and behavioral data. These findings provide novel insights into the molecular and genetic basis of nicotine addiction, including its transgenerational risks, and could inform the development of miRNA-based therapeutic methods to combat nicotine dependence and its long-term risks.

Eakes, Ashley

Faculty Mentor: April Blakeslee

Prevalence of Black Gill Disease in Penaeid Shrimp in NC

As temperatures rise along the U.S. East Coast, Penaeid shrimp, a group of economically and ecologically significant species, have increasingly been affected by emerging disease dynamics. Over the past two decades, Shrimp Black Gill Disease (sBG) has spread along the eastern coast, resulting in greater prevalence over time. Penaeid shrimp contribute approximately $22 million to North Carolina's fisheries, but the lack of appropriate detection of sBG negatively impacts this value. Given the economic importance of Penaeid shrimp, it is crucial to accurately assess the true prevalence of sBG. Previous studies have reported varying prevalence rates due to differences in species, time of year, and region. This led to the hypothesis that the prevalence of sBG in 2024 samples would exceed that of 2023. Because shrimp may remain visually asymptomatic, genetic analysis of gill tissue is helpful to obtain a true determination of sBG prevalence.This study focuses on the continuation and expansion of 3 years of surveys, utilizing microscopy and polymerase chain reaction (PCR) to assess sBG prevalence. A subset of samples from 2024 have been selected for genetic analysis, utilizing 18S rRNA barcoding primers designed to detect sBG infections. The findings from this study provide critical information for North Carolina fisheries, offering insights into the ongoing impacts of sBG on Penaeid shrimp populations.

Evans, Deniya

Co-Authors: Deniya Evans, Ericka Biagioni, Alex Claiborne, Linda May
Faculty Mentor: Linda May

Effects of Gestational Diabetes Mellitus Treatment on Placenta Triglycerides and Efficiency

Background: Gestational Diabetes Mellitus (GDM) is a metabolic condition characterized by glucose intolerance which is first diagnosed in pregnancy. This condition affects 5 to 9% of pregnancies in the United States every year and is related to a higher incidence of adverse birth outcomes, yet the contribution of different placental characteristics in women with GDM is not well understood. Previous research has shown that disrupted placental efficiency, (ratio of birth weight-to-placental weight), is related to adverse pregnancy outcomes, and that increased placental triglyceride (TG) storage could be a contributing mechanism. To date, this has not been directly assessed, and importantly, the influence of GDM treatment, whether diet control or metformin, remains unknown.Purpose: To assess how the treatment of GDM during pregnancy impacts placental TG storage and placental efficiency.Methods: Placentas from women with GDM treated with either metformin (Metformin) or diet control (A1DM) were matched by BMI to placentas from women without GDM (non-GDM). Placental tissue samples were collected at delivery from all groups. Maternal characteristics and birth measures were extracted from patient health records. Placental TG content of central and peripheral villous placental tissue was determined via the Triglyceride Quantification Assay Kit. Placental efficiency was calculated by dividing neonate birthweight (g) by placental weight (g).Results: A total of 32 placentas from non-GDM (n=11), A1DM (n=11), and Metformin (n=10) were collected for analysis. Women were similar between groups, though, there was a significant difference in ethnicity (<.001) between groups. While placental TG content was similar between groups (p=.18), placental weight positively correlated with TG content (r=0.436; p= 0.033). Placental TG was negatively correlated with placental efficiency (r=-.489; p=.015), such that as TG content increased, placental efficiency decreased, which seemed to be best in diet-controlled GDM pregnancies. Controlling for group, race, and GWG, placental TG content is predicted (R2=.529, p=.03) by maternal age (p=.01). Controlling for parity and prepregnancy BMI, placental weight is predicted (R2=.508, p=.04) by race (p=.02) and placental TG (p=.03). Controlling for maternal age and prepregnancy BMI, placental efficiency is predicted (R2=.576, p=.04) by group (p=.03) and race (p=.02) with A1DM and other races having the highest efficiency with Asians having the lowest efficiency. Conclusion: Our results suggest that placental weight is influenced by placenta TG, which is influenced by maternal environment, however, placental efficiency is influenced by group and race. Overall, further research is needed to address the impact of race and GDM treatment on placental health.

Garcia, Lauren

Faculty Mentor: Lok Pokhrel

Evaluating Treatment Efficacy of a Novel Nano-Antibiotic against Drug-Resistant Pseudomonas aeruginosa Planktonic and Biofilm Forms in a COPD Model

Pseudomonas aeruginosa (Pa), an opportunistic soil bacterium, has been identified as an infectious pathogen during advanced stages of muco-obstructive lung diseases, such as chronic obstructive pulmonary disease (COPD) and cystic fibrosis (CF). Patients diagnosed with COPD and CF present hyperaccumulation of thick mucus that impairs ciliary movement within the airways, forming a favorable environment for recurrent and chronic bacterial infections. Despite frequent and high dose antibiotic (i.e., aerosolized Tobramycin) treatments, Pa binds to glycosylated mucin proteins, facilitating evasion of antibiotic insults, and leading to recurrent lung infections, exacerbating symptoms, impacting lung function, and increasing mortality among lung patients. Antibiotic treatment failure remains a global public health challenge due to bacterial resistance to current antibiotics, directly causing 1.27 million deaths in 2019 and contributing to 4.95 million deaths. Additionally, multidrug resistant Pa is estimated to have a monetary healthcare cost of $767 million USD, further justifying the need to develop novel treatment options. Our previous work has shown high efficacy of amino-functionalized silver nanoparticles (NH2-AgNPs) as an effective new treatment therapy against ampicillin- and kanamycin-resistant Escherichia coli, a gram-negative bacillus. The main objective of this study was to determine the potential efficacy of novel nano-antibiotic, NH2-AgNPs, in inhibiting both planktonic and biofilm forms of P. aeruginosa growth under low and high mucin environments, mimicking the airway milieu of patients with early and chronic stages of COPD and CF.
PAO1 strain was used for multiple toxicity bioassays, including the LB broth growth assay, cell leakage and cell debris assays, resazurin oxidative stress assay, crystal violet biofilm inhibition assay, and Bradford protein assay. Results were further confirmed by microscopic and biochemical assays. Our results from multiple complementary assays suggest that NH2-AgNPs were significantly inhibitory to both planktonic and biofilm forms of Pa at ≥1 µg/mL compared to Tobramycin. Pa POA1 was found to be Tobramycin-resistant. Biofilm proteins were also significantly inhibited upon treatment with NH2-AgNPs compared to Tobramycin and negative control. Future research is warranted on the treatment efficacy under high (2%) mucin environment, and proven effective, NH2-AgNPs may replace Tobramycin, providing a much-needed effective treatment against recurrent Pa infections in COPD and CF patients, who are currently suffering as Tobramycin treatment is failing. Before becoming a market-ready treatment option, future steps will include preclinical testing in rodent models, followed by human clinical trials.

Garvin, Nykeria

Faculty Mentor: April Blakeslee

Investigating seasonal trends in reproduction of the non-native green porcelain crab (Petrolisthes armatus) in North Carolina

Petrolisthes armatus, known as the green porcelain crab, is a species native to the eastern Pacific, eastern Atlantic, and western Atlantic from Brazil to Florida. In the 1990's, these crabs began expanding their range poleward and have since established populations along the coasts of Florida, Georgia, South Carolina, and North Carolina. This move is reflective of a broader phenomenon termed the "Caribbean creep", which describes the expansion of tropical marine species northward into temperate waters of the southeast U.S. coast due to warming ocean temperatures. Reproductive patterns are important when studying invasive species because these traits can facilitate a species' spread, enhance their establishment in novel environments, and increase the potential to outcompete native species within the area. By studying temporal reproductive patterns in porcelain crabs, researchers can better understand the seasonal trends and population dynamics of this species. We hypothesize that a greater proportion of female porcelain crabs will be ovigerous during warmer seasons (summer to early fall) than cooler seasons (late fall). Porcelain crabs were collected using passive samplers deployed for 6–8 weeks near oyster reef habitats in Carrot Island, NC (June, September, October 2023) and Pine Knoll Shores, NC (August, October 2024). In the lab, we collected demographic information (size, sex, and reproductive status) to understand the population structure of this species in North Carolina. Learning about ovigerous porcelain crabs and their seasonal reproductive patterns provides key insight to the population dynamics and invasion success of P. armatus at the leading edge of the expanded range.

Garza Hernandez, Neil

Co-Authors: Graham Bitzer, R. Martin Roop II
Faculty Mentor: R. Martin Roop, II

Characterizing the indirect interactions of the H-NS-Like gene silencer MucR on the expression of the virB operon in Brucella abortus.

Brucellosis is an infectious bacterial disease that induces abortions and infertility in various species of mammals, as well as a chronic, febrile disease in humans. Brucella abortus, a causative agent of the disease, is transmitted through the products of infected animals and is easily aerosolized, which marks this as a public health concern. Additionally, the associated dual-course antibiotic regimen lasts for a minimum of 6 weeks with a considerable relapse rate, which further supports this concern. Therefore, there is an interest in characterizing the basic biology and genetic regulation of B. abortus. One potential reason for the high relapse rate is the intracellular nature of the pathogen, as B. abortus resides in professional phagocytes, which renders an immunocompetent immune response ineffective. B. abortus avoids destruction in the phagocyte by preventing the fusion of lysosomes with the phagosome, by releasing effector proteins from the bacteria into the host cell using a type IV secretion system (T4SS). This T4SS in B. abortus is encoded by the virB operon and the genetic regulation has not been fully characterized. Previously, a histone-like nucleoid structuring-like (H-NS-like) protein, MucR, which is a global transcriptional repressor, has been found to bind to the regulatory region of the virB operon. However, this research project investigates the potential for MucR to indirectly regulate virB. This indirect regulation can be conducted through the regulation of the LuxR-like quorum sensing regulator BabR. This quorum sensing regulator has been suggested to repress virB expression by binding to the proximal promoter region. Additionally, previous data from our lab and others indicates that MucR binds to the regulatory region of babR. Therefore, this project hypothesizes that MucR indirectly regulates virB expression through the repression of BabR. To test this hypothesis, the impact of MucR on babR expression is being characterized using quantitative and qualitative genetic approaches. These results will further define the role of MucR in the regulation of the T4SS expression.

Geib, Matthew

Faculty Mentor: Shawn Moore

Low Fidelity Surgical Simulation Models

Surgical residency is an exceptionally challenging period for residents. Emerging from medical school, they are immediately confronted with the realities of being a doctor and the vast array of information they need to master comprehensively. Residents are exposed to hundreds of different surgeries and must understand each one, ultimately learning to perform them independently. With real patients now involved, the stakes are higher than ever, creating an increasing demand for effective resident training. However, surgical simulation equipment often presents a significant barrier, being either prohibitively expensive or insufficiently realistic to provide meaningful practice. Our research aims to bridge this gap by developing simulations that are both cost-effective and highly realistic. Dr. Shawn Moore has collaborated with surgical residents at the Brody School of Medicine for years, creating affordable, high-quality simulations. His extensive experience has provided valuable insights into the best materials and methods for practicing various surgeries. Building on this foundation and incorporating residents' feedback, we have developed new models that more accurately replicate surgical procedures. Additionally, we have scrutinized methodologies from other universities to identify potential improvements and implement innovative materials and techniques.
The residents and doctors at ECU Health have contributed in giving feedback on our models. This collaborative effort ensures that the training tools evolve in line with the residents' needs and the latest surgical practices. Our goal is to make high-quality surgical training accessible to all institutions, regardless of their financial resources, ultimately improving patient outcomes and advancing the field of surgery.

Gentile, Ava

Faculty Mentor: Alice Richman

PEP Squad

Preconception health is the health before a woman becomes pregnant. Preconception health highlights factors that can influence the health of a woman, children, and families. PEP Squad or Preconception Educating Pirates is the club I am co-president of which aims to raise awareness of the importance of women's health focusing on preconception health. When I first started getting involved in the club, membership was low as many members had graduated and the COVID-19 pandemic kept many students away from campus activities. PEP Squad has tried hard to increase membership by doing tabling events and interesting activities for our members. Last fall, PEP Squad help made 70 lunch bags for Community Crossroad which is a homeless shelter in Greenville. We now have 12 members attending monthly meetings and planning interesting future activities. Currently, we have plans to conduct community service at the Ronald McDonald House. Additionally, we have a guest speaker from the Career Center coming to discuss resumes with our members. Finally, I will be conducting my own personal project in the club about the importance of self-care to health. Self-care is taking charge of one's physical, mental, and emotional through steps that prioritize one's well-being. One study demonstrated that self-care benefits happiness by 71%, that self-care increases productivity by 67%, and that self-confidence was enhanced by 64%. There are many categories of self-care that can be looked at but for my project, I am mainly focusing on improving members physical and mental health through self-care. I plan to do this with a spa day during finals week. Finals week can be stressful, and many students neglect themselves. The intention of a spa day for PEP Squad members would help them de-stress, boost their mood, and make them feel rejuvenated to build confidence. During this event, I will first start with a slide show discussing self-care, why it's important, and what they can do to improve their self-care. For example, discussing different types of self-care and how it's important to overall health and well-being. After the slide show, we would do an activity where members can pick out and use a face mask. In the background, we would put on some spa music and do a breathing exercise. This will help our members de-stress and give them an understanding of self-care and its impact on health.

Godwin, Jackson

Faculty Mentor: David Pooser

Incentives for Tax Abuse by Micro-Captive Insurance Companies

Captive insurance companies, particularly micro-captives operating under Section 831(b) of the Internal Revenue Code, were originally designed to provide small and mid-sized businesses with an effective means of self-insurance while offering certain tax advantages. However, these entities have increasingly been exploited for tax avoidance rather than legitimate risk management. In response, the IRS has classified certain micro-captive transactions as abusive tax shelters, leading to heightened regulatory scrutiny and legal action. This thesis examines how micro-captive insurance companies have deviated from their intended function and how management has leveraged tax benefits in ways that undermine regulatory intent. Specifically, the research will explore the mechanics of captive insurance, the structures that enable tax avoidance, and the enforcement measures taken by the IRS and other regulatory bodies. The study will also incorporate insights from industry professionals, including a captive insurance auditor and an IRS agent, to provide a balanced perspective on the issue. The research is guided by two key questions: (1) How are captive insurance companies abusing the tax benefits of Section 831(b)? and (2) How can captive insurance standards be better upheld to prevent misuse? To address these questions, the study will employ qualitative research methods, including expert interviews and analysis of legal and regulatory frameworks. Additionally, academic and trade publications will be analyzed to provide context and support findings.

Griffin, Zasha

Faculty Mentor: Randall Etheridge

Inorganic Nitrogen Export from Waterfowl Impoundments

Waterfowl impoundments, areas specifically managed to provide habitat and food for waterfowl, have been identified as a significant, yet understudied, source of inorganic nitrogen to downstream water. This study quantifies and examines the timing of inorganic nitrogen export from two different management regimes: agricultural impoundments and moist-soil managed impoundments. By monitoring the water exported from two test impoundments in the Lake Mattamuskeet, NC watershed, we conducted sub-hourly assessments of nitrate nitrogen, ammonium nitrogen, and water export at each site's outflow control pump. Our findings revealed that most inorganic nitrogen export occurs between the months of April and June. The primary factors that appeared to influence the timing and concentration of inorganic nitrogen were rainfall events, pump management, and fertilization practices. We concluded inorganic nitrogen export from both waterfowl impoundments was lower than agriculture in neighboring areas and much lower than other agricultural regions of the United States. Further research should focus on nature-based solutions to reduce nitrogen export from waterfowl impoundments and agricultural areas.

Hada, Dhwani

Faculty Mentor: Michael Baker

Puzzles and Playlists: Can Music Help ADHD Focus?

Music has been shown to influence cognitive performance, including attention and problem-solving skills, with varying effects depending on the genre and the individual's cognitive profile. For individuals with ADHD who often experience unique challenges with focus and sustained attention, music may serve as an effective cognitive aid. This study investigates how different genres of music affect task performance in neurotypical individuals and individuals with symptoms of ADHD. Specifically, we explored whether music impacts puzzle-solving ability, measured by the number of pieces correctly placed during a timed jigsaw puzzle task. 81 Participants were divided into two groups (neurotypical and ADHD) based on a validated symptoms checklist. Each participant completed five trials under different auditory conditions: no music/white noise (control), pop, classical, jazz, and metal. The order of music conditions was kept the same, but the order of puzzles was changed for each participant according to a latin square design. The number of puzzle pieces connected in each condition was recorded. We hypothesize that music will significantly influence task performance, with genre-specific differences between the neurotypical and ADHD groups. Particularly, we hypothesize that individuals with ADHD will do better with some kind of music, and others will do better with silence/white noise. Data will be analyzed using repeated measures ANOVA to compare performance across music conditions and between groups. Findings from this study could provide insights into how auditory stimuli affect cognitive task performance, particularly in individuals with ADHD. These results may inform interventions leveraging music to enhance focus and productivity in both clinical and educational settings.

Hada, Dhwani

Faculty Mentor: Lori Eldridge

Pathway to Health Professions: Implementing Undergraduate Interprofessional Education

Interprofessional Education (IPE) is essential for fostering collaboration and communication among healthcare professionals to improve patient outcomes. Early IPE training for pre-health undergraduate students has been shown to enhance teamwork, dismantle stereotypes, and build self-efficacy in healthcare settings. Self-efficacy is the belief that one can achieve their goals and succeed at tasks. These outcomes contribute to creating a cohesive and equitable healthcare environment focused on patient-centered care. Despite evidence supporting the benefits of IPE training, there is a lack of consistent implementation at the undergraduate level across institutions. Programs that have adopted IPE have demonstrated improved student preparedness, better interprofessional collaboration, and enhanced patient care outcomes. Our study addresses this gap in undergraduate IPE by examining the impact of a structured IPE training program, Pathway to Health Professions, designed for pre-health ECU undergraduate students who are members of 'Buff in Scrubs', an ECU organization. Our study employs a mixed-methods approach, including retrospective surveys and open-ended questions, to assess changes in participants'

attitudes, skills, and competencies pre-and post-trainings. Data will be collected from January 2025 to April 2025. We hypothesize that early and structured exposure to IPE training will significantly enhance pre-health undergraduate students' confidence, understanding of interprofessional roles, and ability to collaborate effectively. By focusing on self-efficacy-based skills, we hope to equip pre-health students with critical collaboration and communication skills early in their education. We expect improvements in participants' perceived preparedness for advanced healthcare education and patient-centered care. By improving perceived preparedness, we aim to also increase students' self-efficacy and preparedness for graduate school applications. Our undergraduate IPE program, Pathway to Health Professions, seeks to bridge the gap in IPE implementation at the undergraduate level. We aim to prepare future healthcare professionals to contribute to cohesive teams and improve patient outcomes. This work underscores the need for broader adoption of IPE training in undergraduate education to enhance healthcare collaboration and equity.

Hall, Ryan

Faculty Mentor: David Hart

Ultra Realistic Graphics Rendering Through Means of Gaussian Splatting

3-Dimensional (3D) graphics is a computer drawing technique in which 3D objects are rendered onto a computer screen. These 3D objects are composed of an array of points that map out the shape of the model. The goal of any graphically intensive program is to provide the user with an experience that is realistic, while maintaining a high frame rate. 3D graphics are typically represented through a collection of triangles which are connected to form a model. These triangles are ideal if geometric shapes are drawn. However, representing smooth shapes requires a large amount of triangles and puts a processing burden on the computer. While this may not be a problem for models that have 10,000 triangles, more realistic models tend to have polygon counts of over 100,000, causing a severe drop in frame rate. While other drawing techniques exist that are capable of achieving realism, they typically have low frame rates and are not intended for use in simulations. However, a recent technique, called Gaussian Splatting, is capable of rendering highly realistic graphics at a suitable framerate. Each model rendered through Gaussian Splatting is composed of a sequence of nodes, known as splats, which are morphed through scaling and rotation. These points are morphed and grouped together into point clouds, which depict a highly realistic model. Gaussian Splatting can render a singular object, such as a chair or a toy, or a larger scene, such as a patio or a kitchen, with immense detail, and can be rendered in a computer program at a suitable speed. For this paper, the Open Graphics Library (OpenGL) and its programmable shader pipeline is used. The goal of this research is to implement the Gaussian Splatting in an OpenGL renderer and test out various effects, such as lighting, that are generally used with triangulated models. Comparisons between the frame rates of both techniques will be made. It is expected that the Gaussian splatting model will outperform the triangulated model, as the rendering technique used in Gaussian Splatting is more efficient.

Harris, Catherine

Faculty Mentor: Scott Walfield

Adherence to Male Rape Myths

Rape and sexual assault are prevalent crimes that have serious impacts on their victims. Falsely held beliefs concerning sexual assault, or rape myths, can contribute to victim blaming, the normalization of sexual assault, and impact the way cases of sexual assault are handled and perceived. Understanding adherence to rape myths is crucial in addressing the prevalence of sexual assault. Traditionally, research on rape myths has been focused on female victims, with limited work regarding male victims. Despite this, male sexual assault is a significant issue that needs to be addressed, and adherence to rape myths can have harmful impacts on male victims. The present study examines male rape myth adherence among college students; results are discussed.

Henderson, Za'Qualyn

Faculty Mentor: Avain V. White

Birthing Experiences

In the United States (U.S.), Maternal mortality rates for non-Hispanic black women are significantly higher than those of non-Hispanic white women, with 69.9 deaths per 100,000 vs. 26.6 per 100,000. The U.S. has experienced an increase in adverse maternal health outcomes over the years. The purpose of this research project is to help healthcare facilities decrease maternal mortality rates and increase positive birth experiences in African American women. The data collected during this study will act as a blueprint to help improve maternal healthcare in North Carolina and will serve as a model for other U.S. states. We want to help identify the areas of maternal healthcare that are negatively impacted throughout birthing experiences. Methods: This research study employed both qualitative and quantitative research methods. We targeted mothers who had given birth within the last 2 years or were currently pregnant. 18 participants were asked to complete a question survey online via Redcap prior to the actual event day. During the day of the events, these mothers participated in a focus group where they discussed their birth experiences. Results: Most women reported that they had a negative experience dealing with such bias, inadequate staffing, lack of coordination between healthcare professionals, or insufficient time spent with patients. Most women reported giving birth at Vidant, Pitt County Hospital. We also gathered from the data that most women reported a negative change in their mental health both during and after their births. Discussion: Through receiving this data and hearing directly from patients; providers, hospitals, and clinics may revise policies around staffing ratios, patient-provider interaction times, team collaboration, and adopting policies designed. The data gathered from both the survey and focus group revealed gaps in care delivery and feedback that could lead to changes not only in the way healthcare providers deliver care, but also in how patients approach their birth experiences, in hopes of feeling more empowered informed, and supported.

Herring, Madeline

Faculty Mentor: Kendell Thornton

The Perception, Judgement, and Justification of SSRI Usage

Selective serotonin reuptake inhibitors (SSRIs) are chemical compounds frequently utilized to manage symptoms of major depressive disorder, anxiety, and depression by increasing serotonin levels in the brain. This study, titled "The Perception, Judgement, and Justification of SSRI Usage" investigates college students' perceptions of SSRI usage.
Participants, who are undergraduate students aged 18 and above, are recruited from the Psych1000 course participation pool. To comprehensively assess the conditions of a 2x2 between-subjects design, a minimum of 50 participants is required, divided into two groups: control and manipulated. Each group is provided with background on SSRIs, Serotonin Transport (SERT) and basic surrounding anatomy in layman's terms. The control group then evaluates a scenario involving a veteran with PTSD/TBI treated solely with SSRIs, while the manipulated group assesses a similar scenario with additional treatment options, including psychotherapy, meditation, and focus groups. Basic background information and opinion-based questions are asked regarding SSRIs via Linkert scale. This study aims to determine whether students view SSRIs as a positive or negative solution, assess their perceived effectiveness based on provided data, evaluate a student's critical thinking regarding SSRIs, and evaluate whether SSRIs are deemed an ultimate or main solution for PTSD/TBI. Furthermore, a proposed laboratory experiment will investigate the neurological impact of discontinuing SSRI treatment, focusing on serotonin production and brain activity changes. This involves examining whether serotonin production is adversely affected after cessation of SSRIs and determining the duration required for serotonin levels to return to pre-SSRI conditions. This research addresses the uncertainty regarding college students' perceptions of SSRI usage, particularly considering the increased use of SSRIs among young adults following the post-COVID mental wellness crisis. It aims to fill the gap in population opinion-based surveys on SSRI usage, integrating findings from learning and memory studies, neurobiological mechanisms, and relevant neural circuits and regions.

Hightower, Trenton

Faculty Mentor: George Bailey

Does AI truly create art? Exploring questions of intention and perception.

The widespread advancement of artificial intelligence (AI) has had a huge impact on the work of various creative industries. From film making to song production, artistic works that have been created by a computer, with and without human prompting, have already been unknowingly seen and heard by many. One group which has been particularly consumed by advancements in AI is the visual art community. Software programs like Dall-E and Midjourney are capable of producing visually-appealing works that can be sometimes difficult to distinguish from a human made creation. Jason M. Allen's work "Théâtre D'opéra Spatial", a piece made entirely by prompting AI on the latter program, went so far as to win the digital art category at the 2022 Colorado State Fair Fine Art Show, stirring controversy and raising further question what role AI works have in the art community. Is a work that uses AI within its creation genuine art? After all, AI is not conscious, does not feel or have emotions, and has no understanding of what it produces. This paper aims to explore questions surrounding the inclusion of AI-generated and AI-prompted works within the art community. What is the point to which AI's inclusion in the creation of art makes it not genuine? Is there a distinction to be had between a piece entirely created by AI as opposed to one assisted by human prompting? Is there some part of being a human or having the human understanding that is a necessary condition for being art? This paper argues for AI's inclusion in the art community as to meet the necessary social conditions for art, and places a focus on discussing human intentionality and AI art's perception.

Hinson, Billy

Faculty Mentor: Fidisoa Rasambainarivo

Toxoplasma gondii seroprevalence and transmission factors among six free-ranging lemur species

Toxoplasma gondii is a globally distributed zoonotic protozoan parasite capable of infecting all mammalian and avian species. This parasite uses felids as its primary host, in which it sexually reproduces and forms oocysts to be shed in feces. Toxoplasmosis presents varying degrees of symptomaticity and lethality in its intermediate hosts. Lemurs in captivity are highly prone to infection, reproductive failure, and death by T. gondii infection. The T. gondii seroprevalence in free-ranging lemurs is sparsely studied, and complicated by a lack of validated diagnostic tests for toxoplasmosis in these primates. In consideration of these factors, this study aims to estimate the seroprevalence of six free-ranging lemur species in a particular geographic range while accounting for the variation in detection probability of current diagnostic tests. Serum samples of 159 lemurs from six lemur species were tested in triplicate via the Toxoplasma gondii Modified Agglutination Test (TgMAT). Using an occupancy model framework, the prevalence and probability of detection of T. gondii exposure in the study group will be estimated. Further analysis will be done in order to determine species-specific factors contributing to exposure to T. gondii in these six lemur species. This study provides further insight on the degree to which parasites are affecting wild lemurs, and offers a novel framework to estimate their exposure to pathogens.

Hodges, Melony Grace

Faculty Mentor: Rob Tempel

Determining factors for developing a framework for a feasibility study before opening a rural dental clinic

The ECU School of Dental Medicine's Hyde County Clinic was opened with the goal of bringing oral healthcare to the residents of Hyde County. Hyde County is one of four counties that does not have a single practicing dentist within county lines. The goal of the Hyde County Clinic is to partner with local health and government agencies to bring sustainable and accessible dental care to the residents of Hyde and other neighboring counties. Since the opening of the Hyde County Clinic, 439 patients have been treated by 126 ECU SODM dental students and 62 dental residents. Since its opening, the clinic has also provided $80,379.25 worth of dental care. With the Hyde County Clinic being open for over two years, it is essential to ask what is next. To answer this question, data was gathered from the residents of Hyde County to determine the future of the Hyde County Clinic. The purpose of the research is to link the social determinants of health and the health needs of Hyde County to help build a practice around those specified areas. After collecting data, I will establish a set of questions that could be asked by

those who want to expand the services and dental practice to function each week of the year. By creating these questions, a framework can be developed that other rural counties or cities can follow to help build a functional, profitable, and affordable dental clinic for the residents of those places. To complete this research a combination of qualitative and quantitative data will be used. This can be done by analyzing current data from the Hyde County dental clinic and producing surveys for patients to fill out. Some of the data to be analyzed can be the percentage of Medicaid versus employer-based or private insurance policies being used by patients. The age range of patients that are being seen and what health problems are pre-existing and most prevalent among the patients seen in the clinic. Some of the questions in the survey to be created could ask patients what city within the county would be most accessible for them to reach a dental clinic, whether would they participate in extra dental services such as Invisalign or teeth whitening if offered, and what was the reason for their appointment. This last question would be framed to be asked in a way to ask if the patient is only coming in for routine dental cleanings or if they started coming to the clinic due to an emergency. Another question to be asked would be if they have any children at home that they would send to the clinic to receive dental care.

Honeycutt, Anna

Faculty Mentor: Lauren Sastre

Visually Translating Culinary Medicine: The Innovation Behind Creating a Healthy/Wholesome Cookbook Raising Food Literacy and Combating Cardiometabolic Risks

Using my creative photography/videography skills, I have created an interactive cookbook to increase culinary and health literacy for low-income patients from rural eastern North Carolina enrolled in the Fresh Start Program. This cookbook will empower patients of the Fresh Start program to have an increased quality of life by equipping them with enhanced culinary skills to support improved diet quality, nutrition, and health. We “eat with our eyes”. Creating food that is beautiful, flavorful, and healthy- combines art and science to meet sensory and nutritional needs. To address barriers and promote healthy eating I have created an interactive cookbook that uniquely has both step-by-step recipes with pictures and QR codes leading to brief videos visualizing cooking techniques as well as introductory material supporting food literacy (e.g., you don’t have this use that, things to keep in your pantry) that are visually appealing and simple to promote healthier eating and tailored for individuals with less financial resources (e.g., inexpensive, common ingredients, limited equipment) and literacy/numeracy (reading and following recipe) while promoting healthy eating with a variety of colors, textures, flavors. The finished product consists of a hardcopy cookbook with sections that include breakfast, soups, salads and snacks, vegetables, main dishes, and desserts. Each section contains modified recipes to accompany the needs of the patient population, prioritizing fruits and non-starchy vegetables as well as low sugar, lean proteins, and fiber. Every recipe has been handmade and photographed in a visually appealing manner. Not only were the recipes photographed but the culinary process has been brought to life through the utilization of step-by-step cooking videos accessed through QR codes. Patients can now visualize the cooking process increasing their culinary skills and self-efficacy. Recipe videos will also be utilized on the Fresh Start social media page to increase participant engagement. This cookbook has been made available both in paper copies as well as digitally to improve access for every patient the Fresh Start Program serves.

Hoover, Katlyne

Faculty Mentor: Myon Hee Lee

FBF/PUF and CYB-1/Cyclin B Promote Sperm Viability by Inhibiting CED-4-mediated Apoptosis

Pumilio/FBF (PUF) proteins are conserved not only in their sequence but also in their role in stem cell regulation. Among the 11 PUF proteins present in Caenorhabditis elegans, FBF-1 and FBF-2 proteins are critical for germline stem cell (GSC) maintenance and oocyte fate determination. Thus, in an fbf-1(−/−) fbf-2(−/−) double mutant, all GSCs are differentiated into sperm cells without switching to oogenesis. FBF-1 and FBF-2 proteins repress their target mRNAs by binding to 3' untranslated regions (3'UTRs). In the present study, we identified cyb-1 (a B-type cyclin) as a target mRNA of FBF-1 and FBF-2. Our functional analysis revealed that cyb-1 depletion significantly eliminated sperm cells autonomously through CED-4-mediated apoptosis in adult fbf-1(−/−) fbf-2(−/−) mutant germlines. We also found that FBF proteins could inhibit the expression of ced-4 mRNA by binding to its 3'UTR in distal germlines. These results suggest that FBF proteins and their repression target, CYB-1, work together to protect sperm cells from CED-4-mediated apoptosis. As these regulators are broadly conserved, we suggest that a similar mechanism could control sperm viability in other organisms, including humans.

Hopkins, Essence

Faculty Mentor: Kathrin Rothermich

Shaping Social Perception: How tDCS Affects Sarcasm Interpretation Across Empathy Groups in the Right TPJ

The right temporoparietal junction (rTPJ) plays a crucial role in theory of mind (ToM) and cognitive empathy, both essential for interpreting nonliteral language such as sarcasm and teasing. While prior studies suggest that cathodal transcranial direct current stimulation (tDCS) to the rTPJ disrupts ToM and empathy-related tasks, its specific role in social language processing remains unclear. This study examines how rTPJ inhibition via tDCS influences sarcasm interpretation, with a focus on individual differences in empathy. Unlike previous research relying on static images or written text, we employ 96 dynamic video interactions featuring sarcasm, teasing, and sincerity. Participants (N=17) categorize these interactions while we measure accuracy, reaction time (RT), and eye movements to assess cognitive processing. Before the task, participants receive 20 minutes of cathodal tDCS (1.5 mA or sham) to temporarily inhibit rTPJ activity. Preliminary results reveal that the effects of tDCS on RT depend on empathic concern. Among individuals with high empathic concern, tDCS slows reaction time (1713 ms) compared to sham (1522 ms), suggesting disrupted processing efficiency. Conversely, in those with low empathic concern, tDCS speeds up reaction time (1669 ms) relative to sham (1811 ms), indicating facilitation of task performance. There is also significant variability in RT across participants (SD ≈ 504.18 ms). These findings suggest that rTPJ inhibition has differential effects on sarcasm interpretation based on empathy levels, potentially reflecting distinct underlying cognitive strategies. Ongoing data collection aims to further clarify these effects and assess whether similar patterns emerge in accuracy and gaze behavior. Future research will extend these findings to clinical populations with social cognitive deficits, such as Autism Spectrum Disorder, Schizophrenia, and Parkinson's Disease, to better understand the role of the rTPJ in social language processing and its modulation by tDCS.

Huffman, Hannah

Faculty Mentor: Mitzi C. Pestaner

Exploring the Influence of Self-Awareness of Emotions Among BSN Students

The development of emotional intelligence (EI) for BSN students is crucial to further their critical thinking skills and assurance of patient safety. The concept of EI has been defined in a multitude of ways, though lead theorists have defined it as the ability to recognize, integrate, and understand emotions to facilitate thinking and manage emotions to support personal growth. Literature supports that the implementation of EI in nursing curricula empowers students to handle emotionally charged situations confidently, competently, and safely by firstly understanding their own emotions. Additionally, EI works synergistically with the rational mind to enhance intellectual abilities, directly impacting an individual's success in their role. The purpose of this study was to explore student perceptions of how self-awareness of emotions influenced the development of strategies to manage their emotions in future situations. IRB approval was obtained prior to analysis. Secondary qualitative data analysis was conducted using first and second cycle coding of reflective prompts in journals kept by BSN students in a mental health clinical rotation. The data was gathered in the spring of 2023 from a convenience sample of 31 participants and was de-identified prior to analysis to maintain anonymity. During first cycle coding, in vivo coding was utilized to identify the terminology and language used by participants. Second coding cycle was utilized to collapse and categorize first cycle codes and identify themes. The results of this study are pending. Supporting the development of EI in the nursing curricula is important to help students identify and understand their emotions to guide clinical decision-making and ensure safe patient care is provided.

Humphreys, Hayden

Faculty Mentor: Cal Christian

Exploring the ethical decision-making differences between accounting students and professionals.

Possessing the skill of ethical decision making is crucial for all accounting professionals. Continuing education exploring ethics is required for CPAs to maintain their licensure. Despite the importance placed on ethics at the professional level, there is debate about when and where professionals begin to develop ethical decision making. This study examines the differences in ethical decision-making of undergraduate accounting students, graduate accounting students, and accounting professionals. These groups were surveyed using a ten-question scenario-based quiz to evaluate their ethical reasoning. The undergraduate accounting students represent those that have received minimal ethics education, graduate students representing those who have received some ethics education, and professionals representing those who have developed experience in ethical decision-making. The findings of this research will help determine whether ethics courses should be introduced earlier in a student's education journey and will help provide broader insight into how ethics education is impacting the accounting industry.

Ingram, Lauren

Faculty Mentor: Virginia Driscoll

The Impact of High-Stress Periods and Health Education on Injury Prevalence Among Student Musicians

The purpose of this study is to identify whether a relationship exists between high-stress periods and injury prevalence among student musicians, as well as the potential role of limited health education in increasing injury susceptibility. Research on this topic has identified a high rate of injury among professional musicians, with a pilot study suggesting similar trends in student musicians. However, there is a gap in understanding how stress levels impact injury rates in students on a broader scale. The study is currently ongoing, but projected data anticipates a positive correlation between high-stress periods and injury prevalence among student musicians with a negative correlation with prevention education.

Job, Taylor

Faculty Mentor: Zachary Domire

Snapping Hip Syndrome and Muscle Stiffness

Snapping hip syndrome (SHS), is a common injury among dancers, characterized by either a palpable or audible snapping sensation that is heard during the movement of the hip joint. It can either be internal or external. Internal snapping hip is mostly due to the iliopsoas tendon snapping over underlying bony prominences. External snapping hip is mostly due to the iliotibial band moving over the greater trochanter of the femoral head. Snapping hip of any kind results from the affected tendon tightening and snapping over the bony prominence during hip movement. This study will focus on external SHS which is due to the iliotibial band (ITB) passing over the greater trochanter causing the snapping sensation. The tensor fascia latae (TFL) and gluteus maximus (GM) insert into the iliotibial tract anteriorly and posteriorly, respectively. These muscles pull on the iliotibial tract and tighten it when the hip is flexed or extended, which could be a contributing factor in the development of SHS. This study aims to determine how GM stiffness and TFL stiffness contribute to ITB stiffness and therefore SHS. METHODS: I plan to recruit at least 20 female dancers from a collegiate dance program and 20 BMI-matched controls. Shear wave elastography will be used to determine the stiffness of the GM, TFL, and ITB. Multiple resting images will be taken of each of these muscles. Data will be analyzed by taking an average of the images and creating linear regressions to determine the correlation between GM stiffness and ITB stiffness as well as TFL stiffness and ITB stiffness. ANTICIPATED RESULTS: It is hypothesized that the stiffer the GM and TFL, the stiffer the ITB will be. SHS affects about 90% of competitive dancers with 80% having bilateral involvement. If GM and TFL stiffness affect the stiffness of the ITB, this can be a predictor of whether a dancer is beginning to develop SHS. This information will be beneficial for the treatment and prevention of a syndrome affecting many dancers.

Jones, Loghan

Faculty Mentor: Jamie Perry

Exploring the Possible Correlation Between Levator Origin Distance and Craniofacial Syndrome Diagnosis

Velopharyngeal closure is a phenomenon that occurs during oral speech production and swallowing. This closure is primarily completed through retraction and elevation of a velopharyngeal muscle known as the levator veli palatini muscle. The levator veli palatini (LVP) muscle originates from the petrous portion of the temporal bones and then inserts into the velum (Perry, 2011). Literature has suggested that the distance between the two originating portions of the LVP may be highly correlated to craniofacial syndromes (i.e., 22q11.2. deletion syndrome); however, this study had a small sample size (i.e., n=15) and only included one craniofacial syndrome (Kollara et al., 2019). As the LVP origin-to-origin distance measurement has been shown to be significantly shorter in one craniofacial syndrome compared to healthy peers, the overarching purpose of the present study is to determine if LVP origin to origin distance varies significantly compared to individuals with and without a variety of craniofacial syndromes. Methodology:
In accordance with the Institutional Review Boards at the University of East Carolina University, 111 children were enrolled in this study. The control group and the patient group were matched by age (+/- 1 year), sex, and race. MRI data was obtained for each subject. MRI data will be analyzed in Amira 3D Visualization Software in order to obtain measurements related to levator angle of origin and levator origin to origin distance. Results: Data analysis is still ongoing and is expected to be completed by March 2025. Closure: The analysis of the potential relationship between LVP origin distance and craniofacial syndrome diagnosis is an important aspect of cleft and craniofacial care as this correlation can possibly lead to accurate diagnosis of a variety of craniofacial syndromes. By investigating this topic, the quality and efficiency of overall cleft care can be improved.

Jones, Paul

Faculty Mentor: Stephanie Richards

Efficacy of Formulated Insecticide Product ReMoa Tri® Against Mosquitoes Exposed in a Field Trial or Laboratory Wind Tunnel

Adulticides are an essential tool in an integrated mosquito management program for controlling adult mosquito populations to help prevent outbreaks of mosquito-borne diseases. Here, we evaluated the efficacy of a new adulticide formulated product (FP), ReMoa Tri®, against mosquitoes in a field trial and a compact laboratory wind tunnel. Field trials are a standard method for monitoring FP efficacy and are set up in a 9 x 3 grid pattern with stations 100, 200, and 300 ft from the spray line. However, field trials can be costly, weather dependent, and cumbersome (equipment, personnel, completed at dusk/dawn). A field trial conducted in summer 2024 was analyzed in this study to determine ReMoa Tri® efficacy against lab and wild mosquito populations of Aedes albopictus and Culex pipiens/quinquefasciatus. Field trial and wind tunnel exposure results were compared. At 48 h post-exposure, the mean of mosquito mortality (± SE) was 92 ± 9% (Aedes lab) and 80 ± 17% (Aedes wild) and rates varied by distance from the spray line and mosquito population. Mortality rates of lab (39 ± 15%) and wild (13 ± 7%) Culex populations were significantly lower ($P<0.05$) than mortality of Aedes 48 h post-exposure. Conversely, when mosquitoes were exposed to ReMoa Tri® in a wind tunnel, lab Aedes, wild Aedes, and lab Culex populations experienced 100% mortality 48 h post-exposure. The mortality rate of the wild Culex population tested here was 85% at 48 h post-exposure; hence, this population was considered resistant to the FP. Lower mortality observed in some mosquito populations exposed to ReMoa Tri® during the field trial compared to the wind tunnel was likely due to wind conditions causing incomplete droplet distribution to mosquitoes in the field. These differences were evident in mortality rates between mosquito populations and mosquito cage distance from the spray line. Wind tunnel exposure experiments showed more consistent mortality data than the field trial, highlighting the potential of this exposure method as a screening step or alternative to the field trial.

Kalapurackal, Chris

Faculty Mentor: Morteza Nazari-Heris

Using Second-Life Electric Vehicle (EV) Batteries as Energy Storage Economic, Environmental, and Social Impacts

The global adoption of electric vehicles (EVs) has been substantially increasing, with projections indicating a 6- to 30-fold increase in EV sales by 2030 compared to 2019 levels. This rapid expansion raises awareness to a critical challenge: the management of the end-of-life (EOL) EV batteries. Our current recycling infrastructure is not prepared to handle this surge in discarded lithium-ion batteries, necessitating the need for sustainable alternatives. Our study aims to explore the impacts of repurposing EV batteries as second-life batteries (SLBs) for stationary energy storage for communities and businesses. Second life applications pose a viable solution to this issue as these batteries retain about 70-80% of their capacity after their EV use. By leveraging a circular economy model, second-life applications extend battery lifespan by 3 to 10 years, reducing e-waste and delaying resource-intensive battery production. SLBs also present a viable return on investment. For instance, the Nissan Leaf Gen 1 battery packs are capable of generating $16,200 in value over their second life. These SLBs have also been shown to reduce CO_2 emissions by up to 1,000 kg per battery. Our study examines the impact of SLBs across the three pillars of sustainability: economic, environmental, and social. From an economic perspective, we analyze how second-life batteries create cost savings for consumers through peak shifting and improve grid resilience. Environmentally, we examine how repurposing EV batteries reduces electronic waste, lowers CO_2 emissions, and decreases the reliance on newly mined materials. It also facilitates a greater and easier renewable energy integration. Socially, this study explores how SLB adoption can drive job creation in battery refurbishment, while also improving energy reliability. Our study will also explore some research gaps that have delayed progress in this field. Economic uncertainty surrounding battery longevity and performance discourages investment, while regulatory barriers create legal vagueness regarding liability and grid integration. The lack of standardized battery health tracking systems further complicates resale and reuse. By addressing all these factors and challenges, this study aims to find out how to optimally utilize SLBs and will propose policy interventions and incentives to enhance SLB adoption. Data from this research can inform policymakers, automakers, and energy stakeholders to push investment into sustainable energy storage solutions, optimize battery repurposing strategies and help shape regulations. This study can help push SLB systems to emerge as a cost-effective, environmentally sustainable, and socially transformative solution for the growing energy storage market.

Kalawska, Sara

Faculty Mentor: Michael Baker

Religion and Socioeconomic Status: How Does Locus of Control Fit in?

The connections between religion and socioeconomic status (SES) have been a point of research for decades. It is often observed that people of lower SES tend to be more religious, for reasons that will be explored further in this paper. In many Christian parables and teachings, it has been shown that wealth and material possessions are insignificant, and will not be able to enter Heaven, which may appeal to people of lower SES. As an additional variable, this research will also investigate how SES affects locus of control (LOC). LOC is the psychological theory of how much control one has over the outcomes in their life. Through the review of meta-analyses, experimental studies and dissertations written by various scholars, the paper will analyse and evaluate how SES affects religiosity and locus of control.

Kannajoshyula, Sruthi

Co-Authors: Sruthi Kannajoshyula, Drew Theobald, Srinivas Sriramula
Faculty Mentor: Srinivas Sriramula

Increased B1R expression and microglial activation in hypertension

The kinin B1 receptor (B1R), typically expressed at low levels under normal conditions, is upregulated in response to inflammation, injury, and stress. This upregulation has been implicated in neurogenic hypertension, where brain dysfunction contributes to elevated blood pressure via neuroinflammation and oxidative stress. Prior studies in our lab have shown that in Angiotensin II (Ang II)-induced hypertension, B1R expression is increased in neurons. Given the involvement of the paraventricular nucleus (PVN) and subfornical organ (SFO) in blood pressure regulation, we hypothesize that in hypertensive

mice B1R expression is upregulated in SFO and PVN and co-localizes with neurons and microglia. Methods and Results: Twelve-week-old male C57BL/6NJ mice were administered vehicle (saline) or Ang II (600 ng/kg/min) for 28 days via osmotic minipumps. Immunofluorescent staining was performed on brain sections from the PVN and SFO using antibodies against B1R, IBA1 (microglia), and NeuN (neurons). Fluorescence images were captured and analyzed with ImageJ to assess B1R expression, co-localization with microglia and neurons, and microglial activation status. Our findings revealed a significant increase in B1R expression in the PVN and SFO of Ang II-treated mice. Notably, B1R co-localization was markedly higher in the Ang II group, and microglia exhibited an activated morphology, suggesting a pro-inflammatory response in these key blood pressure-regulating regions.Conclusion: This study demonstrates that Ang II-induced hypertension leads to increased B1R expression and enhanced co-localization with microglia in the PVN and SFO, with a shift toward an activated microglial state. These findings support the hypothesis that B1R plays a critical role in mediating neuroinflammation within key brain regions that regulate blood pressure and that B1R may serve as a potential therapeutic target for the treatment of hypertension. Future research will explore additional regions, such as the rostral ventrolateral medulla (RVLM) and nucleus tractus solitarius (NTS), to further elucidate B1R's role in neurogenic hypertension

Karaivanova, Lexi

Faculty Mentor: Justin Wilmes

Rock on Bones: Western Music and Russian Rock in Perestroika and Post-Soviet Cinema

This thesis focuses on the role of Western and Russian rock music as represented in perestroika and post-soviet film. This research aims to define the political subtext and historical accuracy of the musical movements represented in films, such as the stilyagi movement of the 1940s-1960s and the Russian rock movement of the 1970s-1990s. Films of interest include Leto (2018), Hipsters (2008), Taxi Blues (1990), The Needle (1988), and Assa (1987). Musical films during perestroika had a mutualistic relationship with the Russian rock movement, and thus mythologized those rockers and that genre. Moving into post-soviet cinema, directors are able to engage with reflective nostalgia to retroactively paint the stilyagi and Russian rock movements as more active and revolutionary than they were, imparting stronger political messaging. Films from both periods utilized non-diegesis and song choice to make social commentary the movements themselves could not have made.

Kennedy, Madison

Faculty Mentor: Christine Habeeb

Examining the Relationship between Confidence and Individual Performance in an ROTC Rope Pull Task

In high performance settings, like the military, learning ways to enhance performance can help create better outcomes for soldiers. The U.S. Army has indicated that they are enhancing performance by becoming more focused on creating "cohesive teams that are trained, disciplined, and fit to win" (U.S. Army, 2019). We can use the confidence aspect of team dynamics, confidence in yourself (i.e., self-efficacy) and confidence in a teammate (i.e., other-efficacy), to help with this task as they are both important predictors of performance (Beauchamp et al., 2005). The purpose of this study is to examine how two types of confidence (i.e., self-efficacy and other-efficacy) predict individual performance in a tug-of-war task. Participants (n = 80) will compete in a tug-of-war style task with a partner in which they will pull the rope as hard as possible for 5 seconds. Before each trial, participants will report their self-efficacy and other-efficacy on a scale of 0 (not at all confident) to 10 (completely confident). Electromyography (EMG) sensors will be used to measure individual performance by recording the effort each participant exhibited based on the electrical activity produced by the muscles as it contracts. The max and average effort from the EMG's will serve as dependent variables with self-efficacy and other-efficacy as independent variables for the regression analyses that will be ran. A similar version of this study has been performed and showed that low other-efficacy in their partner altered participants' effort on the task. Given our pilot study align to Dunlop et al. (2011), we expect confidence in a teammate will be a stronger predictor of performance than confidence in oneself. This project is currently in progress and expected to be completed in late spring. Currently, 16 participants have taken part in the study and an additional 68 participants are scheduled.The results of this study can help to improve training techniques for the military by helping us to better understand the relationship between efficacy beliefs and performance.

Kiger, Nathan

Faculty Mentor: Lester Zeager

Gathering Data For A Health Deprivation Dashboard For North Carolina Counties

This Signature Honors Project (SHP) breaks new ground by identifying good health indicators--physical, oral, and mental--for a multidimensional deprivation measure for the 100 counties of North Carolina (NC). My mentors, Dr. Lester Zeager (Department of Economics) and Mr. Scott Wade (Department of Geography, Planning, and Environment), are working on a project to develop an online multidimensional deprivation dashboard for these counties. Until recently, economists treated poverty as one-dimensional; poverty was exclusively measured as income deprivation. Over the past few years, economists and other scholars have broadened their conceptions of poverty to include non-income dimensions of well-being. Multidimensional deprivation measures encompass the traditional "income deprivation" as well as deprivation in education that limits participation in basic political or social activity, deprivation in health that limits longevity, and deprivation in security due to crime. My first role in the project was to recruit members of an expert panel of ECU faculty from public health (Brody School of Medicine), oral health (Dental School), mental health (Department of Psychology), education (College of Education), and public safety (Department of Criminal Justice) to advise us on choosing indicators for monitoring non-economic dimensions of well-being. Following the advice of the expert panel, the data we collected and analyzed showed that North Carolina counties vary substantially in these dimensions of deprivation, and many counties in eastern North Carolina exhibit high levels of deprivation. ECU's commitment to regional transformation creates a need to monitor trends in well-being for the poorest residents in the region, focusing attention on pockets of deprivation and the nature of the deprivations that need to be addressed in those areas. We also discovered that the NC Department of Commerce publishes annual rankings of distress in NC counties using a measure that includes only economic indicators and lacks a measure of poverty. We supplement their economic indicators with one that captures income poverty. We then add measures that capture deprivation in education, health, and security, which allows us to monitor a broader measure of well-being in NC counties. The second part of my SHP focuses on the consequences of including public, oral, and mental health measures for deprivation rankings of the 100 NC counties and for comparisons among 4 geographic county groups: Mountains, Piedmont, Coastal, and Tidewater.

King, Hannah

Faculty Mentor: Ruth A. Schwalbe

Anxiety-like and Motor Activity Abnormalities in Adult Zebrafish Deficient in Hybrid and Complex Types of N-glycans

Aberrant N-glycosylation, the addition of sugars to proteins, causes developmental difficulties and defects in humans. These disorders are referred to as Congenital Disorders of Glycosylation (CDG) and are commonly associated with neurological and motor abnormalities. Further, a knockout mouse model which lacked complex and hybrid types of N-glycans (a.k.a. sugars) attached to proteins, was embryonically lethal due to causing neural tube maldevelopment. N-acetylglucosaminyltransferase-I (GnT- I; MGAT1) catalyzes a required step for converting oligomannose N-glycans into hybrid N-glycans. Hybrid N-glycans are subsequently catalyzed into complex N-glycans via GnT-II. Zebrafish, unlike humans and mice, have two MGAT1 genes, referred to as mgat1a/b. Using CRISPR/Cas9 technology (genetic editing tool), we engineered an mgat1b mutant zebrafish line and showed that global decreases in hybrid and complex types of N-glycans lowered survivability, hampered development, and caused defects in sensory and motor functions in embryos and larvae. Here, we hypothesized that motor defects and anxiety-like behavior are manifested in adult mgat1b mutant fish. Locomotor studies tracking the distance swam during a specified time limit will be measured to observe the dysfunction of motor activity in adult mgat1b mutant fish as it compares to Wt AB fish. A novel tank diving test will be employed to examine behavior of a solitary fish in a novel environment. Taken together, these assays will collect information on whether lowered levels of hybrid and complex N-glycans result in motor and behavior abnormalities in adult fish.

Kiriai, Kristalina

Faculty Mentor: Isabelle Lemasson

Myoferlin is localized to mitochondria associated membranes in adult T-cell Leukemia: potential impact on cellular metabolism?

The human T-cell leukaemia Virus Type 1 (HTLV-1) is a retrovirus that infects CD4+ T-cells. On a global scale, between 5 and 10 million people are infected and it is prevalent worldwide. Particularly, the primary routes of transmission are through blood contact, sexual contact, and breastfeeding from the mother to the infant. Although most people infected are asymptomatic, approximately 5% can develop adult T-cell leukaemia (ATL) due to T cell transformation. Another 5% can develop HTLV-1-associated myelopathy/tropical spastic paraparesis (HAM/TSP), a disease characterised by the migration of infected CD4+ T-cells into the central nervous system, leading to chronic inflammation. In ATL, the HTLV-1 upon infection, will encode for viral proteins enabling viral replication, cellular transformation and long-term oncogenesis. Examples include HBZ, a transcription factor that regulates viral and cellular transcription, responsible for maintaining the oncogenic phenotype. Our research revealed that HBZ induces abnormal overexpression of the cellular gene myoferlin in CD4+ T cells. Myoferlin is naturally highly expressed in muscle cells and its role is to assist with membrane repair, cell movement, and vesicle trafficking. In HTLV-1 infected T-cells, myoferlin stabilizes the viral envelope protein by preventing its lysosomal degradation, facilitating receptor binding on non-infected cells, and enhancing viral propagation. Moreover, considering myoferlin's shown involvement in mitochondria function in pancreatic cancers, HTLV-1 might utilizes myoferlin to disrupt cellular metabolism, promoting hyperproliferation. We hypothesise that HBZ increases myoferlin expression in HTLV-1 infection to alter cellular metabolism and promote cell survival. We have preliminary data that myoferlin silencing is associated with a reduction in mitochondria activity. To determine myoferlin's location, we prepared crude mitochondria extractions from various HTLV-1-infected cell lines under various conditions such as upon myoferlin knockdown. Proteins were identified by western blotting after mitochondrial protein isolation, using Triton X-100 and proteinase K to lyse mitochondrial membranes selectively. Whole-cell extracts were also included to compare protein levels among the various cell lines with their corresponding mitochondria extractions. Our findings showed that myoferlin appears localized at the outer mitochondrial membrane as opposed to the actual mitochondria. To ensure the accuracy of our extractions, multiple mitochondrial and membrane -associated proteins were analysed, such as Caveolin-1, VDAC and Pink1, which are localized to different mitochondrial compartments. Future research will evaluate how myoferlin is recruited to the mitochondria associated membranes and how it impacts mitochondria's function.

Kirkendoll, Joanna

Faculty Mentor: Robert Hughes

Immobilized enzyme approach to anti-microbial peptide production

The rise in resistance to common antifungal agents has highlighted the need for alternative therapeutic options. Antimicrobial peptides (AMPs) have gained attention due to their broad-spectrum antimicrobial properties and low toxicity. Among these, Histatin-5 has shown potent activity against Candida albicans, including strains resistant to standard treatments, without inducing resistance itself. This research focuses on synthesizing and isolating bioactive Histatin peptides via protein overexpression in E. coli. Our immobilized protease method has proven effective in expressing and purifying small quantities of Histatin-5, with purification achieved using prep-scale high-performance liquid chromatography (HPLC). Current efforts, in collaboration with ECU's School of Dental Medicine, are aimed at upscaling Histatin-5 production and exploring the synthesis of Histatin-1. Future work will characterize the antimicrobial activity of these peptides and investigate gel-based formulations for oral delivery, potentially establishing a novel approach for oral health treatments.

Kirwin, Kyle

Co-Presenters: Trent Byrum, Molly Lasure
Faculty Mentor: Teresa Ryan

Summary of Near-Shore Long Range Atmospheric Acoustics Field Measurements

The overall project aim is to improve the understanding of how sound travels over long distances over water. This effort, funded by the Office of Naval Research, has applications to the stealth of military operations; but also has relevance to several other applications, including evaluation of potential impact of offshore wind farms or routing for other civil infrastructure projects like highways. The unique meteorological complexity, as well as the change in acoustic properties of the surface when moving from over water, create challenges in accurately predicting how offshore noise sources sound to observers over the water. This project aims to improve the state of the art in numerical modeling of acoustic propagation, as well as to provide a way to validate this or any numerical modeling effort. A data library of high-resolution measurements in a variety of wind and temperature conditions provides the ground truth for comparison to model output.

Knipe, Joshua

Co-Presenters: Gillian Christman, Kaitlyn Cannon, Makaila Dawson
Faculty Mentor: Courtney Baker

Is it because of my age? The impact of discrimination and goal (dis)engagement on successful aging

Subjective age (SA) is a concept centered around an individual's feeling of age typically associated with individual perspectives regarding their physical, social, and emotional health (Hubley & Russell, 2009; Kotter-Gruhn et al., 2015). Subjective age allows researchers to relate concepts that may not be readily observable through a strict chronological age approach, and can allow researchers to gain insights into abstract concepts that may be influenced more by an individual's feelings as opposed to chronological age. Occupational future time perspective (OFTP) is a construct that views the perceived amount of time and opportunity that an individual may have in the workforce. OFTP, when coupled with the changes in goal setting derived from socioemotional selectivity theory (SST), gives rise to the assumption that individuals will begin to prioritize more emotionally centered goals as they age and their expected remaining time in the workforce decreases (Zacher & Frese, 2009). Counterproductive work behaviors (CWBs) are a purposeful act from a member of an organization that may be destructive to the organization's overarching goals and interests (Gruys & Sackett, 2003). Examples of CWBs may include: leaving work thirty minutes early to make sure you get to watch your favorite television series, deleting a colleagues spreadsheet because they made a comment about how the purple polka dotted tie you love is very ugly (Who does that guy think he is?). Inversely, organizational citizenship behaviors (OCBs) are unnecessary actions performed by an individual that may benefit the overall goal and interests of an organization (Organ, 1988). Subjective age may influence OFTP, when coupled with the goal changes associated with SST, through the shortening or lengthening of the amount of perceived time left in the workplace due to intrapersonal factors such as physical health and social wellbeing. We expect

Krakover, Jacob

Faculty Mentor: Morgan Milton

Advancing the understanding of the Vibrio fischeri biofilm formation through the response regulator SypG

SypG is a bacterial enhancer binding protein that acts as a σ54-dependent transcriptional regulator. In Vibrio fischeri, SypG regulates the initiation of biofilm formation by activating transcription of the syp locus using ATP hydrolysis. The syp locus, named for the symbiosis polysaccharide that its genes are responsible for making, contains 18 genes that code for regulatory proteins and enzymes that can activate or inhibit biofilm formation. A conserved homolog to SypG is LuxO from the lux locus in Vibrio cholerae, V. parahaemolyticus, and V. harveyi. In V. cholerae, LuxO is a negative response regulator of quorum sensing that forms a hexamer and uses ATP hydrolysis to fuel mechanical processes, such as regulation of quorum-sensing and DNA transcription. Since LuxO is an ATP hydrolyzing transcription and response regulator and it is a homolog to SypG, we hypothesize that SypG will behave in a similar fashion. To achieve this, we are continuing to optimize our purification process to conduct biochemical and biophysical assays. These assays would help us to determine the oligomerization states and enzymatic functions of SypG through analytical ultracentrifugation (AUC) and ATPase assays. The AUC assays will show that SypG, like LuxO, forms a hexamer in solution, and the ATPase assays will allow us to observe if SypG hydrolyzes ATP to perform its function as a transcriptional regulator. If we can understand how SypG controls the initiation of biofilms, we may learn a new way to disrupt biofilm formation and combat bacterial antibiotic resistance.

Krause, Kaylee

Co-Presenters: Douglas Sandford Bell, Jr.
Faculty Mentor: Tuan Tran

The Role of ADAP/Centaurin--a1 in Hippocampal-Based Trace Eyeblink Classical Conditioning

The synaptic protein ADAP1/Centaurin-a1 (CentA1) is found in high concentrations within the brain. It is known to regulate dendritic differentiation and their structural plasticity. Research has shown that it may mediate Alzheimer's disease (AD) pathogenesis, leading to behavioral and cognitive impairments in mice. CentA1 is upregulated by amyloid β (Aβ), which correlates with Aβ-dependent spine loss and deficits in spine plasticity in mice. In turn, plaques comprised of Aβ are highly associated with AD progression. Indeed, phosphorylation of CentA1 is prominently expressed in hippocampal tissues of AD patients. In this study we investigated whether suppression of CentA1 would be an ideal method to reverse cognitive dysfunction using trace eyeblink classical conditioning (TECC), a well-studied form of learning mediated by cortical-hippocampal interactions. A learning task that assesses this neural circuit is used because it is highly susceptible to AD neuropathogenesis. AD is characterized by progressive loss of many cognitive functions. Looking at CentA1 overexpression is a novel approach to understanding neuropathology of AD, as current treatments have yielded very little in terms of long-term efficacy. Elevated CentA1 may enhance AD progression and pathology, leading to cognitive impairments and its reduction is a potential target for experimental therapeutics. Adult male and female wild-type (WT) and CentA1 knockout (KO) mice were surgically implanted with recording electrodes and a stimulating electrode. After recovery, they received six days of TECC. Each day consisted of 100 trials in which a 380-ms, 80dB tone conditioned stimulus (CS) was paired with a 100-ms, 1.6mA current (unconditioned stimulus, US) delivered to the periorbital muscle to elicit an eyeblink unconditioned response (UR). A trace period of 500ms in between the tone CS and shock US was imposed. The learning measure is the conditioned response (CR), an anticipatory eyeblink that is elicited by the tone CS and is emitted prior to the US. The trace period taxes the ability to time events properly and requires the integrity of cortical-hippocampal circuits. We compared whether the learning curves expressed by each group differed significantly. Results from this study will provide novel insight on whether CentA1 plays a role in mediating adverse learning outcomes in AD.

Lambert, Davis

Co-Presenters: Cole Languell
Faculty Mentor: Dan Perrucci

Evaluating the Application of AI in Construction Estimating and Scheduling

Artificial intelligence (AI) can transform industries through instant access to information and automation of routine tasks. In construction estimating and scheduling, AI has the potential to reduce errors, accelerate project timelines, and enhance competitiveness by streamlining bid preparation. However, widespread adoption requires the verification of AI-generated outputs against traditional industry standards. This study evaluates the accuracy and feasibility of AI-driven estimating and scheduling by comparing ChatGPT-generated results with traditional methods using RS Means. The benefits associated with AI can permeate into estimating to potentially eliminate common errors and reduce the time required to form a project bid, allowing contractors to be more competitive. The research aims to determine whether AI can provide cost and schedule estimates that match or exceed conventional approaches in terms of efficiency and reliability. Additionally, challenges such as implementation costs, AI training requirements, and industry resistance to change are examined to assess the practicality of AI integration. By analyzing the performance of AI in construction management, this study seeks to highlight both the opportunities and limitations of automation in estimating and scheduling. The findings will contribute to ongoing discussions on the role of AI in construction, offering insights into its potential to reshape project planning, improve resource allocation, and enhance overall industry efficiency.

Lane, Brodey

Co-Presenters: Brian A. Ester
Faculty Mentor: Michelle Henderson

Balancing the Waters: Exploring the Water Quality in Lake Phelps

Phelps Lake is in Washington County along the eastern part of North Carolina. Phelps Lake is a large shallow lake fed entirely by rainfall with an average depth of 4.5 feet and a maximum depth of 9 feet covering 16,600 acres. Phelps Lake is home to a diverse range of flora and fauna including lilies, carnivorous plants, bass, crappies, sunfish, and waterfowl. These species thrive in bogs with sandy soil and acidic water. East Carolina University’s Water Corps Program has been contracted by officials from Pettigrew State Park to monitor water quality in Phelps Lake. The goal for Pettigrew State Park is to restock fish species into the lake to promote fishing and other outdoor activities to stimulate the local economy. The State Park requested that the Water Corps measure water quality parameters to evaluate how these parameters fluctuate throughout the year and determine if there is an impact on aquatic life. Water quality parameters were collected monthly using a handheld YSI ProDSS Water Quality meter. Water quality parameters collected include pH, dissolved oxygen, turbidity, depth, and temperature. Although the lake is entirely fed by rainwater, pH values in the lake were not highly acidic. Average pH levels in Phelps Lake are 6.8 and have remained constant from June 2022 to February 2025. Because the lake is shallow, high winds disturb the water's surface. This causes the water column to be mixed, resulting in sediment being lifted from the lakebed and dispersing throughout the water column. Our results found that some points in Phelps Lake have elevated levels of turbidity and dissolved oxygen levels averaging 8.52 mg/L from June 2022 to February 2025 which is a suitable range for lakes. Our results demonstrated that throughout the year water quality variables were constant and relatively optimal conditions for aquatic life.

Lang, Erin

Faculty Mentor: Ruth A. Schwalbe

Characterization of N-glycans in a Newly Engineered Single Knockout Zebrafish Model

Abnormal modification of proteins with sugars (i.e., N-glycosylation processing of proteins) is crucial for multicellular development as underlined by Congenital Disorders of Glycosylation (CDG) in humans. A vital enzyme of the N-glycosylation pathway is N-acetylglucosaminyltransferase-I (GnT-I; MGAT1) which is involved in the synthesis of hybrid and complex types of N-glycans. The loss of GnT-I activity leads to lowered levels of hybrid and complex N-glycans and an accumulation of oligomannose N-glycans. In fact, knockout of Mgat1 in mice was embryonically lethal. Since zebrafish have two of these genes, mgat1a/b, instead of a single gene like humans and mice, our study involves creating two single knockout models and a double knockout model. The fish models will be used to address our central hypothesis that lowered levels of hybrid and complex types of N-glycans cause developmental delays and defects in zebrafish. In this study, we analyzed the N-glycans in various tissues of the mgat1a mutant zebrafish line. Dissections and tissue homogenization were performed, followed by protein separation via gel electrophoresis and visualization with Coomassie blue staining. Lectin blotting with Galanthus nivalis lectin (GNL) was used to detect oligomannose N-glycans. Results revealed that mgat1a mutant zebrafish exhibited higher levels of oligomannose N-glycans in tissues, e.g., brain and heart, compared to wild type AB zebrafish. These findings support that the mgat1a mutant fish line is a global knockout, as all analyzed tissues displayed elevated oligomannose levels.

Langley, Makayla

Co-Authors: Lydia Randall, Brittany Trotter, Kaitlyn Wojciechowski, Nicholas Murray
Faculty Mentor: Nicholas Murray

Impact of Fatigue on Postural Stability and Brain Wave Activity

BACKGROUND: To maintain postural control, the brain is required to integrate visual and sensory information within the sensorimotor systems. Increases in fall risk is influenced by many factors such as age, fatigue, and neural dysfunction (e.g., Parkinsons Disease). While it is known these factors increase fall risk. the relationship between fatigue and neurological function in postural control are still unclear and the effects of fatigue are still unknown. The aim of this study is to directly analyze the effects of neural brain activity and postural control of healthy individuals following volitional fatigue. METHODS: Twenty healthy participants, ages of 18 to 50, will be chosen. Individuals with any previous history of concussions or major lower-extremity injuries are excluded as these conditions may affect the postural control. After providing informed consent, the participants will be outfitted with a Pedar in-sole and a g-tec EEG system. The pre-test will consist of three trials, each involving 30 seconds of standing with eyes open and 30 seconds with eyes closed. After, the participant will be asked to wear an HTC VIVE virtual reality (VR) headset and do three rounds of 30 seconds in the VR still room, 30 seconds in the VR moving room, and 30 seconds in recovery after the moving room. They will then undergo a volitional fatigue protocol. Fatigue will be defined as reaching a rate of perceived exertion (RPE) of 13 or 76% of their target heart rate. Once fatigue is included, the pre-fatigue protocol will be repeated to assess any changes in the force plate and brain activity. Data will be processed using customized METLAB scripts, and a repeated-measures ANOVA will be conducted to compare pre- and post-fatigue indicators. ANTICIPATED RESULTS: It is expected that fatigue will impair postural control and increase neural activity in brain regions responsible for balance. These effects are predicted to be more pronounced during a visual perturbation and when sensory information is inaccurate.

Lawrence, Sammie

Co-Presenters: Lauren Holliman
Faculty Mentor: Tara Van Niekerk

Empowering Youth Through Community Science

This research presents the work of the Community Water Corps (CWC) and its six-week after school programs designed to engage youth in community science, develop STEM skills, and address local water and environmental challenges. The CWC is part of East Carolina University's Water Resources Center (WRC), funded by the NSF Coastlines and People (CoPe) grant. These six-week sessions are currently held at the Boys and Girls Club in Greenville, and the Princeville Youth Academy. The CWC aims to provide learning experiences related to local watersheds, water quality, and environmental problem solving. These programs consist of one-hour weekly sessions and follow progressive learning models. Hands on experiments involve kits and YSI ProDSS tools to test water quality for pH, turbidity, and nutrients to identify possible environmental stressors. Students performed data collection and analysis using tools like GIS applications, gathering and analyzing data on water quality, land use, and pollution. Community engagement and problem-solving activities helped guide students in designing research projects, interviewing community members, and documenting concerns. The goal of these sessions is to enhance scientific literacy, raise environmental awareness, and encourage participation in community-based research.
The program initially launched in spring 2024 at two Boys and Girls Club locations in Greenville, North Carolina. In both locations, Lucille W. Gorham and Grady White Boats, club member interest was initially high but declined over the duration of the program. Approximately 20 participants joined the welcome sessions in each location, but numbers steadily declined to an average of 15 participants' total for the duration of the program. For the most recent six-week session at Lucille W. Gorham that began in fall 2024, participation began with 25 students, then dwindled to 7 by the final week. This trend was also seen during the Summer 2024 session with the Princeville Youth Academy where participation initially started with approximately 12 members but averaged at 9 for the rest of the program. It is uncertain why participation declined in these programs but could be due to a number of factors including time of day, low student interest and logistical challenges such as students being picked up early by parents. To further assess these trends, surveys have been designed to assess participant engagement and perception of the program. In addition, further engagement strategies, including program completion certificates, small prizes, and more hands-on activities are being designed to help sustain student interest. To address these issues further, future sessions should incorporate more flexible activities where missing a session will not significantly impact a student's ability to complete a project or weekly activity.

Lee, Rachel

Faculty Mentor: Amanda Muhammad

Investigation of the psychological and social factors influencing students' knowledge of and access to professional clothing

The transition from college to professional life requires students to navigate not only academic challenges but also the expectations of professional appearance. Professional clothing is a key component of this transition, yet many students may lack the knowledge or resources to acquire appropriate attire. Professional clothing is often considered a basic requirement for success in professional engagement, affecting confidence, and career opportunities.This study uses the Theory of Planned Behavior (TPB) to investigate the psychological and social factors influencing students' knowledge of and access to professional clothing. TPB provides a framework for understanding these behaviors by examining students' attitudes towards professional attire, the social norms they perceive, and their perceived control over accessing professional clothing (Ajzen, 1991). Specifically, the study will explore how these factors shape students' intentions and behaviors toward professional dress, providing insights into potential interventions that may improve access to professional attire (Fishbein & Ajzen, 2010). Using a quantitative research design, this study will use a survey to collect data from a representative sample of East Carolina University students. The survey will measure students' attitudes, perceived social norms, perceived behavioral control, and intentions regarding professional clothing, based on the constructs of TPB. Descriptive and inferential statistics analysis will be used to identify relationships among these variables and determine factors that influence students' decisions regarding professional attire. The results of the study will inform potential strategies to reduce obstacles and improve access to professional clothing on campus, ensuring that all students are prepared for professional success.

Lee, Parker

Faculty Mentor: Brittany Thompson

Student Belonging at ECU and How it Affects Academic Success

Two of the biggest worries students have coming into college are trying to fit in and belong as well as making sure to continue to be academically successful. Based on the two semesters that have passed thus far as a student, one can confidently say that the feeling of belonging here at ECU is strong and being successful academically has been simple. Now knowing this is not the case for everyone here whether someone is a first-year, sophomore, junior, senior, graduate student, transfer student, etc. It is important to explore what really makes students feel as if they belong here and if it is one single entity on campus or multiple. The main purpose of this study is primarily to see what directly goes into making people feel like they belong at ECU. The idea is to look at several aspects of college and campus life at ECU that people are involved in to see if there really is one entity or multiple entities on campus that are the reason students feel they belong. Another purpose of the study is to see what directly effects or impacts the feeling of belonging or of not belonging has on academics. Keeping the purpose in mind, our subjects/participants will be college students who are currently enrolled and attending East Carolina University. This of course aligns with the purpose of the study since we are focusing on all students on campus, not just a specific population. For this research to be successful and to get the fullest range of data, it was decided that collecting data quantitatively as well as qualitatively is the best approach. To collect and access quantitative data, a survey with questions about student belonging and academic success will be produced and distributed a variety of ways on campus that are appropriate for this study. After closing the survey, data will be analyzed to make generalized conclusions from the responses. With the qualitative data, the decision was made to conduct interviews with random students and ask them a set of questions pertaining to academic success and student belonging. Once collecting this data, a content analysis will be conducted to pull out themes from the interview responses. After this is completed, then both sets of data will be analyzed concurrently to make a conclusion that reflects both sets of data well.

Lisk, Kaylin

Faculty Mentor: Rukiyah Van Dross

Evaluating the Biocompatibility of MIcelles in Melanoma Cells

Introduction: Melanoma is the most common cause of skin cancer death in the United States, and the incidence of this malignancy continues to rise. Unfortunately, drugs that are currently approved by the FDA for the treatment of melanoma are only effective in a fraction of patients. As such, the identification of new promising treatments for this disease is crucial to modern health. 15-deoxy, Δ12,14-prostamide J2 (15dPMJ2) is a hydrophobic small molecule that inhibits the growth of melanoma and colon cancer both in vitro and in vivo. However, the therapeutic efficacy of 15dPMJ2 may be limited by neutralization by glutathione and sequestration in adipose tissue. The goal of the current study is to identify micelle components that are appropriate delivery systems for hydrophobic molecules such as 15dPMJ2. Micelles are detergent-like molecules that are composed of a hydrophilic shell and a hydrophobic center. These structures can be used to encapsulate hydrophobic molecules that can be administered intravenously to travel through the blood stream and empty their payload into tumors. Preferential tumor delivery occurs because blood vessels within tumor beds are poorly formed and allow micelles to escape into the surrounding tumor tissue.
Methods: Micelles were formed with TPGS:DSPE or Pluronic F127. Mouse (B16F10) melanoma cells were treated for 24 hours with different concentrations of the micelle preparations. The viability of the cells was determined by conducting MTS assays.
Results: Empty micelles composed of TPGS:DSPE were cytotoxic towards B16F10 cells reducing cell viability to approximately 10% at 0.1 mg/mL. Similar results were observed for mouse (CT26) colon cancer cells. To determine which micellar component was cytotoxic, the cells were treated with different concentrations of TPGS or DSPE alone. TPGS was cytotoxic at 0.05 mg/mL while DSPE reduced cell viability of B16F10 cells to approximately 75% at 0.1 mg/mL. Pluronic F127 showed little toxicity towards B16F10 cells up to 20 mg/mL.
Conclusion: Micelles composed of Pluronic F127 but not TPGS:DSPE are biocompatible with B16F10 cells. The physiochemical characteristics of Pluronic F127 micelles are being examined to determine if it is a suitable vehicle for delivery of 15dPMJ2 in animal tumor studies.

Locher, Noel

Faculty Mentor: Zachary Domire

Semitendinosus Tendon Stiffness vs. Time After Anterior Cruciate Ligament Reconstruction

The anterior cruciate ligament (ACL) is one of the most injured ligaments in the knee. Many anterior cruciate ligament reconstructions (ACLr) involve a graft from the semitendinosus (ST) and/or gracilis tendon. These surgeries are largely successful but often leave imbalances in tendon stiffness. Reduced tendon stiffness impacts the ability of the semitendinosus to produce force and the lengths at which it can produce force may change. Hooke's Law explains this where during an isometric contraction, muscle force is equal to tendon stiffness times the change in tendon length. Less tendon stiffness correlates to less muscle force that can be applied to the tendon. Changes in the functioning of the ST could impact knee joint loading. This may contribute to the high incidence of early onset osteoarthritis (OA) following ACLr. Of the known studies, ST tendon stiffness has shown to have a moderate correlation with time since ACLr or has been shown to have no significant correlation between the time post-ACLr. However, the time after surgery was mostly limited in these studies. The study objective is to see if the semitendinosus tendon stiffness of the injured limb is correlated to time since ACLr over a wider time range.
This is an ongoing study that plans to recruit participants who have had an ACLr using an ipsilateral ST tendon or ST and gracilis tendon autograft. Participants will be out at least 6 months since ACLr and will have been cleared to return to full activity. Ultrasound-based shear wave elastography will be used to measure ST tendon stiffness of both limbs in individuals. It is anticipated the results of this study will show that the ST tendon will not approach the contralateral tendon's stiffness the longer after ACL reconstruction has been performed. These findings will support future work to understand possible altered joint loading and hopefully lead to eventual surgical or rehabilitation changes that can reduce rates of OA.

Locklear, Bayli

Faculty Mentor: Rukiyah Van Dross

Investigating the effect of 15dPMJ2-induced PGE2 synthesis on tumor growth and immune cell infiltration in CT26 colon tumors

Colorectal cancer (CRC) is the third most common cause of cancer and cancer-related death in the U.S. Advanced stage CRC is treated with cytotoxic, targeted, or immunostimulatory therapeutics. Although immunotherapeutic checkpoint inhibitors (ICIs) have significantly improved survival rates of different cancers, only 15% of CRC lesions respond to these drugs. Thus, new therapeutics are needed to improve outcomes for CRC patients. 15-deoxy, Δ12,14-prostamide J2 (15dPMJ2) is an investigational molecule that inhibits the growth of melanoma skin cancer in vitro and in vivo. 15dPMJ2 also increased the quantity of cancer killing immune cells (e.g., CD8+T cells) in the tumors. Our recent studies show 15dPMJ2 is cytotoxic towards colon cancer cell lines including CT26 cells. 15dPMJ2 also caused CT26 cells to release prostaglandin E2 (PGE2), a cytokine known to stimulate tumor growth and decrease the quantity of CD8+ T cells. The objectives of the current study are to determine the role of 15dPMJ2-induced PGE2 expression in CT26 tumor growth and T cell content. CT26 cells were injected into the subcutaneous flank of immunocompetent Balb/c mice. When tumors were palpable, the mice were treated with 15dPMJ2, an inhibitor of PGE2 synthesis (indomethacin), 15dPMJ2 + indomethacin, or vehicle (peanut oil) once per day for 5 days. On day six, the tumors were excised, weighed, frozen, sectioned, and mounted on slides. The growth of CT26 tumors was inhibited in mice treated with 15dPMJ2, indomethacin, and 15dPMJ2 + indomethacin compared to animals treated with vehicle. Tumor tissue from each of the treatment groups is being stained with antibodies directed towards CD45 (marker of hematopoietic cells), CD3 (marker of T cells), and/or CD8 (cytotoxic T cells) and then counterstained the with the nuclear dye, DAPI. The fluorescent images are being captured using a Keyence BZ-X800 microscope. The quantity and localization of T cells in the tumors is being examined.

Lozano, Alec

Faculty Mentor: Nic Herndon

Will introducing younger students to robots propel them to pursue computer science?

This research project, conducted in collaboration with Dr. Herndon, Professor Vilkomir, and another computer science student, focuses on programming NAO robots to perform a series of actions for a demonstration at Greene High School. Utilizing the Choregraphe software provided with the robot, we are going to develop the robot to perform a variety of behaviors including walking, recognizing objects, and path-following. These actions are fundamental for the ultimate goal of enabling the NAO robots to play soccer. Our approach begins with programming basic movements, such as walking, ensuring the robot can navigate its environment with fluidity and precision. Object recognition is implemented using the robot's camera and sensors, allowing it to identify and interact with objects in its surroundings. Path-following is integrated to enable the robot to track and follow predefined routes, enhancing its ability to move autonomously. The culmination of this research will be a synchronized set of actions that allow the NAO robots to engage in a game of soccer. The showcase at Greene High School will serve as an opportunity to highlight the capabilities of the NAO robots and the potential of robotics in educational settings. Ultimately, this project aims to promote engagement with robotics technology, showcasing its practical uses while providing valuable hands-on learning experiences for students. Through this work, we aim to explore the intersection of robotics, programming, and their uses in getting students into the field of computer science.

Mainor, Heather

Faculty Mentor: Susan McRae

Prescribed burns and avian reproduction: investigating fire impact on Eastern Bluebird egg and clutch size

Prescribed burning is a widely used environmental management tool aimed at reducing wildfire fuel and woody encroachment in fire-adapted ecosystems. Beyond this, prescribed burning can limit essential resources, especially when conducted shortly before the breeding season. However, its effects on breeding birds remain poorly understood. This study focuses on the Eastern Bluebird (Sialia sialis), a species adapted to breeding in fire-prone long-leaf pine savannah. We analyzed 13 years of Eastern Bluebird reproductive data taken from ECU's West Research Campus, which is managed with irregular, rotational prescribed burns. Breeding birds were individually marked using color bands for identification each season, and nests were monitored every other day to determine first egg dates and clutch sizes. Upon clutch completion, standardized photographs of each clutch were taken that included both size and color standards from which to measure the length and width of individual eggs. We compared egg size and clutch size in burned and unburned areas. During burn years, prescribed fires were applied only to select portions of the site. Bluebirds in burned areas generally laid fewer but larger eggs, consistent with reproductive trade-off theory. Late-season burns were linked to smaller first clutch sizes, likely due to reduced resource availability. These findings highlight how prescribed burns influence avian reproduction and provide insights for optimizing burn timing to minimize negative impacts on wildlife while maintaining habitat quality.

Maisto, Sarah

Faculty Mentor: Linda Quick

Emerging Trends and Approaches to Student Leadership within Higher Education

This study investigates the trends and challenges surrounding student leadership in higher education. While leadership development is a priority for many institutions, existing research suggests that current efforts may not be sufficient, highlighting a need for new strategies and programs. This research aims to uncover key issues in student leadership while addressing gaps in existing literature. The study will conclude with actionable recommendations to enhance leadership participation and engagement at institutions nationwide. Previous research emphasizes the transformative power of extracurricular activities and leadership positions for students' future careers. However, studies show that many students are reluctant to engage in these activities, with barriers being particularly pronounced for marginalized populations. This study seeks to bridge these research gaps by exploring these challenges through the perspectives of both students and faculty,

incorporating insights into post-pandemic shifts and evolving leadership dynamics. The research will involve surveying students and faculty in higher education. Participants will respond to a mix of open-ended, scale-rating, and multiple-choice questions to explore their perceptions of leadership accessibility, barriers, and potential improvements. The survey will be administered through East Carolina University's Qualtrics platform. Upon conclusion, the findings are expected to reveal common concerns and trends in student leadership, as well as insights into the effectiveness of leadership academies and training programs, including those targeting high school students. The study will examine how early interventions, such as high school leadership academies, impact future participation in higher education leadership roles. An example of a high school leadership academy will also be provided to share its relevant findings and experiences. By analyzing these findings, this research will offer practical strategies for institutions to foster more inclusive and effective leadership development programs.

Marsicano, Nick

Co-Authors: Brooke Arnott, Marley Ray, Kathrin Rothermich, Matthew Walenski
Faculty Mentor: Matthew Walenski

On the acceptability of short passive sentences with and without thematic violations

The present study focuses on the real time processing of the comprehension of passive sentences in people with agrammatic aphasia. We examine the comprehension of these sentences using event-related potentials to measure processing as it unfolds in real time. Prior ERP studies of the comprehension of passive sentences report N400 and P600 effects at the verb in healthy comprehenders, with normal N400 but reduced P600 effects in comprehenders with aphasia (Walenski et al., 2021). While most studies of passive sentence comprehension in aphasia use full passives, which include an agentive by-phrase (The man was chased by the woman), reduced (short) passives (The man was chased) are also impaired in aphasia (Bastiaanse & van Zonneveld, 2006; Burchert & De Bleser, 2004; Gavarró & Dotti, 2014; Martin et al., 1989). To elicit the N400 and P600 effects, which are differences between grammatical sentences and sentences with violations, we plan to use short passives in grammatical (The man was kissed) and violation (*The man was ironed) sentence conditions and will measure the ERP effects at the verb (e.g., kissed, ironed). We created 68 sentence pairs in grammatical and violation contexts. To ensure that the grammatical sentences were acceptable and the violations unacceptable, we used an online questionnaire where participants rated the acceptability of each sentence on a 5-point scale. Nine adult native English speakers rated each sentence. The results indicated that the correct versions (mean: 4.3; SD: 1.1; range for item means: 2.7 – 4.8) were rated much more acceptable (?) than the violations (mean: 1.9; SD: 1.1; range for item means: 1.3 – 2.9). While the ranges overlapped a small amount, only 2 of the correct versions had mean scores below 3, and the violations were not rated more highly than the correct versions for any pair of sentences. Therefore, we expect to see ERP effects to these violations (relative to the grammatical sentences): All participants, including those affected by agrammatic aphasia, are expected to exhibit standard N400 effects, indicating preserved semantic access. However, P600 effects should vary: Participants without aphasia should show P600 effects at the violation during the short passive sentences, whereas participants with agrammatic aphasia should show reduced or absent P600 effects. We are currently collecting ERP pilot data to test these predictions.

Martines, Cindy

Faculty Mentor: Alessandro Didonna

Creation of the First B-Cell Specific Ataxin-1 Conditional Knockout Mouse Model

Multiple sclerosis (MS) is an autoimmune demyelinating disease of the central nervous system and is the leading cause of non-traumatic neurologic disability of young adults. In MS, the immune system deteriorates the myelin sheaths surrounding neuronal axons. Myelin loss interrupts normal nerve conduction and eventually leads to axonal injury. MS has a complex and multifactorial etiology encompassing both genetic and environmental triggers.
In a previous genome wide association study (GWAS), the ataxin-1 encoding locus ATXN1 on chromosome 6p22 was linked to increased MS susceptibility. Our lab has functionally characterized this genetic association in the MS animal model experimental autoimmune encephalomyelitis (EAE). Global Atxn1 knockout mice display a more aggressive EAE course which is associated with aberrant B cell function. However, because ataxin-1 is expressed in multiple tissues within the organism, the precise contribution of the B cell compartment to the overall disease phenotype is unknown. Therefore, here we developed the first B cell-specific Atxn1 knockout mouse model using the Cre/Lox system. An Atxn1 floxed mouse line was generated using CRISPR-mediated genome editing which was crossed with the B cell-specific Cd19-Cre driver line to generate conditional knockout mice (Cd19-Cre+/-, Atxn1Flox/Flox). We first demonstrated the selective loss of Atxn1 expression by quantitative real-time PCR on isolated B cells. Subsequently, we performed a comprehensive immunophenotyping and we found that ataxin-1 deficiency selectively increased the size of the B1a and B1b cell sub-populations, replicating the phenotype of the global Atxn1 knockout mice. We also employed unbiased RNA-seq technology to profile the transcriptomes of isolated B cells. In total, 1391 significantly differentially expressed genes were identified between cKO and control B cells, confirming widespread changes take place at the transcriptomic level in response to ataxin-1 ablation. Finally, to determine if the B cell-specific loss of ataxin-1 was sufficient to recapitulate the more aggressive EAE course of global knockout mice, we immunized cKO and floxed mice with MOG35-55 peptide. Surprisingly, there was no significant difference in disease severity or histopathology between genotypes. These results suggest that the disrupting ataxin-1 expression in B cells is not sufficient to fully cause the more aggressive autoimmune demyelination, and other cell types and tissues are likely involved. Together, we successfully created and validated the first Atxn1 conditional knockout mouse line and provided experimental evidence of an immunoregulatory role of ataxin-1 in B cells.

Mays, Madison

Faculty Mentor: Susan McRae

Nestling Diet and its Effect on Developmental Rate and Gut Microbiomes in Eastern Bluebirds

Nestling eastern bluebirds (Sialia sialis) and must attain their adult size in under three weeks. A diet of protein-rich invertebrate prey is considered essential for passerine nestlings to fledge in good condition. Bluebird parents provision their young in the nest primarily with invertebrate prey. Yet, observations during a long-term study at ECU's West Research Campus revealed that nestlings in late broods were additionally fed fruit. The goals of this study were to observe potential differences in gut microbiomes of eastern bluebird nestlings fed fruit (fruit fed') versus those fed prey only, and to determine how diet affects their growth rate and survival. Observations of parents provisioning nestlings were conducted to determine the identity of food items and prey types fed to broods. Feeding observations for three hours per brood and morphometrics were taken on post-hatching Days 5, 7, 9, 11, and 13 to craft growth curves. Nestlings fed fruit had larger tarsus lengths than nestlings fed only prey, and the differences were statistically significant, but the magnitude of difference decreased with date. The same trend was observed for nestling weight, although the magnitude of difference was smaller. A broader goal of this research is to understand possible benefits to survival, future reproductive success and lifelong health outcomes of the addition of fruit to nestling diets in eastern bluebirds. With rising global temperatures and fruit provisioning being restricted to late summer broods, these novel observations of parents provisioning with fruit could represent an adaptive response. Concerned citizens could potentially assist bluebird conservation efforts by ensuring that species have access to fruit-bearing plants during the breeding season.

McClain, Molly

Faculty Mentor: Hillary Dodge Evans

The Prevalence and Danger of Drivers Under the Influence Around East Carolina University

Drunk driving on and around ECUs campus is a longstanding issue that puts the safety of staff, students, and community members alike in danger. It is important that awareness be brought to the prevalence and implications of drunk driving. The purpose of this study is to portray the importance of bringing awareness to the dangers and prevalence of drunk driving on and around ECU's campus. Drunk driving can have detrimental consequences, and it is pertinent that more attention be brought to how common and dangerous it is. When considering statewide statistics in North Carolina in the year 2023, 35% of drunk driving statistics were among people ages ranging from 21-30, and 4% were people as young as 15-20 (NCSPAC, 2024). This survey is being conducted using a mixed methods approach. All information collected through this survey will be stored within my student pirate drive. The information will only be accessed from the privacy of my apartment and will be used for papers, presentations, and coursework. This survey will be distributed to students in the Department of Addictions and Rehabilitation Studies and the Honors College via student email. No one person is being sought out because of affiliation or history.

McCown, Wally

Faculty Mentor: Derek Maher

Beyond Interpretation: Religious Experience as Phenomenon, Narrative, and Transformationa

Religious experience has long been a central aspect of human life, bridging the personal and the transcendent, the psychological and the cultural, the universal and the particular. This paper explores religious experience as a multidimensional phenomenon, drawing from Thomas Merton's The Inner Experience, Wayne Proudfoot's Religious Experience, Ann Taves' Religious Experience Reconsidered, Tsangyön Heruka's The Life of Milarepa, and William Parsons' The Enigma of the Oceanic Feeling. Merton's reflections on Christian meditation offer a vision of spirituality as an innate human capacity, while Proudfoot and Taves examine how interpretation and social context shape the ways such experiences are understood. Milarepa's story illustrates the transformative power of religious experience within a Buddhist framework, demonstrating how spiritual insight unfolds through personal struggle and cultural tradition. Parsons' engagement with Freud's concept of the "oceanic feeling" introduces a psychological perspective, yet rather than reducing religious experience to mere emotion, it suggests that the sense of transcendence may be foundational to human consciousness itself. By weaving together these perspectives, this paper argues that religious experience cannot be dismissed as purely subjective or culturally relative, nor can it be fully divorced from the frameworks that give it meaning. Instead, it emerges as a dynamic and irreducible encounter with the sacred—one that demands careful, interdisciplinary study to appreciate both its diversity and its depth.

Meer, Kaylee

Faculty Mentor: Christyn Dolbier

Understanding College Student Stress: Conceptualizations and Health Outcomes

Introduction:College students in emerging adulthood (ages 18–29) face a range of stressors across various life domains, including academics, relationships, and finances (Arnett, 2000; Garett et al., 2017). Research shows that college students experience higher stress levels compared to the general population, and this trend is increasing. Stress is strongly associated with decreased physical and psychological wellbeing (Zochil & Thorsteinsson, 2017) and can lead to poor academic performance (Hjeltnes et al., 2015). The literature reveals that stress measures vary in how they define and assess stress, focusing on factors like exposure to stressors, frequency, duration, and intensity, as well as different life domains such as academics and relationships. The variability in how stress is conceptualized and measured makes it difficult to synthesize research on the relationship of stress to mental and physical health. This study will address this gap by using the Stress and Adversity Inventory (STRAIN), a self-report measure assessing lifespan stress through factors such as exposure, duration, frequency, timing (e.g., cumulative, early childhood, past month), intensity, and life domains (Slavich & Shield, 2018). The STRAIN offers a comprehensive life stress assessment without the lengthy interviews typical of other lifespan stress

measures. Purpose: To identify which stress conceptualizations (e.g., cumulative, early life, past month; exposure; magnitude; chronic; acute; frequency; domains) are most associated with mental and physical health outcomes, aiding interventions for student well-being. Method: A 2-part cross-sectional study surveying ECU undergraduates (ages 18–26) from Introductory Psychology courses (majority female, freshmen, White) and a diverse sample (men, non-freshmen, POC) via the Survey Review & Oversight Committee. After consent, participants will complete a Qualtrics survey on demographics and health, followed by STRAIN via UCLA portal, receiving course credit or a $10 gift card. Results: Recruitment begins spring 2025 after IRB approval, with preliminary results included if available. Discussion: This study seeks to identify stress conceptualizations most linked to health outcomes, informing interventions for student well-being by targeting stressful domains. Cumulative and chronic stress are likely most harmful, and establishing this in college students could enhance academic intervention efforts.

Mehra, Neeraj

Faculty Mentor: Dennis Barber

Technology's Impact on Entrepreneurship

The rapid growth of technology has dramatically altered the entrepreneurial scene, influencing firm operations, scalability, and market accessibility. This study investigates the impact of technology on entrepreneurship, with an emphasis on key topics such as business development, operational efficiency, and the problems that entrepreneurs confront while using emerging technologies. The research takes a mixed-methods approach, combining quantitative surveys of entrepreneurs with qualitative interviews to acquire a better understanding of the role of technology in current company initiatives. The study investigates how digital technologies, artificial intelligence, cloud computing, social media, and fintech solutions help businesses succeed. It also studies impediments to technology adoption, such as cost, technical skills, and cybersecurity hazards. Findings from 100 survey respondents and 10-15 in-depth interviews will be examined statistically and thematically to discover major trends and relationships. This research is planned to yield a complete understanding of technology's involvement in entrepreneurship, practical recommendations for business owners, and an examination of future technological trends that may further alter the entrepreneurial environment. This study intends to provide data-driven insights to entrepreneurs, investors, and regulators on how to use technology to support innovation and commercial success.

Meininger, Caroline

Faculty Mentor: Kristin Burnette

Lilly's Magical Toolbox

This project is a children's book that aims to raise awareness about the experiences children face after being diagnosed with dyslexia. It challenges the common stereotypes of what dyslexia "looks like" and the challenges those with dyslexia may encounter. The book encourages understanding, self-expression, and acceptance while educating readers about the difficulties individuals with learning disabilities face. By adding more inclusive books to children's literature, this project promotes representation, empathy, and awareness. As someone with dyslexia, I wrote and illustrated this book myself. Having dyslexia gives me a unique and deeply personal perspective, making me particularly qualified to share this experience. It portrays what life after a dyslexia diagnosis might look like and highlights the capabilities of those with dyslexia. The story incorporates culturally relevant language, inclusive illustrations, and accessible text, making it enjoyable for a wide audience. The book follows a character’s journey after receiving their diagnosis, focusing on reading strategies, teamwork, and self-discovery. This book aims to expand the availability of inclusive children's literature, offering teachers more resources to foster empathy, inclusivity, and understanding about learning disabilities.

Mendoza, Ulises

Faculty Mentor: April Blakeslee

Assessing Seasonal Impacts on Biodiversity of Crabs and Parasites

With a long history of oyster population declines, there has been widespread interest in reef restoration along NC coasts to restore the variety of ecosystem services that oysters provide, including enhanced water quality, shoreline stabilization, and habitat provisioning. Understanding how biodiversity within these reefs changes is important for ensuring effective conservation and restoration efforts. This study looks at the seasonal variations in mud crab and parasite communities associated with restored oyster reefs in the Rachel Carson Reserve (Beaufort, NC). More specifically, we will assess how seasonal changes influence species richness and abundance across different reef restoration methods, including shell bags (SB), novel OysterCatcher™ (OC) technique, and loose clutch (LC). These three site types (n=17; SB=6, OC=6, LC=5) were surveyed in June, September, and October of 2023 using passive samplers left to recruit mobile fauna for ~6-8 weeks. Mud crabs were removed from the passive samplers and dissected in the lab using established methods to search for parasites. By comparing these restoration strategies, we aim to determine seasonal trends in mud crab recruitment and parasite prevalence and highlight potential drivers of variation in presence among different substrate types. The findings will give insight into how biodiversity changes over time and will contribute to monitoring efforts and ongoing restoration efforts by the Blakeslee and Gittman labs (2018–present).

Mendoza-Guerra, Maria

Co-Authors: Drew Theobald, Srinivas Sriramula
Faculty Mentor: Srinivas Sriramula

Stimulation of kinin B1 receptor induces mitochondrial dysfunction in microglial cells

Background/Hypothesis: Mitochondrial dysfunction is a key factor in the development of cardiovascular diseases, making it an important target for understanding and treating hypertension. Mitochondria continuously undergo dynamic changes through fission, the process of mitochondrial division, and fusion, where mitochondria merge to maintain energy production and cellular health. Disruptions in this balance can lead to increased oxidative stress and impaired mitochondrial function, both of which contribute to disease progression. We previously observed that kinin B1 receptor (B1R) inhibition in primary hypothalamic neurons can prevent increased oxidative stress and decreased mitochondrial respiration caused by angiotensin (Ang) II. However, the link between B1R and mitochondrial dysfunction in microglia remains unexplored. Given this information, we hypothesize that B1R activation alters mitochondrial dynamics in primary microglia. Approach and Results: To investigate the role of B1R activation in mitochondrial dysfunction, primary microglia from neonatal C57BL/6NJ wild-type mice were cultured and treated with Lys-des-Arg9-Bradykinin (LDABK, B1R agonist) or vehicle for 24 hours. Following treatment, we assessed key markers of mitochondrial dynamics, including fission and fusion, as well as oxidative stress levels within the mitochondria. Immunofluorescence staining revealed an imbalance of mitochondrial dynamics, indicated by an increase in expression of dynamin-related protein 1 (Drp1, fission) and reduced expression of mitofusin-2 (MFN2, fusion) in microglia, suggesting an impairment in the ability of mitochondria to merge and maintain functional integrity. Alongside these changes, there was an increase in mitochondrial oxidative stress as indicated by increased expression of MitoSOX. This suggests a potential mechanism by which B1R stimulation could contribute to neurogenic hypertension through mitochondrial dysfunction and oxidative stress in microglia. Conclusion: Our findings imply that B1R activation causes mitochondrial fission, decreases fusion, and increases oxidative stress, hence disrupting mitochondrial homeostasis in microglia. Based on the involvement of microglia in neuroinflammation and neurogenic hypertension, these results lend credence to the hypothesis that B1R-induced mitochondrial dysfunction may contribute to hypertension.

Miller, Dylan

Faculty Mentor: Nathan Hudson

Computational Tracking of Fibrin Polymerization

As a blood clot forms, fibrinogen is converted into fibrin through the action of the enzyme thrombin. The resulting fibrin monomers polymerize laterally and longitudinally, eventually forming the fibers that comprise the structure of a clot. Throughout the polymerization process, fibers meet, forming a number of junctions until a dense, interconnected network is formed. Despite the immense research importance of characterizing this process, as aberrant clot structures correlate with many hemostatic pathologies, the mechanisms that govern polymerization themselves are poorly understood due to the speed of clot formation. Modern developments in microscopy, however, have allowed for the real time imaging of this process in 3-dimensions. The dense nature of the clots and the speed of polymerization still present a challenge though, as to be understood, thousands of fibers must be tracked as they grow and form junctions. Manual annotation of fibers is slow and struggles to characterize many points of interest like growth rate or changes in fiber stiffness which require many data points across time. To this end, a computational approach is required. By designing these computer algorithms for fibrin tracking including using AI-based classification and an implementation of the Hungarian algorithm, information can be collected on thousands of fibers in the time frame of minutes. This wealth of data will allow for statistics and features which could not be extracted otherwise. A successful characterization would be among the first observations of gelation in biopolymers.

Mireles-Camey, Jannire

Faculty Mentor: Karen Litwa

Super-Resolution Imaging to Visualize the Composition of Developing Synapses

Understanding synapse formation and the molecular mechanisms underlying this process is crucial for uncovering fundamental principles of neuronal development. This study aims to investigate how synapses form and whether these processes are conserved across different brain regions. Specifically, we examine the developmental timeline of synapse maturation by evaluating whether the distance between pre-synaptic and post-synaptic compartments differs between different developmental stages, such as DIV-7 and DIV-14, in mouse cortical and hippocampal neurons.To achieve this, immunostaining and Stochastic Optical Reconstruction Microscopy (STORM) super-resolution imaging are utilized to visualize and analyze individual synapses with nanoscale precision. Our findings indicate that by DIV-14, mouse neurons exhibit more mature synaptic structures compared to DIV-7, where synapses are still undergoing development. This suggests that synaptic architecture undergoes significant refinement over time, contributing to the functional maturation of neuronal circuits.These results provide insights into the molecular and structural organization of developing synapses and have implications for understanding how synaptic development may vary across different brain regions. Future directions include investigating the specific molecular components driving synaptic maturation and determining whether these processes are conserved across various neuronal subtypes. This knowledge could enhance our understanding of neurodevelopmental disorders where synapse formation is disrupted.

Modugu, Sudiksha

Faculty Mentor: Archana Hegde

A Systematic Literature Review on Asian Indian Parenting Children with Disabilities: What we learnt and What is in the Future?

Disabilities are often a polarizing topic amongst parents, with different cultural groups frequently holding vastly different opinions on the impact and diagnosis of disabilities in children. To understand disabilities through a cultural context, this research study aims to explore the viewpoints of immigrant Asian Indian parents who have a child or children with disabilities and are living in the U.S. This study will be conducted at a national level. The main aim of the study is to determine how cultural differences impact parents' views on having a child with disability and raising one in the U.S. This fundamental research question will be examined through a lens of phenomenology, which examines people's lived experiences. The first step towards this research required conducting a systematic literature review on this topic. Thus, words such as Asian Indian parenting children with disabilities, immigrant parents and children with disability, culture and parenting, disability and culture were certain words utilized to gather studies close to our topic of interest. We found that South Asian immigrant children and their family carers experienced cultural clashes as they attempted to incorporate their cultural beliefs about long-term conditions into a more westernized biomedical approach (Sudarsan et al, 2022) . Zechella and Raval (2016) found cultural explanations and community response are all aspects of culture that influence Asian Indian families. Community responses from Hindu communities influenced the way parents viewed their children. Prevalent in the community was the lack of acceptance and understanding of the child's particular disability (Zechella & Raval, 2016). For older and extended family members, acceptance of the child's condition was an issue. In addition, there have been many traditional views of Long-Term Conditions (LTC) as life-threatening or contagious to other family members (Sudarsan et al., 2022). Hence, sometimes acceptance that a child has a disability might be harder for some families. Asian Indian parents also grieved the lack of familial contact and support while living in the United States. The top stressors from one study highlighted were "(a) long term planning for accommodations, (b) finding opportunities for the child to make friends, (c) child being diagnosed with a disability, and (d) planning for socioemotional support for the child" (John et al. 2016, p. 1600). Thus, close examination of this topic reveals the presence of some repetitive themes that indicate a link between cultural beliefs and parent's openness to treatment, acceptance of a diagnosis and the way they care for children with disabilities. This review will inform our future research on Asian Indian Parenting children with disabilities: A lived experience, pending IRB approval.

Mooers, Caitlyn

Faculty Mentor: Bobbie Garvin

Altered cell signaling in an aged model of heart failure with preserved ejection fraction

The ZSF1 rat is produced by crossing a Zucker diabetic fatty female and a spontaneously hypertensive heart failure male rat resulting in two phenotypes: healthy lean or obese prone to diabetes and heart failure. The metabolic syndrome and hypertension displayed by the obese ZSF1 rat mimics that seen in individuals who are predisposed to heart failure with preserved ejection fraction (HFpEF). This disease is extremely prevalent in the United States. On average, between 2017 and 2020, 122.4 million US adults had hypertension and 29.3 million had diabetes. In recent studies, 32-week-old ZSF1 obese rats displayed diastolic dysfunction and hypertrophy with minimal cardiac fibrosis. Since the prevalence of HFpEF increases with advanced age, the aim of the current study is to evaluate the extent of fibrosis in older ZSF1 rats (40-42 weeks) and determine whether this age group is more appropriate for the study of fibrotic cardiac remodeling related to HFpEF. We hypothesize that left ventricular (LV) fibrosis and collagen gene expression will be increased in obese compared to lean counterparts. Furthermore, we expect that the extent of fibrosis in this age group will exceed that reported in 32-week-old rats; thus, providing an improved model for the study of fibrotic heart disease. 40–42-week-old male ZSF1 rats (n=8/group) were anesthetized, and hemodynamics were measured via LV catheterization. The heart was excised and a section from the mid-myocardium was fixed for histology, and the remainder of the LV was frozen for protein and RNA extraction. Fibrosis was evaluated by picrosirius red stain, protein levels of periostin, pAKT/AKT, and pSMAD3/SMAD3 measured by western blot, and Collagen 1 (Col1a1) and collagen 3 (Col3a1) gene expression measured by PCR. Obese ZSF1 rats had higher LV developed pressure compared to lean (191.1 vs. 122.0 mmHg, $p<0.05$) and increased contractility (+/- dP/dT, $p<0.05$). Obese ZSF1 rats exhibited cardiac hypertrophy as measured by LV weight normalized to tibial length (30.21 vs. 23.61 mg/mm, $p<0.05$) and increased fibrosis compared to lean counterparts. Fibrotic tissue in obese ZSF1 rats was concentrated in the endocardial and

perivascular regions, and qualitatively more than in 32-week-old ZSF1s. Preliminarily, obese ZSF1 rats exhibit a 3.5-fold increase in Col1a1 ($p=0.02$) and a 19-fold increase in Col3a1 ($p=0.06$) gene expression compared to lean (n=3/group). Periostin ($p=0.002$) and AKT ($p<0.001$) protein levels were increased in the obese ZSF1 compared to lean. Use of aged ZSF1 rats may be valuable for the study of fibrogenic mediators in HFpEF for the elucidation of therapeutic agents to reduce or reverse cardiac fibrosis. Future studies will include female rats to evaluate sex-specific progression of fibrosis. Funding: North Carolina Biotechnology Center (NCBC) Flash Grant (JH), ECU REDE startup program (AG), URCA (CEM), SBRP (CEM)

Moore, Garrett
Faculty Mentor: Amy McIntyre

Leveraging Virtual Reality for Pedagogical Innovation: A Case Study of a 3D Heart Model for Anatomical Education

Traditional anatomical models and textbook depictions have served as cornerstones of medical education, offering precise representations of the human body that have empowered generations of healthcare professionals. These tools excel in conveying essential structural details and remain indispensable in foundational medical training. However, their static nature limits the ability to explore structures from multiple perspectives or fully grasp the dynamic processes and interactions in living systems, such as the human heart. For instance, while textbooks and physical-based models can accurately depict the form and layout of the heart, they fall short in illustrating real-time phenomena like blood flow, valve mechanics, or electrical conduction—particularly in ways that allow for multidimensional exploration. This project aims to address these limitations by developing a high-fidelity, interactive 3D model of the human heart, specifically designed for virtual reality (VR) environments. Through the integration of animations, simulations, and dynamic visualizations, this tool offers learners the ability to interact with cardiac structures in real-time, fostering a deeper understanding of both anatomy and physiology. By enabling users to examine the heart at varying scales and from multiple perspectives, the VR model transcends the limitations of traditional resources, offering an immersive and engaging learning experience that bridges the gap between theoretical knowledge and practical application. This project aims to investigate how VR-based tools can enhance comprehension and retention of complex anatomical and physiological concepts. By leveraging VR technology, this study seeks to advance pedagogical innovation in medical education, offering an accessible, scalable, and adaptable solution for teaching. The hypothesis driving this research is that immersive, software-driven resources can enhance learning outcomes when used in addition to traditional methods, particularly for visualizing complex structures and processes, compared to static models alone. The methodology for this project involves developing a 3D heart model using industry-standard tools such as ZBrush, Autodesk Maya, and Adobe Substance, with integration into Unreal Engine to ensure VR compatibility. To support this research, funding is being sought for a Meta Quest 3 headset (512GB) at the current price of USD 499.99 and a Meta Quest 3 Elite Strap with Battery at the current price of USD 139.99. Both prices exclude tax. These components provide the necessary storage capacity, high-resolution performance, and extended operational duration to ensure the simulation is effective within educational and testing environments. Additional items are requested, but not required, to aid research.

Morrison, Cassidy

Faculty Mentor: Michelle Malkin

Understanding the operation and distribution of tribal casinos across the U.S.: A comparative analysis of state-wide casino domains and self-exclusion programs under Native American tribal ownership for responsible gaming initiatives

Despite the rise of gambling across the United States, little research has been conducted on the subject. Even less studied is the distribution and operation of tribal casinos across the United States. Tribal casinos are gambling facilities owned and operated by Native American tribes across the country and are often the result of state-tribal compacts permitting their operation. These casinos, while similar to commercial casinos (Caesar's, MGM, etc.), are regulated by the various Native American tribes and exist across the United States. As these are not regulated by the state government, each tribal casino operates independent of each other— especially in terms of Voluntary Self-Exclusion programs. Understanding the structure of tribal casinos is crucial for better understanding the nature of gaming in casinos not operated by the states, and how self-exclusion practices are enforced for those who frequent tribal casinos. By understanding these findings, information regarding gambling and self-exclusion can be expanded beyond commercial casinos and expand the outreach of responsible, healthy gaming initiatives. This will allow for more comprehensive, inclusive actions to highlight necessary resources for those who want to learn more about how they can gamble healthily across multiple operations.

Mountz, Abby

Faculty Mentor: Jamie Perry

An MRI Analysis: Is there a correlation between bihamular distance and intravelar levator veli palatini length?

Introduction/Background:
Velopharyngeal closure is an important phenomenon during oral speech production and swallowing as it creates closure between the oral and nasal cavities. This closure is completed through retraction and elevation of the levator veli palatini muscle. The levator veli palatini (LVP) muscle runs from the base of the skull, specifically the petrous portion of temporal bone and courses inferiorly, medially, and anteriorly to insert into mid-portion of velum (Perry, 2011). This muscle has two distinct parts, the intravelar and extravelar segments. The intravelar portion is contained within the velum. The extravelar potion extends from the origin of the LVP at the cranial base and inserts along the lateral margins of the velum (Perry et al., 2025). Literature has suggested that longer extravelar segments combined with shorter intravelar segments may create a more advantageous mechanism for VP closure. To better understand the intricacies of these muscle segments, this study has been proposed.
Purpose of the study:
The purpose of this study is to complete an MRI based study on if there is a correlation between bihamular distance and the intravelar segment of the LVP muscle, giving a better understanding of intravelar segment length origins.
Methodology:
In accordance with the Institutional Review Boards at the University of East Carolina University, 46 children were enrolled in this study. The control group and the patient groups were matched by age (+/- 1 year), sex, and race. The age ranged from 3-19 years of age. MRI data was obtained for each subject. MRI data will be analyzed in Amira 3D Visualization Software in order to obtain linear measurements related to pharyngeal width and hamular distance.
Results:
Data analysis is still ongoing and is expected to be completed by March 2025.
Closure:
The research conducted will provide information on an aspect of the communication sciences and disorders field that has not yet been completed to our knowledge. Anatomical exploration of the bihamular distance may contribute to further understanding of the intravelar segment of the LVP muscle as well as aid in surgical planning for children with a history of cleft palate.

Nelson, Weston

Faculty Mentor: Nic Herndon

Voice-Based Mood Detection for Emotionally Appropriate AI Responses

The widespread adoption of conversational AI assistants has revealed an emerging challenge: their static emotional delivery can clash with users' moods, potentially worsening negative emotional states during routine interactions.
While a great deal of research has focused on making AI assistants more empathetic and emotionally supportive, less attention has been paid to the simpler, but crucial, goal of preventing these assistants from inadvertently worsening users' existing emotional states. This gap is particularly relevant given that interactions with AI assistants often occur during routine daily tasks when users are not actively seeking emotional support. My research proposes to develop a structure for real-time mood detection from voice input, enabling conversational AI to recognize users' emotional states during routine interactions. The primary focus is on identifying negative emotional states where standard cheerful AI responses might be inappropriate or unwelcome. If successful, this approach could lead to more contextually appropriate AI responses that respect users' emotional states rather than inadvertently amplifying their discomfort. The findings could inform the development of more nuanced interaction models for conversational AI, where the priority is not to improve users' moods but to maintain emotional neutrality when users are not receptive to positive affect.

Ngandi, Majoie

Faculty Mentor: Nic Herndon

Using Machine Learning to Predict Breast Cancer Reccurence score: Improving accuracy

Whole slide imaging (WSI) has revolutionized digital pathology by enabling high-resolution analysis of tissue samples. The integration of machine learning into WSI workflows has further enhanced diagnostic efficiency and accuracy, offering promising advancements in automated pathology. Breast cancer, one of the most common cancers globally, requires precise risk assessment to guide treatment. Traditionally, pathologists manually annotate cancerous regions, a time-consuming and variable process. This study seeks to overcome these limitations by using machine learning techniques to predict breast cancer recurrence risk without requiring manual annotation. In this research, we will analyze a dataset of 102 whole slide images, focusing solely on hematoxylin and eosin (H&E)-stained images. We aim to train a machine learning model to predict breast cancer Oncotype DX risk categories, without additional clinical data or specific region annotations. By separating individual nuclei within the slides and calculating recurrence scores through machine learning, this approach aims to offer a more efficient and automated assessment tool for breast cancer prognosis.

Ngandi, Majoie

Faculty Mentor: Moysey Stephen

Enhancing Air Quality Visualization for Pitt County: Developing an Interactive Data Platform

Air quality monitoring plays a crucial role in assessing environmental health, informing policy decisions, and protecting public well-being. In Pitt County, North Carolina, access to historical air quality trends has been limited to raw datasets, making it difficult for residents, researchers, and policymakers to interpret the data effectively. To address this gap, we developed an interactive web-based platform that enables users to visualize air quality parameters for the years 2019 through 2022, leveraging data from the Environmental Protection Agency (EPA).
The platform offers a user-friendly interface that integrates various air pollutants, such as Styrene, Chloroethane, and Ethylbenzene, into dynamic visualizations. Through time-series plots, histograms, and comparative analysis tools, users can explore pollution trends, detect anomalies, and analyze long-term variations in air quality. The system processes large datasets efficiently, providing data filtering by date range and pollutant type, and applies statistical techniques to highlight significant deviations from baseline concentrations.
The platform is designed with a modular and scalable architecture, ensuring future adaptability. It is structured for seamless integration with the North Carolina Community Information Portal (NCCIP) website, enhancing accessibility for a broad

audience. Key visualization features include interactive graphs with filtering capabilities, an intuitive navigation system, and export functionalities that allow users to download relevant datasets for further analysis.
Challenges encountered during development included data inconsistencies, API limitations, and ensuring optimal performance for large-scale datasets. Future enhancements will focus on expanding sensor networks for more granular data collection and incorporating real-time alerts for pollutant threshold exceedances. Additionally, ongoing community engagement will help refine the platform based on user feedback and needs. This project demonstrates the power of data visualization in environmental monitoring and decision-making. By bridging the gap between raw data and meaningful insights, the Pitt County Air Quality Dashboard serves as a valuable resource for policymakers, researchers, and local residents.

Nguyen, Thanh

Faculty Mentor: Jason Pajski

Optimization of "Green" Nitration of Vanillin and o-Vanillin

This research aims to find new potential reagents to conduct a “greener” vanillin nitration that is a safer and more environmentally friendly laboratory exercise in organic chemistry. Vanillin is a popular flavoring compound widely used in the food industry, cosmetic manufacturing, perfumery, and pharmaceutical preparation with the chemical formula C8H8O3. Nitration is a crucial process that is necessary for many areas and fields. However, the chemicals that are responsible for carrying out the reaction are dangerous (strong acids causing chemical burns). Therefore, it is urgent to find safer methods. Typically, the reagent used for this process is a mixture of sulfuric (H2SO4) and nitric acid (HNO3). Since these acids are dangerous and have caused student injuries in the past when being used in undergraduate-level laboratories, researchers have been replacing them with the weaker glacial acetic acid (CH3COOH), which is safer when conducting an experiment as well as giving a similar result. In previous work, CH3COOH and Ca(NO3)2 were used to nitrate vanillin or o-vanillin with heating or the use of a 400 W microwave. This work investigates the use of more benign sodium and potassium nitrate salts to see their efficacy in this green nitration procedure.

Nieves, Alexiya

Faculty Mentor: Jeannie Golden

Autism in Hispanic Families- How the Behavioral Perspective can Help Facilitate Early Diagnosis and Intervention

Early Diagnosis and Intervention, Hispanic families may resist the diagnosis of autism in their children due to misinformation from religious beliefs, language barriers, gender roles, family dynamics, and assumptions within the community about illnesses. This unwillingness to obtain diagnosis and treatment in the Hispanic community may prevent children with autism from getting early intervention and a complete education, from feeling that their disabilities are seen, and from realizing their wish for betterment to lead a fulfilling life. By understanding parents in the Hispanic culture’s attitudes and beliefs about autism and early intervention, we may be able to educate and empower parents to allow their children access to much needed diagnostic and intervention services. Compounding the problem of unwillingness to accept diagnoses and obtain early intervention are the barriers Hispanic families face in their attempts to obtain appropriate services when their children are identified in schools. Even when families have a basic understanding of the English language, grasping the meanings of the terminology used within the schools and discomfort with assertiveness make it difficult for families to advocate for their children. The behavioral perspective can provide families with the confidence and skills they need to find their voices.

Noonan, Ilaria

Faculty Mentor: Drew T. Ashby-King

Examining Southwest Airline's Paradoxical Communicative Response to the December 2022-2023 Crisis

This study examines the crisis through the lens of Rhetorical Arena Theory to understand how Southwest's paradoxical messaging and limited engagement in stakeholder dialogue worsened the situation. The research focuses on communications from December 21, 2022, to January 3, 2023, analyzing Southwest's social media activity, stakeholder responses, and corporate statements. I found that there was a direct shift in the messaging as Southwest attempted to align themselves with the weather crisis. Through the investigation of platforms such as Twitter and the Southwest Community forum, conversations between publics made stakeholder frustrations clear. The lack of trust studied in this crisis were able to be directly tracked through conversations across arenas. My analysis focused on connecting the ideas of Rhetorical Arena Theory with the ideas of paradoxical messaging in order to understand the lasting impact that crisis has on the stakeholder.

Norris, Makayla

Co-Presenters: Elina Kaveh, Joshua Knipe, Kaitlyn Cannon
Faculty Mentor: Courtney Baker

Look Good, Age Well: The Role of Subjective Age in Understanding Workplace Behaviors

Subjective age (SA) is a concept centered around an individual's feeling of age typically associated with physical, social, and emotional health (Hubley & Russell, 2009; Kotter-Gruhn et al., 2015). Subjective age allows researchers to relate concepts that may not be readily observable through a strict chronological age approach. Occupational future time perspective (OFTP) is a construct that views the perceived amount of time and opportunity that an individual may have in the workforce. OFTP, when coupled with the changes in goal setting derived from socioemotional selectivity theory (SST), gives rise to the assumption that individuals will begin to prioritize more emotionally centered goals as they age and their expected remaining time in the workforce decreases (Zacher & Frese, 2009). Counterproductive workplace behaviors (CWBs) are a purposeful act from a member of an organization that may be destructive to the organization's overarching goals and interests (Gruys & Sackett, 2003). Examples of CWBs may include leaving work thirty minutes early to make sure you get to watch your favorite television series, deleting a colleague's spreadsheet. Inversely, organizational citizenship behaviors (OCBs) are unnecessary actions performed by an individual that may benefit the overall goal and interests of an organization (Organ, 1988). Subjective age may influence OFTP, when coupled with the goal changes associated with SST, through the shortening or lengthening of the amount of perceived time left in the workplace due to intrapersonal factors such as physical health and social wellbeing. We expect older subjective age to reduce OFTP and in turn decrease OCBs and increase CWBs.

Nuijens, Catherine

Faculty Mentor: John Stevens

The Thin Line: When Democracies Turn Against Themselves

This paper examines the paradoxical relationship between democracy and authoritarianism, exploring how inherent vulnerabilities predispose democracy to tyranny and despotism. The analysis draws on Alexis de Tocqueville's Democracy in America, classical literature, historical case studies, and political theory to explore critical factors that threaten the stability and longevity of democratic systems. Through case studies such as Athens and the Roman Republic, the paper identifies patterns of democratic decline, emphasizing the roles of corruption, factionalism, and centralization of power in eroding governance. Key distinctions between tyranny and despotism are addressed, with tyranny characterized by overt, violent rule and despotism emerging as a subtler, more systemic threat—a hallmark of Tocqueville's "soft despotism." Additionally, the phenomenon of majority tyranny is explored as a unique danger within democratic systems, where the unchecked power of the majority suppresses minority rights and stifles intellectual diversity under the guise of popular consent. The tension between equality and liberty, two democratic ideals, is explored as both a strength and a vulnerability, with their misalignment often paving the way for instability. Ultimately, the paper argues that democratic resilience hinges on fostering civic virtue and maintaining institutional safeguards to uphold freedom and moral authority.

Okafor, Marcus

Faculty Mentor: Joseph A. Houmard

A Relationship between Exercise and Obesity

Obesity is one of the biggest problems in the United States. In the United States, 40% of adults are obese while 20% of children from ages 2-19 are obese. The main causes of obesity are consuming too many processed foods, sugary drinks, foods that are high in fat, and a lack of physical activity. Consequences of obesity are type 2 diabetes, heart disease, osteoarthritis, respiratory problems, and stroke. Also, 39.2% of men are obese while 41.3% of women are obese. Fuel partitioning plays a part in obesity as the body stores more energy as fat in obese individuals leading to weight gain. A shift in fuel partitioning that favors fat deposition over oxidation reduces energy expenditure. In my study, I examined the effect of either 3 months of resistance or endurance-oriented exercise training to increase the capacity to burn fat in obese individuals. Fat burning ability was determined by measuring RER on a cycle ergometer during mild exercise. I found that endurance-oriented exercise training burned off more fat than resistance-oriented training. During the 5 minutes of endurance-oriented exercise, the results that I noticed were a decrease in RER in the pre and post of burning off carbohydrates and fats. The average of the pre-RER came out to be 1.04 while the post RER resulted in 0.84 for the endurance-oriented training which is a lot of fat burning. For the resistance training, the RER average for the pre showed 0.86 while the post value was 0.86.

O'Sullivan, Thomas

Faculty Mentor: David Hart

Enhancing Vision Transformers with Selection Based Attention Mechanisms

Vision Transformers are a powerful tool for image classification and computer vision tasks, leveraging "attention" to capture dependencies across spatial tokens. Despite their success, standard ViT attention mechanisms often struggle to efficiently model localized interactions among tokens (Structured Data). In this work, we explore a selection based attention mechanism designed to enhance token interaction modeling within ViTs. By introducing multiple projection matrices, our method selectively attends to subsets of tokens based on spatial relationships (proximity or relative orientation), scale (big or small objects) and texture (smooth or sharp surfaces). We introduce specialized projection matrices that selectively attend to tokens representing distinct properties, allowing the foundational model to capture more nuanced object characteristics. This granularity improves the interpretability of attention maps when dealing with diverse image datasets. We adopt established optimization strategies to stabilize training and promote convergence. loss metrics are employed to guide the model toward accurate predictions, and hyper parameters are tuned to achieve optimal results across image datasets. To validate the effectiveness of the proposed projection selection approach, we perform analyses of model outputs, with a particular focus on attention map visualization. This step reveals how the custom attention module learns to concentrate on spatially relevant tokens, providing a better insight into the decision making process. Experiments compare our selection based attention model against standard ViT architectures, aiming for improvements in classification accuracy and computational efficiency. We report these gains, highlighting the potential of our method to serve as an extension to conventional self attention blocks.

Packard, Joshua

Faculty Mentor: Nathan Hudson

The effect of Fiber tension on blood clot digestion (fibrinolysis)

When a blood vessel is damaged, the wounded area undergoes a process known as hemostasis, which includes the formation and degradation of a blood clot. This is undertaken by the body to promote healing and prevent blood loss. At the damaged area, the enzyme thrombin is activated and cleaves the soluble protein fibrinogen. The cleaved fibrinogens become fibrin monomers, which polymerize to form fibrin fibers. These fibers link together to form a web-like structure which traps blood cells and platelets, making it the major structural component of blood clots. The degradation of the clot occurs when the glycoprotein plasminogen is activated by tissue plasminogen activator. The activated plasminogen is called plasmin and is responsible for cleaving the fibers and digesting the clot. This process is called fibrinolysis (lysis). During wound healing, blood clots are subjected to tension from numerous sources. For this reason, the lysis of fibrin fibers under increased tension was observed, which may help in the understanding of its physiological role in fiber digestion. This was accomplished by utilizing a fugitive glue substrate which was stamped with micropatterned ridges, allowing the fibers to be observed on a microscale level. A clot was then polymerized on the stamped area, leaving individual fluorescent fibers spanning the ridges horizontally. Following this, the fibers were tensioned with a stretching device, and plasmin was added to initiate fibrinolysis. Time series of the fibers were recorded using an inverted epiflourescent microscope. The experiments were run at three levels of strain which correlate to different amounts of tension: 50%, 100%, and 150%. Preliminary data has been fully collected for fibers at 50% strain, and partially for those at 100% strain. This data suggests that fibers at 50% strain lyse in 40-60s, while fibers at 100% strain lyse in 20-30s. Once data collection for all strains is complete, the statistical differences between fibers lysed at these strains will be compared. It is hypothesized that increasing tension will increase the speed of fibrinolysis, until a threshold is met where increasing tension has the opposite effect.

Pakulniewicz, Emma Lou

Faculty Mentor: Beth Thompson

Characterization of background-dependent effects of zfl1;zfl2 double mutants in maize development

Reproduction in flowering plants is reliant on the correct function of the genes that regulate meristems, which are stem cell populations that give rise to specific tissues. Maize is a monoecious grass species that develops two inflorescences: the tassel, producing male flowers, and the ear, producing female flowers. In early development, tassel and ear primordia follow similar growth patterns that rely on shared regulators, but their meristems differentiate into their respective floral organs based on transcription factors. Redundant genes zfl1 and zfl2 were found to be upstream regulators of floral organ identity genes, and individuals with transposon insertion mutations in both zfls have defective floral meristems and severely altered phenotypes. However, these genes have only been studied in one genetic line (W22). Due to the highly diverse genetic background of maize, there is an abundance of family lines, each possessing a variable genetic makeup that manifests in a distinct presentation of mutations. The Thompson Lab has introgressed zfl1 and zfl2 mutations into the A619 background and has observed some enhanced phenotypic effects. We are characterizing the double mutant zfl1;zfl2 phenotype of maize with an A619 background by rearing individuals with varying numbers of mutated zfl alleles in a greenhouse, extracting DNA from their leaf tissues, identifying presence of zfl mutations through PCR and gel electrophoresis, and imaging early tassels and ears with scanning electron microscopy. In our investigation we have observed that zfl gene mutations have a dosage effect of severity, causing non-double mutants to express mild floral defects. There is also evidence that zfl1;zfl2 double mutants commonly demonstrate indeterminacy in their floral meristems, initiation of excess floral organs, derepressed bracts, and reduced tassel branch production. These SEM photographs will provide modern imagery of maize with zfl afflictions and may aid in establishing the functions of zfl1 and zfl2, understanding maize development, and exploring the function of zfl homologs in other cereal crops.

Palmer, Kylie

Co-Presenters: Ella Donahue
Faculty Mentor: Lauren Turbeville

Enhancing Sensory Development in Early Childhood Through Innovative 3D-Printed Sensory Boxes

Sensory processing is one of the most critical aspects of development in early childhood as it helps in motor, language, and emotional development. This project examines the effectiveness of customized sensory bins with 3D-printed elements aimed at enhancing the sensory development of children at the Nancy W. Darden Child Development Center (NDCDC). Tailored toward developmental levels from infancy into early childhood, these sensory bins integrate tactile, visual, and auditory activities designed to foster developmental milestones. The bins are categorized into four age-specific categories: The Little Explorer's Box (0-12 months), The Little Learner's Box (12-24 months), The Little Discoverer's Box (2-3 years), and The Little Imaginator's Box (4-5 years). Materials like kinetic sand, playdough, fabric swatches, and magnetic playboards are included alongside interactive 3D-printed elements such as color-matching puzzles and imaginative toys.Produced at East Carolina University's Isley Innovation Hub, 3D-printed components provide customizable and cost-effective sensory tools. Handbooks were created for each sensory box, highlighting the developmental benefits of each toy, acting as a guide for teachers, parents, and caregivers in engaging children with the toys. The design of this project was informed by research supporting the benefits of sensory play for cognitive, motor, and social-emotional development, especially beneficial for those with developmental delays. With our backgrounds in psychology and communication sciences and disorders, we could apply the knowledge we've gained in child development, somatic processing, and therapeutic interventions to contribute to the design and implementation of the project. Dr. Lauren Turbeville, MSOT, OTD, OTR/L, mentored us in creating inclusive and developmentally appropriate sensory toys. Two observational visits were conducted at NDCDC to assess the bins' effectiveness. These visits focused on children's engagement with the materials, problem-solving abilities, and peer collaboration. The continuing feedback from teachers via survey indicates that implementing our developmental packages will foster a collaborative and hands-on learning environment. This positive impact suggests that integrating resources tailored toward a child's development will encourage deeper engagement among children and provide innovative teaching approaches. Sensory play is necessary in early childhood development, strengthening motor skills, cognitive growth, and social interaction. Customized sensory boxes with various 3D printed materials provide children with hands-on opportunities to explore, problem-solve, and connect.

Park, July

Faculty Mentor: Sohan Gyawali

Enhancing IoT Cybersecurity through Attack Simulation and Machine Learning-Based Detection

To improve cybersecurity in connected environments, current research focuses on the creation, examination, and categorization of IoT cyberattack data. Developing strong security measures is essential because the attack surface for malevolent actors has grown dramatically due to the quick spread of Internet of Things (IoT) devices. In this study, different cyberattacks on IoT devices will be simulated, network traffic data will be collected and preprocessed, and machine learning models for attack detection and classification will be assessed. Problem Description and Importance IoT devices are susceptible to attacks like Denial-of-Service (DoS), Distributed Denial-of-Service (DDoS), reconnaissance attacks, brute force attempts, and web-based exploits because they frequently lack built-in security mechanisms. These dangers have the potential to compromise private information, interfere with vital systems, and open doors for significant cyberattacks. This study advances the creation of AI-driven intrusion detection systems (IDS) that can successfully detect and lessen cyberthreats in practical applications by methodically creating attack datasets in a controlled setting. Techniques This study is carried out in an IoT cybersecurity lab using a testbed that includes switches, routers, IoT devices, and network monitoring tools. The following are the main stages of the methodology: 1. Configuring a Network and Simulating Attacks IoT devices and networking hardware are used to create a network topology. Tools like hping3 and Nmap are used to carry out a variety of cyberattacks, such as reconnaissance scans, UDP floods, ICMP floods, and SYN floods. These attacks' effects on linked IoT devices are documented. 2. Data Gathering and Preparation
To gather raw attack data, network taps (SPAN ports and Gigamon G-TAPs) and Wireshark are used to capture network traffic.To make sure the data is organized for machine learning applications, it goes through preprocessing steps like conversion, labeling, and feature extraction. Preliminary Results Initial attack simulations successfully disrupted IoT device functionalities, confirming their susceptibility to cyber threats. Early machine learning evaluations indicate that feature-based detection models can effectively classify attack types, with accuracy improvements observed through dataset optimization.

Parker, Kenison

Faculty Mentor: Christine Habeeb

Verbal Feedback and Cadets' Shooting Performance

Leadership styles influence performance through verbal feedback to followers. Task-involving feedback (e.g., “You know what you are doing, you got it!”) emphasizes personal improvement of followers (Ames, 1992.) while ego-involving feedback (e.g., “If you miss the target one more time…”) is centered on comparing a follower’s abilities to others. Task-involving leadership is positively associated with successful outcomes and is, therefore, considered more favorable (Isoard-Gautheur et al., 2021). However, the impact of these two leadership feedback styles on performance has not been explored in ROTC, a program designed to develop future Army officers. Leadership is crucial in the military as failure could result in the loss of lives, such as during a live-fire situation. Understanding how a leader’s verbal feedback style can predict cadet success, particularly in shooting performance, could enhance training in Army ROTC as well as in other team-oriented environments such as educational institutes and corporate settings. Data collected in Spring 2024, as part of a larger study, involved 64 Army ROTC cadets participating in a shooting simulation. Half (n = 32) of the cadets received task-involving feedback while the other half received ego-involving feedback. Cadets shot from three stances (prone, kneeling, standing) at three distances (100m, 150m, 200m) with five shots per distance, totaling 45 shots per cadet and 2880 shots overall. Cadets received structured feedback from a leader (typically an upperclassman cadet) during the task. All audio was recorded, transcribed, and then classified as either task-involving (e.g., name of 2 categories) or ego-involving (e.g., name of 2 categories). Transcriptions were analyzed using both qualitative (feedback categories) and quantitative (frequency of feedback) methods. A comparison of the two feedback styles against cadet performance outcomes is in progress. This study supports ECU’s mission of servire by offering valuable insights into how verbal feedback impacts cadet performance and leadership development. The findings can inform leadership training in stakeholders (e.g., ROTC cadet command), as well as in healthcare, sports teams, and beyond.

Parrish, Maegan

Faculty Mentor: E. Whitney G. Moore

Depression & Anxiety Levels of Club & DI Athletes

Young adults aged 18-25 experience the highest number of mental health diagnoses in comparison to those of other ages groups due to life changes that happen during this season of life (Edwards & Froehle, 2021). The college transition period often falls within this age range, bringing added stress from multiple different sources. Collegiate sports – Club and DI level – introduce additional demands and stressors, including heavy workloads, performance anxiety, and balancing time demands (Edwards & Froehle, 2021; Peacock, 2022). Female students in general have a higher prevalence of symptoms of mental health diagnoses and/or psychological distress (Hruby, 2022). Previous research has primarily focused on psychological distress of athletes at the NCAA (DI, DII, and DIII) level rather than Club level (Martin, et al., 2021). Therefore, this study explored the differences in psychological distress prevalence between athletes’ level (DI vs Club) and gender identity. Participants for this cross-sectional study included 459 student-athletes: 254 (54%) DI athletes (95 men; 159 women) and 207 Club athletes (83 men; 122 women). These student-athletes were asked to provide demographic information (e.g., gender identity, sport) while completing a mental health screening, including anxiety and depression symptomology levels measured, respectively, by the General Anxiety Disorder Questionnaire-2 (GAD-2) and Patient Health Questionnaire-2 (PHQ-2), which are, validated brief versions of the GAD-7 and PHQ-9. The total scores (0-6) align with classifications for clinical (3-6), subclinical (2), and minimal (0-1) symptoms. Chi-square analyses were used to evaluate differences in the prevalence of clinical, subclinical, and minimal levels of depression and anxiety across athletic level and gender. There were no significant differences in prevalence of anxiety or depression by gender noted from the chi-square analyses. By athlete level, there was a significantly higher prevalence of subclinical anxiety (26%) among DI athletes compared to Club athletes (7%). As well as a significantly higher prevalence of subclinical depression (18%) among DI athletes compared to Club athletes (6%). Though no other differences were significant, compared to Club athletes, nearly twice as many DI athletes had clinical level anxiety symptoms and three times as many had clinical level depression symptoms. Thus, it can be concluded there is a higher prevalence of psychological distress among DI athletes compared to their Club peers. This may illustrate the effect on students’ mental health symptoms by having greater sports performance related stress and time constraints for DI athletes. These findings support the increasing trend and requirements for NCAA DI Athletic Departments having embedded sport psychologists and mental health counselors. Furthermore, conducting mental health screeners quarterly could better capture the effects of training and performance on athletes’ mental health.

Pate, Caroline

Faculty Mentor: Erin Field

Identifying the minimum number of bacterial cells needed for metagenomic sequencing: Guidelines for fluorescence activated cell sorting

Fluorescence-Activated Cell Sorting (FACS) is a method used to isolate specific cell populations based on fluorescence and physical characteristics. These qualities make FACS an invaluable tool for studying unculturable bacteria. Our lab aims to use FACS to isolate a group of unculturable bacteria for metagenomic sequencing. To do this successfully, we must sort a sufficient number of bacteria to obtain enough DNA for accurate sequencing, balancing that with the time and cost it takes to run the FACS instrument. I aim to determine the minimum number of bacterial cells needed to be isolated by FACS to obtain enough DNA for metagenomic sequencing. To accomplish these outcomes, I conducted growth curves and serial dilutions on Pseudomonas putida, Serratia marcescens, and Escherichia coli. I used this information to create cultures of 10^9, 10^8, and 10^7 bacteria/mL in triplicates. DNA was extracted from 1 mL of each culture using Biorads InstaGene Matrix kit. I verified culture concentrations by conducting serial dilutions. The concentrations of DNA were quantified using a Qubit to determine how much DNA could be extracted from a known number of bacteria. DNA extraction analyses reveal differences in total DNA yield among these bacterial species. Analyses are ongoing for E. coli and P. Putida; however, we seem to be able to consistently extract good yields from 10^8 concentrations, providing enough DNA for metagenomic sequencing. At 10^7, yields were inconsistent, with some concentrations falling below the threshold needed for successful sequencing. S. marcescens appears to yield consistent DNA extractions for sequencing at 16.14 ng/uL for 10^8 concentrations, while results at 6.6 ng/uL for 10^7 concentrations continue to be inconsistent. However, it may be possible to reduce the number of cells needing to be sorted if we are able to concentrate the DNA, which we intend to test after the initial analyses are finished. These findings will be crucial in identifying the minimum bacterial cell count needed to ensure successful metagenomic sequencing.

Patel, Bhumi

Faculty Mentor: Matt Whited

Investigating College Students' Blood Pressure Knowledge: Implications for Long-Term Cardiovascular Health

Background: Hypertension (high blood pressure) continues to exist as a leading risk factor for cardiovascular disease (CVD), leading to adverse outcomes such as heart attack and stroke. Hypertension affects almost one-half of the U.S. adult population. Emerging research reveals young adults, particularly those in college, are potentially at an increased risk for developing hypertension, especially those defined by the 2017 modification of hypertension classification guidelines. It is also unclear from the existing literature whether college students are aware of their blood pressure, or the risks conveyed by high blood pressure. Furthermore, hypertension is known to be influenced by various factors—including behavioral (e.g., physical activity, diet, alcohol consumption), physical (e.g., weight, blood pressure), and mental health factors (e.g., depression, anxiety).

The purpose of this presentation is to present the methods of an ongoing study that is designed to determine college students' personal and overall blood pressure knowledge. Also, this study measures their engagement in various health behaviors that are associated with blood pressure control.

Methods: College student participants will complete surveys evaluating their self-perception of their own blood pressure and their general blood pressure knowledge. In addition, participants are asked to report on health behaviors that are related to hypertension and psychological factors, such as depression, anxiety, and substance use.

Blood pressure will be measured using a standardized laboratory procedure involving multiple measurements of blood pressure with the participants seated at rest. Blood pressure knowledge will be measured with an enhanced version of the American Heart Association's blood pressure knowledge test. Other factors will be measured using established survey instruments (physical activity, anxiety, depressed mood, sleep, stress, tobacco, alcohol, and caffeine use).

Conclusion: We anticipate that, at the conclusion of this study, we will be able to determine the degree to which college students are aware of their own blood pressure and are able to recognize why blood pressure is an important aspect of their health. From these data, we will then be able to begin to design interventions to enhance blood pressure knowledge and determine if increased knowledge leads to enhanced health behavior changes.

Paul, Lovens

Faculty Mentor: Elizabeth T. Ables

Investigating the role of the nucleocytoplasmic protein Tnpo-SR in the germline stem cells of Drosophila melanogaster

Nucleocytoplasmic transport is the process by which proteins are transported between the two major sub-compartments of every cell: the nucleus and the cytoplasm. This process is mediated by a specialized group of proteins known as importins (karyopherins) and exportins. The Ables lab identified a specific β-importin, Tnpo-SR, that is essential for maintaining the female germline stem cell (GSC) population in Drosophila. Importins mediate multiple, parallel transport pathways by selectively binding to specific protein cargoes, making them critical regulators of cellular function. Therefore, understanding the molecular mechanisms of importins and their cargo interactions is essential to understand how stem cells maintain their identity, balance self-renewal and differentiation, and respond to signals. This research aims to define the role of Tnpo-SR in maintaining GSCs and promoting female fecundity by generating transgenic flies with targeted disruptions in the functional domains of the protein. Using molecular cloning, we will create truncations in the importin and exportin domains and introduce point mutations in specific residues necessary for cargo binding. We will use immunostaining to observe the effects of these mutations on Tnpo-SR localization and germ cell differentiation. The findings of this research will allow us to dissect the contributions of specific domains to Tnpo-SR function in GSC maintenance. By exploring the mechanisms of Tnpo-SR-mediated nuclear transport, we will gain insights into how stem cells regulate their fate and maintain tissue homeostasis. Furthermore, given the evolutionary conservation of Tnpo-SR with its human ortholog, TNPO3, our findings may have broader implications for understanding diseases linked to nuclear transport defects, such as ALS, cancer, and viral infections.

Petersen, Bethany

Faculty Mentor: Virginia Driscoll

Jamming for Connection? - Does informal music-making increase interpersonal communication skills when compared to formal music-making.

While current literature shows that medical students who take part in jazz improv classes specifically designed to teach communication skills improve those skills. There is not any other relevant literature, and no literature that examines the effect of informal jamming on interpersonal communication skills that is not specifically designed to teach communication skills. The purpose of this study is to identify whether a relationship exists between informal music-making and stronger interpersonal communication skills when compared to formal music-making. Informal music-making is defined as exploring instruments without prescribed exercises, improvising, and jamming with other musicians without an assigned leader/director/conductor. Formal music-making is defined as prescribed exercises and songs, declared and structured practice time, and playing in groups only with an assigned leader/conductor/director. Subjects included individuals who self-identified as a musician and had been playing music formally or informally for longer than three months. Participants completed a survey that included an altered version of the Rosenberg Self-Esteem Scale (to fit a ten-point scale rather than 4-points), a ten-point Big Five Personality scale, scales identifying levels of and experiences with formal and informal music making, and rating interpersonal communication skills. Data was evaluated to identify relationships between types of music-making, personality, self-esteem, and interpersonal communication skills. Researchers hope to determine if informal music-making increases interpersonal communication skills and other relationships between identified variables. Results could inform music therapy practice and neurology regarding interpersonal communication skills, self-esteem, personality, and informal versus formal music-making.

Pixley, Kendall

Faculty Mentor: Jessica Cooke Bailey

Bridging Rural Inequities in Diabetes and Glaucoma Education and Screening in North Carolina (BRIDGES-NC)

In Eastern North Carolina (ENC), there is a lack of accessible vision screenings and access to ophthalmology in rural areas. ENC is part of the "diabetes belt" which has a high rate of diabetes (14.4%), compared to the national average (11.6%). Individuals with chronic conditions like diabetes are at a heightened risk for ocular diseases such as diabetic retinopathy and glaucoma. If not detected early, these conditions can lead to irreversible blindness. However, many patients are unaware that they have an eye condition or realize the connection between their chronic illness and eye health. This research, in collaboration with Team Cooke Bailey, Prevent Blindness North Carolina, and Access East, aims to assess current practices surrounding vision screenings in community-based primary care clinics, with a particular focus on how referrals are made for specialized care. In the preliminary phase, we are conducting a needs assessment of Federally Qualified Health Centers (FQHCs) in the region that offer vision screenings, alongside reviewing data from PBNC's 2024 screening year across 14 sites. We are also mapping the ophthalmology and optometry practices in the region. The insights gained from this initial phase will lay the groundwork for larger initiatives aimed at increasing vision screenings in primary care settings, addressing barriers to follow-up care, and ensuring that patients receive the necessary vision care. Expanding access to vision screenings in rural populations is essential to preventing severe and preventable eye health outcomes, ultimately improving the quality of life and reducing the long-term costs associated with untreated vision loss.

Pleasant, Jake

Co-Presenters: Lawson Barbee
Faculty Mentor: Jeanne-Marie Lawrence

The Impact of ASCM on IDIS

The Distribution and Logistics (IDIS) program has suffered from low enrollment and engagement of students over the past decade. The COVID-19 pandemic only led to a greater distance being driven between the IDIS program and the student body. Between Fall 2020 and Spring 2025, enrollment in the program dropped by 24%. To combat declining enrollment and decreasing engagement rates, the ECU ASCM Student Chapter was formed. Inside Higher Ed states [that] "…involvement in campus life beyond the classroom is linked to increased academic achievement, retention, belonging and interest from potential employers." Consequently, this new student organization has planned several events, including plant tours, social activities, community service opportunities, networking events, and monthly guest speaker meetings to increase student interest in the IDIS program. To date, one goal of our project has been successfully achieved; however, the second goal is still in progress. If these goals are not met, and enrollment and engagement in the IDIS program continue to decline, it is possible that the program could be reorganized or even discontinued. ABC Channel 12 News has reported that ECU has previously cut eight-degree programs, including public history and vocational education, as they were "flagged as having low enrollment". The ECU ASCM Student chapter hopes to engage and enroll students in the IDIS program, while providing the opportunity for students to network and form lasting connections with peers and companies.

Price, Amilia

Faculty Mentor: Regina Dewitt

Investigation Proton Absorption using SRIM Simulations

The purpose of this project is to modify Gafchromic films for the measurement of radiation dose during irradiation with 2-4 MeV protons. Gafchromic films are commercially available plastic films that change color when exposed to ionizing radiation. The color change is directly correlated with the absorbed dose. The films consist of a color-changing ("active") layer that is sandwiched between two mylar layers as carrier materials. Measuring the dosage output by a proton beam from a particle accelerator with Gafchromic film can be difficult when the beam is at an energy lower than 4MeV. This is due to the fact that the majority of the energy of the proton is deposited in the plastic layer before the film itself, but if that layer is removed then the energy is deposited behind the film, both outcomes leading to an inaccurate dosimetry measurement. The goal of this project is to find a way to modify film dosimeters to allow for the accurate measurement of the radiation output of the linear accelerator here at ECU. Modifying the Gafchromic films will allow for the measurement of radiation doses over a wide range of proton energies. This will in turn allow for a larger number of experiments to be conducted with greater accuracy. In the project's current stage simulations are run to find suitable materials to place on top of the film dosimeter. This simulation is run in a program known as SRIM. This program runs a Monte Carlo simulation to find the distribution of the protons once they pass through the added layer. Once a simulation has been run the details of the results and parameters used will be noted in a spreadsheet and further tweaks to the added layer will be applied. Eventually, a material will be simulated that is suitable for the desired proton energy. The next step in a future project will be creating this material.

Provenzano, Gianna

Co-Presenters: Kelsey Dudash

Faculty Mentor: Rebecca Asch

Abundance and Distribution of Larval Fishes and Eggs over the Cape Hatteras Front

In marine ecosystems, the distribution and abundance of fish eggs and larval fishes are influenced by environmental factors, such as water temperature and salinity. Understanding these interactions is crucial, especially as the changing climate affects marine patterns and areas with varying oceanographic conditions, such as Cape Hatteras, North Carolina. This transition zone features complex oceanographic dynamics that influence the distribution of fish eggs and larvae. Cape Hatteras also serves as an important migratory route for marine fishes. In June 2024, a research cruise collected CTD (conductivity, temperature, and depth) data and plankton samples to explore the relationship between environmental conditions and the distribution of fish eggs and larval fishes. Six casts were conducted at three stations on either side of the Cape Hatteras Front. Using Mantabongo nets, our research team gathered replicate plankton samples from surface waters. The preserved samples were analyzed in the laboratory to assess the distribution and abundance of fish eggs and larval fishes in relation to environmental variables. It was hypothesized that egg abundance would vary with temperature and salinity, particularly between sites north and south of Cape Hatteras. However, temperature and salinity measurements showed minimal spatial variability, likely due to the summer timing of the cruise, which is characterized by enhanced thermal stratification and strong surface heating. The study found that as salinity increased, egg abundance decreased. Additionally, the highest number of eggs was found in nearshore sites (mean = 219.25 eggs/m^3), while offshore transects had significantly less (mean = 50 eggs/m^3). Understanding how ocean dynamics affect the spawning patterns of fishes is vital for managing and conserving marine species, particularly commercially important ones. By investigating the abundance of fish eggs and larval fishes alongside environmental variables, the study illuminates how ecological processes influence the early life stages of marine organisms and contribute to broader patterns in the region, especially in the context of climate change impacts. This knowledge is crucial for effective marine conservation efforts.

Ramirez, Collin

Co-Presenters: Cmauri Hinton
Faculty Mentor: Michelle Henderson

Public perception, Knowledge, and Plastic use of Greenville residents.

A study estimated that upwards of 230 billion pieces of plastic from the size of a human hair to as small as a grain of sand flow into the Pamlico Sound each year from the Neuse River Basin. The Neuse River basin is the 4th largest river basin in North Carolina, and the Tar-Pamlico River basin is the 3rd largest river basin. Both drain into the Albemarle-Pamlico estuary system that hosts 90% of the commercial fish species caught in North Carolina.
Recent studies suggest that between 1 and 2 million Tonnes of plastic enter the oceans annually, and 100,000 animals die from plastic entanglement each year. An effective strategy to managing plastic pollution is to prevent it from entering the environment through proper disposal practices, reductions in use, and trash traps. Sound Rivers, a local riverkeeper organization, installed a trash trap into the Green Mills Run stream on March 2024. Sound Rivers, and the community wanted to survey the people of Greenville about their perceptions, knowledge, and usage of plastics to better understand how to involve the community in plastic waste prevention. To survey the people of Greenville, we asked attendees of the Tar River Festival and other groups on campus to complete a survey. We asked participants, public perception of plastic waste, and usage of plastics and demographic information. Currently, around 79% of survey participants were middle aged or young adults, leaving other age groups, ages 40 and older and 19 or younger, at around 28%. Out of all participants, about 63% were White/Caucasian, leaving other groups at about 37%. When asked about how informed they are about different kinds of plastic, only 13% answered “a lot,” while the remaining responses were “somewhat” or “very little/nothing at all. Based on these results, we know we should increase efforts to reach other communities, and to help them acquire access to resources to increase engagement in this issue. Water quality is critical to us and our environment. Therefore, it is important that we try to increase engagement with our communities to help reduce plastic waste either through proper disposal or reduction in use.

Ramirez, Luis

Co-Authors: Rose Baker, Dai’Sha Dowson, Makyah McNeill, Elisha Eanes, Megan Bowling, Audrey Eaves, Joseph G. Lee, Susan C. Bobb, Kathrin Rothermich, Moritz Dannhauer
Faculty Mentor: Moritz Dannhauer

Computational Analysis of Pitch Modulation: Prosodic Adaptation to L2 Avatar Patients a Mixed-Reality Simulation

Successful communication is critical in healthcare, yet language discordance between providers and patients can hinder comprehension and rapport. This study examined how L1 Physician Assistant (PA) students modulate pitch over time when interacting with Hispanic L2 avatar patients of varying English proficiency. Using Praat and custom Python scripts, we analyzed pitch trajectories conducted in a mixed-reality simulation. By using a controlled, interactive avatar patient, this study isolates the effects of language proficiency on provider speech accommodation, allowing for precise analysis of real-time pitch modulation in a simulated yet naturalistic clinical setting. Results revealed a significant interaction between gender and proficiency in pitch modulation over time. Female PA students consistently adjusted pitch based on patient proficiency, showing greater differentiation between high- and low-proficiency interactions. Their pitch contours exhibited more dynamic shifts, suggesting an effort to enhance clarity and engagement. In contrast, male speakers showed consistent pitch adjustments, maintaining a more stable trajectory regardless of patient proficiency. These findings suggest gendered differences in prosodic accommodation strategies, with female speakers engaging in more adaptive pitch modulation, while male speakers demonstrated a more uniform prosodic pattern. While pitch adjustments may aid comprehension and foster rapport, excessive modulation could risk over-accommodation, making patients feel patronized. Conversely, insufficient adjustment may limit communication effectiveness. Understanding gender-based prosodic adaptation can inform training programs that help healthcare providers optimize communication strategies for linguistically diverse patients. Future research should explore how these pitch patterns influence patient trust, comprehension, and real-world clinical interactions to enhance equitable and effective healthcare communication.

Randall, Lydia

Faculty Mentor: Nicholas Murray

The Effects of Fatigue on Postural Control in Healthy Populations: A study using Novel Pedar in-sole pressure system and a force plate to evaluate balance

BACKGROUND: The sensorimotor system is how the brain processes visual information to adjust a person's position to maintain postural control. It is known that fatigue leads to an increase in fall risk and other motor dysfunction; however, the visuomotor changes that occur are unclear. The purpose of this study is to determine the effects of fatigue on postural control of healthy individuals and to see if visual conditions exacerbate the effects. Postural control will be evaluated through indirect and direct measures center of pressure data. This includes displacement, velocity, acceleration, 95% confidence ellipse area, virtual time-to-contact, and approximate entropy.
METHODS: Twenty healthy participants between the ages of 18 to 50 will be recruited. Having any previous history of concussions or major lower-extremity injuries are exclusion criterion because it could interfere with postural control. After signing the informed consent, the participants will be outfitted with a Pedar in-sole and will stand on the force plate. The pre-test will involve three rounds of standing for 30 seconds with their eyes open and 30 seconds with their eyes closed. Following, the participant will be asked to wear an HTC VIVE virtual reality (VR) headset and do three rounds of 30 seconds in the VR still room, 30 seconds in the VR moving room, and 30 seconds in recovery after the moving room. They will then undergo a volitional fatigue protocol, where fatigue is considered reached when the participant reaches a rate of perceived exertion (RPE) of 13 or 76% of their target heart rate. Then, the pre-test protocol will be repeated and evaluated for changes. Customized MATLAB scripts will be used to process the CoP data from the force plate and Novel Pedar in-soles and a repeated measures ANOVA will be used to compare pre and post-indicators of fatigue.
ANTICIPATED RESULTS: It is predicted that fatigue will decrease an individual's postural control. Accordingly, displacement, velocity, acceleration, and ellipse area will increase, and further it is expected approximate entropy will demonstrate a decrease in balance control following fatigue. It is expected that these effects will be amplified when vision is perturbed, such as when eyes are closed or in the moving room.

Rangaraju, Trisha

Co-Authors: Grace Campbell, Anthony Kulas
Faculty Mentor: Anthony Kulas

The association of functional performance deficits with quadriceps strength deficits

INTRODUCTION: Anterior Cruciate Ligament tears (ACL) are common injuries that often occur in young individuals who participate in cutting and jumping sports. Individuals who suffer from an ACL injury are faced with short and long term-effects in their lives. These individuals typically have a decreased active lifestyle, an increase in medical bills, and run the risk of developing osteoarthritis (OA) at an earlier age. Even after surgery and recovery, individuals who have a reconstructed ACL (ACLR) are 15 times more likely to suffer a second knee injury compared to the risk of a healthy population of athletes sustaining their first ACL injury. Because of the high rates or second injury focus has been put onto the components of the return to sport (RTS) criteria. The RTS is composed of 4 main components: patient reported outcomes, testing of functional movements, quadriceps strength, leg strength symmetry (LSI) within 90%, and time. From those 4 components only time and quadriceps LSI has been shown to be a risk factor of a second ACL injury. Unfortunately, not everyone has the resources, such as a dynamometer, to properly test quadriceps LSI so they rely on a person's functional ability. As of now traditional functional tests are not predictive of quadriceps strength deficits. Horizontal jump distance has not been shown in literature to be linked with quadricep strength deficits, however, single leg vertical jump height deficits may be more comparable to quadricep strength deficits. PURPOSE: To determine if quadricep strength deficit is associated with single leg vertical height deficit.
METHODS: Healthy and ACLR subjects will be recruited and testing will consist of quadriceps strength assessment as well as functional performance during a single leg horizontal and single leg vertical jumping. Height and distance for vertical and horizontal jumps will be recorded. EXPECTED OUTCOMES: Single leg vertical jump height deficit will correlate with quadriceps strength deficits but single leg horizontal jump distance deficit will not correlate with quadriceps strength deficits.

Ray, Marley

Faculty Mentor: Matthew Walenski

The production and comprehension of reversible dative and benefactive sentences

Individuals with agrammatic aphasia often have comprehension deficits, especially on complex sentence structures that are reversible – that is, either participant in the sentence could plausibly perform the action of the verb or have the action of the verb done to them (e.g., The boy is chased by the girl). Comprehension of these sentences is impaired in agrammatic aphasia because their comprehension requires an understanding of the syntactic structure of the sentence. However, virtually all prior research in this area has investigated reversible sentences with two arguments (subject, object). In our study, we begin to expand this investigation to reversible sentences using verbs with three arguments, such as dative verbs (give, send) and benefactive verbs (find, get). We examined these sentences in two structures (prepositional object: The matchmaker sent a bride to the groom; double object: The matchmaker sent the groom a bride). The primary purpose of this study is to create a set of materials that we can use to examine sentence comprehension in participants with aphasia. We created 3 online questionnaires to examine the judgment, comprehension, and production (sentence completion) of these dative and benefactive reversible sentences. Results from the judgment test revealed that both structures for both verb types were all similarly acceptable. Results from the comprehension test revealed that the prepositional object sentences were easier to understand than the double object sentences, similarly for dative and benefactive verbs. Results from the production (completion) test, in which participants were given the sentence up to the first object (e.g., The matchmaker sent the bride ___), indicate that that first object (bride) is typically interpreted as the recipient of the thing sent, rather than someone who is being sent. This same pattern was found for dative and benefactive verbs. Further research will use these reversible sentences with temporally sensitive methods examining real-time comprehension in participants with aphasia. This will offer more valuable insight for understanding syntactic deficits in this disorder and how to address them with this population.

Rhodenhiser, Braddock

Faculty Mentor: April Blakeslee

Evaluating the impacts of black gill disease on hepatopancreas size in penaeid shrimp

Due to climate change and coastal development, temperatures and salinities of estuaries have begun to change which have direct effects on the biota living in these estuaries. Estuaries and other aquatic ecosystems that provide vital ecosystem services are at risk due to anthropogenic activities, such as urbanization, development, pollution, and dredging. Rising temperature and changes in salinity can cause a higher prevalence of diseases in crustaceans as causative agents increase their ranges and become more successful. Black gill disease (BGD) is caused by a parasitic ciliate that encysts on the gill tissue of crustaceans. This results in an inflammatory and necrotizing response thus reducing respiration efficiency and making the host more likely to be predated upon. In North Carolina this disease impacts penaeid shrimp, which supplies a fishery that generates around $10 million dollars annually. Due to the ecological and economic importance of penaeid shrimp, the impacts of black gill disease must be studied to better understand how it may affect shrimp populations. Penaeid shrimp have an organ called the hepatopancreas which contributes to their immune system supplying the crustacean with immune defenses and energy for fighting off diseases or pathogens. When penaeid shrimp are infected with BGD, it triggers an immune response which can potentially cause the hepatopancreas to be underdeveloped. Measuring the weight of the hepatopancreas as a proportion of the total body weight allows us to use this proportion as a proxy for hepatopancreas performance. The goal of this study was to identify if shrimp that were infected with black gill had smaller hepatopancreas size compared to their body size due to immunological stressors. The preliminary results indicate there is a difference between HSI measurements and severity of BGD infection.

Richardson, Haley

Faculty Mentor: Chelsea Passwater

The Impact of a Cancer Diagnosis on the Adolescent and Young Adult Experience

Adolescence and young adulthood are periods marked by significant physical, emotional, and social development. A cancer diagnosis during this time can disrupt normal developmental milestones, forcing individuals to face unique challenges, such as missed school or workdays, discontinued sports and social activities, symptom burden from illness or treatment, and navigating the emotional toll of social isolation and uncertainty about the future. This study aims to explore the illness experience of adolescents and young adults (AYAs) with cancer to identify common challenges and develop resources to support this vulnerable population. This study consisted of a comprehensive literature review followed by qualitative interviews with AYAs diagnosed with cancer during this critical life stage. Interviews were conducted with participants who had a cancer diagnosis and were treated between the ages of 18-35 years old. The interviews explored the impact of their diagnosis on education, relationships, and overall quality of life, while also identifying any interventions that proved beneficial to the participants. Analysis of the literature and interview data reveals that many AYAs undergoing treatment had similar experiences of feeling isolated or a lack of belonging. Not fitting in with adult or pediatric populations, often leaves AYAs feeling out of place, struggling to find peers who can understand their unique circumstances. Key themes that emerged include navigating uncertainty, demonstrating resilience, and the importance of community and support systems. By exploring the unique needs of this often overlooked population, this study aims to promote a deeper understanding of the cancer experience of AYAs. Insights from this research will guide healthcare professionals in creating interventions to improve outcomes and provide support for AYAs through their cancer diagnosis.

Roberson, Jake

Faculty Mentor: Tracey Woodlief

Immunotoxicology of Understudied PFAS Found in North Carolina

Per- and polyfluoroalkyl substances (PFAS) are a broad class of synthetic compounds widely used in consumer and industrial products, particularly as processing aids in the production of fluoropolymers. Perfluorooctanoic acid (PFOA) and Perfluorooctane sulfonate (PFOS) have been classified as presumed immune hazards by the U.S. National Toxicology Program, raising concerns about the potential immunotoxicity of other PFAS. Although many PFAS remain understudied, they are detectable in both drinking water sources and finished drinking water across the U.S., presenting a potential risk of direct exposure for many people. Understanding how PFAS interact within the human body is crucial for assessing their potential risks. This study investigates the immunotoxic effects of 2-[difluoro(trifluoromethoxy)methoxy]-2,2-difluoroacetic acid (PFO2HxA), a specific PFAS compound. We exposed adult male and female C57BL/6 mice (6-8 weeks old) to PFO2HxA via gavage for 30 days at doses of 0, 0.5, 5.0, or 50 mg/kg. On day 25, all mice were immunized with sheep red blood cells (SRBCs) to stimulate TDAR. Endpoints included terminal body weights, organ weights, immunophenotyping of lymphoid organs, liver peroxisome proliferation (females only), and the T-cell dependent antibody response (TDAR). Results showed no significant differences in body weight, liver, spleen, or thymus weights between groups by dose. Exposure did not alter immunophenotyping of the spleen or thymus, TDAR or liver peroxisome proliferation (female only) at the dose administered. These findings suggest that PFO2HxA, at the doses administered, does not exhibit immunotoxic effects.

Rodriguez, Adriana

Co-Authors: Alexandria Warren, Elizabeth Ables
Faculty Mentor: Elizabeth Ables

Determining the Role of Transcription Factor Ftz-F1 in Germline Stem Cell Maintenance

Stem cells are a population of undifferentiated cells in the body that help maintain tissues undergoing high cellular turnover. They are sensitive to the hormonal changes that occur during aging, pregnancy, and metabolic disorders, but the molecular mechanisms are largely undetermined. Previous studies have shown that ecdysone, an insect steroid hormone that is analogous to human sex steroids, regulates stem cell renewal by binding to the nuclear hormone receptor ecdysone receptor (EcR). In turn, EcR regulates transcription of other nuclear receptors, including Fushi tarazu factor 1 (Ftz-F1). However, the significance of Ftz-F1 in stem cell maintenance remains unknown. Preliminary findings revealed that overexpression of EcR results in the formation of stem cell-like tumors, and that Ftz-F1 is highly expressed in these cells. Here, we created two conditional transgenic tools designed to overexpress Ftz-F1 in the stem cells of Drosophila melanogaster (the fruit fly) to determine whether it is also sufficient to induce tumorigenesis. Our initial finding was that the overexpression of Ftz-F1 prompted the formation of agametic ovaries. These results suggest that Ftz-F1 plays a critical role in germline stem cell maintenance. The conservation of genes in D. melanogaster and humans presents parallels between the roles of nuclear hormone receptors across species, offering a better understanding of related mechanisms that can be applied to advance regenerative medicine.

Rogers, Sydney

Faculty Mentor: Claudia Kitchin

Exploring the Adverse Effects of Anesthesia and how Nurses can Alleviate It

Anesthesia is widely used in various medical procedures, including surgeries, screenings, tests, and dental treatments. However, its extensive use also carries the risk of unintended complications and adverse effects. It is crucial for nurses to be equipped with the knowledge and skills to manage patients experiencing these adverse events and to know the most effective interventions preoperatively, intraoperatively, and postoperatively. This systematic literature review includes studies on anesthesia-related complications and the nursing interventions designed to address them. The analysis of 20 selected studies including case studies, clinical trials, and literature reviews, demonstrates a clear connection between specific nursing interventions and antidotes for managing anesthesia complications. This integrative review was conducted following the PRISMA 2020 guidelines. The inclusion criteria included being publish in English, internationally, and within hospital settings trials. The exclusion criteria were published older than ten years, non-English publications, theses and dissertations and nonacademic settings. The findings suggest that IV lipid infusion, oxygen administration, fluid management, position changes, and early symptoms recognition significantly reduce anesthesia-related adverse effects. This research will contribute to the advancement of nursing practice by enhancing postoperative care for patients who have undergone anesthesia. By equipping nurses with targeted strategies to manage anesthesia related complications, the recovery process can be accelerated, leading to shorter hospital stays and reducing the likelihood of long-term issues.

Rollins, Kyrstin

Faculty Mentor: Nicholas Murray

Mobile Sensorimotor Integration Assessment in Soccer Players

Background: The purpose of this study is to establish metrics that work in the field to promptly identify and evaluate the level of sensorimotor integration impairment incurred by repetitive sub-concussive loading (RSCL). Repeated head impacts, even without clinical symptoms of mTBI, can cause neurocognitive and neurophysiological impairments. In contact sports, repetitive sub-concussive impacts may lead to mTBI-like deficits, increasing the risk of neurological injury, cognitive decline, and CTE. One study found CTE in 41.4% of contact sport athletes under 30 at death. With many neurological injuries going undetected, developing a rapid, in-field assessment is crucial to prevent further damage. We hypothesize that the use of wireless sensorimotor integration measurements can be harnessed to objectively evaluate sensorimotor integration following periods of exposure to RSCL in the field.
Methods: Our approach is to integrate wireless measures of postural control, oculomotor control, and cortical activation with virtual reality (VR) to provide a comprehensive assessment of sensorimotor integration function, independent of a lab setting, following a single period of exposure to RSCL. Twenty participants will be chosen who are ages 18-50 who currently play, or have played within the past two years, organized soccer with no diagnosed concussions within the past year and no lower extremity injuries within the past three months. These participants will be outfitted with a Pedar in-hoe pressure distribution and gTEC EEG systems after consent is obtained. They will then participate in the pretest using the wireless measures listed above. Next, the participants will take part in the RSCL exposure period. For the RSCL exposure period, soccer players will engage in a heading training protocol. Following completion of the heading protocol, participants will be re-tested using the same measures in the pre-test.
Expected Results: We expect to see a difference in the sensorimotor integration measures before and after the RSCL exposure period. More specifically, we expect to see results similar to what is seen following concussion. The RSCL exposure data will help to develop a portable sensorimotor integration system for real-time impairment assessment after RSCL incidents in field settings. This system could help prevent neurological injury in sports, military, and other environments while also aiding in the evaluation of conditions like Parkinson's disease and stroke.

Rush, Emma

Faculty Mentor: Stephanie Richards

Comparison of field trial and wind tunnel exposure of mosquitoes to insecticide formulated products

Mosquito issues related to pathogen transmission and nuisance are handled by mosquito control programs throughout North Carolina and elsewhere. Field trials are a common method for evaluating the efficacy of insecticide formulated products (FP); however, this method is cumbersome, expensive, and labor intensive. A novel compact wind tunnel used in a laboratory setting was developed as an alternative method for evaluating FP efficacy and mosquito mortality was compared between field trial and wind tunnel methods of exposure.
Two different FP (Biomist® 3+15 and Duet®) were applied to wild and laboratory populations of Aedes albopictus and Culex pipiens/quinquefasciatus. The field trial included FP application via truck-mounted ultra-low volume (ULV) equipment to caged mosquitoes set up in a 9 x 3 grid with 100 ft distances between rows of stations. Mosquitoes were transferred to clean cages immediately post-exposure, incubated at 28°C, and mortality monitored for 36 h. Wind tunnel experiments consisted of exposing each replicate mosquito cage to aerosolized FP for 10 s, following the same post-exposure methods as in the field trial. Mosquito knockdown was recorded 2 h post-exposure and mortality was recorded at 36 h. Mosquito mortality in the group exposed to FP at 100 ft (closest location to ULV treatment) during the field trial were similar ($p>0.05$) to mosquitoes exposed in the wind tunnel for Biomist® and Duet®. Mosquito mortality in the group exposed to FP 200 and 300 ft from the field trial spray line were similar to the wind tunnel for Duet®, but significantly lower than wind tunnel results for Biomist® (200 ft: $p=0.019$, 300 ft: $p=0.049$). There was near 100% mortality in lab Ae. albopictus, wild Ae. albopictus, and lab Cx. pipiens/quinquefasciatus for Biomist® and Duet® in the wind tunnel but field trial results varied depending on distance from the spray line and mosquito population. Wild Cx. pipiens/quinquefasciatus showed insecticide resistance in both the field trial and wind tunnel experiments for all tested FP. Based on these results, the wind tunnel could be used as a screening step for FP or a potential alternative testing method when field trials are not possible.

Rust, Colton

Co-Authors: Cory Joyner, Erin Field
Faculty Mentor: Erin Field

Preparing Mariprofundus erugo, a novel iron-oxidizing bacteria for type cultures

Type culture repositories, such as the American Type Culture Collection (ATCC) or Leibniz Institute DSMZ are crucial in supplying microbial stocks that are used in research processes globally. Culture repositories are beneficial because a lot of the novel traits are already characterized from the scientist that collected them, providing standardization for other scientists that may want to study them. Currently, ECU's Field lab is working to submit stocks of Mariprofundus erugo (M. erugo), a novel iron-oxidizing bacterium (FeOB) species that was isolated from stainless steel samples from the Pamlico sound and Neuse River in 2017 and published in Applied and Environmental Microbiology. As part of this process, we must first complete growth characterization studies to assess a variety of environmental and metabolic conditions including salinity tolerances, temperature ranges, and carbon source utilization. Therefore, I will be presenting my results from these experiments which are ongoing. I will also prepare frozen glycerol stocks and lyophilized stocks for submission to these Type culture collection repositories. Ultimately, these studies will provide more information about the growth condition of these two model iron-oxidizing bacteria as well as lay the foundation for others to use them in their studies.

Saddison, Emma

Co-Presenters: Kaylie Williams, Emma Saddison
Co-Authors: Kaylie Williams, Emma Saddison
Faculty Mentor: Laura Levi Altstaedter

Sustainability in Buenos Aires

Our research is a humanities project that aims to incorporate digital humanities to create an accessible, interactive interface that will also focus on how conservation efforts towards native species, directly and indirectly, affect the human population. Sustainability in Buenos Aires, Argentina is aimed at raising awareness of the conservation efforts towards their native species while also noting the impacts of climate change that is causing severe damage to human lives. Our focus includes the balance of this relationship and how its social and environmental impacts affect diverse cultural, spiritual, biodiversity, and climate change values. Incorporating a multilingual and multi-media aspect in our research will allow us to connect with broader audiences. Within this interface, we included multi-layer mapping to capture satellite imagery over a specific period using ArcGIS mapping technology. We can visually capture the changes occurring within and around chosen green areas and native species in Buenos Aires based on the nation's conservation efforts. Also, we have checked the environmental policies and data in Argentina to compare the policies and data in the United States. Specifically, we have researched the United Nations' Seventeen Sustainable Development Goals (SDGs) to find where Argentina fits on a global scale and in comparison, to the United States. The SDGs that we focus on specifically include eleven, thirteen, and fifteen which center attention on sustainable cities and communities, climate action, and life on land, respectively. Moreover, we will focus on how countries, whether considered developed or developing, can learn from one another about the relationship between people and sustainability efforts. The end goal is to intertwine the conservation efforts between countries to come together, protect our native species, and provide concrete steps and recommendations that can improve people's lives and livelihoods. Upon completion, we are designing a digital map itinerary to visit a sustainable space in Buenos Aires, Argentina. The itinerary will be incorporated into the ECU faculty-led study abroad program in Buenos Aires. This allows students to learn about the conservation efforts being made in that area in terms of its social, environmental, and economic impact. By doing so, the students will personally see how those impacts affect the native species and how climate change is affecting human lives, whether in a positive or negative way.

Sadlowski, Matthew

Faculty Mentor: Linda Bolin

Faculty Perspectives of Utilizing Graduate Research Assistants within a College of Nursing

The nursing profession currently faces a significant workforce shortage, including a lack of PhD-prepared nurse educators and researchers, which impacts the future of nursing education and scientific advancement. To balance the needs of a PhD prepared faculty member as an educator and researcher, the utilization of research assistants can assist in their productivity and scholarly endeavors. Many universities across the nation, including the College of Nursing at East Carolina University, have created Graduate Research Assistant (GRA) programs which aim to address this need. Programs such as these offer a potential solution by providing doctoral students with research experience and exposure to the research process while also supporting research focused faculty members in their scholarly work. The current literature reveals limited research on this topic. There is a need for further exploration. The research question is: What are the faculty perspectives of utilizing graduate research assistants within a college of nursing. This qualitative study aims to examine the experiences of nursing faculty members at the East Carolina University's College of Nursing who have interacted with GRAs in the past. Demographic questionnaires will be used to collect quantitative data. This qualitative inquiry will be approached through the use of focus groups. Analysis will reveal recurrent themes and topics that emerge, which will then be summarized. Findings will provide valuable insights into the experience and perception of faculty members with doctoral students in GRA programs. This information can be used to identify key factors that contribute to satisfaction and influence faculty engagement and retention. By clarifying these factors and gaining a deeper understanding of faculty perspectives, institutions can improve current programs in hopes of recruiting and retaining nursing faculty scholars.

Salaheldeen, Nema

Faculty Mentor: Kura Duba

Enhancing Biodiesel Yield through Enzymatic Transesterification of Waste Cooking Oils

Enzymatic transesterification for biodiesel production from waste cooking oils is a promising biodiesel purification technique due to its sustainability and reduced energy requirements under mild operating conditions. Biodiesel production is a renewable alternative to diesel fuel from vegetable oils and animal fats. The current biodiesel production is not ideal for long term production as it is not economically competitive with petroleum-based diesel, which requires high raw materials and operating costs. The current process requires recycled oils and fats to react with methanol to form biodiesel and glycerol in the presence of strong acids and bases which act as a catalyst. Due to the catalyst dissolving in the mixture a secondary purification technique is required to separate the major co-products, biodiesel and glycerol. This process is no longer efficient or sustainable for large-scale production due to its high costs, complex purification steps, and environmental concerns, making alternative methods necessary for future biodiesel production. The biocatalyst or enzyme method is used to improve efficiency, reduce byproduct formation, and eliminate the use of harsh chemical catalysts. However, the process still has challenges, including the high enzyme cost, selectivity, and slow reaction rate. This paper reviews the different approaches to enhance the yield, and lower the overall cost of biodiesel production. The main factors affecting the yield of biodiesel include reaction time, reaction temperature, and the molar ratio of methanol to oil.

Sampson, Noah

Co-Authors: Mark Mannie
Faculty Mentor: Mark Mannie

Cloning and Characterization of Regulatory T Cells for Therapeutic Applications in Autoimmune Diseases

Regulatory T cells are a promising therapeutic avenue for treating autoimmune diseases because they can modulate immune responses and restore immune homeostasis. Autoimmune conditions such as Type 1 Diabetes, Celiac Disease, and Myasthenia Gravis are associated with the depletion or dysfunction of regulatory T cells, leading to overactive immune responses. This project investigates the cloning of regulatory T cells to expand their populations for potential therapeutic use. Using a limiting dilution method, regulatory T cells were successfully isolated and cloned from human Peripheral Blood Mononuclear Cells (PBMCs), after which they were cultured in cytokine-enriched media. Their phenotypic stability and suppressive function were then assessed via flow cytometry. Results provide insights into the challenges and potential of cloning regulatory T cells, emphasizing the importance of maintaining their suppressive function throughout the process.

Sarambo, Stephanie

Faculty Mentor: Nic Herndon

AI-Powered Chatbot for Automated Essay Review: Enhancing Writing Feedback and Revision

Feedback is one of the most effective ways for students to improve their essays or papers. Many teachers allow students to peer review their classmate's papers, however, this may be ineffective if a student is not well versed in the topic their peer wrote about. Without proper critiques, students may not be aware of how to improve their writing skills, which parts of their paper need editing, or the overall accuracy of their understanding of the topic. This paper proposes an artificial-intelligence (AI) chatbot that takes a paper as input, and provides quality feedback and suggested changes as output for the author to improve upon. By utilizing this approach, authors can upload their papers to the chatbot and receive constructive criticism from a reliable system that is knowledgeable about the paper's subject matter. This research aims to develop an AI-driven feedback system that enhances the writing review process by providing efficient and insightful critiques. The proposed chatbot will be designed to analyze content, ensuring that its suggestions are relevant and informed, thereby minimizing the need for extensive manual revisions or peer review. Furthermore, this study will evaluate the chatbot's effectiveness in identifying errors in grammar, syntax, and coherence, with the goal of improving the overall quality of academic and professional writing.

Schwartz, Mason

Faculty Mentor: Ramiro Murata

Spilanthol as a Prospective Fungicidal Treatment of Oral candidiasis caused by Candida spp.

Hypothesis
Spilanthol will be an effective treatment against Candida spp.
Significance
Oral Candidiasis, caused by Candida spp., primarily affects immunocompromised individuals, those undergoing chemotherapy, antiretroviral therapy, or prolonged antibiotic use. Current antifungal therapies, such as Nystatin, Fluconazole, and Amphotericin B, are increasingly compromised by rising resistance among Candida isolates. The growing prevalence of drug-resistant Candida infections has major clinical implications, including prolonged hospitalizations, increased healthcare costs, and elevated mortality rates in high-risk populations. To address this challenge, agencies such as the NIH and CDC have emphasized the need for the development of novel antifungal therapies targeting eukaryotic pathogens like Candida spp.
Purpose
Natural products are a critical source of innovative therapeutic agents for infectious diseases. Spilanthol, a bioactive alkylamide classified as Generally Recognized as Safe (GRAS) when used as a flavoring, has shown antimicrobial activity against oral bacteria and, in preliminary studies, was effective against Candida albicans ATCC 10231. This project aims to

investigate the antifungal activity of Spilanthol against C. dubliniensis, C. tropicalis, C. glabrata, and resistant strains of C. albicans1.
Role in larger project
I will work to look at novelty treatments for Candida spp. and do MIC, MFC, time kill, biofilms quantification and co-culture protocols.
Methodology
C. dubliniensis MYA-646, C. tropicalis MYA-3404, C. glabrata MYA-275 and fluconazole resistant C. albicans 321182 will be used for all experiments.
For minimum inhibitory concentration (MIC), Spilanthol will be diluted in 1% dimethylsulfoxide (DMSO) with concentrations ranging from 1000-0.1 µg/ml. Nystatin (160-1.25 µg/ml), and fluconazole (4,000-31.3 µg/ml) act as positive controls (n=6). All tests will be in a volume of 200µl with 104 CFU/ml. The plates will incubate at 37°C for 24h. MIC values will be calculated as the highest dilution showing complete growth inhibition of tested strain. Minimal fungicidal concentration (MFC) will be determined as the concentration of the spilanthol able to inhibit visible growth.
For time-kill, fungal cells will be incubated for 24h in RPMI, 10%FBS at 37°C in 5%CO2. Then treatments of Spilanthol (0-1000 µg/ml) will be added. 10 µL from the wells will be plated onto blood agar plates at certain time intervals (0-3-6-12-24h) and allowed to grow for 48h before counting the CFU2.
For coculture, human fibroblast cells and Candida ssp. will be cultured together in DMEM and 10% FBS then incubate for 24h at 37oC in 5% CO2. The suspension will be treated with various concentrations of Spilanthol (0-1000 µg/ml) (n=6). The suspension will undergo 72h of treatment and be tested for cytotoxicity and plated onto SDA plates to count CFU2.

Sehizadeh, Kia

Faculty Mentor: Erzsebet M. Szatmari

µCT analysis of craniofacial skeleton in ADAP1 KO mice

The growth of the craniofacial skeleton is a complex process regulated by genetic and epigenetic factors. Mouse models replicating clinical craniofacial phenotypes are key in understanding disease progression and revealing the underlying genetic and molecular factors. ADAP1 (Arf-GAP with dual PH domain-containing protein 1) is highly expressed in the brain and the immune system. Its level increases during development and decreases with adulthood. Given that the craniofacial skeleton develops parallel with the brain, we evaluated the postnatal craniofacial ontogeny changes associated with using ADAP1 KO mice. In this study, we performed a quantitative morphometric analysis of the craniofacial skeletal structures in ADAP1 KO and ADAP1 WT mice using classic morphometry and high-resolution microcomputed tomography (µCT). The upper and lower incisors of ADAP1 KO mice were significantly longer, while no enamel discoloration or chips were observed. µCT assessment of the effect of ADAP1 KO on the development of the skull indicated no statistical difference between genotypes in a small cohort of mice (3-4/genotype). This work provides insights into the role of ADAP1 in developing craniofacial skeletal structures. Our pilot data indicates that a lack of ADAP1 enhances the length of incisors without affecting the length of established bone landmarks within the skull.

Shaw, Benjamin
Co-Authors: Alia Simon, Kelsey Dietrich, Maeve Schumacher, Christyn Dolbier
Faculty Mentor: Christyn Dolbier

Mindfulness Based Program Participation Interest, Motivators, Barriers, and Preferences in Emerging Adults with Low Income

Introduction: Socioeconomic status (SES) is strongly linked to physical and mental health challenges, with economic hardship being strongly associated with elevated levels of stress, stigma, and trauma. Despite the need of those with low SES (often characterized by earning a personal income of $15-20,000 or less) regarding stress reduction, these individuals are the least likely to engage in mindfulness-based programs. Mindfulness-based programs (MBPs) include practices emphasizing non-judgmental awareness of thoughts, feelings, bodily sensations, and environmental surroundings; and have been shown to be effective in stress reduction in various populations. A review of MBPs with low SES samples revealed they were beneficial in enhancing well-being when appropriately adapted towards greater accessibility and feasibility (Foale et al., 2023). Further research is needed to gain insight into ways MBPs could be optimized to facilitate mental health and well-being among individuals with low SES.
Purpose: This presentation will report on MBP participation interest, motivators, barriers and preferences in emerging adults with low income.
Method: This study is a secondary analysis of a larger study comparing MBP participation interest, motivators, barriers and preferences between racial/ethnic groups. Using a cross-sectional design, eligible participants (US residence, english fluency, 18-29 years old) were recruited through CloudResearch crowdsourcing. Participants completed an online survey assessing MBP participation interest, motivators, barriers, and preferences. In this secondary analysis, participants (N = 392) were stratified into three personal income brackets: low income, (<$20,000; n = 146), medium income ($20,000-$49,999; n = 118), and high income ($50,000+; n = 128).
Results and Discussion: Findings demonstrate that participants within the low-income group expressed the least interest in MBP participation in comparison to those with medium and high income. The low-income group identified cost (69.9%), time (43.8%), SES (34.2%), and transportation (29.2%) as top barriers to MBP participation. Top motivators for MBP participation for the low-income group included promoting mental health (65.8%), stress reduction (47.3%), and self-awareness (30.8%). The low-income group had a greater preference for face-to-face MBP formats than online, app, or combination formats. These results support the value of minimizing barriers and ensuring that MBPs are tailored to enhance stress-management and general well-being, while also offering different modalities for participation. The presentation will include results of qualitative analysis to offer unique, personalized perspectives representative of individuals with low income.

Shook, Hannah
Co-Presenters: Jordan Cline, Caleigh Jones,
Faculty Mentor: Dierdre Larsen

Impact of a Student-Led Clinical Practicum on Dysphagia Knowledge and Competency in Graduate Speech Pathology Clinicians

Background
Speech-language pathologists (SLP) are the preferred healthcare providers for managing and directing clinical care of patients with dysphagia. Though graduate courses and clinical practicum increase self-perceived competency to assess and treat dysphagia, SLP graduate students and recent graduates report low competencies. For many students, there are few opportunities in an academic setting to apply learned coursework knowledge and develop hands-on skills to become competent in dysphagia. A university student-led clinic can address the needs of a novel graduate clinician by providing a clinical practicum that promotes a positive learner-focused environment while using existing university resources. However, no study has examined student perception of knowledge or competencies gained from this experience in speech-language pathology.
The Student-Led Head and Neck Cancer Clinic pilot program initiated in August 2024 at East Carolina University Speech-Language and Hearing Clinic (ECU SLHC). The program's protocol requires graduate clinicians to review relevant prophylactic exercise literature to create a patient-centered, evidence-based plan, develop strong documentation skills, as well as conduct formal data collection of swallowing outcomes.
Purpose
The intent of this study is to determine if a one-semester rotation in a student-led clinical practicum increases dysphagia knowledge and self-perceived and preceptor-perceived competency for graduate clinicians in speech pathology.
Methods
Four graduate clinicians acted as providers to HNC patients at ECU SLHC for one semester. The Dysphagia Competency Verification Tool (DCVT), a 6-point Likert scale assessing four areas of clinical competency, was completed by each clinician and their preceptor pre- and post-rotation. Each student also completed a multiple-choice Knowledge Test relating to the four areas of clinical competency as well as case-based application pre- and post-rotation. Score differences from pre- to post-rotation will be determined. Differences between first and second-year graduate students will also be analyzed using appropriate parametric or nonparametric statistics.
Results
These results will be used to determine the impact of the clinical practicum experience for the pilot program for graduate clinicians.
Conclusions
Few studies provide training and education strategies to enhance the skill acquisition and development related to dysphagia assessment and treatment. Limited student-led clinics have been implemented with SLP students. As stakeholders in the development of a student-led clinic, ongoing investigation of student and patient input is invaluable to ensure long-term sustainability.

Simmons, Lydia

Faculty Mentor: Morgan Milton

Characterizing the DNA binding activity of biofilm regulatory protein SypG from Vibrio fischeri

The discovery of antibiotics in 1928 was invaluable to the advancement of medicine. However, as of 1990, approximately one million lives have been lost every year due to antibiotics resistance complications. Biofilms are a contributor to antibiotic resistance; they are a sticky extracellular matrix of polysaccharides, eDNA, and proteins that create a microenvironment around colonies of bacteria. Biofilms provide a physical barrier, preventing the antibiotic from getting near the bacteria. This is significant, as bacteria spend most their lives in a biofilm state. SypG is a transcriptional regulator responsible for initiating biofilm formation in Vibrio fischeri, a symbiotic marine bacterium. SypG is a bacterial enhancer binding protein that exploits ATP hydrolysis for σ54-dependent transcriptional regulation. While highly conserved across ¬Vibrio species, in V. fischeri, SypG initiates biofilm formation through transcription of the syp gene locus. The syp locus includes four transcriptional start sites that include SypG binding sites. We hypothesize that SypG's binding affinity will differ between sites. Different binding affinities would mean that certain segments of the locus are transcribed more than others. Here, we are working towards quantify SypG's binding affinity to each of the four start sequences and exploring how mutants change the behavior of SypG. The characterization of SypG, and its role in biofilm formation, could open doors for future therapeutics targeting antibiotic resistance.

Simmons, Allison

Faculty Mentor: Elizabeth Ables

Overexpression of Eip75B results in early lethality and egg chamber death in Drosophila

Nuclear hormone receptors link nutritional signals to cellular responses necessary for development, reproduction, and viability. In Drosophila, two nuclear receptors, Ecdysone Receptor (EcR) and Ecdysone-induced protein 75B (Eip75B) are transcribed in response to the steroid hormone ecdysone and genetically interact to regulate developmental transitions and reproduction. Characterized by a unique N-terminal sequence, Eip75B has three protein isoforms (Eip75B-A, Eip75B-B, and Eip75B-C). Eip75B-B lacks a DNA binding domain, but heterodimerizes with Hormone receptor 3 (Hr3), an orphan nuclear receptor. Depending on the cellular context, Eip75B functions as either a transcriptional target of EcR or a repressor of EcR-responsive genes. Yet while both are expressed and necessary for proper oogenesis, their molecular relationship is unclear. Previous studies found that loss of Eip75B increased germline stem cell maintenance and arrested egg chamber development during mid-oogenesis, and isoform-specific over-expression resulted in egg chamber apoptosis. How Eip75B interacts with EcR in the ovary is unknown. To begin to address this question, we created two novel transgenes that over-express Eip75B-A or Eip75B-B under the control of upstream activating sequences (UAS) that can be driven in either the germline or the soma. We found that over-expression of either isoform in all somatic cells promotes premature lethality. Using these transgenes, we will comprehensively over-express Eip75B in the ovarian germline and somatic cells using a variety of ovarian Gal4 drivers. We hypothesize that the over-expression of the isoforms in the germline will cause flies to be agametic. We anticipate that these results will assess potential independent roles in oogenesis, and lead to future studies dissecting the interplay between Eip75B and EcR.

Singh, Prisha

Faculty Mentor: April Blakeslee

Can higher mesograzer abundance and diversity influence epibiont load in seagrass beds?

Seagrass beds are an important marine ecosystem that supports biodiversity, stabilizes sediment, and contributes to overall marine life; yet they are experiencing a widespread decline due to environmental stressors such as climate change and habitat degradation. Small invertebrate consumers such as crustaceans and gastropods, also known as mesograzers, play an important role in shaping seagrass ecosystems by feeding on epiphytic algae and detritus. These epibionts create competition for sunlight and inhibit the growth of the seagrass, so consumption of algae by mesograzers could promote seagrass growth. Spatial distribution and habitat structure can affect diversity of mesograzer species, as one site having greater mesograzer species abundance could potentially result in greater consumption of epibionts. We examine seagrass beds in 10 sites along Bogue Sound and the Straits of North Carolina, sampling during 6 seasons over 2 years. Epibiont biomass is measured using a scraping and filtration method, where epibionts are removed from Halodule wrightii blades to determine average epibiont biomass per site, along with average blade length and dry weight. Mesograzer abundance is sampled via mesh aquarium nets, preserved, and sorted by taxa with a 70% ethanol + Rose Bengal solution. Data analysis compares quantitative mesograzer abundance and diversity between site and season, as well as the relationship between abundance and epibiont biomass reduction. As this is an ongoing project, we expect that sites with higher mesograzer diversity and abundance will correlate with H. wrightii beds possessing lower average epibiont biomass.

Skinner, Maximillian

Faculty Mentor: Joseph Luczkovich

Assessing the Relationship of Increasing Sea Surface Temperatures, Estuarine Hypoxia, and Wind on Red Drum Spawning Rates

Red drum (Sciaenops ocellatus) are not only important to fisheries and fishers but also very economically important to the state of North Carolina. Despite being the state saltwater fish and native to North Carolina, there is an absence of research on the effects of increased estuarine hypoxia on red drum recreational and commercial catches, specifically the influence of increasing estuarine hypoxia on red drum spawning and juvenile index recruitment rates. This research will build on previous studies showing that N and NE winds and warmer Sea Surface Temperatures (SST) have positively affected juvenile red drum juvenile abundance index (JAI) numbers, which are correlated with increased fishery harvests (Goldberg, et al., 2020). However, bottom water hypoxia has been shown to suppress red drum spawning based on passive acoustic recordings of mating calls in North Carolina estuarine areas (Luczkovich et al., 2024). This study will consider estuarine hypoxia as an additional explanatory variable for NC juvenile red drum index in the Neuse and Pamlico River estuaries, along with wind and SST data, and will provide an updated understanding of these environmental factors on red drum JAI. Specifically, this study will explore whether there is a significant statistical relationship between estuarine hypoxia and red drum spawning rates (ECU Biology passive acoustic surveys) and the red drum juvenile abundance index (NC DMF beach seine surveys) in North Carolina. This work may contribute to adding insight into additional variables that should be considered by the Department of Marine Fisheries when making decisions about catch quotas. Existing data from sea surface temperatures and the recruitment of red drum juveniles in North Carolina will be collected. The data will be analyzed using correlations and regression models to see if there is a relationship between the increase in sea surface temperatures, bottom water hypoxia, and wind and an increase in red drum spawning rates.

Slough, Cooper

Co-Presenters: Kevin Reilly
Faculty Mentor: Joe Stock

The Effect of Maximal Voluntary Breath Hold on Blood Pressure and Augmentation Index

Conducting a maximal voluntary breath hold test engages the body's chemoreflex. As the blood's pH decreases throughout the test due to a rising concentration of CO2, sympathetic vasoconstriction of the blood vessels is activated. As a result, peripheral blood pressure is increased and a greater increase is associated with developing cardiovascular disease. Central blood pressure and measures of arterial wave reflection (i.e. augmentation index) are stronger predictors of future cardiovascular disease compared to brachial blood pressure. Objective: Therefore, the purpose of the study was to examine the effect of maximal voluntary breath hold on central blood pressure and augmentation index. Methods: Six young, healthy, non-hypertensive adults participated in a maximal voluntary breath hold study. Participants were instructed to hold their breath after a normal exhale, avoiding body tension or the Valsalva maneuver. Blood pressure, heart rate, and radial pressure waves were recorded at baseline and during the last 10 seconds of the breath hold. Results: There was no change in brachial systolic or diastolic blood pressure. There was a trend in central systolic blood pressure (96±7 vs. 108±16 mmHg, p=0.07) and an increase in central diastolic blood pressure (67±6 vs. 78±11 mmHg, p=0.02). Augmentation pressure (1±2 vs. 7±4 mmHg, p=0.03) and augmentation index (4±7 vs. 22±11%, p=0.01) increased during the breath hold. Conclusion: Despite no change in brachial systolic or diastolic blood pressure, we found a significant increase in augmentation index during the breath hold compared to baseline. Future studies should investigate additional variables such as breath hold length, oxygen saturation, age, and pre-existing hypertension.

Smith-Butler, Bridget

Faculty Mentor: Kelli Russell

Empowering Health and Well-Being: Integrating CMHRP, CMARP, and Healthy Beginnings

As a BSW-Social Work student, an internship at the Beaufort County Health Department in Washington, NC, has provided a unique opportunity to shadow and collaborate on various programs aimed at improving the health and well-being of low-income women and families. The primary programs involved were CMHRP (Care Management for High-Risk Pregnancies) and CMARC (Care Management for At-Risk Children).

Care managers under the CMHRP and CMARC programs were shadowed and observed. CMHRP focuses on promoting healthy mothers and babies through case management for high-risk pregnancies and prenatal care, targeting Medicaid-eligible women. CMARC serves both Medicaid and non-Medicaid children from birth to five years of age who have long-term medical conditions, are under toxic stress, face social determinants of health, are in foster care, or were in the Neonatal Intensive Care Unit (NICU). Children in the CMARC program may be referred by their primary physicians, DSS, WIC, or other healthcare entities.

Additionally, professionals in the Healthy Beginnings program, a separate program within the Health Department, were interacted with. Healthy Beginnings promotes Safe Sleep programs and provides intensive home visiting services for pregnant women. The program, funded by grants, focuses on reducing infant mortality among minority populations and continues to support families until the baby's second birthday.

This hands-on experience highlighted the importance of comprehensive, community-based approaches in reducing health disparities and improving health outcomes. The integration of various programs within the Health Department underscores the collaborative efforts needed to support vulnerable populations and prepares for meaningful contributions to public health.

Programs Overview:

- CMHRP: Care management during pregnancy and postnatal care for high-risk pregnancies, promoting healthy mothers and babies, targeting Medicaid-eligible women.
- CMARC: Serving children from birth until their fifth birthday with long-term medical conditions, toxic stress, social determinants of health, foster care, and NICU graduates, for both Medicaid and non-Medicaid children.
- Healthy Beginnings: Grant-funded intensive home visiting program for pregnant women, focused on promoting Safe Sleep and reducing infant mortality among minority populations.
- Managed Care Organizations: Offer value-added benefits such as car seats, pack 'n plays, strollers, doula services, or diapers.

Sousan, Marian

Faculty Mentor: Dr. Nic Herndon

Computational Pathology for Cancer Recurrence Prediction

The accurate classification of intraductal breast lesions, specifically distinguishing ductal carcinoma in situ (DCIS) from usual ductal hyperplasia (UDH), remains a significant challenge in pathology. This distinction is crucial, as DCIS is a malignant proliferation that requires aggressive treatment, while UDH is benign and does not. However, even experienced pathologists often struggle with reliable differentiation, leading to the risk of both over- and under-treatment. Misclassification can lead to overtreatment of benign cases or undertreatment of malignant ones, potentially affecting patient outcomes. This problem is critical because advancements in computational pathology offer a potential solution by leveraging image analysis and machine learning to enhance diagnostic accuracy. In this study, Dong et al. (2014) developed a computational model that extracts nuclear morphology, intensity, and texture features from histopathological images to classify DCIS and UDH. Nuclear atypia, cytologic and architectural features is what allows for differentiation and has the potential to set the groundwork for the utilization of computational models in the process of classifying proliferative breast disease. The researchers developed an automated image analysis model that extracts 392 quantitative nuclear features related to morphology, intensity, and texture from histopathological images. L1-regularized logistic regression was applied to classify DCIS and UDH, training the model on 116 breast biopsy samples from Massachusetts General Hospital (MGH) and validating it on an independent dataset of 51 samples from Beth Israel Deaconess Medical Center (BIDMC). The model demonstrated high performance, achieving an AUC of 0.95 on the training data and 0.86 on external validation. Furthermore, it successfully stratified DCIS cases into low, intermediate, and high nuclear grades, with an AUC of 0.98 for distinguishing low- from high-grade cases. One change that we're proposing to their methodology is to use all the individual data points generated for an individual, i.e., 392 features for each nucleus, rather than their aggregate values (mean and standard deviation), to identify the malignant regions within the tissue and predict the recurrence score. This approach could lead to more efficient diagnoses and better-informed treatment decisions. With continued research and validation, computational pathology has the potential to become an essential tool in breast cancer diagnosis, ultimately improving patient outcomes and the overall quality of care.

Spencer, Aliah

Faculty Mentor: Rose Haddock

Evaluating Rural Healthcare Disparities and Applying Public Health Interventions

Many people in the United States of America live in rural areas. Out of the 330 million people that live in the United States 65 million live in rural districts (Leider et al., 2020). This is why it is important to address the existing health disparities in regions where large populations are being affected and have poorer health than urban residents. For instance, rural residents' mortality and morbidity rate is higher no matter the economic status compared to urban residents. There have been many studies performed that have determined factors of why the mortality rate is higher. The results are barriers in geographic dispersion, cost and insurance, and provider shortage. These barriers affect the quality of care and access for occupants causing them to be sicker and not recover from illness compared to urban occupants. However, the discipline of public health has different strategies to protect communities' health status. This paper will discuss different public health solutions, such as Medicaid programs, expanding telehealth, Public Health Departments, using the Health in All Approach, and implementing partnerships in rural communities. These possible solutions will hopefully close the gap and allow many people to benefit from the strategies, not just one person. Scholarly articles were used to gather information about rural healthcare and understand how public health strategies can benefit rural communities. These sources also suggested solutions and helped with the process of coming up with new ways to approach barriers. This paper will hopefully lead people in the right direction to address disparities and better health outcomes for rural populations.

Stafford, Samuel

Faculty Mentor: Ian Hines

Atlantic Mackerel, Vitamin A, Inflammation, and Gut Microbiome

Fish consumption is below the recommendation in American diets. Atlantic mackerel (AM) is rich in nutrients and low in cost. This study sought to determine the effect of AM on DSS-induced colon inflammation and colitis in rats. Three-week-old male Sprague Dawley rats from Charles River Laboratories were randomly divided into 6 groups (6 rats per group) to receive the control AIN93G diet, control with 1%, or 5% AM for 4 weeks, followed by continued tap water or 3% DSS solution for 1 week. Animals were then recovered in regular tap water for an additional 1 week prior to necropsy. Animals were single-housed and ad libitum. Food intake was monitored weekly. Blood, liver, and colonic lamina propria (LP) tissues were collected. Colon samples were also fixed in 10% formalin for histology studies. Total proteins and total RNAs were extracted from LP tissues for immunoblotting and real-time PCR analyses, respectively. AM supplementation did not cause any changes in food intake, compared to the control groups. There were also no changes in body weight gain in groups with or without DSS treatments. However, histology results showed that AM attenuated DSS-induced inflammation and tissues damage in colons.

Standish, Kira

Faculty Mentor: Morgan Milton

SypA: A Key Biofilm Regulatory Protein in Vibrio fischeri

SypA is a STAS protein that regulates biofilm formation in Vibrio fischeri. STAS proteins typically function through a partner-switching mechanism with an anti-sigma factor. In the standard mechanism, the phosphorylation state of the STAS protein determines its interaction with its anti-sigma factor, a transcriptional regulatory protein. Normally, the anti-sigma factor acts downstream of the STAS protein in this process. However, in the case of SypA and its binding partner SypE, this arrangement is reversed – SypE functions upstream of SypA, and both proteins regulate biofilm formation at a post-transcriptional level. Currently, the exact mechanism for how SypA regulates V. fischeri biofilm formation is unknown. To help determine this mechanism, we have been conducting biochemical and biophysical analyses of the protein, which requires us to produce large quantities of SypA. Over the past six months, we have successfully developed reliable protocols for SypA expression. Our current efforts focus on structural visualisation to gain deeper insight into SypA's configuration. Additionally, we are conducting ATPase assays to confirm interactions between SypA and SypE. These findings will allow us to further understand SypA's function within V. fischeri biofilm formation. Although V. fischeri is not pathogenic to humans, the knowledge gained from the research may apply to other pathogenic Vibrio species.

Stanley, Brianna

Faculty Mentor: April Blakeslee

Comparing Biodiversity Between Restored and Natural Oyster Reefs

As a foundation species, oyster reefs can control community dynamics and ecosystem processes by enhancing water quality and shoreline stabilization. However, North Carolina oyster reef populations have experienced declines due to multiple anthropogenic impacts and are in need of restoration. My study aims to examine the diversity of crab hosts and the prevalence of parasites along two shorelines in Taylor's Creek, Beaufort, North Carolina: one along Carrot Island where oyster restoration occurred in the Rachel Carson Reserve 5 years ago in late spring of 2020, and the second along the town of Beaufort shoreline. My study will compare these shorelines for potential differences in crab abundance, diversity, and parasite prevalence and diversity. For this project, I am taking standard population demographic metrics (species, size, sex) of host crabs and dissecting them for parasite diversity analyses using standard techniques (light microscopy). I aim to determine whether parasites can be used as an effective bioindicator for biodiversity metric changes after restoration and will compare biodiversity of hosts and parasites to the more established oyster reef communities along the Beaufort side of Taylor's Creek. By comparing recently restored and established oyster reefs within the same waterbody, these data will help us better understand how long it may take communities to reestablish oyster reefs post-restoration.

Stephenson, Brooke

Faculty Mentor: Jacqueline De Chabert-Rios

Supporting Education through the Growth of the ECU School of Hospitality Leadership Food & Wine Festival

The ECU School of Hospitality Leadership Food and Wine Festival is an annual event designed to provide invaluable hands-on learning experience for students, while also celebrating culinary flavors and fostering community engagement. Since the first event in 2023, the festival has grown steadily, both in scale and impact, becoming a cornerstone event for the hospitality department. This project was developed as a part of the School of Hospitality Leadership to emphasize multidiscipline collaboration with event planning, marketing, management, and execution. The primary focus of this project is the festival's ability to sustain and expand the SHL scholarship fund, which supports our students pursuing their degrees in hospitality management. The 2025 festival, happening on March 28th, will showcase the continued growth of the event, enhancing the attendee experience. This presentation will highlight the festival's evolution over the years, examining factors that have contributed to its growth, including innovative planning strategies, increased marketing, and enhanced student involvement. By analyzing tickets sales, attendee feedback, and sponsorship contributions, this project will explore the future growth potential for the festival. Moreover, this project will examine the festival's impact on education, as it serves as a department wide project for SHL students. By actively participating in the festival students are able to apply the knowledge they have learned in the classroom and develop crucial skills in leadership, teamwork, and problem-solving. These opportunities not only enhance the student's understanding of hospitality concepts but also prepare them to enter the competitive industry. The ECU School of Hospitality Leadership Food and Wine Festival is more than just an event; it is a platform that bridges education and industry, providing students with hands-on experience. As the festival continues to grow, its dual focus of education and fundraising ensures that it continues to be a transformative event for students and a celebrated tradition throughout the SHL department and university as a whole. This presentation will showcase how the festival serves as a model for innovative, student-led initiatives that combine education, community involvement, and philanthropy, while also exploring its long-term impact on the growth and success of the School of Hospitality Leadership and its students.

Stewart, Camille

Faculty Mentor: Michelle Henderson

Insight on Plastic Waste in a Greenville River: An Examination of a Trash Trap

Plastic waste is a global problem that affects everyone because plastics are found in water bodies such as creeks, rivers, and oceans. Larger plastics can erode into microplastics which enter into our water systems and can end up in drinking water. Plastic contamination in waterways can cause many issues that affect human and wildlife health and well-being. To deal with local plastic pollution, Sounds Rivers created and installed a Trash Trap to stop plastics from entering water bodies. Identifying what types of plastics are being found in the river will help to advocate for better plastic use and inform the Greenville community about plastic pollution and water quality. The Trash Trap is an open-faced cage that collects plastics floating in the river but allows fish to swim around it. The Trash Trap is emptied once a month, so it does not overflow with plastics and wood debris. This research focused on identifying and quantifying plastic pollution in Green Mills Run to focus specifically on plastic pollution in Greenville North Carolina. Trash was gathered from the Trash Trap located in Greenville at Greens Springs Park that accumulated from March-August 2024. Plastics were separated by type: Polyethylene Terephthalate (PET) [plastic water bottles and plastic soda bottles], High-Density Polyethylene (HDPE) [grocery bags and milk jugs], Polyvinyl Chloride (PVC) [rubber materials], Low-Density Polyethylene (LDPE) [plastic bags and wraps], Polypropylene (PP) [Autoparts], Polystyrene (PS) [Styrofoam and other unclassified plastics]. Collected trash was then measured and analyzed by volume, quantity, and weight. For broken pieces of plastic such as Styrofoam, the length and brands were recorded. Most of the identified plastics were Polyethylene Terephthalate (PET), water and soda bottles, accounting for 60% of the 684 items. The 2nd largest identified plastic was Polystyrene (PS: Styrofoam). Of the Styrofoam collected, 112 items were found fully intact, and the rest of the identified pieces were fragmented cups and food trays. Results from the plastic collection and classification show that the two largest contributors to plastic waste in the Trash Trap are plastic water bottles (and soda bottles) and Styrofoam (fast food cups and containers). The implications of this research show that most plastic collected in the trash trap was from individual use. It is clear that the public needs to access other resources where they can dispose of their plastics waste. It is also important that people are encouraged to reduce, reuse and recycle their plastic usage to tackle the larger problem of plastic pollution to protect our waterways and water supply.

Stewart, Emma

Faculty Mentor: Jamie Perry

Consistency in Clinical Reporting of Nasopharyngoscopy Findings: A Multisite Study

Background: Velopharyngeal insufficiency (VPI) is caused when the soft palate (roof of the mouth) does not close against the back of the throat during speech. Incomplete velopharyngeal (VP) closure allows air to enter the nasal cavity and makes speech sound hypernasal. VPI is typically treated surgically. Obtaining images of the VP port is an important aspect of surgical planning. One of the most common imaging methods used to assess VPI is nasopharyngoscopy, also referred to as scoping. Despite how frequently scoping is used in clinical care, there are inconsistencies in what is being measured and reported in clinical reports. The International Working Group proposed guidelines for the standardization of clinical scope reports, including which measures to provide, but these guidelines were not universally adopted. This has resulted in inconsistencies in data reported between cleft and craniofacial teams.
Methods: 148 clinical scope reports were collected and deidentified from 13 cleft teams across North America for children undergoing evaluation for VPI. Data from the deidentified reports were entered into REDCap and descriptive statistics were used to summarize the proportion of reports that followed the recommendations of the International Working Group.
Results: The International Working Group recommended reports include the extent of velar movement, left and right lateral pharyngeal wall (LPW) movement, total percent closure, and the closure pattern. 73.5% (n=109 of reports included the degree of velar movement, 37.8% (n=56) included left and right LPW movement, 73.6% (n=109) reported the total percent closure, and 87.2% (n=129) included the closure pattern. Of the 148 reports collected, only 35.1% (n148-52=52) included all four of these measures. There was further variability in the way the data in these categories were reported. For example, 33.1% reported LPW movement as a single value, and 14.9% reported the data qualitatively. There were additional inconsistencies in the reporting of VP gap size, patient compliance, the presence of velar notching, and the activity of Passavant's ridge. Despite the differences in the measures reported, 65.5% (n=97) of reports recommended a specific surgery to correct the patient's VPI.

Conclusions: The analysis of clinical scope reports revealed substantial variability across cleft teams. The standardization of scope reports is an important aspect of cleft and craniofacial care. Standardizing the information included and how it is reported in scope reports would allow teams to compare treatment outcomes and expand opportunities for multisite research. By improving consistency in clinical scope reports, cleft teams could increase the quality of their patient care.

Stroud, Ginny

Faculty Mentor: Jamie Perry

Does body position in a MRI machine impact the perception of speech and resonance?

Approximately 5%-40% of children born with cleft palate have velopharyngeal insufficiency (VPI) after primary palatoplasty (Ahmed, 2002; Mackay,1999; Sell et al., 2015) resulting in a need for secondary surgeries. Perceptual evaluations by a trained speech-language pathologist and visual instrumentation serve as the clinical tools used to support a diagnosis of VPI and subsequently determine treatment plans. Magnetic resonance imaging (MRI) is beginning to see more clinical use as a tool for visual instrumentation and the use of dynamic MRI during speech production has begun to be requested for clinical use as well. However, before dynamic MRI can be used clinically, knowledge must be gained in understanding if speech recordings captured during dynamic MRI are at an acceptable level for clinical judgments as speech is produced in a nosier environment (from the scanner) and in the supine position that is not typical when compared to the current gold standard of perceptual evaluations by SLPs and other clinical imaging methods that are done in the upright position. Any acoustical variances in speech production that might be altered during a dynamic speech MRI in the supine position must be further investigated.
In accordance with the Institutional Review Boards at the University of East Carolina University, 12 children were enrolled in this study. Subjects underwent a speech assessment (done in upright) and a dynamic MRI (done in supine) where the same speech stimuli were gathered in both instances. We will use a blind perceptual rating process to determine if SLPs rate the same degree of nasality between positions. Additionally, audio data from the dynamic MRI and upright speech recordings will be extracted from their respective files using VLC media player software. Using Praat software, the vowels in each stimulus will be manually segmented from the waveform and used to obtain F1 and F2 values of corner vowels present in the speech stimuli to examine if there are distinctions in the tongue placement (front/back or high/low) that vary between body positions across the speech stimuli.
Data analysis is still ongoing and is expected to be completed by March 2025.
Findings from this project will determine if recordings from MRI are at a level that is satisfactory for clinical judgments and to determine if there are specific variations in speech that might be altered during dynamic MRI assessments. This knowledge is critically important particularly in determining the utility of dynamic MRI.

Sweeney, Gracie

Faculty Mentor: Mattew Walenski

Analysis of pauses in the narrative speech of healthy speakers and speakers with aphasia

Aphasia is an acquired language disorder characterized by deficits in understanding or producing language. In non-fluent aphasia, language production is generally characterized as slow and effortful, with frequent pauses. Prior studies have examined word pauses as indicators of cognitive effort in producing contextually and grammatically appropriate language (Mack et al., 2015). Recent advances in technology have facilitated the processing of larger, more comprehensive datasets for analysis. In this study, we examined pauses in narrative samples provided by 17 healthy individuals (in their 60s) and 16 individuals with aphasia. These samples came from larger datasets of healthy individuals (Wright and Capilouto, 2017) and individuals with aphasia (MacWhinney et al., 2011). Processing of additional samples is ongoing. To examine pauses, we used the Montreal Forced Aligner (Montreal Forced Aligner 3.0.0 Documentation, 2018), an AI-based speech timing system, to collect precise timing information for the length of a pause before every word in the narrative sample. For each word in the sample, we looked up their lexical properties from the English Lexicon Project (Balota et al., 2007). Our first goal is to examine whether pause duration reflects lexical access difficulty (indexed by lexical properties of the produced words, including their length and frequency). In addition, we will code each word for its syntactic properties (part of a subject, verb, or object) to examine whether pause duration reflects difficulty of planning / creating the syntactic structure of the sentence being produced. We expect that pause duration may reflect both lexical and syntactic factors in healthy individuals, but may be more biased towards one or the other in aphasia, depending on the characteristics of the language impairment in an individual (e.g., an agrammatic speaker may show greater influence of lexical variables, consistent with impaired syntax). Analysis and

processing of pauses is currently ongoing for these 33 participants. Through this research, we aim to deepen our understanding of the speech patterns associated with aphasia.

Thomas, Alexis

Faculty Mentor: Colin Burns

Structural and quantitative analysis of the prostamide 15d-PMJ2 by NMR and computational studies.

Prostaglandins are biologically active molecules with significant medicinal applications, including their potential as anticancer agents. My research focuses on 15d-PMJ2, a prostaglandin derivative, to better understand its physical properties and improve methods for its quantification. This semester, I present findings from computational modeling used to analyze the stability of its C12-C13 double bond and compare the thermodynamic properties of its E and Z isomers. The biologically active E-isomer is well studied, but the activity of the Z-isomer remains unclear. The Z-isomer is a possible product formed in the chemical synthesis of 15d-PMJ2. Using GaussView and molecular modeling software, I conducted energy calculations, geometry optimizations, and vibrational frequency analyses to determine steric and electronic effects that influence isomer stability. These insights help refine synthetic strategies to favor the biologically relevant E-isomer and improve our understanding of how stereochemistry impacts the reactivity of this molecule. In addition to computational studies, I developed a quantitative NMR (qNMR) method to measure the concentration of 15d-PMJ2 in lab-prepared samples. Accurate quantification is essential for ensuring consistency in biological studies, as sample variability due to residual solvents or moisture can introduce uncertainty in concentration. qNMR provides a direct and precise way to measure concentration without the need for calibration curves. I prepared synthesized samples, dissolved them in deuterated solvents, and analyzed them via NMR spectroscopy. By integrating peaks corresponding to 15d-PMJ2 and a reference standard, I calculated concentration, assessed purity, and compared results to other quantification methods such as UV-Vis spectroscopy to ensure accuracy. My role in this project spans both computational and experimental work. I used GaussView and quantum mechanical calculations to explore isomer stability, focusing on steric strain, electronic effects, and possible transition states between isomers. This analysis provides insights into the thermodynamic and kinetic factors governing the isomerization process. Experimentally, I optimized the qNMR method to ensure accurate and reproducible concentration measurements. Together, these approaches enhance our understanding of 15d-PMJ2's properties, improve its quantification, and contribute to designing better synthetic methods for producing biologically relevant prostaglandin derivatives. This project integrates computational and experimental techniques to address key challenges in molecular stability and quantification, providing valuable insights for future studies.

Thomas, Robin

Faculty Mentor: Karen Litwa

Investigating the Role of Tuberous Sclerosis Complex In Synapse Formation

Tuberous sclerosis (TS) is a genetic condition manifesting as non cancerous tubers throughout the body, especially in the brain where they result in several neurodevelopmental disorders, including Autism Spectrum Disorder (ASD). However, even when patient tubers are removed, neuropsychiatric symptoms do not fully recover. This is consistent with other research demonstrating neural autonomous effects resulting from loss of tuberous sclerosis complex (TSC) function. TS results from mutations in either the TSC1 or TSC2 gene, which form a complex to regulate mammalian target of rapamycin (mTOR), a major driver of cell growth and inhibitor of synaptic autophagy. However, early synaptic effects appear to be independent of mTOR activity, leading us to hypothesize that non-canonical TSC pathways drive initial synaptic defects. To begin to address this hypothesis, we generated and characterized human induced pluripotent stem cells (hIPSCs) from a family with TS. To model the emergence of synaptic defects, we differentiated TS patient hIPSCs into human cortical brain spheroids (hCSs), which model fetal brain development and synapse formation. Our initial observations suggest that similar to idiopathic autism cases, TS-derived brain spheroids exhibit increased excitatory synapses. We used flow cytometry and real time reverse transcriptase-polymerase chain reactions (RT-PCR) to characterize cell populations in our hCSs. We observed decreased neural progenitor cell mRNA and protein, and increased expression of early neuronal markers, suggesting that accelerated neural differentiation may contribute to increased synapse formation. We have also optimized siRNA conditions to model TS in both human and mouse neurons to examine how loss of TSC siRNA specifically impacts synapse formation independent of neural differentiation. Our findings highlight novel TS-mediated defects in progenitor cell maintenance and a corresponding increase in neural differentiation. We have developed tools to examine how loss of TSC drives synaptic pathology at distinct stages in developing neural circuits.

Thomas, Molly

Faculty Mentor: Patrick Rider

Athlete Recovery and External Workload in Collegiate Women's Soccer Players

Introduction: NCAA Women's Soccer consistently ranks among the sports with the highest injury rates due to the significant physical and mental demands placed on athletes throughout the competitive season. Research indicates that elevated stress levels can negatively affect performance, slow recovery, and increase the likelihood of injury. Additionally, external workload metrics, such as total distance traveled and high-intensity accelerations and decelerations, contribute to physical strain and extended recovery periods. Understanding how external workload influences recovery status and mental well-being is essential for developing evidence-based training and recovery strategies. By examining these relationships throughout a season, this study provides data-driven insights that can help coaches adjust training loads to better support athlete recovery and long-term performance.
Methods: Thirty-one Division I women's soccer players were recruited for this study, however, only 20 participants were used in the analysis due to sustained injuries or playing time. Participants completed a daily Qualtrics survey assessing their recovery status, mental health, and stress levels each morning before training or competition. The survey consisted of eight key questions, with seven using a -3 to +3 rating scale, where 0 represents the athlete's perceived "normal" state. Negative values indicated worse conditions, while positive values signified improvement. Metrics assessed included readiness, soccer-related stress, overall stress, mental health, sleep quality, and soreness. Mental health was categorized using a scale from "in crisis" to "excelling," with "surviving" as the baseline. To track external workload, STATSports GPS sensors were worn during all training sessions and matches, collecting over 350 workload metrics. This study focuses on five key indicators of biomechanical load: total distance covered, sprint distance, acceleration and deceleration counts, and high-intensity efforts. These variables provide objective measures of physiological strain and physical exertion during play. Workload and recovery data were synchronized daily for accuracy. Over the season, more than 3,000 self-reported data points were collected, with a 96% compliance rate. Significance of Results: Findings from this study will provide evidence-based recommendations for optimizing training loads and recovery protocols in collegiate women's soccer. Identifying the relationships between external workload and self-reported recovery will enable coaches and athletic trainers to implement data-driven strategies that improve athlete well-being, training effectiveness, and injury prevention. Additionally, this research may inform personalized workload monitoring, allowing teams to tailor recovery programs based on player-specific needs and performance trends. A deeper understanding of these relationships may contribute to reducing fatigue-related injuries and supporting long-term athlete development.

Throckmorton, Alia

Faculty Mentor: Dr. Renee Spain

Examining the Impact of a Mother's Health and Environment on her Child's Health in Utero and Personal Health Outcomes

In the United States, pregnancy and birth have been radically medicalized. While the intention behind the medicalization is pure, our current practices have not led to favorable health outcomes. Like many other areas of medicine, we focus on managing a problem once it arises instead of taking an upstream approach and working to optimize health in order to minimize complications. This thesis studies how a mother's health before, during, and after her pregnancy impacts her child's health and her personal health outcomes. Some lifestyle factors examined include diet, exercise, alcohol and drug use, emotional/spiritual status, and education on health in pregnancy. The goal of this paper is to act as a resource for both healthcare professionals and those who seek information on how to optimize the health of their own pregnancy. This systematic literature review utilized a comprehensive search strategy across multiple databases, including PubMed, PsycINFO, CINAHL, Google Scholar, and ECU libraries OneSearch. All studies included were scholarly, peer-reviewed sources published within the last 10 years. Some key findings include the link between consuming processed foods during pregnancy and negative health outcomes for both mother and child, the link between a low protein diet during pregnancy and the risk of obesity and type 2 diabetes in the child, and the link between euglycemia and weight management to prevent preeclampsia. Moreover, the study looks at emotional factors such as anxiety and how high levels of maternal anxiety contributes to negative health outcomes in the fetus such as behavioral issues, gastrointestinal problems, and lower scores on the mental

development index. This paper explores the data, then gives recommendations on how to eat, move, and behave in order to optimize the health of a pregnancy. Some of these recommendations include eating whole foods, exercising within a moderate heart rate zone, avoiding endocrine disrupting chemicals, practicing emotional regulation strategies, participating in pregnancy education classes and more.

Trank, Mikaela

Faculty Mentor: Laura Levi Altstaedter

Expanding Cultural Competency through a Digitally Immersive Map of Buenos Aires

Over this summer, myself and 13 other students worked hard to create digital artifacts of Buenos Aires through our study abroad program. We were each in charge of a different excursions photos and worked together to curate the best representatives from each location and create captions that best represented our experiences and individual perspectives. After curating these experiences, I worked to upload them into arcGIS and create a virtual map of our trip to Buenos Aires. This experience helped students grow their understanding of technology and working together.
It is my goal to use this digital map to educate my future students on the culture from Argentina from the comfort of their own homes. Many students do not have the financial means to travel half way around the world to experience this culture first hand. It is my belief that this map helps provide that perspective and helps the students grow into well rounded individuals. It is also my goal to show this project to other teachers to inspire them to create their own digital map of other countries or locations to help their student gain more cultural understanding and competency.

Tribbe, Savanah

Faculty Mentor: Karly Murphy

Demographic Factors that Influence Age of First Depression Medication Use in Pediatric Cancer Patients

Background: Previous research has shown that 10.2% of pediatric cancer patients take antidepressant medication, which is higher than the 4-8% rate of depression and 1% antidepressant medication use in the general pediatric population. However, there may be disparities in access to depression medication among cancer survivors as a function of sociodemographic characteristics. In this study, we sought to explore whether such disparities exist in younger cancer survivors.
Methods: We analyzed data from 371 patients from the St. Jude LIFE cohort who had been prescribed medication for depression. Using a linear regression, we explored how age at cancer diagnosis, sex, household income, and current health insurance coverage were associated with the age of first depression medication use in pediatric cancer patients.
Results: The regression analysis indicated that individuals diagnosed with cancer at age 15 or older had a significantly higher age at first use of depression medication compared to those diagnosed at a younger age ($\beta = 7.399$, 95% CI [5.546, 9.252], $p < .001$). Male patients were less likely to start depression medication at a younger age compared to female patients, though this association was not statistically significant ($\beta = -0.5566$, 95% CI [-2.324, 1.211], $p = 0.54$). Income and current health insurance coverage were not statistically significant.
Conclusion: This study suggests that age at cancer diagnosis may influence the age of first depression medication use among pediatric cancer patients. However, sex, income, and current health insurance coverage did not have a significant impact on the age of first depression medication use. These findings highlight the importance of considering age at cancer diagnosis when planning mental health interventions. Further research could explore additional factors that may influence access to depression care.

Van Benthuysen, Avery

Faculty Mentor: Nadine Heck

Beach driving impacts on nesting sea turtles: A qualitative analysis from Cape Hatteras, North Carolina

The effects of beach driving on sea turtles is largely under-researched, despite sea turtles being of conservative importance.Cape Hatteras National Seashore is a key nesting area for sea turtles in North Carolina, and faces conservation challenges as off-road vehicles are permitted for recreational use to drive on the beach. This study investigates the impact of off-road vehicles (ORVs) and beach driving in Cape Hatteras, North Carolina on sea turtles by analyzing data provided by the Network for Endangered Sea Turtles (NEST) Network from the years 1999 to 2023. A qualitative analysis of 13,000 sea turtle records identified 76 instances of interactions between ORVs and sea turtles in Cape Hatteras. categorized into six types: 1)

turtles struck by vehicles, 2) ORVs driving over nests (with or without egg damage), 3) maternal sea turtle disorientation from tire ruts, 4) hatchling disorientation from tire ruts, 5) turtles nested in high traffic areas and had to be relocated, 6) ORV headlights disturbed turtle. The most common occurrence was an ORV driving over a nest. These findings emphasize the risks posed by ORVs to nesting sea turtles and highlight the need for targeted conservation strategies. These include stricter enforcement of ORV regulations and public education campaigns, as well as balancing recreational use with wildlife protection which is essential for the long-term viability of sea turtle populations at Cape Hatteras National Seashore.

Villacorte, Ysabella

Faculty Mentor: Qun Lu

Redistribution of pRhoA in the Mouse Hippocampus and Cortex: Implications for Neurodegenerative Disorders

The purpose of this project is to investigate the spatial and planar distribution of RhoA GTPase, a protein that is part of the Rho family of small GTPases. Rho GTPases are linked to the regulation of actin polymerization, leading to changes in spine morphology and impaired synaptic function. This is especially significant in Alzheimer's disease (AD), as dysregulation of Rho GTPases leads to synaptic loss, a hallmark symptom of AD. Investigating the function of Rho GTPase will help illuminate their role in AD. Significance: Rho GTPases have been linked to various neurodegenerative diseases such as Alzheimer's Disease (AD), Amyotrophic Lateral Sclerosis (ALS), and Frontotemporal Dementia (FTD). Research has shown that Rho GTPases play a role in AD pathogenesis. The Rho GTPases consists of about twenty members out of which RhoA, Rac1, and Cdc42 are the most well-studied. The exact nature of their role in AD pathogenesis is complex. The complexity is due to the different models and methods used to study these proteins. Elucidating their mechanism in synaptic loss will help provide potential therapeutic options. Methodology: 16-month-old female mouse tissue will be used to investigate RhoA distribution and function. The brain will be cut into 8-micron-thick coronal sections in rostral to caudal progression. Immunofluorescence for inactivated RhoA (pRhoA S188) and microscopy will be used to assess protein expression and staining pattern. The collected data will then be consolidated and analyzed to draw conclusions about pRhoA redistribution. Brain regions of focus include the CA3, CA2, and CA1 areas of the hippocampus as well as the cortex. Preliminary Results: Preliminary results have shown differential expression and staining pattern of pRhoA in the hippocampus and cortex of the mouse from rostral to caudal. It is anticipated that the complete data collection in this project will form part of a manuscript that compares pRhoA in wild type and AD mouse models.

Vishwakarma, Nandini

Faculty Mentor: Laxmansa C Katwa

Dopamine Receptor Control of Collagen Transcription and Secretion: Relevance to Fibrosis, Health, and Disease
Dopamine receptors (DRs) play critical roles beyond the central nervous system, influencing cardiovascular function and fibrosis. However, the impact of DR signaling on collagen regulation in cardiac fibroblasts remains poorly understood, specifically the direct and indirect effects on collagen transcription factors. SP1, SMAD3, and TCF21 are all important transcription factors, previously determined in Endothelin-1 (ET1), Angiotensin II (Ang II), and transforming growth factor beta-1 (TGFb-1) pathways for collagen synthesis and accumulation. This study aims to investigate the effects of dopamine receptor 1 (D1R) and dopamine receptor 3 (D3R) signaling on transcription factors mediated by these established collagen synthesis pathways in regulation of human fibroblasts, that are heavily involved in health and disease across the human body, especially the cardiovascular system. Human cardiac fibroblasts will be cultured in vitro as per standardized protocol and treatments done under serum-free conditions to minimize external influences on collagen production. Cells will be treated with selective D1R and D3R agonists (SKF 38393 hydrobromide, Pramipexole dihydrochloride respectively) and antagonists (SCH 39166 hydrobromide, SB 277011A dihydrochloride) to assess their effects on key collagen-related transcription factors, including SMAD3, SP1 and TCF21. Gene expression levels measured using quantitative PCR (qPCR), while protein expressions were via Western blotting. Preliminary data examining the gene and protein expression of collagen type 1, type 3, and TGFb-1 shows that these profibrotic markers are affected by dopamine receptor signaling changes. Notably, collagen 1 gene and protein expression is significantly decreased with treatment of D3R agonist PPX. Additionally, prominent profibrotic marker TGFb-1 is substantially upregulated by D1R agonist SKF in both gene and protein analyses ($p<0.01$, $p<0.0001$). To further confirm collagen secretion results from previous experiments, enzyme-linked immunosorbent assays (ELISA) will be performed on conditioned media collected from treated human cardiac fibroblasts as well. Additionally, we will investigate potential crosstalk between dopamine receptors and the ET1 and angiotensin II type 1 receptor (AT1R) signaling pathway, given its established role in fibrosis. By elucidating the role of dopamine receptor signaling in regulating collagen transcription and secretion, this study will provide insights into novel cellular and nuclear mechanisms underlying fibrosis in cardiovascular disease. Moreover, since collagen regulation is critical for tissue remodeling, wound healing, and fibrotic disorders beyond the cardiovascular system, these findings may have broader implications for human health and disease.

Vogel, Katelyn

Faculty Mentor: Ryan Wedge

Determing Prosthesis Acceptance: Differences in Patient Characteristics and Utilization of Rehabilitation after Lower Limb Amputation

People with lower limb amputation that use a prosthesis have higher quality of life and mobility than those who do not, and prosthesis fitting occurs after comprehensive medical care and rehabilitation. However, the amount of medical care and rehabilitation provided for different causes of amputation preceeding prosthesis fitting and receipt is unknown. We aim to retrospectively identify the medical care and rehabilitation necessary for people with lower limb amputation from vascular and non-vascular etiologies to have an initial prosthesis fitting.

Wall, Lucia

Co-Presenters: Nikki Kasireddy, Sammie Lawrence

Faculty Mentor: Michael O'Driscoll

Linkages Between Discharge, Salinity and Nutrient Relationships

Freshwater is one of the most valuable limited resources around the world, and it is very sensitive to changes in the surrounding environment. Healthy freshwater systems are vital to surrounding terrestrial ecosystems, agricultural and fishing economies, and potable water supplies. Land-use and discharge can influence water quality and nutrient loading. Along the Tar-Pamlico River there are linkages between discharge, nutrient concentration, and saltwater intrusion. Salinity is of specific concern because concentrations are increasing along tidal reaches of freshwater streams in eastern North Carolina's (NC) watersheds. Salinity levels are affected by drought, tides pushing saltwater upriver, hurricanes, and sea level. As sea levels steadily rise, saltwater encroaches on freshwater ecosystems and is impacting these surrounding systems. In addition to ecosystem impacts, salinity increases in soil water and groundwater lead to loss of agricultural crops and damage to terrestrial flora. These systems cannot cope with such rapid changes in salinity leading to this agricultural decline, changes to the fish population and density, thus impacting human activities. The objective of this study is to monitor and analyze water quality trends of sites along Tar-Pamlico watershed with variable discharge and salinity levels. This was accomplished by monitoring three different test sites monthly across a 10-mile stretch of the Tar River for a period of three years. The water was tested on site for specific conductivity, a proxy for salinity, using a YSI multiparameter probe, and discharge data was collected from United States Geological Survey Greenville, NC station throughout the sampling period. Nutrient analysis was conducted later in a lab after a grab sample was collected from each site using a Lachat flow injection analyzer. The results of this study will be useful to provide guidance concerning freshwater environments and the communities that rely on them.

Walston, Matthew

Faculty Mentor: Sara Bryson

Public Perceptions of Juvenile Justice

Prior research has examined the public's perceptions of the severity of punishment between youths and adults. While much of this literature acknowledges the developmental differences between youth and adults, it is limited in scope. Studies that examine the differences between youth and adults on culpability, blameworthiness, and severity of punishment in the criminal justice system primarily utilize older data (1990s and early 2000s) and use small samples (e.g., Miller & Applegate, 2015; Poythress et al., 2006). The current study seeks to expand on prior research by asking members of the public within North Carolina about their perceptions of culpability, blameworthiness, and severity of punishment ask it relates to the "Raise the Age" legislation that was passed in North Carolina in 2019. In doing so, age is parsed out to reflect any differences in perceptions for 14- and 15-year-olds compared to 16- and 17-year-olds. Based on the limitations of previous research, this study has two primary research questions. This research's central questions are: (1) what is the difference in the perceptions of blameworthiness and culpability between youth and adults? More specifically, (1a) do adults in North Carolina perceive

youth ages 14-15 as less blameworthy when compared to adults? And (1b) do adults in North Carolina perceive youth ages 16-17 as less blameworthy when compared to adults? The current study also seeks to answer a second primary research question that asks (2) do members of the public feel that youth who are convicted of felony offenses should be penalized like adults and does this differ for 14–15-year-olds compared to 16–17-year-olds. To answer these research questions, a Qualtrics survey was sent out via Connect for Researchers to every individual in North Carolina aged 18 or older and had an active Connect account. Connect identified that 389 individuals were eligible to participate in this study. Responses have been received from 240 participants and data collection is ongoing. Results from the current study will provide insight into the public's perception of how the juvenile justice system handles youth in North Carolina. Using recent data and asking pertinent questions about the "Raise the Age" legislation will allow us to understand if the public views a clear distinction between youth and adults. Moreover, the results will allow us to investigate if the public believes that older youth should be sanctioned like adults.

Washington, Max

Faculty Mentor: Michael Brewer

A comparison of extraction methods to identify volatile compounds produced by bryophytes in the nests of prothonotary warblers (Protonotaria citrea)

Bryophytes are non-vascular plants divided into three main groups: liverworts, mosses, and hornworts. Bryophytes can aid in maintaining soil moisture and recycling nutrients. Additionally, many birds incorporate them, particularly mosses and liverworts, in their nests, including prothonotary warblers (Protonotaria citrea), a watchlist, cavity-nesting bird species. Bryophytes are soft and malleable which helps create the structure of the nest, but beyond that it is unclear why birds include green plants like bryophytes in their nests. It is hypothesized that bryophytes may be included to deter arthropods, including ectoparasites like lice, from entering their nest, but more research is needed to investigate this. The focus of this project is to analyze bryophyte species identified from prothonotary warbler nests collected from five different wetland habitats. Gas chromatography–mass spectrometry (GC-MS), will be used to identify the compounds produced by bryophytes using extracts derived from two extraction methods: soaking bryophytes in a solvent at room temperature for three weeks (the solvent method) and using a Soxhlet distillation method. Determining an ideal extraction method will benefit future research investigating the chemical profile of bryophytes, and determining the volatile chemical profile of bryophytes in the nests of prothonotary warblers will contribute to understanding why they incorporate bryophytes in their nests. I hypothesize that the solvent method will produce a more complete extract, as the lower temperature may reduce the breakdown of volatile compounds, and that at least some of the volatile compounds identified from the bryophyte extracts will be associated with negatively impacting arthropod behavior.

Waters, Darby

Faculty Mentor: Nic Herndon

Navigating the Pitch: Path Planning and Computer Vision for Soccer Robots

Nao is a programmable, autonomous humanoid robot with computer vision, path planning, and advanced motion control capabilities. Designed for interaction with both people and objects, it serves as an excellent option for robotic soccer. In fact, Nao is the robot of choice in RoboCup, an annual autonomous soccer competition. With onboard cameras and a programmable control system, Nao offers a powerful foundation for developing and testing such skills needed for autonomous soccer. This research aims to integrate path planning and computer vision techniques to enable Nao to navigate the soccer field, track the ball, and possibly execute strategic movements. By using various path planning methods, Nao will be able to maneuver around obstacles and opponents efficiently. Through computer vision, it will detect and track objects, enabling it to respond dynamically to the game environment. The system will be implemented and tested in a simulated environment before real-world testing with the physical Nao robot. Simulations will allow for rapid testing of different path planning and vision methods, enabling iterative improvements. Once refined, experiments will be conducted using the Nao robot in a controlled environment to assess performance in real-time conditions. The primary challenge is ensuring real-time visual data processing and path planning under computational constraints and unprecedented scenarios. Additionally, moving elements, like opponent movements introduce more unpredictability, requiring adaptive decision-making strategies. Solving these challenges will contribute to the much broader field of autonomous robotics by improving real-time perception, motion planning, and decision-making in complex and changing environments.

Watson, Calissa

Faculty Mentor: Vanessa Pardi

Exploring Patient Perspectives Through Visual Research

When discussing the major conflicts and public health concerns regarding oral health, one of the main subjects is dental caries in youth. Dental caries is the most common chronic disease among children ages 6-10 years old in the United States. Between the years 2015 and 2016, 45.8% of youth aged 2-19 years had dental caries with the prevalence increasing with age. Not only do these youth have dental caries, but 13% of those lesions are left untreated. Analysis of data on dental caries in youth and the federal poverty level reveals that children from families living below the poverty level have higher rates of dental caries. Preventing dental caries in children can begin as early as pregnancy through oral health education provided during prenatal dental visits. However, data shows that a low percentage of pregnant women receive dental treatment, which negatively impacts both maternal and offspring's oral health. Photovoice as well as interviews is the main form of gaining qualitative data in research. Photovoice is a visual research methodology that allows participants to document and present their concerns from their perspective. Participants are able to find their voice through the use of photos. The finalized research will be able to thoroughly discuss the barriers between pregnant women and oral health. The main objective of this research is to understand how social determinants of health (Social and Community Context, Economic Stability, Education Access and Quality, Health Care Access and Quality, and Neighborhood and Built Environment) impact prenatal dental care. This data will help identify barriers and disparities in access to prenatal dental care, inform targeted interventions to improve oral health outcomes for pregnant individuals and their offspring and guide policy recommendations to enhance equitable healthcare access.

Weaver, Riley

Faculty Mentor: Alice Richman

MCH - STEP/ Public Health Internship

Maternal and child health (MCH) is a critical public health issue, often overlooked, especially in communities facing health disparities. In the U.S., maternal mortality rates are rising, with Black women dying from pregnancy-related complications at a rate 3.3 times higher than White women (CDC, 2020). Infant mortality is also higher for Black babies compared to White babies (CDC, 2020), highlighting the need for change.

This internship with the Virginia Health Department in Richmond, VA, offers a chance to directly address these challenges. The goals are to:

Connect with moms and families to understand the challenges they face regarding healthcare access.

Support programs that improve health outcomes for pregnant people and infants.

Gather and analyze data to inform better public health policies.

Develop and implement community-based solutions that are tailored to local needs.

The internship combines hands-on fieldwork and data analysis. I'll work directly with the community, engaging in activities such as educational sessions, reaching out for support, and identifying barriers to care. A key focus will be prenatal care, which is critical to improving outcomes. I will also analyze key data points like maternal mortality rates, low birth weight, and access to prenatal and postnatal care to identify areas for improvement.

By the end of the internship, I hope to have a deeper understanding of how local public health efforts improve MCH outcomes. I will write a report with recommendations for program enhancements and gain skills in communication, data analysis, and working with stakeholders.

This internship isn't just about learning—it's about making a real impact. Improving maternal and child health helps set up mothers and babies for better futures, which creates positive ripple effects across the community and leads to a healthier, more equitable society.

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Weglarczyk, Paulina

Faculty Mentor: Jennifer Matthews

Determining if East Carolina University is willing to become a more trauma-informed campus.

Many college students encounter periods of heightened stress due to academic, occupational, financial, or social stressors. It is especially important to highlight adverse childhood experiences (ACEs), a root cause of poor mental and physical well-being for college life. ACEs are difficult or traumatic events that occur in childhood and adolescence. Examples include violence, parental alcoholism, divorce, abuse, neglect, loss of a loved one, and distress. Between 50% and 70% of university students have experienced an ACE, and between 12% and 20% have experienced four or more ACEs. College students who have experienced one or more ACEs or traumatic events are more likely to have poorer retention rates and grades, feel anxious and lonely, and experience a decreased quality of life. Many university administrators and staff disregard past trauma or negative effects of ACEs. A trauma-informed campus incorporates training for administrators, faculty, staff, and students to minimize traumatization or retraumatization in the college environment. This framework prepares leaders on college campuses to prioritize the well-being of students and employees by recognizing and appropriately responding to trauma by creating a systematic model for combatting the effects. Interviewing stakeholders, consulting faculty and staff through surveys, and conducting environmental scans will help determine the knowledge ECU personnel have on trauma and if the university would be willing to become more trauma informed in the future. Trauma-informed approaches are helpful in acknowledging the widespread impact of trauma, understanding the life experiences that drive student behavior, and providing paths for recovery.

Welborn, Jordan

Faculty Mentor: David Hart

Improving Convergence in Transformers: A Bidirectional Attention Approach

The Transformer, a machine-learning algorithm introduced in the "Attention is All You Need" paper, has revolutionized natural language processing (NLP) by enabling a wide range of tasks through its encoder-decoder architecture and multi-headed attention mechanism. Self-attention, a component of the Transformer, allowed models to relate words to each other by computing pairwise interactions within a sequence, enabling the model to be aware of the context representations. Building on this, multi-headed attention introduced a more sophisticated approach, allowing the model to simultaneously focus on different parts of the input sequence through multiple attention heads, capturing diverse relationships and patterns in the data. However, conventional Transformer models often exhibit directional biases in word mappings, such as emphasizing unidirectional relationships (e.g., "King -> Queen") rather than recognizing bidirectional associations.
This research proposes a modified Transformer architecture that leverages a bidirectional attention mechanism, incorporating both positive and negative attention components to enable symmetric processing of word relationships. This approach aims to create a more balanced and unbiased model for classification and translation tasks by addressing potential biases in the architecture. Firstly, We develop a modified version of the transformer architecture with our negative attention idea in the multi-head attention. Then will train the modified Transformer and evaluate its performance using accuracy metrics and inference data, comparing it against a baseline Transformer model trained under identical conditions. The proposed method has the potential to contribute to a more consistent and unbiased ecosystem for classification and large language models, ensuring fair and symmetric processing of data.

Wilkerson, Kendall

Faculty Mentor: Karen Litwa

Elucidating Neuroprotective Signatures of Cannabidiol in a Valproic Acid Model of Autism Spectrum Disorders

Prenatal brain development is particularly sensitive to chemicals that induce oxidative stress. For example, prenatal exposure to the anti-epileptic drug valproic acid (VPA), induces oxidative stress and synaptic alterations, promoting autism spectrum disorders (ASD) in humans and autism-like behaviors in rodents. There is a need to identify strategies to prevent oxidative stress and protect the developing brain from neural circuit alterations underlying neurodevelopmental disorders, such as ASD. Our research addresses whether cannabidiol (CBD) can prevent oxidative stress through activation of the transcription factor, nuclear factor erythroid 2-related factor 2 (NRF2), which promotes expression of detoxification enzymes and antioxidant genes and thereby protect developing neural circuits. In the following study, we exposed human induced pluripotent stem cell (hIPSC)-derived neural progenitor cells (hNPCs) to increasing CBD concentrations and immunostained for the activated phosphorylated form of Nrf2. After 24 hours of treatment, 50nM CBD significantly increased pNRF2 nuclear intensity from the DMSO vehicle control by ~40%. However, 100nM did not increase pNRF2 nuclear intensity and 10mM CBD reduced pNRF2 intensity and resulted in cell stress. Using 50nM CBD, we addressed whether CBD could alter VPA-induced gene signatures. At this dose, CBD alone was almost indistinguishable from the control transcriptome (only 14 transcripts had an adjusted p-value < 0.05). However, comparison of transcriptomic data between VPA+CBD and VPA alone revealed that the addition of CBD significantly upregulated expression of genes associated with mitochondrial respiration, including components of complex I (NDUFAF4, NDUFA1) and ATP synthase (ATP5MK). These transcripts were not increased by CBD alone when compared to vehicle control conditions. In preliminary data from primary mouse cortical neurons immunostained for glutamatergic synapse marker, 50nM CBD reversed VPA-induced synaptic deficits. 50nM CBD alone did not alter excitatory synapses. However, 100nM CBD decreased the number of excitatory synapses and was unable to reverse VPA-induced synaptic deficits. Our results demonstrate the ability of CBD to engage NRF2 cytoprotective signaling pathways in a dose-dependent fashion. In combination with a model of chemically induced ASD, we were able to elucidate potential neuroprotective signatures of CBD, specifically increased expression of genes associated with mitochondrial function. This is particularly relevant given that VPA is documented to decrease mitochondrial respiration similar to other ASD-associated chemicals, such as organophosphates. Promising preliminary data in mouse neurons also suggests that 50nM CBD can prevent VPA-induced synaptic deficits, whereas higher CBD doses adversely impacted synapse formation, highlighting the importance of the CBD dose for protection of developing neural circuits.

Williams, Danielle

Faculty Mentor: Stephanie George

Modeling Utero-Ovarian Blood Flow and the Impacts of Hysterectomy on the Ovarian Blood Supply

Historically, research related to women's health has been limited and largely underfunded. On average women have a longer life expectancy than men, and they typically spend a larger percentage of life coping with poor health or disability [1]. One area requiring further research is long-term impacts of hysterectomy on a woman's overall health. Hysterectomy is the second most common surgical procedure performed on women in the United States, second only to cesarean section. Approximately 500,000 women have a hysterectomy each year. In some cases, both the uterus and ovaries are removed during surgery (hysterectomy with bilateral oophorectomy). More recently, however, it has been discovered that allowing the ovaries to remain can have many benefits for heart, brain, and bone health. It is known that the blood vessels between the uterus and ovaries form a loop, but little is known about how blood flow in the ovaries is impacted by removal of the uterus [2]. The objective of this project is to model ovarian blood flow before and after hysterectomy. We will begin with a literature review of existing research about ovarian blood flow and contributions from the uterus. We will identify models of ovarian blood flow including computational fluid dynamics and mathematical models. We will then implement the most appropriate model using flow data reported in the literature as proof of concept. Results from this project may advance models of ovarian blood flow or perfusion; and may be useful in surgical planning.

Williams, Emma

Faculty Mentor: Matthew Walenski

Event related potentials to noun and verb production

Individuals with aphasia often have difficulties naming pictures of objects. Using event-related potentials (ERPs), which measure a brain's electrical activity as a response to sensory, cognitive or motor events, researchers have been able to identify that individuals with aphasia have lexical processing difficulties during picture naming tasks. In previous studies, Laganaro and colleagues (2013) found effects consistent with earlier semantic activation than phonological activation during naming tasks. Compared to control participants, participants with aphasia had a significant delay in phonological encoding and semantic processing. However, their research was limited to individuals with anomic aphasia and only focused on noun naming. Individuals with agrammatic aphasia often have more difficulty retrieving verbs compared to nouns, and prior research also suggests phonological deficits in agrammatism. Crucially, verb naming has not yet been investigated using ERPs, in any group with aphasia. This study aims to remedy that gap, by investigating ERPs to verb production in more depth. In this study both noun and verb picture naming tasks will be tested to give more insight into word production in both anomic and agrammatic aphasia. We are currently collecting ERP production data from individuals with aphasia and a control group of healthy participants.

Williams, Haley

Faculty Mentor: William Allen

Covering Collagen: Pyrene as Probe and Protector

Previous studies have shown that hydrophobic moieties can have a stabilizing effect on collagen triple helices. When nonpolar groups are appended at the N-terminus of model peptides, their aggregation inhibits fraying of strands. When attached elsewhere, they may create a hydrophobic microenvironment that favors the trans disposition of amide bonds required for folding. Our group is interested in using pyrene as a nonpolar stabilizing group, owing to its unique distance-dependent emission properties. Thus, an Fmoc-protected lysine with a pyrene unit in its side chain, suitable for solid phase peptide synthesis, was prepared in high yield without chromatography. The pyrene-modified lysine has been incorporated near the C-terminus of a (Pro-Hyp-Gly)7 model of collagen. CD and fluorescence studies monitoring collagen melting temperatures will be presented. We hypothesize that the stabilizing effect of pyrene pendants will vary significantly as they are moved throughout the collagen strand.

Williford, Kelly

Faculty Mentor: Jerry Johnson

Teacher Recruitment and Retention in Rural Areas

Teacher recruitment and retention has long been a challenge across the state of North Carolina. Rural school districts are especially affected due to small population sizes, limited access to housing, and limited resources. Rural areas form a large portion of North Carolina. In fact, according to Showalter and colleagues in the Why Rural Education Matters 2023: Centering Equity and Opportunity report, "Even with changes from our last report in the indicators measuring the health of its rural education system, North Carolina continues to rank among the states most in need of critical examination. With over one in three students attending school in a rural district, North Carolina's total rural student population enrollment is second only to Texas" (p. 125). High quality educators are needed in these areas to provide students with a quality education, regardless of where they live. The focus of this study is to determine perspectives of prospective educators and determine what factors are important when deciding where to teach. In addition, perspectives of current rural school teachers are taken into account to determine what strategies can be used to recruit and retain new teachers in these school systems. To gather data, a survey was sent to students in the Educator Preparation Program (EPP) at East Carolina University. Following this survey, a small focus group gathered together to further explain their perspectives. Interviews were also held with current rural school teachers to discuss potential recruitment strategies and their perspectives of teaching in a rural school. Following the survey and interviews, the data was analyzed to determine potential themes. It is hoped that this information will help school administrators and leaders recruit and retain teachers.

Wilson, Alexus

Faculty Mentor: Jason Pajski

Molecular Level Insights into PFAS Interactions with Human Serum Proteins

Molecular Level Insights into PFAS Interactions with Human Serum Proteins, Alexus Wilson, Thanh Nguyen, Greyson Sanchez, Bridget Aidoo, Jason Pajski, Department of Chemistry, East Carolina University, Greenville, NC, 27858
Per- and polyfluoroalkyl substances (PFAS) have been found to cause effects with the immune toxicity systems, certain cancers, and other metabolic affects. In this area this is important as military bases use firefighting foams that contain PFAS, the Chemours plant in the Cape Fear river basin is a point source PFAS polluter, and the landfill in Snow Hill leaches PFAS into the local environment, making PFAS exposure within Eastern North Carolina a serious concern. The purpose of this research is to use CD, DSC, ITC, tryptophan fluorescence, and computational approaches to characterize PFAS binding to human serum proteins such as albumin and γ-globulins. This research would like to expand the previous studies on HSA to other PFAS compounds, LOX proteins, and γ-globulins. PFAS are generally toxic and there is more research at the organismal level about how PFAS affect specific parts of body, such as kidney and liver function, but less is known about PFAS effects at the molecular level. This study will add to our understanding of how PFAS interact with human serum and structural proteins.

Winsett, Brianna

Faculty Mentor: Brett D Keiper

Function of Crispr-tagged and altered forms of translation factors in C elegans germ cell mRNA translation.

This research uses CRISPR-tagged and modified translation factors to address the roles of these factors in regulated mRNA translation in C. elegans germ cells and embryos. Translation factors play a vital role to positively and negatively control these mRNA to produce new proteins vital to the embryo differentiation process. By using CRISPR technology to tag or make site-directed mutations in translation factors, we will engineer changes in the interactions or spatial distribution of the translation factors. Our follow up with microscopy, fertility and development analysis, and detailed imaging will address the impact of altered protein synthesis on reproduction and development. By investigating how the interactions between two or more of the factors, we aim to elucidate the biochemical mechanisms of mRNA regulation that give rise to specific proteins at key points in embryonic development. This research will reveal detailed mechanistic aspects of protein synthesis during cell differentiation, growth, and developmental transitions. Ultimately, the findings will provide valuable insights that may carry over to fetal development disorders or human inherited diseases, with potential applications in the healthcare field.

Winter, Olivia

Faculty Mentor: Catherine Walker-Bailey

The Hands of Life

“The Hands of Life” is a personal exploration of the human experience expressed through the evolution of hand and facial shapes. This series reflects my fascination with how hands reflect one's individuality and the passage of time. Initially, I had difficulty understanding their proportions, and I struggled to draw them with accuracy. However, through perseverance I transformed my frustrations into expressive pieces that convey a multitude of emotions. Each piece features family members at different stages of life, highlighting the beauty of our shared experiences in the stages of life. My artistic journey began as a young child, scribbling over pages and doodling in class. It soon evolved into a passion for figure drawing. My utmost favorite thing to draw is portraits, but I chose to challenge myself by making hands the main focus. By using black and white graphite on gray paper, the even mid tone emphasizes the art’s contrast and textures, creating additional depth in my pieces. Ultimately, “The Hands of Life” observes both my passion and my evolution as an artist while reflecting the beauty of life’s changes.

Wood, Madison

Faculty Mentor: Lori Ann Eldridge

Buprenorphine Prescription in North Carolina

A 2022 report from The Centers for Disease Control and Prevention (CDC) reported that 75% of overdose deaths involved the use of opioids. Medications such as Buprenorphine, Methadone, and Naltrexone can be used to treat opioid use disorder (OUD), and they are referred to as medication-assisted treatment (MAT). Buprenorphine acts as a partial opioid agonist, binding to opioid receptors in the brain and activating them less than a full agonist (e.g., heroin, oxycodone, fentanyl, morphine). This can decrease an individual's reliance on stronger opioids. Increasing the accessibility of Buprenorphine among individuals with OUD is essential to decreasing the prevalence of overdose-related deaths. In June 2023, the Mainstreaming Addiction Treatment Act decreased barriers and eliminated the x-waiver requirement for clinicians to prescribe Buprenorphine. The purpose of this study is to examine the prevalence of Buprenorphine prescription among clinicians in Pitt County, North Carolina, after the x-waiver was eliminated in June 2023. Data will be obtained through a convergent mixed methods Qualtrics survey. The survey design was largely based on the Consolidated Framework for Implementation Science (CFIR). Survey constructs included employment demographics, attitudes toward Buprenorphine prescription, Buprenorphine prescription prevalence, the impact of the x-waiver, infrastructure, barriers to prescribing Buprenorphine, and personal demographics. Clinicians will be identified using the North Carolina Medical Board roster. Respondents will consist of Medical Doctors, Doctors of Osteopathic Medicine, Physician Assistants, and Nurse Practitioners currently practicing in Pitt County. A recruitment letter outlining the study will be sent to clinicians identified from the roster. The recruitment timeline is based on the Dillman Method, which assists with maximizing response rates. Data will be analyzed using the SPSS statistics software. Descriptive statistics will be applied to summarize the data both graphically and numerically. Qualitative data analysis will be analyzed using a combination of deductive and inductive approaches. Due to the MAT act and x-waiver elimination, we hypothesize that the prevalence of Buprenorphine prescription will have increased since June 2023.

Woodard, Kailan

Faculty Mentor: Adrienne Muldrow

Effectiveness of Social Media Campaigns in Increasing Awareness of the Combined Health Risks of Vaping and Alcohol Use in College Students

The simultaneous use of vaping and alcohol among college students presents compounded health risks, yet awareness of these risks remains limited. Social media serves as a primary source of information for young adults, shaping their health perceptions and behaviors. This study examines how social media campaigns, particularly those on TikTok, influence college students' awareness, attitudes, and harm perceptions regarding vaping, alcohol use, and their combined effects. Using Social Cognitive Theory as a framework, the research explores how humor-based health messaging affects engagement with and receptiveness to health information. We will survey college students (N = 150) to assess their awareness of the combined health risks of vaping and alcohol use, their engagement with social media health messaging, their need for humor, and the influence of humor-based content on their perceptions. Furthermore, the research will also explore whether humor-related TikTok posts are associated with greater awareness of this combined health issue among students who are more likely to possess a need for humor. Overall, this study contributes to the broader discussion of digital health communication by examining how social media influences young adults' health behaviors and awareness of vaping and alcohol risks.

Woollen, Victoria

Faculty Mentor: Xiaoping Pan

Investigating the role of microRNAs on the transgenerational effects of nicotine using Caenorhabditis elegans

This project aims to investigate the effects of nicotine, the highly addictive and toxic substance in tobacco-based products, has on offspring (1st and 2nd generations, F1 and F2) using the model organism C. elegans. C. elegans are microscopic nematode worms that are used as a model organism to study epigenetic effects passed down through generations. Due to their transparency, small size, and cellular simplicity, researchers can easily observe the internal structures and processes of C. elegans. To characterize nicotine-dependence, our lab looks at three behaviors: stimulation, withdrawal, and tolerance. We hypothesize that maternal nicotine exposure (F0 generation) influences F1 and F2 worms, increasing susceptibility to nicotine dependence. To test this, F0 worms will be exposed to a 61.7 μM nicotine solution or a control (K medium) at the L3 larval stage for 24 hours, then withdrawn. The F1 and F2 generations will develop without nicotine exposure, and behavioral assays using WormLab will measure locomotion changes, with increased speed in nicotine-free environment indicating withdrawal while lower locomotion speed in nicotine-containing environment indicates nicotine adaption. To explore miRNA-mediated molecular mechanisms, RNA interference with the miRNA inhibitor anti-cel-miR-1 will knock down miR-1 regulating nicotinic acetylcholine receptor (nAChR) expression. Behavioral changes in miRNA-inhibited worms will be compared to vehicle controls. Gene expression analyses will verify the inhibition of miRNAs, its targeting of nAChR subunit expression, and its correlation with observed behaviors. Statistical analyses of behavioral and molecular data will reveal connections between miRNA regulation, nAChR expression, and multigenerational nicotine dependence. By using this methodology, the understanding of nicotine addiction mechanisms and related target pathways can be brought to light.

Yang, Susan

Faculty Mentor: Courtney Caiola

Facilitators and Barriers to Treatment and Harm Reduction Services for Perinatal Persons with Opioid Use Disorder in North Carolina

Background: Opioids are effective for pain relief but pose risks of dependence, addiction, withdrawal, and overdose. Opioid Use Disorder (OUD) during the perinatal period, defined as pregnancy through the first year after birth, can lead to significant health risks for both perinatal persons and neonates, including neonatal withdrawal syndrome (NOWS). Treatment options like methadone and buprenorphine and harm reduction measures such as syringe service programs and Narcan distribution aid those with OUD and can improve maternal and neonatal health, but stigma and legal fears deter many from seeking help. Addressing barriers and improving access to treatment and harm reduction measures can enhance outcomes for perinatal individuals with OUD.
Purpose: The purpose of this study is to identify treatment and harm reduction facilitators and barriers for perinatal persons with OUD in North Carolina.
Methods: This qualitative descriptive study utilized secondary data collected in the parent study titled “Exploring Facilitators and Barriers to Harm Reduction Services in North Carolina with An Emphasis on Rural, Historically Marginalized Communities, and Pregnant or Parenting People. Thematic analysis was used to analyze six (n=6) in-depth interviews with healthcare workers and OUD program staff in North Carolina.
Results: Analysis found facilitators to treatment and harm reduction included adequate funding, human resources, cross-sector collaborations, availability and access to resources, building rapport, and collaboration with other SSPs. Conversely, barriers to treatment and harm reduction services included insufficient funding, limited peer and institutional support, funding restrictions, OUD-related stigma, and concerns about staff and client safety. Additionally, a notable finding was the lack of involvement by perinatal persons in these programs, likely due to the stigma surrounding perinatal substance use disorder (SUD) and the limited availability of perinatal-specific resources.
Discussion: This research identified several facilitators and actionable barriers to treatment and harm reduction for people who use substances in North Carolina. However, a primary finding was that few services are being provided to perinatal persons and their neonates. This research highlights the complexity of providing treatment and harm reduction services for the perinatal population and the need to develop interventions to increase treatment specifically for this population.

Yelamanchili, Raghav

Faculty Mentor: Andrew Willford

Community Attitudes Towards Mental Health In the Indigenous Communities of the Nilgiris

Mental health perceptions within Indigenous communities remain under-researched, affecting access to care and intervention strategies. This project explores community attitudes toward mental illness in the Indigenous populations of the Nilgiris, India, using the Community Attitudes Towards Mental Illness (CAMI) Short Form survey, combined with 1-1 interviews and focus group discussions. Findings reveal a nuanced spectrum of beliefs, where fear and exclusion persist among older individuals while younger generations exhibit greater acceptance. Traditional healing remains central, yet psychiatry is gaining recognition despite accessibility barriers. Stigma, geographic isolation, and inadequate facilities continue to limit care. Beyond data, this research opens broader discussions on Indigenous mental health, the tensions between Western and non-Western treatment paradigms, and the need for culturally sensitive clinical applications. By understanding these narratives, we move toward interventions that honor Indigenous lived experiences, paving the way for more inclusive and effective mental health strategies for these communities.

Zeferino-Rodriguez, Ricardo

Faculty Mentor: David Hart

Developing Interactive Software For Sperm Motility Analysis

This research focuses on developing a web-based application that allows user to analyze sperm motility by uploading a sperm microscopy video. Users can input key parameters such as sperm diameter and pixel scale, which help calibrate the system for tracking. The application processes the video using computer vision techniques to detect and track sperm movement, providing useful data analysis. The goal of the project is to create an accessible and user-friendly tool for sperm motility analysis. By offering a web-based solution, this system makes sperm tracking more convenient for researchers and medical professionals.

Zeidler, Megan

Faculty Mentor: Cheryl Kovar

Reproductive Coercion: An Innovative Intervention for Adolescent Females – Phase II

Background: Reproductive coercion (RC) was first identified in the literature in 2010 by Miller et al. There are three main forms: 1) contraceptive sabotage, 2) pregnancy pressure, and 3) pregnancy outcome pressure. RC is a form of relationship abuse that can increase the risk of unintended pregnancies through behavior that interferes with contraception use and pregnancy coercion. Hallmarks of RC within a relationship are power and control. Our focus population in this scholarly project is adolescent females 14-19 years old. Prevalence of RC among adolescent females range from 12-20%. Through the literature search it was discovered that RC was not included in any teen pregnancy prevention curricula. This project (Phase II) addresses the creation of learning objectives and activities that focus on the six modules that were developed in Fall 24 (Phase I) by another Undergraduate Honors Student under Dr. Kovar's mentorship. Methods: Over the summer of 2024, a review of the literature was conducted. This review focused on areas such as current innovative interventions, adolescent learning styles, and the use of different behavioral theories. Through the literature, it was determined six modules were supported and the content in the modules will be guided by social cognitive theory. Synthesis of published studies in those areas helped to guide our work. Results: The objectives and activities will be presented from work in Phase II during Spring 2025 regarding the six modules developed. These modules are Module One - Definition of Reproductive Coercion, Module Two - Negative Health Sequelae of Reproductive Coercion, Module Three - Pregnancy, STIs, and Contraception, Module Four - Recognizing Power and Control in Relationship, Module Five- Skills to Improve Communication and RC, and Module Six - You are in Control of Your Body. These activities focus on methods where adolescents learn best. Clinical Implications: According to the literature, one in five women have been coerced into having sex without a condom by their partner, and adolescent females who have experienced RC are five times more likely to report intimate partner violence (IPV). In addition to unintended pregnancies, there is a strong association between RC and the risk of STIs, depression, and substance use with bisexual and lesbian adolescent females at a much greater risk of RC than their heterosexual peers. This novel upstream approach to implement this pilot intervention into current teen pregnancy prevention curricula will be the first intervention of this type to address this population.

Zodulua, Diane

Co-Presenters: Yakira Striblin, Diane Zodulua
Faculty Mentor: Jeanne Golden

Black Woman Victims of Domestic Violence: How the Behavioral Perspective can be used to Develop Individualized Interventions

Several factors make it particularly difficult for Black women victims of domestic violence to escape abusive relationships including being impoverished, having poor self-esteem, lacking information, resources, and services, as well as the stigma involved. Black women victims of domestic violence need culturally responsive services for mental health and substance abuse. They also need safe housing, transportation, education, career and medical services, and childcare. Applied behavior analysts can create interventions that are individualized to meet the unique needs of Black women victims of domestic violence.