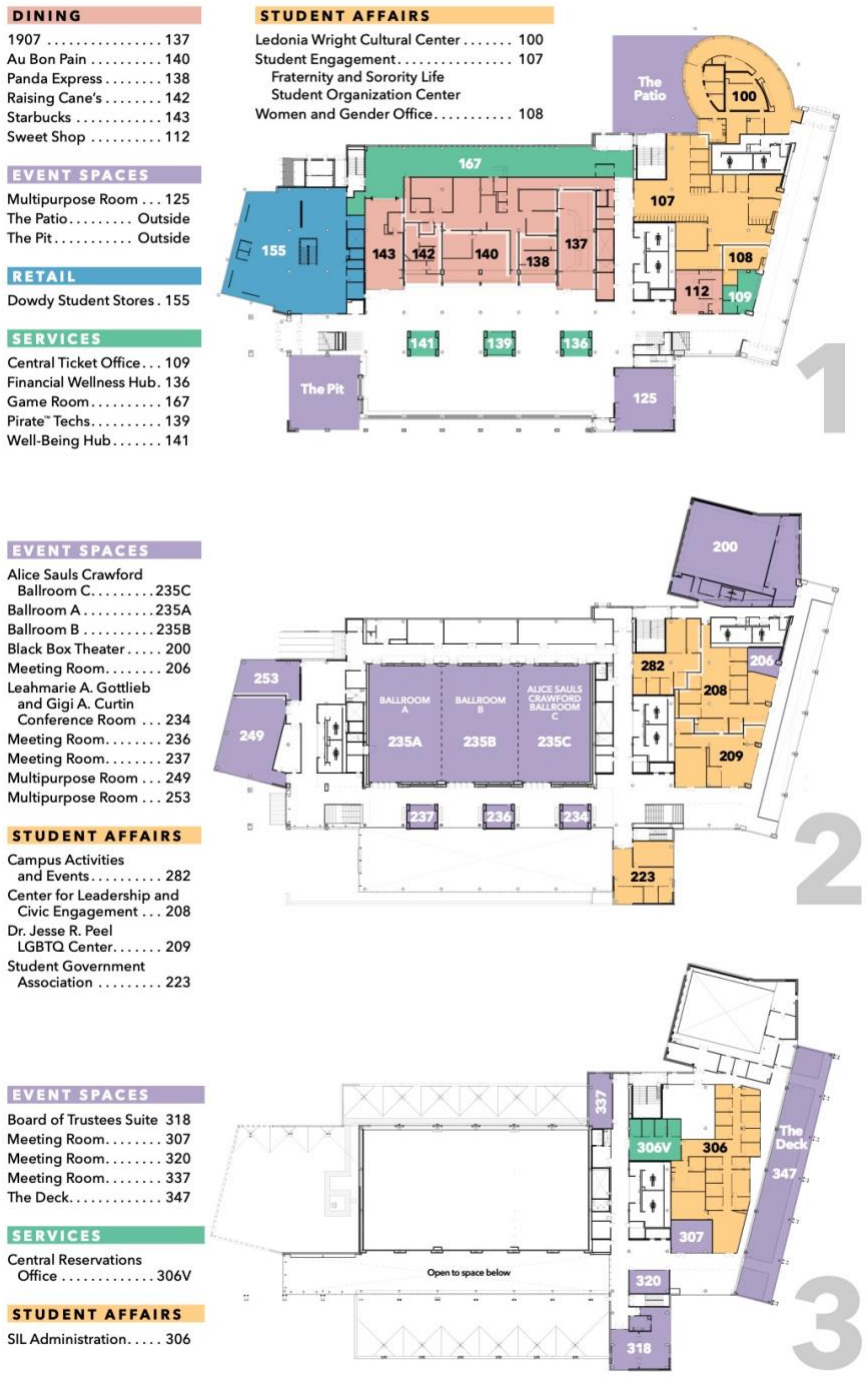
Research and Creative Achievement Week

April 3 - 6, 2023

Main Campus
Student Center
#RCAW

Table of Contents

Main Campus Student Center



Map of Main Campus Student Center

February 2023

We are pleased to invite you and your students to participate in the 17th annual Research and Creative Achievement Week (RCAW). The week of April 3-6, 2023, has been set aside to highlight the extraordinary accomplishments of our students in research and creative activities. This year's event will be held in the Main Campus Student Center and includes in-person podium presentations, poster sessions, performances, and showcases, as well as virtual posters featuring the research and creative activities of our undergraduate and graduate students and postdoctoral scholars from across ECU.

At this time, we would like to request that faculty engage with their students and postdoctoral scholars to help them determine which research project they might submit for this event. The abstract submission system is open, and abstracts are due February 15, 2023. Please also consider encouraging your classes to attend specific discipline-related student presentations throughout the week.

This will be an exciting week and a great experience for our students to share their research and creative activity with the university community. The event will certainly highlight the success of our students and the faculty who work with them. Additional information can be accessed at the RCAW website. Any questions can be sent to this year's co-coordinators of the event. Graduate students should contact Faculty Fellow Dr. Michelle F. Eble. Undergraduate students should contact Director of Undergraduate Research Dr. Tuan Tran.

We look forward to seeing you at the Main Campus Student Center and participating in these events.

Sincerely,

Robin N. Coger, Ph.D.
Provost and Senior Vice Chancellor
for Academic Affairs

Sharon R. Paynter, Ph.D.
Acting Chief Research and
Engagement Officer

Kathleen T. Cox, Ph.D.
Interim Dean
Graduate School

Letter from Provost, Acting Chief Research and Engagement Officer, and Interim Dean of the Graduate School

Research and Creative Achievement Week Sponsors

Academic Affairs
Research, Economic Development, and Engagement (REDE)
    Office of Undergraduate Research
    Office of Postdoctoral Affairs
Graduate School

Special Thanks

Tuan Tran, RCAW Co-Chair, Director of Undergraduate Research
Michelle F. Eble, RCAW Co-Chair, Faculty Fellow, Graduate School

Nehad Elsawaf, Chair & Organizer, International Scholars' and Students' Symposium
Tuan Tran, Organizer, Capture 180 Research Challenge
Karen Litka, Organizer, Capturing the Art of Science Image Competition

Tania Alvarez, Executive Assistant, Graduate School
Marquerite Bond, Administrative Support Associate, Graduate School
Anyah Born, Admissions Administrative, Graduate School
Anja Burcak, Graduate Assistant, Graduate School
Lisa Hagans, Administrative Support Specialist, Graduate School
Margaret Macready, Executive Assistant, REDE
Alexis Morris, Business Officer, Graduate School
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Yasmine Habal
Cindy Martines
Ashanti Moore
Gale Paradis
Rindi Povlich
Henry Shelton
Ysabella Villacorte
Yveonna West

RCAW Artwork
Brittany Kernea, BFA student
Dan Elliott, MFA, Associate Professor, School of Art & Design

Thanks to Faculty, Staff, Graduate Students, and Community Partners for serving as moderators and judges.

List of Mentors

Abdel-Rahman, Abdel-Rahman
Ables, Elizabeth Tweedie
Agarwala, Ranjeet
Aileru, Azeez
Akhnoukh, Amin Kamal
Alexander, Marina
Alexander, Patrice Elaine
Allen, William E
Anderson, Eric Shawn
Asch, Rebecca G
Autry, Cari Elaine
Babatunde, Oyinlola Toyin
Baker, Michael Drew
Banerjee, Sambuddha
Beierlein, Jaclyn J
Bell, Natasha Lynn
Beltran-Huarac, Juan
Black, Kristin Zenee
Blake, Beth A
Blakeslee, April Monica Houghton
Briley, Patrick Minton
Broskey, Nicholas Thomas
Bryson, Sara
Cai, Sunny
Caiola, Courtney Ellis
Castles, Ricky
Caswell, Nicole Irene
Chalcraft, David R
Christensen, Timothy W
Clemens, Stefan
Cofie, Leslie E
Das, Bhibha Mayee
de Castro Bras, Lisandra E
De Jesus Toderick, Elizabeth
DeVille, Kenneth
DeWitt, Jamie C
DeWitt, Regina
Dias, Nancy
Dickerson, Anne
Didonna, Alessandro
Dillon, Margaret Ann
Dixon, Helen Marie
Dolbier, Christyn
Domire, Zachary J
Donica, Denise
Doyle-Mekkes, Jessica Bligh
Duba, Kurabachew Simon
Durland, Alexander Nathaniel
Eagle, John Scott
Eble, Michelle F
Egan, Kathleen Louise
Elliott, Daniel Wayne
Elsawaf, Nehad
Eppler, Marion A
Ewen, Charles R
Farrow, John Matthew
Fazzone, Patricia Anne
Fernandez, Madeline
Field, Erin Kirby
Filho, Faete
Fisher-Wellman, Kelsey Howard
Fletcher, James C
Frost, Erin Anne
Furner, Zhan Zhang
Gantt, Laura T
Garcia, Brandon L
George, Stephanie
Geraldeli, Saulo
Golden, Jean Ann
Goodwillie, Carol
Graber, Theodore G
Grace-McCaskey, Cynthia A
Grady, Maureen M
Gregory, Kristen Howell
Habeeb, Christine
Hannan, Johanna
Hargrove, Jarvis Lamar
Harris, Michael Lee
Hegde, Archana
Herndon, Nic
Holt, Yolanda Feimster
Horsman, Eric
Hu, Xin-Hua
Huang, Hu
Huang, Jinling
Huang, Yilei
Hudson, Nathan E
Huener, Thomas Joel

Hughes, Robert Murray
Humphrey, Charles Pittman
Hur, Mi-Sook
Hvastkovs, Eli Gerald
Irons, Paige Latham
Irwin, Megan Rebecca
Issa, Fadi Aziz
Iverson, Guy Joseph-Gene
Johnson, Erika Katherine
Johnson, Sarah Elizabeth
Jung, Jae Won
Kain, Donna Jean
Kane, Melinda D
Katwa, Laxmansa C
Kearney, Gregory Dale
Keiper, Brett
Koch, Peter J
Komoski, Mary Catherine
Kulas, Anthony
Lamb, Richard Lawrence
Lamson, Angela Lynn Smith
Larsen, Deirdre Helen Suzanne
Larson, Kim L
Lazure, Timothy
Lee, Jinkun
Lee, Jonathan Michael
Lee, Joseph G
Lee, Myon Hee
Lee, Tammy D
Lemasson, Isabelle
Lesko, Charles John
Levi Altstaedter, Laura
Lewis, Travis Earl
Lim, Kwang Hun
Lin, Ziwei
Linder, Julie Michelle
Litwa, Karen Ann
Loudon, James Ernest
Malkin, Michelle L
Mallinson, David J
Matthews, Jennifer Cremeens
May, Linda Elizabeth
Mayo, Margaret Rogers
Mazow, Laura B
McClung, Joseph Matthew
McIntyre, Amy Elizabeth
McMillan, Amy
McRae, Susan B
Meardon, Stacey Augusta
Medina, Almitra
Meher, Akshaya Kumar
Miles, Gera S
Miller, James Kirk
Milton, Morgan Eilise
Mitra, Siddhartha
Mizelle, John Christopher
Moore, Shawn Anthony
Moss, Mark Eric
Moysey, Stephen
Mukherji, Anuradha
Muller-Borer, Barbara Jean
Murashov, Alexander K
Murphy, Larkin Dewey
Murray, Nicholas P
Nassehzadeh-Tabrizi, Moha
Nimmo, Mary Jo Bankhead
Normoyle, Catherine Lucille
O'Reilly, Dennis M
Offenbacher, Adam Richard
Owens, Tosha Lynn
Page, Sarah
Pan, Xiaoping
Park, Yoo Min
Peach, Matthew Sean
Peralta, Ariane Legaspi
Perry, Jamie L
Pickard, John L
Pokhrel, Lok R
Popoviciu, Ciprian
Quick, Linda Ann
Raupp, Jason Thomas
Reinsmith-Jones, Kelley K
Reisch, John T
Richardson, Mark Douglas
Richman, Alice Rose
Robbins, Thomas R
Robinson, Zachary
Roop, Roy M
Roper, Rachel L
Rothermich, Kathrin
Rupp, Nicholas G
Ryan, Teresa Jean
Saeed, Syed A
Sastre, Lauren Rogers
Schmidt, Cameron Alan
Schwalbe, Ruth

Sears, Samuel F
Shearman, Sachiyo M
Shewchuk, Brian M
Shinpaugh, Jefferson
Smith, Aimee West
Soule, Eric Kendall
Sousan, Sinan
Spain, Renee O
Spuches, Anne M
Stiller, John W
Summers, Kyle
Surkar, Swati Manoharrao
Swain, Amy Elizabeth
Swift, Alison D
Szatmari, Erzsebet Maria
Taylor, Alan
Tedesco, Laureen
Tempel, Thomas R
Thompson, Beth
Ticknor, Anne Swenson
Tisnado, James R
Tran, Tuan D
Tulis, David Anthony
Tumin, Dmitry
Vadati, Alex
Vance Chalcraft, Heather D
Vermiglio, Andrew J
Wagner, Jennie Maria-Nora
Walcott, Christy Mangione
Walker, Joi Phelps
Wells, Angela Franks
Wheeler, Michael D
White, Kevin Robert
Willson, John David
Wrenn, Melissa Joy
Wu, Rui
Yang, Li
Zhang, Baohong
Zhu, Yong
Zipf, Karin L

RCAW 2023 SCHEDULE: April 3 – APRIL 10, 2023
Main Campus Student Center, 10th Street

Monday

APRIL 3

8:30 am – 4:00 pm | Undergraduate Student Presentations
Podium Presentations | Rooms 249, 253, Black Box Theatre (200)
Undergraduate Posters | Ballrooms
Undergraduate Online Posters | Room 237

Tuesday

APRIL 4

2:00 pm – 4:00 pm | Capture 180 Research Challenge | Room 249
2:30 pm – 6:00 pm | International Scholars' and Students' Symposium | Black Box Theatre

Wednesday

APRIL 5

8:30 am – 5:00 pm | Graduate Student and Postdoctoral Presentations
Podium Presentation | Rooms 249, 253, Black Box
Theatre (200)
Graduate and Postdoctoral Posters | Ballrooms
Graduate Online Posters | Room 237

Thursday

APRIL 6

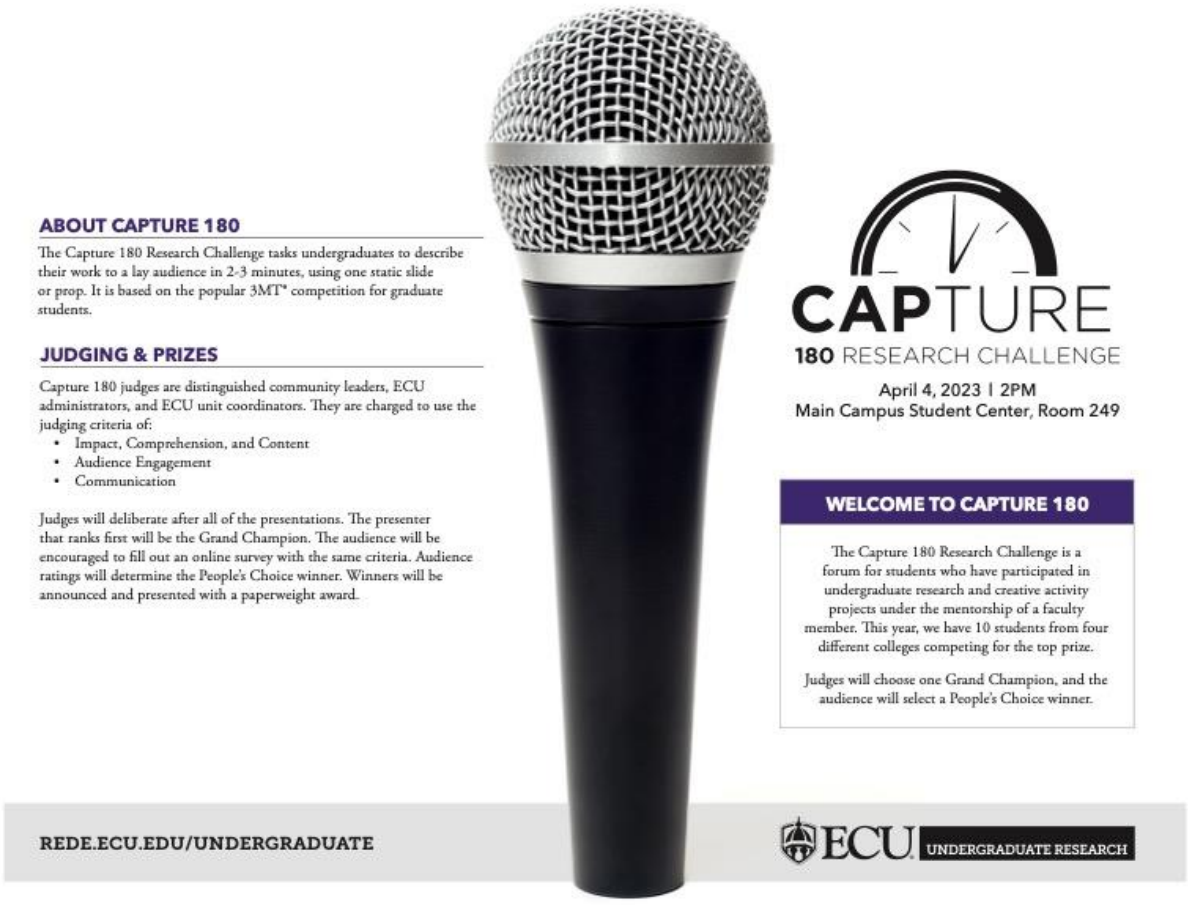
10:00 am – 11:00 am | Capturing the Art of Science Speaker
Michelle S. Itano, PhD | Room 253

Monday

APRIL 10

12:00 pm – 1:30 pm | Student Awards Luncheon (Invitation Only) | Ballroom A
Capture 180 Awards
ECU Distinguished Graduate Faculty Mentor Awards
Thesis/Dissertation Awards
RCAW Undergraduate Awards
RCAW Graduate & Postdoctoral Awards
Capturing the Art of Science Awards

Capture 180 Research Challenge



EVENT OVERVIEW

2-2:15 P.M.	JUDGE & PRESENTER CHECK-IN
2:15-3:05 P.M.	PRESENTATIONS
3:05-3:15 P.M.	JUDGING DELIBERATIONS (RM 237)
3:15 P.M.	AWARDS

PRESENTATIONS

1. Machine Learning Techniques to Aid Breast Cancer Recurrence Prediction

Exploring the potential benefits of applying machine learning techniques to the task of breast cancer recurrence prediction.

MADISON ROSE (COMPUTER SCIENCE)
MENTOR: NIC HERNDON

2. Mechanisms of Synapse Formation in Developing Neural Circuits of a Human Brain Model

Investigating the fundamental molecular mechanisms of synapse formation in the developing human brain and their contribution to neurodevelopmental disorders.

DAISY PEREZ (NEUROSCIENCE)
MENTOR: KAREN LITWA

3. Not Rememberin'? Might Be Rab10

We explore a rodent model of cognitive dysfunction as a result of Rab10 protein.

ELIZABETH HARRIS (NEUROSCIENCE, PSYCHOLOGY)
MENTOR: TUAN TRAN

4. Can You Read This Clearly?

I-VERGE was tasked with designing a near-point convergence device to aid in concussion protocol testing that is portable, accurate, cost-effective, and repeatable.

REBECCA JENKINS (ENGINEERING, BIOMEDICAL)
MENTOR: BARBARA MULLER-BORER

5. Aegean Frescoes and Their Correlating Greek Myths

Demonstrating parallels between Bronze Age wall paintings and popular myths of Classical Antiquity.

SHANNON DUGAN (ANTHROPOLOGY)
MENTOR: LAURA MAZOW

6. STEM and Politics

Diving into the realm of STEM and politics.

BRADDOCK RHODENHISER (BIOLOGY)
MENTOR: TIM CHRISTENSEN

7. Gastrocnemius Stress and Stiffness Research in Relation to High Heeled Shoes

This study will be conducted by using shear wave ultrasound imaging of the gastrocnemius and the flexor digitorum brevis showing change in stiffness from the beginning to end of a typical eight-hour workday.

BRANDON WAUGH (EXERCISE PHYSIOLOGY)
MENTOR: ZACHARY DOMIRE

8. Can You Hear Me Coming?

The Office of Naval Research is supporting East Carolina University® and Catholic University of America to understand how weather affects nearshore sound transmission.

JAMIE BONFIGLIO (ENGINEERING; BIOMEDICAL CONCENTRATION)
MENTOR: TERESA RYAN

9. Evaluation of Efficacy and Reception of Health Coaches in the Fresh Start Program

Understanding the impact of interdisciplinary student health coaches on the lives and health outcomes of rural patients with diabetes in Eastern NC.

SARAH ELLIOTT (NUTRITION AND DIETETICS)
MENTOR: LAUREN SASTRE

International Scholars' and Students' Symposium
Chair and Organizer, Dr. Nehad Elsawaf

Tuesday April 4th, 2023
Black Box Theater, New Student Center on East campus (2:30- 5:30 PM)

PROGRAM

2:30-2:40
Opening Remarks: Dr. Nehad Elsawaf – International Scholars' Symposium Chair and Organizer.

Session 1:

2:45- 3:00
Designing For Wellness, Dina Al-Dajani, The Department of Interior Design and Merchandising, and The Department of Construction Management, East Carolina University, Greenville, NC 27858

3:00-3:15
Simulation of Mixed Transportation Network Optimization: Dynamic Programming Approach, Jinkun Lee, Department of Engineering, East Carolina University, Greenville, NC, 27858

3:15-3:30
Integrating Leadership Skills in Math-based Construction Management Course, Carol Massarra, Department of Construction Management, East Carolina University, Greenville, NC, 27858

3:30-3:45
Numerical Study of a Solar-Assisted, sCO2 Brayton Cycle for Power Generation, Kenneth R. Weddle, Dr. Tarek Abdel-Salam, Dr. Kura Duba, Dr. Faete Filho, College of Engineering and Technology, East Carolina University, Greenville, NC, 27858

3:45-4:00
Adverse Childhood Experiences (ACEs) Screening in Primary Care Settings for Adults: A Systematic Review, Betül Küçükardalı-Cansever and Angela Lamson, Department of Human Development & Family Science, East Carolina University, Greenville, NC, 27858

Session 2:

4:00-4:15
Adolescents with Complex Heart Disease Voicing their Stories of Medical Milestones Using Beads as Symbol of Courage, Priti P, Desai, Department of Human Development & Family Science, East Carolina University, Greenville, NC, 27858

4:15-4:30

Academic Deans in Chinese Universities during the Republic of China period: As case study of Pekin and Tsinghuo Universities. Xiangju Liu**,** College of Education, East Carolina University, Greenville, NC, 27858

4:30-4:45

Green Roofs' Influence on Architectural Design Decisions: Exploring climate change mitigation by green infrastructures, M. M. Lekhon Alam, Department of Technology Systems, East Carolina University, Greenville, NC, 27858

4:45-5:00

Risk of COVID-19 infections Among People with Asthma: A Scoping Review, Chukwudi S. Ubah, Gregory D. Kearney, Department of Public Health, The Brody School of Medicine, East Carolina University, Greenville, NC, 27858

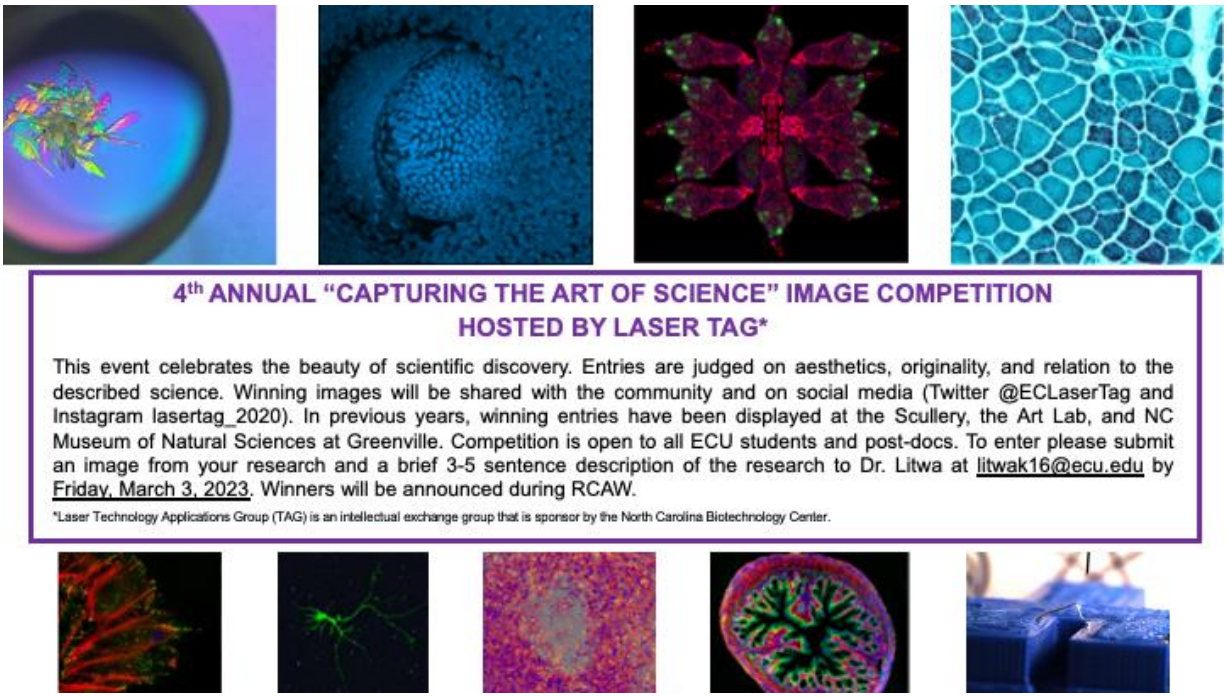
5:00-5:15

An Implementation of Federated Learning in Protecting Patient Privacy, Kaiji Fu, Omar S.Taha, J. H Rose High School, and The Brody School of Medicine, East Carolina University, Greenville, NC, 27858

5:15-5:30

Techno-economic analysis of Oscillating Surge Wave Energy Converters, Cole Dickerson, Dr. Nehad Elsawaf, Dr. Tarek Abdel-Salam, Dr. Faete Filho, Dr. Kura Duba, Departments of Engineering and Economics, East Carolina University, Greenville, NC, 27858

5:30 -Concluding remarks- Dr. Nehad Elsawaf



"Capturing the Art of Science" Image Competition Speaker
Thursday, April 6
10:00 am – 11:00 am |
Michelle S. Itano, PhD | Room 253

Schedule – Monday, April 3, 2023
Research and Creative Achievement Week (RCAW) 2023

Undergraduate Students Day

Undergraduate Podium Presentations

MCSC 200 | Biomedical Sciences **9:00 AM - 10:15 AM**

UPM01 9:00-9:15 Characterizing the Subcellular Localization and Function of Citron Kinase in the Germline of *Drosophila melanogaster,* Kyra Porter

UPM02 9:15-9:30 FbpA and FbpC from the Louse-Borne Relapsing Fever Spirochete, Borrelia Recurrentis, Bind Human C1r and Inhibit Complement Activation, Anna Schulz

UPM03 9:30-9:45 Fluorescence-Activated Cell Sorting Validation of Cell Specific Recombination in Novel Mouse Model, Ananya Pentakota

UPM04 9:45-10:00 Investigating the Role of *Coding Gene 8093* in the Germline Stem Cells, Michael Cavallero

UPM05 10:00-10:15 Vitamin B12 Regulates Long Chain Fatty Acid Synthesis in Macrophages: Implications for Age- Related Inflammatory Disease Intervention, Abigail Dickerson

Moderator: Taylor Kinney
Judge: Morgan Milton

MCSC 249 | Engineering, Technology, and Computer Science **9:30 AM – 11:00 AM**

UPM06 9:30-9:45 Assessing Cloud Coverage with MATLAB Segmentation, Hannah Blackburn

UPM07 9:45-10:00 Sensor Integration Platform for Older Adults, Braxton Chambers

UPM08 10:00-10:15 Characterizing Vegetation by Surface Geometry Through LIDAR, Kyle Kirian

UPM09 10:15-10:30 Application of DFAM in Eastern North Carolina, Micah Gruninger

UPM10 10:30-10:45 Real-Time Alerting for Advanced IoT Management and Deployment, Braxton Chambers

UPM11 10:45-11:00 Design for Additive Manufacturing Applications in Eastern North Carolina, Arlenis Santos

Moderator: Kaitlin Southern
Judge: Colleen Janeiro

MCSC 253 | Human Health **10:00 AM - 11:00 AM**

UPM12 10:00-10:15 Greek Life and Overdose Education, Jackson Cheek

UPM13 10:15-10:30 Secondhand Electronic Cigarette Aerosol in Vehicles Impacts Indoor Air Quality, Luke Thomas & Alex Tiet

UPM14 10:30-10:45 Project MOMS: Mothers, Movement, and Maternal Health Care Providers Study, Abigail Ulffers

UPM15 10:45-11:00 Can Trauma be an Opportunity to Identify and Treat Non-Injury Medical Conditions in Young Adults?, Jackson Cheek

Moderator: Everett Minchew
Judge: Brandon Stroud

MCSC 200 | Diversity, Equity, and Inclusion, Education, Social Sciences 1:00 PM - 3:30 PM

UPM16 1:00-1:15 The Impact of Islamophobia and Social Media on Muslim American Students' Mental Health in School Settings in North Carolina, Noorhan Abu Khalaf

UPM17 1:15-1:30 Body Positivity Influencers: Their Values, Impact on Retailers, and College Student's Opinions, Jenna Scott

UPM18 1:30-1:45 Use of Modular Therapy to Treat Anxiety for School Age Students with Autism, Madison Bille

UPM19 1:45-2:00 Did Policing of Immigration Change During the Trump Administration?, Nitika Jane

UPM20 2:00-2:15 Diving Into the Realm of Politics, Braddock Rhodenhiser

2:15-2:30 BREAK

UPM21 2:30-2:45 School-Based Programs that Address the Social Emotional Learning Needs of Traumatized Children, Samantha Brenz

UPM22 2:45-3:00 Healing from Racial Trauma: Identity Affirmation, Self-Awareness/Reflection, and Problem-Focused Coping, George Cherry

UPM23 3:00-3:15 Don't Sit So Close to Me!: Life History, Disease Salience, and the Behavioral Immune System, Emily Lagnese

UPM24 3:15-3:30 The Effects of a Growth Mindset Intervention on Stereotype Threat of First Generation College Students, Gibely Cisneros-Estrada

Moderator: Babatunde Falohun
Judge: Sydney Wilson

MCSC 249 | Fine Arts, Humanities, Visual Art and Design 1:30 PM - 3:45 PM

UPM25 1:30-1:45 The Connection Between Family: A Representation of Generational Love and Strength Between Women, Lorah Currin

UPM26 1:45-2:00 The Development of Young Adult Committed Dating Relationships, Apoorva Mutyala

UPM27 2:00-2:15 Supportive School Administrative Leadership Practices for Beginning Teachers Retention, Emily Bronson

UPM28 2:15-2:30 Tolkien's Long Defeat and Final Victory: The Christian Triumph of King Théoden in The Lord of the Rings, Arthur Schupbach

2:30-2:45 BREAK

UPM29 2:45-3:00 Adapting Puddleglum: An Exploration of Artistic Liberty, Samuel Lanier

UPM30 3:00-3:15 Nefertiti, Hypatia, and Sappho: Reception History and Women in the Ancient Mediterranean, Anna Roche

UPM31 3:15-3:30 Carnatic and Western Post-Tonal Fusion: Asha Srinivasan's Exploration into Combining Western Post-Tonal Music and Carnatic Classical Music, Ella Green

UPM32 3:30-3:45 My Great Expectations: A Personal Narrative Portfolio, Olivia Warren

Moderator: Seo Eo
Judge: Bethany Martin

MCSC 253 | Natural Sciences **2:00 PM - 4:00 PM**

UPM33 2:00-2:15 Silicon DiOxide is the Most Abundant Mineral in the Earth's Crust: How Toxic is It?, Ankita Prakash

UPM34 2:15-2:30 Investigating the Seed Bank of a Wetland Plant Community in a Long-Term Mowing and Fertilization Experiment, Peyton Harrelson

UPM35 2:30-2:45 Identifying Cu^{2+} Binding to a Novel Cupredoxin from *Brucella abortus,* Alexa Kerkan

UPM36 2:45-3:00 Quantum Tunneling in AtLOX1, Savannah Swink

3:00-3:15 BREAK

UPM37 3:15-3:30 Trehalose Effects on Soybean Lipoxygenase-1 Catalysis and Activation Energy, Luis Guevara

UPM38 3:30-3:45 Investigating the Causes of Hatching Failure of Eastern Bluebird Eggs, Hannah Costa

UPM39 3:45-4:00 Clots and Chromatography: Analyzing the Role of Post-Translational Modifications on Blood Clot Formation, Caroline Daub

Moderator: Juan Beltran-Huarac
Judge: Jasper Leavitt

Undergraduate Poster Presentations (In-Person)
Ballrooms

Ballrooms | Biomedical Sciences **9:30-11:30**

UPR01 The effects of manipulated performance feedback on the individual performance of a rope-pulling task, John White Singleton
UPR02 Combating bacterial biofilms: Functional characterization of the Vibrio fischeri biofilm regulatory protein SypE, Ehime N. Abhulimen and Morgan E. Milton
UPR03 Examination of ADAP/Centaurin-a1 in Cognitive Dysfunction Using Trace Eyeblink Classical Conditioning, Luke Davis Jackson, Liz Harris, Wyatt Bunner
UPR04 Adhesion-Mediated Synapse Formation in Developing Neural Networks, Gaelle Desert, Daisy Perez, Michelle Cobb
UPR05 Exploration of Early-Stage Infection-Detection Bandages as Means for Increasing African American Health Outcomes, Marzuq Islam, Ono Abhulimen, Daniel Lee Dickerson, Shawn Anthony Moore
UPR06 A Self-Separating Colloid: A Stochastic Model of Sperm Cell Population Dynamics, Logan Michael Harrison
UPR07 The role of mRNA translation mechanisms in germ cell and embryonic development in C. elegans, Hannah B. Umphlett, Molly Lasure, Eun Suk Kim
UPR08 The Effect of Landing Error Scoring System Performance on Femoral Articular Cartilage Deformation in Recreationally Active Females, Lily Szwejbka, Matthew Blount, Starrett Vesper
UPR09 Offspring Deficits Associated with Paternal Western Diet Are Replicated by Depletion of miR-10 in Drosophila Melanogaster Brain, Steven Bradley, Contributors: Elena Pak, Ethan Angell, Yousef Ahmed, Daniel Akhnoukh, Mohammed Ibrahim
UPR10 Electrochemical Detection of Abasic Sites in DNA using Novel Azulene Derivatives, Samantha Brandt, Rachel Smith, Elizabeth LaFave
UPR11 Developmental Toxicity and Immunotoxicity of Perfluorohexane Sulfonamide, Nia Moore, Qing Hu and Jamie C. DeWitt

Ballrooms | Business **9:30-11:30**

UPR12 Investigating Fraud and Strategies to Decrease Fraud within Youth Sports Organizations, Mason W Hudnall

UPR13 Student and Professional Perceptions of CPA Evolution, Jordan Patricia Anderson
UPR14 Investor's Perceptions regarding Fraudulent Environment, Social, and Governance (ESG) Disclosures, Madison O'Neal Cullipher
UPR15 InHouse Call- Business Plan, Grant Harrison Smith
UPR16 Accounting Students' and Professional Perceptions of Work-Life Balance and Stress in Public Accounting, Noah Preston Fox
UPR17 Covid-19 Effects on Commodity Pricing, Andrew Christopher Page, Thomas Robbins

Ballrooms | Fine Arts, Humanities, and Interdisciplinary Innovation **9:30-11:30**

UPR18 Voices of the Silenced: A Musical about Domestic Abuse, Mikaela Eleanor Trank- Director, writer, lyricist; Graham Podraza-Music Director; Alex Scanlan- Partial Lyricist (one song only); Emma Laughinghouse- Partial Lyricist (one song only); Paige Oneil- Choreographer
UPR19 Athelas the Healing Herb in Tolkien's The Lord of the Rings Books, Kelly Melissa Lizama
UPR20 Experiential Learning in the field of Social Work, Silvia Teresa Tyson
UPR21 Digital Mapping to Enrich Study Abroad Experiences, Nina Marlyn Carrillo Corujo, Julia Marie Kohake
UPR22 Compositional Analysis of Women's 19th Century Medicines by Liquid Chromatography-Tandem Mass Spectrometry, Grayson B. Sink, Elizabeth R. LaFave
UPR23 If I Had Known! Designing a Preparatory Course for Maximizing Study Abroad Experiences, Samantha Nichole Odell

Ballrooms | Natural Sciences **9:30-11:30**

UPR24 Does Black Gill Disease increase the likelihood of other parasitic infections?, Amanda Lynn Riggs
UPR25 Investigating the formation of Carolina Bays using ground penetrating radar, Jennifer H. Fulcher, Dr. Eric Horsman, Dr. David Mallinson
UPR26 Isolation and kinetic characterization of a plant lipoxygenase from maize, ZmLOX5, Yuri Ly Almonte, Kaylee Sagrero
UPR27 Identification and Characterization of Dry Detention Basins in the City of Greenville, NC: A Preliminary Assessment, Kaleigh Bell, Guy Iverson, Mike O'Driscoll, Rob Howard, Philip Van Wagoner, Charles Humphrey
UPR28 Toxicity of nanoparticle titanium dioxide on the biochemical and physiological mechanisms in Camelina sativa, Shivangi Jha
UPR29 Effects of Localized pH Changes on Enamelin Phosphoserine Stability, Rachael Adair Johnson
UPR30 Adamts9 Mutation Causes Ectopia Lentis in Humans and Zebrafish, Alyssa D. Blackwell, Jenny Thi Huynh, Caroline M. Johnston, Jonathan J. Carver, Lama Alabdi, Timothy Erickson, Fowzan S. Alkuraya, Yong Zhu
UPR31 DIVALENT CADMIUM AND LEAD INTERACTIONS WITH EF-HAND PROTEINS: AN INTRINSIC FLUORESCENCE STUDY, Taylor Falk, Tamara Vasquez
UPR32 The Importance of Temporal Components of the Advertisement Call in the Peruvian Mimic Frog, Ranitomeya imitator, Otha Malik Whitney
UPR33 Comparative Parasite Diversity in Panopeid Crabs, Carrie Adams

Ballrooms | Social Sciences **9:30-11:30**

UPR34 Examining the Cultural Validity of the Coping Flexibility Scale-Revised, Kolby Nicole Kinnaman
UPR35 Prevalence and Correlates of Stress-Related Growth due to the Pandemic, Jordan Signorelli
UPR36 The Relationship between Stigma and Mood in College Students with Disabilities, Caroline Penny Knox
UPR37 The Relationship between Athlete Efficacy Beliefs, Decision Making, and Eye-gaze, Emily M Ryan and Sophia Garcia
UPR38 The Impact of FIA's 2022 Rule Changes on Competitive Balance in Formula 1, Cameron Prince, Jonathan Lee, and Lester Zeager
UPR39 Oral Health Care Providers Retention Across ENC, Quaid Lawler, Dr. Lauren Sastre, Dr. Vanessa Pardi
UPR40 An Analysis of the Effectiveness of the Essential Air Services Program, Kaylee Brett Warren
UPR41 PREA protections for incarcerated transgender individuals: An updated comparison of state correctional policies in the United States, Tyler Shane Hug

Ballrooms | Biomedical Sciences **10:00-12:00**

UPR42 Functional Connectivity Alterations for Oculomotor, Cognitive, and Fine Motor Tasks Across Disease States in Neuroborreliosis, Jenna Grissam, Maanav Desai
UPR43 Neuroinflammation in Gulf War Illness, Olivia Marie Glazer
UPR44 Role of Ferlin Family in Human T-cell Leukemia Virus Type 1 Infection, Abigail Fruge, Kimson Hoang, Nicholas Polakowski, Isabelle Lemasson
UPR45 Investigating the effects of inherent and applied fiber tension on fibrinolysis, Mason Lee Verhaeghe
UPR46 Exploring the Relationship Between Migraines, Hemoglobin, and Oculomotor Controls, Kendall Riley Nelson, Clarke Oliver, Carolyn Baylee Haynes, Sydney Nestor

UPR47 Setting Up an EEG Laboratory for Language Research, Maddie Coster, Matthew Walenski, & Kathrin Rothermich
UPR48 The Influence of Fatigue on Decision Making in Adults with mTBI, Karen Warlick, John Mallett, Emily Smith
UPR49 Sensorimotor and Visuomotor Characteristics of Baseball Pitching Performance, Samantha Morgan, Carolyn Baylee Haynes, Taylor Kinney, Baylor Fish, Jeremy Praski
UPR50 Expression and purification of the regulatory domain of human cardiac troponin C:A protein optimization study, Luis Felipe Oliveira
UPR51 Intracardiac Dopamine Receptor 1 and 3 Expression in Angiotensin II-Induced Hypertension, Myna Tirupattur, Srinivas Sriramula, Laxmansa C. Katwa

Ballrooms | Community Engagement, Diversity, Equity, and Inclusion, and Education

10:00-12:00

UPR52 Building Emotional Intelligence Through LGBTQ Children's Books, Madison Alexander
UPR53 The Pitt Perspective Podcast, Kamryn S Scott, Ashley H Wolfe,
UPR54 Handwriting Abilities of Low-SES Elementary Students Compared to Grade-Level Expectations, Ashley Grace Jones
UPR55 Researching and Writing a Children's Book for Underrepresented Groups in Literature, Lauren Anastasia Price
UPR56 Effectiveness of Phonological Interventions with Students At-Risk for Reading Difficulties, Noelle Rose Halverson, Shelby Marie Hoggard

Ballrooms | Human Health **10:00-12:00**

UPR57 Spring Evaluation of Low-Cost Aerosol Instruments, Joanna Mathew, Neha Joseph
UPR58 Improving the Quality of Nasopharyngoscopy Data for Management of Velopharyngeal Insufficiency: A Multisite Experience, Lydia Marie LaFevers, Taylor Danielle Snodgrass, Kathryn Grace Fennie, Imani Rochelle Gilbert, Thomas James Sitzman
UPR59 The effect of gravity on velopharyngeal soft tissue and muscles Haley M. Masterjohn
UPR60 The Role of the Right Temporo-parietal Junction in Social Language Processing: A tDCS Study Protocol, Jewlia Burney, Ke'Asia Craig, & Kathrin Rothermich
UPR61 Dialogic Reading and the Impact on Emergent Literacy and Developing Literacy Skills, Meghan Grace Whalen, Yolanda Holt
UPR62 Neuroplasticity Mechanisms of Remote Ischemic Conditioning in Children with Unilateral Cerebral Palsy, Destiny Alling
UPR63 Creating Methods for Measuring Individual Muscle Force through Ultrasound Elastography and Motion Capture, Nancy Chizorom Imoh
UPR64 The Relationship Between Speech Recognition in Noise vs Dichotic Digits Performances, Katelyn Nichole Overcash
UPR65 Exploring the Relationship Between Stuttering, Tinnitus, and Other Hearing Difficulties, Anna Scott Ivey, Patrick M. Briley
UPR66 The Effect of COVID-19 Infection on Behavioral Measures of Auditory Function, Laney Pope, Andrew J. Vermiglio, Virginia Driscoll, Erin Kokinda, Drew Huffman, Gabriela Musumeci, Kaitlin Abrams, Alyssa Alford, Trenton Barnett, Morgan Deans, Kelly Dorman, Emily Harrison, Katelyn Overcash, Caitlyn Paulson, McKenzie Perry, Melissa Rafaniello, Olivia Sullivan
UPR67 Association Between the Bindex® and CT Bone Parameters, Bridget Kenny
UPR68 The Effect of a History of Noise Exposure on Speech Perception in Noise Ability, Olivia Sullivan, Andrew J. Vermiglio, Virginia Driscoll, Caitlyn Paulson, Melissa Rafaniello, Erin Kokinda, Drew Huffman, Gabriela Musumeci, Kaitlin Abrams, Alyssa Alford, Trenton Barnett, Morgan Deans, Kelly Dorman, Emily Harrison, Katelyn Overcash, Laney Pope, McKenzie Perry
UPR69 The Effect of Musical Experience on Speech Recognition in Noise Ability, Melissa Rafaniello, Andrew J. Vermiglio, Virginia Driscoll, Caitlyn Paulson, Erin Kokinda, Drew Huffman, Gabriela Musumeci, Olivia Sullivan Kaitlin Abrams, Alyssa Alford, Trenton Barnett, Morgan Deans, Kelly Dorman, Emily Harrison, Katelyn Overcash, McKenzie Perry, Laney Pope
UPR70 Physical Recovery versus the Usage of Analgesics for chronic pain among ECU Students, Kunj Chintankumar Patel
UPR71 Standardizing Brake Force, Makenzie Raine Steidl
UPR72 Gastrocnemius Stress and Stiffness Research in Relation to High Heeled Shoes Brandon Waugh, Coni Heinemann
UPR73, The effect of risk for cochlear synaptopathy and musical experience on speech recognition in noise ability Kaitlin Abrams, Andrew J. Vermiglio, Virginia D. Driscoll, Alyssa Alford, Trenton Barnett, Morgan Deans, Kelly Dorman, Emily Harrison, Drew Huffman, Erin Kokinda, Gabriela Musumeci, Katelyn Overcash, Caitlyn Paulson, McKenzie Perry, Laney Pope, Melissa Rafaniello, Olivia Sullivan
UPR74 Morphology of the Levator Veli Palatini Muscle: Volumetric Assessment, McKenzie Renee Perry, Neda Tahmasebifard
UPR75 A Mixed Methods Review of the Fresh Start Program, Grace Corrine Regan
UPR76 Perceptions of disposal options for prescription opioids among community members in Greenville, North Carolina, Cassidy Nicole Joyce

UPR77 The relationship between Working Memory and Speech Perception in Noise Ability, Emily Harrison, Andrew Vermiglio, Virginia Driscoll, Caitlyn Paulson, Erin Kokinda, Drew Huffman, Gabby Musumeci, Kaitlin Abrams, Alyssa Alford, Trenton Barnett, Morgan Deans, Kelly Dorman, Katelyn Overcash, McKenzie Perry, Laney Pope, Melissa Rafaniello, Olivia Sullivan

UPR78 Investigating the Relationship Between Compensatory Articulation Errors and Severity of Hypernasality: A Preliminary Literature Review, Hannah Ragsdale

Ballrooms | Engineering, Technology and Computer Sciences **1:00-3:00**

UPR79 Simulation of Autonomous Vehicles for Safe Transportation Network, Sophie M Arruza

UPR80 Determination of nutrient adsorption capabilities of 3D-printed ecomodules, Ariel R'Monie Lineberger

UPR81 Concrete Crack Sealant in Infrastructure Repair Literature Review, Caleb Lane Messer, Amin Akhnoukh

UPR82 Simplifying and Improving a Near-Point Convergence Test Tool, Jamie Bonfiglio, Claire Jenkins, Emma Cole, Nigel George

UPR83 Bioplastic production for food packaging application: A proof of concept, Luciano DeRose, Kura Duba

UPR84 Development of a Virtual Reality Assessment of Oculomotor Function, Austin Finlason, Rui Wu, Chia-Cheng Lin, Brian Sylcott

UPR85 A Student-Centered Personalized Learning Framework to Advance Undergraduate Robotics Education, Nicholi William Kaminky, Carlos Ochoa, Austin Conner Finlayson, Zhen Zhu, Marjorie Campo Ringler, Rui Wu

Ballrooms | Human Health: Maternal and Child Health **1:00-3:00**

UPR86 Walking Into Wellness, Gracie Reavis, Ana Cabrera-Perez, Bianca Martinez, Gauri Patel

UPR87 Latino Families Experiences with Science in Their Daily Lives, Natalia Figueroa-Bernal and Adamari Calixto-Benitez

UPR88 Centering Family Voice- A Multi-Dimensional Examination of Family Engagement, Ashley Zuniga, Pooja Deshpande

UPR89 A Closer Look at Mothers in Rural North Carolina, Simona Adhikari

UPR90 Exploratory Program Evaluation of BabyCare, a Medicaid-Funded Home Visiting Program in Virginia, Leslie M Osorio Pascual

UPR91 Dentists and Dental Hygienists' role in Human Papillomavirus (HPV) vaccination uptake in North Carolina, Rory Moore

UPR92 'If you just tell me you're 18, I'll still sell to you': A qualitative study of underage tobacco product purchasing experiences in a tobacco 21 compliance study, Tyler Austin West, Mahdi Sesay

UPR93 A Group-Based Approach to Addressing Postpartum, Lactation, Pregnancy, and Mental Health Needs of Women, Miranda Faith Gavin

UPR94 The Effects of Hand-Arm Bimanual Intensive Training (HABIT) on Real-world Bimanual Performance in Children with Unilateral Cerebral Palsy, George Grant Kirkman

UPR95 Mapping and Analyzing the Pressuring Points and Structural Inequities of Maternal Healthcare, Shakira S Jones

UPR96 Care Management for High-Risk Pregnancies, Lindsay Jean McCoy

UPR97 Vaping Prevention Among the Youth Population in Pitt County, Alisia Ling Tseng & Jennifer Cremeens Matthews

UPR98 The Impact of Dialogic Reading Techniques on Individuals with Autism, Katherine Manning Whitehurst

UPR99 North Carolina Foster Care Systems, Audrey Bell

Ballrooms | Natural Sciences **1:00-3:00**

UPR100 Using DNA Barcoding and Fouling Plates to Identify Cryptic Species, Rachel Gittman, & Charles Michael Brooks

UPR101 Design of a pDronpa1.2-based optogenetic switch for control of disease-associated cytoskeletal structures, Hasitha Sri Tatineni

UPR102 Anisotropic Cross Section for Elastic Scatterings Within the Quark Gluon Plasma, Jennifer H. Fulcher

UPR103 Testing models of subvolcanic magma system growth using geochemistry and rock magnetism, Joseph Mohamed Abuarab

UPR104 Identification of polyphosphate accumulating organism (PAO) candidates for biosensor development in WWTP, Ananya Koirala

UPR105 Temperature study and genome analysis of marine Pseudoalteromonas sp., Opal E. Moore

UPR106 Investigating the role microRNAs play in the root-knot nematode Meloidogyne incognita's viability, reproduction, and parasitism in cotton, Wesley Jennings Shepherd

UPR107 Mitochondrial genome evolution suggests where the eukaryotic root connects to the tree of life, Ryan Leigh Griffin

UPR108 Design and Application of an Immobilized Protein Kinase, Anna M. Schulz, Charles E. Booth Robert Hughes

Ballrooms | Social Sciences **1:00-3:00**

UPR109 AN ANALYSIS OF PUBLIC OPINION ON HUMAN TRAFFICKING LEGISLATION IN NORTH CAROLINA, Aimee Corinn Heroux
UPR110 Relationships among Cumulative Life Stress, Interoception, and Psychopathological Symptoms, Isabella Renee Benitez, Alia Simon
UPR111 How 17th Century German Law Affected the Witch Trial of Katherina Kepler, Regan Moore and Christina Dolan
UPR112 Aegean Frescoes and Their Correlating Myths, Shannon Shields Dugan
UPR113 School-Based Mental Health Services in Students with Autism Spectrum Disorder, Alicia Taylor Ringgold
UPR114 Public Opinion and Catholic Infrastructure's Impact on the Fluctuation of DignityUSA Chapters, Michelle Ann Voyles
UPR115 Nativity differences in cardiovascular disease outcomes among Blacks in US, National Health Interview Survey (2013-2017), Madison Barnhill, Haley Tailor, and Leslie Cofie
UPR116 Juvenile Court Outcomes across Race/Ethnicity, Taylor C Kibble

Ballrooms | Biomedical Sciences **1:30-3:30**

UPR117 Effect of H-10 on Flexural Strength of Methacrylate-based Adhesive, Sarah Gillespie, Joesph Hampton, Saulo Geraldeli
UPR118 Immune Checkpoint Inhibitors-Induced Colitis is Mitigated in GPR4 Knockout Mice via TNF-α Downregulation, Luke W. Boldt, Mona A. Marie, Ashely J. Williams, Li V. Yang
UPR119 Altered Hypothalamic Transcriptome in a Mouse Model of Multiple Sclerosis, Kristy M. Lau, Jonathon C. Carver, Alessandro Didonna
UPR120 HIIT Training and preservation on muscle and mitochondrial function in mice, Hayden Gary Carter
UPR121 Student Assessment of PM2.5 Concentration at ECU Transit Bus Stops Using a Low-Cost Aerosol Monitor, Will Murray
UPR122 Centaurinα1-Bid Signaling in Alzheimer's Disease Progression, Mary E Phipps, Wyatt Bunner, Denys Bashtovyy, Ryohei Yasuda, Erzsebet M. Szatmari
UPR123 Effect of Drop Jumping and Knee Valgus on Femoral Cartilage Thickness, Matthew G. Blount, Starrett Vesper, Lily Szwejbka, Anthony S. Kulas
UPR124 Investigating Mechanisms of Synapse Formation in Developing Neural Circuits of a Human Brain Model, Daisy Perez, Gaelle Desert, Michelle Cobb, Karen Litwa
UPR125 Sensorimotor and Visuomotor Characteristics of Baseball Pitching Performance, Samantha Morgan, Carolyn Baylee Haynes, Taylor Kinney, Baylor Fish, Jeremy Praski, Dr. Nicholas Murray
UPR126 The Hidden Role of Dopamine Receptors 1 and 3 in Cardiac Fibrosis, Nandini Vishwakarma, Shannon E. Bryne, Srinivas Sriramula, Laxmansa C. Katwa

Ballrooms | Community Engagement, DEI, Education **1:30-3:30**

UPR127 Hyde County Dental Project: Providing Oral Healthcare in a Health Professional Shortage Area, Wrenn McCrae Whitfield
UPR128 Bringing Diversity to the ECU Honors College, Kyia Lanae Riddick, Mahogany Roper, Fosua Dadson
UPR129 Impact of the HNRS 2000/3000 Course Sequence, Taylor Katherine Lee, Allison Nicole Werner, Nia Gilmore
UPR130 Portfolio of informative materials for prospective East Carolina University students seeking accommodations from Disability Support Services, Aurora Shafer
UPR131African American English (AAE) Usage and Its Impact on African American Children in an Academic Setting, Kira Mariah Stith
UPR132 The evolution of my identity as a literacy educator througout my English Language Arts methods course, Molly Ryanne Baile
UPR133 How do Children Respond to Fairytales?, Mallory Blair Smith
UPR134 Investigating Co-planning and Co-teaching in Higher Education Statistic, Emma Rebekah White
UPR135 PBIS through an International Lens, Calli Jon Massengill
UPR136 A Survey of Perceptions of Cheating on Exams by Undergraduate Students, Jeremy Pope Dawson

Ballrooms | Engineering, Technology and Computer Sciences **1:30-3:30**

UPR137 Recycled and Manufactured Adsorptive Materials to Reduce Phosphorous Concentrations in Wastewater Loads, Deja Alexis Drummond
UPR138 Investigating the impact of flow rate on the structural and mechanical properties of clots formed under flow, Hannah Kristen Sowers
UPR139 Evaluation of Hydraulic Spread Calculations for NC Bridges, Preston Lewis Skinner
UPR140 Furcation Involvment Detection in Dental X-Ray imaging using Machine Learning, Jordan Welborn
UPR141 The Benefit of Machine Learning Techniques to Aid Breast Cancer Recurrence Prediction, Madison Rose, Jarred Desrosiers

Ballrooms | Natural Sciences **1:30-3:30**

UPR142 Identification of Iron-Oxidizing Bacteria on Steel Structures in Freshwater Environments, Meredith Cox
UPR143 Reliability of E. coli as a Water Quality Parameter in Monitoring Urban Streams, Roman A. Mirra, Andron Adams, Tyra Denning, Surinder Gill, Eryn Meads, Scott Siebor, Christina Skinner, Randall Etheridge, Michael O'Driscoll
UPR144 Characterization and Synthesis of Brucebactin Conjugate, Rodney Emmanuel De Diavoukana
UPR145 Invasive species, Petrolisthes armatus, documented in North Carolina waters for the first time; New demographics and parasite diversity of the green porcelain crab, Chloe Elisabeth Manning-Moore, Carter Kathleen Stancil
UPR146 Microglial changes in the brains of mice exposed to individual per- and polyfluoroalkyl substances (PFAS) specifically whether exposure affects basic locomotor activity and number/morphology of microglia in the brains, Jessica Ann Bartram
UPR147 The Effects of the Metal Ions Zn and Ca on TTR Amyloid Formation, Ashton Nichole Norris, Kwang Hun Lim
UPR148 Coastal Stressor Effects on Sediment and Salt Marsh Cordgrass (Spartina alterniflora) Root-Associated Microbiomes, Surinder Kaur Gill, Mary-Margaret McKinney, Rachel Gittman
UPR149 The Effects of Horizontal Gene Transfer on the Evolution of Land Plants, Memphis C Jandron
UPR150 Incorporating Team Science in Undergraduate Research, Seth E. Green

Ballrooms | Social Sciences **1:30-3:30**

UPR151 Intersectionality and Burnout in Medical Residency Programs, Kassidy Johnson, Tolu Joaquim
UPR152 Pain Acceptance and Anxiety in Adolescents with Sickle Cell Disease, Anna E. McMillan, Dhanashree R. Bahulekar
UPR153 The Effects of Racialized Poverty Within the Health Care System of Eastern North Carolina, Kendra Renee Brent
UPR154 Understanding the factors which influence the choice to pursue a career in accounting among Hispanic students, Evelyn Gonzalez
UPR155 Factors that Impact Infidelity Forgiveness, Ruby Claire Bradford
UPR156 Differences in cannabis strains and product types used most often by a cross-sectional sample of people who use cannabis to relieve pain, nausea in the United States, Devin William Sabatino, Kathleen Louise Egan

Undergraduate Student Posters (Online)

MCSC Room 237, 9:30-3:05

9:30-10:30 Why are Women Less Motivated to Become Financially Literate?, Lexi McCoy

9:30-10:30 Palliative care providers and administrators' perspectives on integrating social determinants of health to provide comm8nity-based palliative care, Savannah Gail Blalock

9:30-10:30 The Effects of Per- and Polyfluoroalkyl Substances on Testosterone and Erectile Function through a Liver Peroxisome Proliferation Assay and Lipid Liver Histology, Anjalee J Hou, Johanna Hannan, Molly Alexander

9:30-10:30 Exploring Facilitators and Barriers in Advance Care Planning with Latino Leaders, Abby Harris

9:30-10:30 Purple vs. Gold: An Exploration of Tabletop Exercises for Collegiate Cybersecurity Training, Collin Garrett Roach, Isaiah Bradshaw, Tyler Allen Brown, Matthew Maurice Castelo, Donovan Earl Bernard

9:30-10:30 Facilitating Conversations About Advance Care Planning with Latino Leaders Using the Hello Game, Teresa A Hupp

9:30-10:30 Impact of Parental Substance Abuse on Children Involved with the Child Welfare System in the U.S.: A Literature Review, KaLynn Mae Toler

9:30-10:30 The Utilization of Interprofessional Education (IPE) in Nursing Education to Close the Communication Gap Among Healthcare Teams: An Integrative Review, Jillian Irene Harvey

9:30-10:30 Genre Immersion, Jaela Angelique Fisher

9:30-10:30 A Needs Assessment for a Physical Activity Intervention for Caregivers, Kristen E Somma

9:30-10:30 The Realtionship Between Breastfeeding and Postpartum Depression, Kendall Lynn Tingen

9:30-10:30 Monkeypox Vaccines: Importance of the Vaccina Virus O1L Gene, Marina Nichole Boatman

10:45-11:45 The novel function of PUF-9 RNA-binding protein in C. elegans Parkinson model, Savannah Jean Marie Lipski, Mariah Jones, M.H Lee

10:45-11:45 Health Coaching Course Data Analysis and Evaluation, Maya B. Cowan

10:45-11:45 DRUGS CLASSIFICATIONS AFFECTING CHILDHOOD MALNUTRITION AND TIME-TO-RECOVERY IN GUATEMALA, Alexia L. Woodward

10:45-11:45 Evaluating the Impact of Social Media Influencers on Exercise Addiction in College-aged Women, Leah Sky Darby

10:45-11:45 The Community Resiliency Model and Community Well-being, Michaela Elmore

10:45-11:45 Introduction of Gender Affirming Care to the APRN Curriculum, Carly Marie Hebert

10:45-11:45 The Unmet Psychosocial Needs of Patients with Sickle Cell Disease from the Perspectives of Family, Patients, and Caregivers, Quinton Direll Braswell, Julie Danielle Doran, and Dr. Aimee West Smith

10:45-11:45 Groundwater Quality Improvements at a School in Eastern North Carolina after Installation of a Permeable Reactive Barrier, Lucas Colby Mebane, Charles Humphrey, Mike O'Driscoll, Guy Iverson

10:45-11:45 Nurses' Use of Chiropractic for Relief of Back and Neck Pain, Regan Taylor Vellan

10:45-11:45 Differences in Neurological Connectivity Between Right and Left Limb Dominant Individuals in Implicit Motor Sequence Learning, Jennifer Lee Painter

10:45-11:45 Veteran-centered health care: A mandate for nursing curriculum integration, Olivia Leigh Kingman

10:45-11:45 MCH Development & Support - An Evaluation, Peri Katrina Palmer

2:00-3:05 Neurocognitive Processes in Children During Talk in the Classroom, Denisse Rosales-Mercado

2:00-3:05 Perspectives of Latino Adults on Cancer Pain, Spirituality, and Advance Care Planning, Kylie Elizabeth Latino

2:00-3:05 Relationships of Religious Affiliation, Coping, and Support with Symptoms of Psychopathology in College Students, Daisy Kathleen Edmondson

2:00-3:05 Surveillance and Dental Health, Alexandra Lynette Marks

2:00-3:05 Rural Dwelling Women Living with HIV in the South: Facilitators and Barriers to HIV Care, Justine Nakanishi Caskey

2:00-3:05 Fresh Start Program at ECU, Jenny Bryant Harris

2:00-3:05 Soul Food: An Examination of Physical Actvitiy in Black Women, Jalen J Walker

2:00-3:05 Examining stress and quality of life in women who undergo and forgo infertility treatment, Alison D Swift, Melvin S Swanson, Emily R Thomas

2:00-3:05 LoRa Signal Mapping and Modeling for Deployment Planning, Henry H Jones, Braxton Chambers

2:00-3:05 Faculty Competency in Nursing Informatics: An Integrated Literature Review, Natalia Grace Biser

2:00-3:05 Data at Integrity, Trek Emerson Thorne

2:00-3:05 *Type IQ: A Typographic Research & Design Project,* Savannah Renae Harris

2:00-3:05 Pandemic miscarriages: Social determinants of health and patient experiences, Anna Whaley

Schedule—Wednesday, April 5, 2023
Research and Creative Achievement Week (RCAW) 2023

Graduate Student and Postdoctoral Scholar Day

Graduate Student and Postdoctoral Scholar Podium Presentations

MCSC 249 | Community Engagement, Diversity, Equity, and Inclusion, Education 9:00 AM – 11:00 AM

GPP19 9:00-9:15 Castle Island Community Initiative: Increasing Public Awareness of and Engagement with Isolated Cultural and Environmental Resources in Washington, NC, Lindsay Myers Wentzel

GPP20 9:15-9:30 MMIWG2: Rhetorical Strategies for Awareness, Change, and Reclamation, Rocky Elizabeth Patacsil

GPP21 9:30-9:45 Intersecting Rhetorical Velocity & Antiracism as Strategies for the Creation of University Crime Notifications under the Clery Act, Jason Lee Sugg

GPP22 9:45-10:00 A survey of a co-evolutionary review _strategy for writing center exit forms/session notes, Steven Andrew Amador

GPP23 10:00-10:15 Public education of monitoring and maintaining local waterways through participation in the Earth Echo Water Challenge, Emma Teed

GPP24 10:15-10:30 Does Entrepreneurship Education Impact Undergraduate Interest, Grit, Self-Efficacy, or Retention in Biology?, Elliot Weinthal

GPP25 10:30-10:45 Domestic Immersion-Based Learning: Preparing Students for a Global Workforce, Bethany Leigh Martin

GPP26 10:45-11:00 Identifying and Applying Sound Design Principles for Multimodal Content Creation: Analyzing Professional Content Creators' Adobe Instructional Videos, Yvonne Kao

MCSC 253 | Biomedical Sciences 9:00 AM - 10:30 AM

GPP01 9:00-9:15 Cox6a2 in skeletal muscle: a marker of and therapeutic target for chronic limb threatening ischemia, Makenzie G. Kolasa, Emma J. Goldberg, Zoë S. Terwilliger, Reema Karnekar, Thomas D. Green, Ananya V. Pentakota, Feifei Li, Dean J. Yamaguchi, Kelsey Fisher-Wellman, Espen E. Spangenburg, Joseph M. McClung

GPP02 9:15-9:30 Postural Control Following COVID-19 Infection: Pilot Data, Brittany Trotter; Kendall Nelson; Delaney Brumback; Sydney Nestor; Dr. Nicholas P. Murray

GPP03 9:30-9:45 Net Charge Distributions from High Energy Heavy Ion Collisions, Mason Alexander Ross

GPP04 9:45-10:00 CRISPR/Cas9-mediated deletion of FGF Receptor 1 in AgRP neurons results in obesity and impaired glucose metabolism, Daniel Shookster, Hu Huang

GPP05 10:00-10:15 pH-sensing G protein-coupled receptor GPR68 inhibits proliferation and migration of vascular smooth muscle cells, Madison D. Williams, Joshua S. Morgan, Michael T. Bullock, Cindy Kukoly, David A. Tulis

GPP06 10:15-10:30 GammaTile Brachytherapy with 5-Aminolevulinic Acid Fluorescence-Guided Resection in an Adolescent with High Grade Glioma, Julian Gordon, Melisa Pasli, Cathleen Cook, Rainor Connor, Andrew Ju, Stuart Lee, Kathleen Knudson, Matthew Peach

MCSC 200 | Human Health 9:00 AM – 10:00 AM

GPP48 9:00-9:15 Exercise During Pregnancy Influences Offspring Health Biomarkers, Alex Claiborne PhD

GPP49 9:15-9:30 Beliefs About and Attitudes Towards Menstruation Among American Youths and Their Suggestions to Improve Early Menstrual Communication, Insha Pun

GPP50 9:30-9:45 Utility of screening for Adverse Childhood Experiences (ACEs) in adult primary healthcare settings: A Systematic Review, Betul Kucukardali Cansever, Stephanie Ann Bridgland

GPP51 9:45-10:00 Effect Of Load Carriage on Patellofemoral Joint Stress in Physically Active Young Females, Ankur Padhye, Stacey Meardon, Junfei Tong, Jaques Reifman, and John Willson

MCSC 200 | Natural Sciences 10:15 AM – 11:45

GPP67 10:15-10:30 Tradeoffs between phenology and geography constraints in response to environmental changes in the Eastern Pacific, Katherine E. Dale

GPP68 10:30-10:45 Monitoring breeding Black Rails in North Carolina Game Lands to evaluate the effects of prescribed burns on occupancy, Bailey A Kephart

GPP69 10:45-11:00 Modeling the Impact of Container Geometry on the Uniformity of Dose in Irradiation Calibration, Marcus Snedeker

GPP70 11:00-11:15 Using environmental DNA (eDNA) to monitor river herring movement within the lower Roanoke River Basin Chase G Spicer, Cammy Bailey, Will, Sara Roozbehi, Aaron J. McCall, Patrick Harris, Brian Boutin, Julie DeMeester, Roger A. Rulifson), Erin K. Field

GPP71 11:15-11:30 Can a native mud crab exploit low salinity refugia to escape an invasive body snatching parasite?, Haley Dawn Hagemeier, Carter Stancil

GPP72 11:30-11:45 Effects of Productivity on Grassland Community Structures Across Spatial and Temporal Scales, Jasper Leavitt

MCSC 253 | Fine Arts, Visual Art, and Design 10:45 AM – 12:00 PM

GPP38 10:45-11:00 Material Translations, Emily Booker

GPP39 11:00-11:15 Doodles From the Noodle: The process of translating intuitive drawing into the third dimension, Charles Randolph Shotton

GPP40 11:15-11:30 Assembly Required: The Queering Principles of Collage and Science-Fiction, Anthony Naimo

GPP41 11:30-11:45 River Rat, Morgan Williams Zichettella

GPP42 11:45-12:00 Beyond the Folds: Emergent Properties in Paper, John Cannon Rhodes-Pruitt

MCSC 249 | Biomedical Sciences 11:15 AM - 12:45 PM

GPP07 11:15-11:30 Silencer/Counter-Silencer Interactions Coordinate Virulence Gene Expression in Brucella spp.—Role of Zn-Finger Protein MucR as an H-NS-like Gene Regulator, Ian S. Barton, Joshua E. Pitzer, Connor B. Cribb, Daniel W. Martin, Ilaria Baglivo, Zhongqing Ren, Xindan Wang, and R. Martin Roop II

GPP08 11:30-11:45 Elucidating the conjoined regulation of the Chkb-Cpt1b locus in the development of the eutherian brown adipocyte phenotype, Jonathan Berkuta, Bhavin Patel, Dr. Fanrong Yao, Dr. Brian Shewchuk

GPP09 11:45-12:00 Sperm Information Games: Rethinking Sperm Physiology Through the Lens of the Reproductive Microenvironment, Benjamin Brisard, Debajit Bhowmick, William J. Miller, Stephanie Stewart, Ethan Carrow, Logan Harrison, Bethany Siefferman, Chelsea Dennis, Paul Vos, Nathan Hudson, P., Cameron A. Schmidt

GPP10 12:00-12:15 Social regulation of the A11 Dopaminergic Region in Zebrafish (Danio rerio), Faith K Heagy, Katie N Clements, Miranda C Setneska, Elena Blain, Fadi A Issa

GPP11 12:15-12:30 Biochemical and HDX Studies of the SNP Y649C in Human Platelet 12-Lipoxygenase Linked to a Bleeding Disorder, Rachel Lee Signorelli

GPP12 12:30-12:45 Multi-Technique Determination of Fibrin Fiber Diameter, Heather Ann Belcher

MCSC 253 | Fine Arts, Visual Art, and Design 12:15 PM – 1:30 PM

GPP43 12:15-12:30 Ceramics, Glaze, and Plaster Molds, Nicholas Ryan Fowler

GPP44 12:30-12:45 Nature, Heart, Life: A Study of the Life and Works of Alma Mahler, Jordan Virginia-Mae Cartrette

GPP45 12:45-1:00 A Shift in Process II: Non-Traditional Painting Applications with Integrated Technology, Christopher Michael Zidek

GPP46 1:00-1:15 Exploring the Potential of Educational Games in Graphic Design Education: Creating Engaging User Interfaces and User Experiences, Amal Abdelazeem, Abdelsalam Abdalla

GPP47 1:15-1:30 Implementing Letterpress Printing in the Design of Information, Lee Turner

MCSC 200 | Humanities and Social Sciences 12:00 PM - 1:15 PM

GPP57 12:00-12:15 The Negotiation is the Game: How TRPGs influence player agency through document design, Kasen Christensen

GPP58 12:15-12:30 Consubstantiality In The Legal Profession, Michael Gordon Byrd

GPP59 12:30-12:45 Optics of Implication: Rhetorical Performance in Zoom Quarterly Earnings Webinar, Sarah Bess McCullouch

GPP60 12:45-1:00 The Return of what? Coherence Issues in ECU's Return of Pirate Nation Covid Resources, Nicole Elizabeth Allen

GPP61 1:00-1:15 Speech Directed toward Older Adults, Rose Baker, Catherine Nobles, Heidi Reis, Susan C. Bobb, & Kathrin Rothermich

MCSC 249 | Biomedical Sciences 1:00 PM - 2:30 PM

GPP13 1:00-1:15 Defining mechanisms underlying tissue fragility in AEC, Maddison N. Salois

GPP14 1:15-1:30 Analysis of Different Types of Bracketing and Their Ability to Track Lung Tumor Motion, Wesley Andrew Belcher

GPP15 1:30-1:45 The Effects and Mechanisms of Lactate and Protons on the Human Umbilical Vein Endothelial (HUVEC) and Murine Melanoma (B16F10) Cells' Migration, Adhesion, and Attachment, Fatema B. Salem and Li V. Yang

GPP16 1:45-2:00 Confocal imaging and quantitative analysis of 3D morphology of human neutrophils, Lillie Dawn Huffman

GPP17 2:00-2:15 Oligomannose N-glycans Promote Neuroblastoma Progression, Adam Burch, Kristen Hall, Cody Hatchett, Ruth Schwalbe

GPP18 2:15-2:30 ATP synthase reversal supports oxidative metabolism in AML, James T. Hagen, Mclane Montgomery, Debijit Bhowmick, Darla Liles, Myles C. Cabot, Cameron Schmidt, Tonya Zeczycki, and Kelsey H. Fisher-Wellman

MCSC 253 | Engineering, Technology, and Computer Science 2:00 PM – 3:15 PM

GPP27 2:00-2:15 Using Unmanned Aircraft Systems For Construction Verification, Volume Calculation, and Field Inspection, Andres Leonardo Acero Molina

GPP28 2:15-2:30 Computational Modeling of Arteriovenous Fistula Hemodynamics in Pulmonary Hypertension Patients, Kaitlin Southern Fatehmeh Bahmani, Stephanie George, Veeranna Maddipati

GPP29 2:30-2:45 Global Health Technology Project [Imaging the Source of Intelligence and Creativity], Babatunde I Falohun

GPP30 2:45-3:00 Automatic Brain Tumor Classification, Ekaterina Vilkomir, Tara Gill, Jerrica Deloatch

GPP31 3:00-3:15 Workflow Automation for Water Resource Modeling and Forecasting, Colby Lee Sawyer, Ciprian Popoviciu

MCSC 200 | Humanities and Social Sciences 1:30 PM – 2:45 PM

GPP62 1:30-1:45 Impact of Buyout Programs on Land Use Patterns in the Special Flood Hazard Area of Pitt County, North Carolina, Adeniji, K.N., Mukherji, A.

GPP63 1:45-2:00 The future of wastewater in coastal areas: linking socio-economic and natural systems using Agent-based modeling, Kyra Selina Hagge

GPP64 2:00-2:15 Utilizing the Calm Before the Storm: An Exploration of Disaster Mitigation in Princeville, North Carolina, Alexandra Paige Stevenson

GPP65 2:15-2:30 Preserving the Apex: A Shark Conservation Campaign, Katelyn Francis

GPP66 2:30-2:45 Farm Animal-Assisted Therapy for Individuals with Autism Spectrum Disorder: Parent and Caregiver Perspectives, Mackenzie Paige Dolecheck

MCSC 249 | Fine Arts, Visual Art, and Design 2:45 PM - 4:15 PM

GPP32 2:45-3:00 The Grotesque, Haley Lynn Mcelroy

GPP33 3:00-3:15 Portraiture: An Artistic Representation through Persons and Passions, Loraine Scalamoni

GPP34 3:15-3:30 Documenting the Complexity of Tourette Syndrome: a Neurological Disorder of Control, Repetition and Loneliness, Katelyn Brooke Stanley

GPP35 3:30-3:45 Making Onggi Glaze in American Cireumstance, Joogab Kim

GPP36 3:45-4:00 Dueling Identities: Exploring My Individual Identity within My Twinship, Haleigh Nicole Stanley

GPP37 4:00-4:15 Fuguelistic Inclinations, Michael Benjamin Gaines

MCSC 253 | Human Health 3:15 PM – 4:30 PM

GPP52 3:15-3:30 Management of a Type A Aortic Dissection in a Pregnant Patient, Julian Gordon, Melisa Pasli, Michael Larkins, W. Douglas Boyd, Michael J. Bates, Jason Ryan, Sunny R. Cai

GPP53 3:30-3:45 Quality assessment and predictors of success in velopharyngeal MRI – a multisite study, Kathryn Fennie, BS, Taylor Snodgrass, MS, CCC-SLP, Thomas Sitzman, MD, MPH, Jamie Perry, PhD, CCC-SLP

GPP54 3:45-4:00 Association of Leadership, Performance, and Efficacy in ROTC Cadet, Ajala Baker, Christine Habeeb, Tom Raedeke, Patrick Rider

GPP55 4:00-4:15 Post-Disaster Mental Health: Resilience and Risk Factors in the Context of Natural Disasters, Steven Paul Gargano

GPP56 4:15-4:30 Nanbar Health; Empowering Patients, Supporting Providers, and Discovering Connections to Transform Healthcare, Arvind Subramaniam (Mallikarjunan), Jhana Parikh, Shannon Ford, Abhinav Gundala, John Saavedra, Elizabeth Anne Hensley

MCSC 200 | Natural Sciences 3:00 PM - 4:30 PM

GPP73 3:00-3:15 Team Science in Undergraduate Research, Clark Isaac Andersen

GPP74 3:15-3:30 Copper Binding in FtrB from Brucella sp., Kai Alexander Hart

GPP75 3:30-3:45 Resolving Human Fibrinogen's In-Solution Structure with Cryogenic Electron Microscopy, Nicholas Carter Kirby

GPP76 3:45-4:00 Inferences Over Fields, Charles Wingate Crumpler

GPP77 4:00-4:15 Comparing parton scattering cross section for QGP from the AMY formalism and AMPT model, Noah M. MacKay

GPP78 4:15-4:30 Assessing Parton Transport with an Exact Solution of the Relativistic Boltzmann Equation, Todd Mendenhall, Zi-Wei Lin

Graduate Student and Postdoctoral Scholar Poster Presentations (In-Person) Ballrooms

Ballrooms | Biomedical Sciences **9:00-11:00**

GP01 Probing melanoma CD8+ T-cell mitochondrial dynamics and exhaustion: A possible way forward to improve patient therapy outcomes, Raphael Taiwo Aruleba, Debjani Ghosh, Nasreen Vohra, Kelsey Fisher-Wellman

GP02 Estrogen restores the cardiac function in ovariectomized rats: Role of circadian clock Per2-regulated heart-specific miRNAs and redox enzymes, Syed Anees Ahmed, Baohong Zhang, Abdel A. Abdel-Rahman

GP03 Effects of perfluorooctane sulfonate (PFOS) and perfluorooctanic acid (PFOA) exposure on erectile function in Sprague-Dawley rats: A Pilot Study, Alexander MK, Hou A, DeWitt JC, Hannan JL

GP04 Developing an animal model of chronic pain to predict biomarker profiles of morphine responsiveness, Dylan Marshall, Felicia Branch, Mandee Schaub, Kori Brewer, Stefan Clemens

GP05 Magnetic Control of NanoEL via Magneto-Mechanical Actuation, Mohammad Kanber, Obum Umerah, Sydney Grose, Lew Reynolds, and Juan Beltran-Huarac

GP06 BAFF neutralization impairs the regression of insulin resistance in diabetic mice by modulating the innate immune response, Melissa Lempicki, Jake Gray, Bradley Whitaker, Coleen McNamara, Akshaya Meher

GP07 MucR represses Brucella genes encoding polar adhesins, Connor Brett Cribb; Ian Barton; R. Martin Roop II

Ballrooms |Community Engagement, Diversity, Equity, and Inclusion, and Education **9:00-11:00**

GP32 Factors Behind Intrinsic Motivation for Mathematics: A Cross-Sectional Study of 4th and 5th-grade students, Dawn D Fletcher

GP33 Impact of Fluency Homework on Math Achievement, Kalysha Mccarthy

GP34 Student Perceptions of Science Instructional Strategies and Vocabulary Acquisition, Tabitha Dawn Mozingo

GP35 Assessing Reading Motivation in Fourth Grade Students, Jessica Rose Dolan

GP36 Teacher Perceptions on Teaching International Students, Abigail Elisabeth Prosser

GP37 Effectiveness of Homework, Deonte Lamont Cavender

GP38 Teachers' Stance on Foundational Reading Skills, Amanda Taylor Monroe

Ballrooms | Human Health **9:00-11:00**

GP50 Video fluoroscopic Detection Sensitivity of Swallowing Landmarks following Radiotherapy for Head and Neck Cancer, Deirdre Larsen, M; Caela Collichio;

GP51 Addressing Nosocomial Infections Caused by Antibiotic Resistant Bacteria using Surface-functionalized Nanoparticles, Chukwudi S. Ubah

GP52 Multi-Source Exposure Assessment of Lead on Minority Populations and Homes in Pitt County, North Carolina, Elizabeth May Abioro

GP53 National Assessment of Fatality Reports Among Landscaping and Tree Trimming Workers, Anna Doub and Nancy Romano

GP54 Does Daily Use of Prolonged Speech Patterns Benefit People Who Stutter, Nathalia Kalena Cannon, Patrick M. Briley, PhD, CCC-SLP

GP55 Exploring the Relationship Between Praxis & Handwriting Legibility in Elementary Students, Larymi Beck and Kathryn Hill

Ballrooms | Biomedical Sciences **10:00-12:00**

GP08 Characterization of cardiovascular function, metabolic status and erectile function in rat model of cardiometabolic syndrome, Wrenn D. Pallas, Johanna L. Hannan

GP09 No Evidence of Erectile Dysfunction, Nerve Injury or Change in SDF-1 Signaling 2 Weeks Following Prostatic Radiation, Bethlehem Peters

GP10 What is the myocardial implication in RAAS-regulated hypertension? A closer look at the NKA, NCX and Ca2+ reuptake machinery in the left ventricular myocytes, Rachel E Byrum

GP11 Effects of interprofessional mass casualty incident simulation on role perception and communication between medical, physician assistant, and nursing students, Hayley Behm, K. Ryan Dickerson, Rachel Stiglitz, David Nacouzi, James Fletcher,

GP12 Physical Activity During Pregnancy Increases Mitochondrial Efficiency In Myotubes And Offspring Myogenic Mesenchymal Stem Cells, Polina M. Krassovskaia, Ericka M. Biagioni, Alec B. Chaves, Abby D. Altazan, Caitlin Hebert, Chien-Te Lin, Kelsey H. Fisher-Wellman, P Darrell Neufer, Owen T. Carmichael, Kristen E. Boyle, Leanne M. Redman, Nicholas T. Broskey.

GP13 The role of myoferlin and S100A4 in migration of Human T-cell Leukemia Virus type-1 infected T-cells, Md Abu Kawsar Sarker, Kimson Hoang, Nicholas Polakowski, Isabelle Lemasson

Ballrooms | Community Engagement, Diversity, Equity, and Inclusion, and Education **10:00-12:00**

GP27 Discovering Motivation to engage social work graduate students: A Student Leadership Advisory Board, Sheila Gay, JoAnna Latham, Jessica Llamas, Zaye Massey, & Meghan Marie Stello
GP28 Seeking Sista Blackademics for Support: The labor of being a Black woman doctoral student at a Primarily White Institution, Codi Renee Blackmon, Anie Patterson Partin
GP29 Enhancing Tuberculosis Treatment Adherence by Tailoring Education to the Patient, Daniela K Ingram
GP30 Exploring Head Start Teachers' Perception of Science in Preschool Education, Taylor Marie Brown
GP31 Teaching Social Justice in a Post-MAGA World: Writing Past The Stop WOKE Act, Amanda Patterson Partin

Ballrooms | Engineering, Technology, and Computer Science **10:00-12:00**

GP39 Deicing of bridges by heating rebars and heat transfer effect, Pablo Andrés Nunez Hernandez
GP40 Computational fluid dynamics simulation of pulmonary hypertension in sickle cell disease patients, a viscosity model study, Fatemeh Bahmani, Alex Vahdati, Veeranna Maddipati, Stephanie M. George
GP41 Optimizing HVAC Design for Pharmaceutical Requirements with Computational Fluid Dynamics, Lijun Liu
GP42 Cancer subtype detection using tensor decompositions and artificial neural networks, Farnoosh Koleini
GP43 Undergraduate Medical Education Enhancement Using HoloLens, Cody Michael Johnson, Edward F Gonzales

Ballrooms | Humanities and Social Sciences **10:00-12:00**

GP76 Athlete Mental Health and Peer Relationships, Stephanie Fuller
GP77 An Eighteenth-Century Archaeology of Socioeconomics at Historic Bath, NC, Chloe Suzanne Scattergood
GP78 Food swamps have stronger impacts on geographic disparities in obesity and diabetes than food deserts in North Carolina: Census tract-level analysis using GI, Connolly David Baxter
GP79 Self-Exclusion: A look at polices by state based on legalized forms of gambling, Hannah Elizabeth Thornton, Summer Hamideh
GP80 Examining the Effects of Child Perception of Family Functioning on Psychological Wellbeing, Haiden Hice
GP81 Training ECU Writing Center Consultants in Suicide and Crisis Intervention Assessment and Response, Joshua A Wade, Amai Hagans, Brandon Higson, James Adam May
GP82 Emotional Labor in the Writing Center: A Pilot Study, Elizabeth Marie Gagne'
GP83 Data Analysis and Vizualization: Trials and Tribulations of a Graduate Student, Crystal Lee Bowers

Ballrooms | Biomedical Sciences **1:00-3:00**

GP14 Collagen-derived matricryptin reduces cardiac inflammation post-MI via regulation of inflammatory response, Sirin Nazan Cakir, MSc
GP15 Sensitization of Malignant Breast Epithelial cells to Proton Radiation by Gold Nanoparticles, N. Libby, T. Gaddis, M. Nabavinia, J. Huarac-Beltran, J-L. Scemama , and J.L. Shinpaugh
GP16 How ettA and lepA mutations impact Acinetobacter baumannii strains with csrA deletions, Jackson Aaron Wood, John M. Farrow III, Everett C. Pesci
GP17 Ethanol-induced right ventricular hypertrophy and pulmonary hypertension: The Role of pro-inflammatory signaling, M.K. Donovan and Abdel A. Abdel-Rahman.
GP18 Determination of the Elastostatic Force Exerted in the Prostate from Image Registration, Aaron Bain, Shiva Bhandari
GP19 Investigating the role of Covid-19 in blood clotting, Raegynn Wright, Donald Luckett, Noemi Fuentes-Rivera, Eric Anderson, Donald Tyler Luckett, Noemi Rivera GP20 Central axis and off-axis heterogeneity correction factors for three commercially available I-125 seeds models for COMS eye plaques, Mehran Nik Akhtar, Jae W. Jung, Yongsook Lee, Yongbock Kim

Ballrooms | Human Health **1:00-3:00**

GP44 A Convergent Validity Study: Listening in Spatialized Noise-Sentences (LiSN-S) test and the BKB-SIN test, Gabriela Musumeci B.S, AuD Graduate Student, Caitlyn Amber Paulson, Erin Kokinda, Drew Huffman, Kaitlin Abrams, Alyssa Alford, Trenton Barnett, Morgan Deans, Kelly Dorman, Emily Harrison, Katelyn Overcash, McKenzie Perry, Laney Pope, Melissa Rafaniello, Olivia Sullivan,

GP45 The Effect of Target Speaker Sex on Monosyllabic Word Recognition in Quiet Ability, Caitlyn Amber Paulson, Erin Kokinda, Drew Huffman, Gabby Musumeci, Kaitlin Abrams, Alyssa Alford, Trenton Barnett, Morgan Deans, Kelly Dorman, Emily Harrison, Katelyn Overcash, McKenzie Perry, Laney Pope, Melissa Rafaniello, Olivia Sullivan

GP46 Mesenchymal stem cell insulin sensitivity is associated with adiposity in early infancy, Filip Jevtovic, Donghai Zheng, Joseph A Houmard, Christian A Lopez, Kara Kern, Nicholas T Broskey, Linda E May

GP47 Hertford County: A Review of Contributions Related to Infant Mortality and Potential Solutions, Meek Myoung, David Oakley, Aaron Phillips, Pankti Sheth, Taylor Stamey, Johnny Vang

GP48 Maternal Physical Activity Enhances Mitochondrial Bioenergetics in Offspring Fetal Mesenchymal Stem Cells, Ericka M. Biagioni, Polina M. Krassovskaia Alec B. Chaves, Abby D. Altazan, Caitlin Hebert, Chien-Te Lin, Kelsey H. Fisher-Wellman, P. Darrell Neufer, Owen T. Carmichael, Kristen E. Boyle, Leanne M. Redman, Nicholas T. Broskey

GP49 Risk of COVID-19 infections Among People with Asthma: A Scoping Review, Chukwudi S. Ubah, MPH

Ballrooms | Natural Sciences **1:00-3:00**

GP69 PAH Contamination Variability in the Lower Tar River N.C. From a Legacy Hazardous Waste Site as a Function of Hydrological Conditions, Daniel Joel Reed

GP70 Dry matter digestibility and stable carbon and nitrogen isotope analysis of captive northern galagos (Otolemur garnettii) fed experimental frugivorous and invertebrate diets, ZACKARY R. SHEPARD, JAMES E. LOUDON, KATHERINE B. SMITH, MICHAELA E. HOWELLS, ANDRES M. GOMEZ, OLIVER C.C. PAINE, and MATT SPONHEIMER6

GP71 CONSTRAINTS ON EMPLACEMENT HISTORY OF SUBVOLCANIC MAGMA SYSTEMS FROM THERMAL MODELING, HENRY MOUNTAINS UTAH, Collin Earls

GP72 Prevalence and Transmission of Black Gill Disease in Penaeid Shrimp in the Pamlico Sound, Chloe Elizabeth Gabriel

GP73 Deciphering potential toxicity of Alumina (Al_2O_3) nanoparticles in Camelina sativa, Bishwa Raj Pokharel

GP74 Laser and X-Ray Source Characterization for Optically Stimulated Luminescence, Christopher Garcia, Regina DeWitt

GP75 Characterization of the floral development mutant, Polytypic earl, Kimberly R. Rispress, Anastasia Amoiroglou

Ballrooms | Biomedical Sciences **1:30-3:30**

GP21 The effects of protons and lactate due to increased glycolysis on the expression of the inflammatory and stress genes of human umbilical vein endothelial cells, Kylie D. Cashwell, Li V. Yang

GP22 Modelling of Light scattering by microspheres and biological cells, Ismail Ibrahim

GP23 The Radiosensitization Effect of PEG-coated Gold Nanoparticles in Prostate Carcinoma Cells with Proton Irradiation, Tristan Gaddis, Nichole Libby, Mahboubeh Nabavinia, Juan Beltran-Huarac, Michael Dingfelder, and Jefferson Shinpaugh

GP24 Association between congenital heart disease and trauma surgery outcomes, Titilola Babatunde, Seth Wolf, MD, Dmitry Tumin, Erika Greene, Shannon Longshore

GP25 Hamstring Length Effects on Ground Reaction Force in Pitchers, Houmard T, Tart L, Casadonte J, Durland A, Young B

GP26 Impact of Insecticide Exposure Method on Susceptibility/Resistance in Mosquitoes, Crystal Elizabeth Dailey, Stephanie Richards, Sinan Sousan

Ballrooms | Natural Sciences **1:30-3:30**

GP62 Non-destructive Indicators of Trematode Parasite Infection in Littorinidae Snail Hosts, Grace Loonam, Amanda Wolf, Amy Fowler,

GP63 PALEOENVIRONMENTAL CHANGES RELATED TO RAPID SEA-LEVEL RISE DURING THE LATE PLEISTOCENE IN THE LOWER NEUSE RIVER BASIN, NORTH CAROLINA, Jessica King, David Mallinson

GP64 Recent Biochemical Advances in the Isolation of Cryptochrome, Samuel Wyatt Guy

GP65 Review of pQCD Derivations of Shear Viscosity of the Quark-Gluon Plasma, Okey Ohanaka

GP66 Pyrogenic organic matter in sediments from Lake Bosumtwi as a proxy for Holocene climate in northern Africa, Michael Paul Zigah

GP67 Status of a mid-Atlantic population of a threatened freshwater marsh bird: land management is a key predictor of occupancy, Carol Gause

GP68 Dosimetry calibration for low-energy protons produced in the ECU accelerator, Homeira Faridnejad and Regina DeWitt

Ballrooms | Human Health **1:30-3:30**

GP56 Decontamination of food packaging plastics with novel nano-antimicrobial and cool light, Caroline A. Knowles; Chukwudi S. Ubah

GP57 The Influence of Orthodontic Appliances on MRI of the Velopharynx, Eshan Schleif, Van Wallace McCarlie Jr, Xiang Ming Fang, Patrick M. Briley

GP58 THE IMPACT OF BLOOD FLOW RESTRICTIONS ON STRENGTH AND COORDINATION OF A YOUNG ADULT WITH QUADRIPLEGIC CEREBRAL PALSY, Taylor Lucas, Sarah Johnson, Swati Surkar, Shailesh Gardas

GP59 Reducing Patient Harm: Identifying Risk Factors Associated with Development of Pressure Injuries in a Pediatric Cardiac ICU, Jamie C Johnson, Tammy Candito

GP60 Characterizing Nationally Available Gelatin-Based Products using IDDSI Testing Methods, Meghan Eisenhardt, Abigail Perrini, Mathew Vansant; Deirdre Larsen,

GP61 The Effect of Male vs Female Voices in Speech Recognition in Noise, Erin L Kokinda, Andrew J. Vermiglio, Caitlyn Paulson, Reyse Stirrett, Ava Cunningham, Kathryn Fennie, Laura Hall, Abigail Ormond

Graduate Student Posters (Online)

MCSC Room 237, 10:00-4:00

10:00-10:55 Exploring the Role of Complex I in Colorectal Cancer, Mclane Matthew Montgomery

10:00-10:55 North Carolina Read to Achieve Legislation: Is it Successful for Third Graders in a Title I School? Tracy Lee Gilbert

10:00-10:55 Early Childhood Phonemic and Phonological Strategies in Kindergarten Students, Stephanie Moody

10:00-10:55 Understand the predicting factors of achievement gaps in upper elementary students at Title One schools, Jodian Monique Barker

10:00-10:55, Student Attitude of Social-Emotional Learning, Sarah Elizabeth Seymour

10:00-10:55 Improving Students' Self-Determination Using Engaging Instructional Strategies, Ashleigh Claire Fleming

10:00-10:55 What are the science education programs and outreach programs that are provided by informal science centers in Central Eastern NC?, Courtney Leigh Olvey

10:00-10:55 Math Curriculum Implementation and Student Proficiency, Elaine Elizabeth Waters

10:00-10:55 Open Court Curriculum, Olivia Nichole Haley

10:00-10:55 Investigating Achievement Gaps with Student Led Mathematic Instruction, Hunter Avery Mcneeley

10:00-10:55 Learning Outcomes of a Peer-Explored Inquiry Method Using Virtual Simulation Laboratory Experiences, Candice June Lavra Fleming

11:00-11:55 The novel function of PUF-9 RNA-binding protein in C. elegans Parkinson model, Mariah Elizabeth Jones, Savannah Lipski, M.H. Lee

11:00-11:55 Investigating how Student Motivation can Impact and Benefit Middle School, Special Education Students in the Classroom, Kara Wilkerson

11:00-11:55 Teachers' Perception on CKLA: Knowledge (Listening and Learning) Strand, Fernanda Pivetta Gerringer

11:00-11:55 Second grade students' view on how humans impact the life cycle of sea turtles, Morgan Alyssa Salge

11:00-11:55 The effect studying abroad has on a science teachers' implementation of multicultural instruction into their classroom, Kayla Alex O'Brien

11:00-11:55 Inclusion Benefits for Self-Contained Elementary Students, Casey P Herman

11:00-11:55 Teacher Perception on the Impact of Retention on Student Achievement, Vanessa M Jeanty

11:00-11:55 Implementing Barthel Index of Activities of Daily Living into Standard Nursing Assessment on the Medical-Surgical Unit to Help Reduce Falls, Rebecca Dunn

11:00-11:55 Classroom Management: Effective Support for Beginning Teachers in the Kindergarten & First Grade Classroom, Ashley Bass Sullivan

11:00-11:55 The Impact of Environmental Injustice Education on High School Students' Attitudes and Behaviors Related to Climate Change, Kristine Lynn Doster

11:00-11:55 Third Grade Students Virtual Plant Models: How does the use of SeeSaw impact Third Graders knowledge of creating a plant structure model for flowering and non-flowering plants?, Hannah Falk

2:00-2:55 Spectrophotometric study of turbid samples and artery phantoms for modeling of photoplethysmography process, Zachary David Jones

2:00-2:55 Teachers' Perception on Class Size, Kayla Marie Wood

2:00-2:55 Impact of Virtual Models in 5th Grade Students Conceptual Understanding of The Greenhouse Effect, Sarah Sanchez

2:00-2:55 Effect of Serious Educational Games on Physical Science Student Knowledge, Jarrett Davidson Godwin

2:00-2:55 The Relationship Between Scores on 3 Different Kindergarten ELA Assessments, Jessica Leigh Williams
2:00-2:55 Integration of Movement in Physics Teaching for 1st Grade Students, Danielle Nicole Marsicano

2:00-2:55 Analyzing Student Task Values For Activities in an Earth History/Evolution 8th Grade Science Unit, Shayna Renee Hines

2:00-2:55 The Effectiveness of School to Home Relationships: Family Perceptions of English Language Learners, Lindsey Christine Main

2:00-2:55 Strategies to Motivate Struggling Readers, Connie D Oliver

2:00-2:55 Teacher Motivation and AP Courses, Cassandra Maralica Flemming

2:00-2:55 Parent Participation in Middle School Education, Julia Dean Gilmore

3:00-3:50 'Where's Jim Cantore?': Using Humor & Affective Ecologies for Crisis Communication, Ashleigh Hill Taylor

3:00-3:50 Rooted, Kristen Lanier Baucom

3:00-3:50 From the Inside: Educators Perspective on Academic Curriculum and Child Development, Kristin Danielle Schneider

3:00-3:50 The impact of CER argumentation instruction on student abilities to support a claim with evidence, Krystal Krill

3:00-3:50 Where are We?, Tamla Boone

3:00-3:50 THE IMPACT OF ARGUMENTATION ON THE ACHIEVEMENT LEVELS OF 7TH GRADERS' KNOWLEDGE AND ATTITUDES TOWARDS GENETICS, Mitchelle Simone McLeod

3:00-3:50 Analysis of Fibrin Fiber Growth, Aravind Elangovan

3:00-3:50 Effectiveness of nutrition education in a cardiac rehabilitation (CR) program and barriers to diet adherence, Mary Frances Donnelly

3:00-3:50 The Impact of Recess on Students' Academic Performance, Meredith Louise Valentine

3:00-3:50 Geometry Analysis of Oscillating Surge Wave Energy Converter Flap, Jason Takeo McMorris, Faete Filho

Undergraduate Podium Presentations Abstracts

UPM01 9:00-9:15

Characterizing the Subcellular Localization and Function of Citron Kinase in the Germline of *Drosophila melanogaster*

Kyra Madison Porter

Mentor: Ables, Elizabeth Tweedie

Cytokinesis, or the final division of cells, is a conserved and highly regulated process that is crucial for all multicellular organisms. Errors in cytokinesis are linked to a variety of maladies, including microcephaly and chromosome abnormalities such as polyploidy and aneuploidy. Eukaryotes have a dynamic structure called the actin-myosin contractile ring that is responsible for separating the two daughter cells upon the completion of the final phase of mitosis. The proper positioning and timing of the contractile ring is crucial to the dividing cell. Contractile ring assembly is shown to be regulated by Citron Kinase, which organizes actin formation. During traditional cytokinesis, the contractile ring is the machinery responsible for the total separation of daughter cells from one another. Intriguingly, germ cells exhibit incomplete cytokinesis, in which the dividing cell never fully abscises from its daughter, which effectively tethers cells in a cyst. The cyst is joined by intracellular canals that are stabilized by the actin-myosin contractile ring. Cyst formation is necessary for germ cell differentiation into oocytes. However, Citron Kinase's role in the incomplete cytokinesis of germ cells is unclear. Here, I use the model organism *Drosophila melanogaster* to investigate my hypothesis that Citron Kinase is required for proper cyst formation. To compare the localization of the protein in germ cells that undergo complete versus incomplete cytokinesis, I used the Gal4/Upstream Activating Sequence (UAS) system to over-express a fluorescently tagged version of Citron Kinase in the *Drosophila* germline. Then, to visualize the changes in germ cell division that occur in the absence of Citron Kinase, I used the Gal4-UAS system in conjunction with RNA interference (RNAi) to knock down Citron Kinase, depleting its mRNA. My findings show that Citron Kinase is localized to the fusomes and the cytoplasm in both germline stem cells (GSCs) and dividing cysts, and to the ring canals of dividing cysts. Moreover, when Citron Kinase is lost, females exhibit a complete loss of germ cells, indicating that Citron Kinase has a larger role in female fecundity that has yet to be explored.

UPM02 9:15-9:30

FbpA and FbpC from the louse-borne relapsing fever spirochete, Borrelia recurrentis, bind human C1r and inhibit complement activation

Anna M. Schulz, Charles E. Booth Jr., and Brandon L. Garcia

Mentor: Garcia, Brandon L

Infectious microbes that travel through a host's bloodstream exhibit immune evasion techniques to combat the effects of innate immunity of the host. The complement system is an ancient arm of the innate immune system responsible for bacterial cell lysis and priming of the adaptive immune system. Borrelia spirochetes, associated with Lyme disease and relapsing fever, are recognized as model pathogens to study bacterial complement evasion. These spirochetes potently inhibit the complement system via the expression of a vast repertoire of outer surface lipoproteins that harbor specific anti-complement activities. However, the mechanism by which the louse-borne relapsing fever spirochete, Borrelia recurrentis, evades the classical pathway of complement, is not known. Here, we show that the fibronectin-binding proteins of Borrelia recurrentis (FbpA and FbpC) are capable of dose-dependent inhibition of the classical pathway of complement, determined by measuring C4b deposition mediated by human complement activation. In addition, FbpA and FbpC both bind human complement protein C1r as determined by surface plasmon resonance assays. Interestingly, only FbpA bound to zymogen C1r strongly, whereas both FbpA and FbpC bound tightly to the activated form of C1r. Collectively, these data improve understanding of the ability of blood-borne pathogens to manipulate components of the classical pathway of complement to successfully evade immunity.

UPM03 9:30-9:45

Fluorescence-Activated Cell Sorting Validation of Cell Specific Recombination in Novel Mouse Model

Ananya V. Pentakota, Reema Karnekar, Thomas D. Green, Makenzie Kolasa, Zoe. S Terwilliger, & Joseph M. McClung

Mentor: McClung, Joseph Matthew

Peripheral artery disease (PAD) is a vascular condition caused by atherosclerosis in the peripheral arteries, most commonly the ones supplying blood to the lower extremities. Chronic limb threatening ischemia (CLTI) is the most severe clinical PAD presentation and carries a high risk of major amputation or death. Despite twenty years of trials and pre-clinical testing, no CLTI therapeutics have advanced or improved limb salvage. There is a dire need to understand the genetic mechanisms underlying CLTI to aid in effective therapeutic design. We have identified cytochrome oxidase 6a2 (Cox6a2), a regulatory protein subunit of cytochrome c oxidase (complex IV of the mitochondria),

with the potential to therapeutically treat CLTI but need to understand the cell specific expression of these targets in order to effectively treat the disease. To do this, we generated a novel mouse model of Pax7 cell specific Cox6a2 loss (Pax7-Cre; Cox6a2). This project was designed to: 1) establish effective Fluorescence-Activated Cell Sorting (FACS) procedures for pre-clinical modeling of cell specific biology, and 2) validate muscle progenitor cell specific Cox6a2 knockdown. Cell isolations and FACS were performed from isolated murine tissues and Pax7 cell specific populations were verified, validating the efficiency of the procedure. This data demonstrates the usefulness of FACS as a fundamental tool in validating models of cell specific targets from in vivo samples and is a crucial step in validating tools necessary for effective therapeutic design

UPM04 9:45-10:00

Investigating the Role of *Coding Gene 8093* in the Germline Stem Cells

Michael Louis Cavallero

Mentor: Ables, Elizabeth Tweedie

Cell division and differentiation is imperative for the maintenance of living organisms. Germ cells, which serve as the progenitor cells necessary to create oocytes and sperm, are maintained by many organisms by the activity of a tissue-resident stem cell population called Germline Stem Cells (GSC). To understand how germ cells are maintained, we use the well-characterized model reproductive tissue, the Drosophila ovary, which contains approximately 45 GSCs in young flies. Recent advances in whole genome sequencing have recently made possible the identification of the GSC transcriptome. In this data set, we identified an uncharacterized coding gene (CG8093) that is enriched specifically in the GSCs during oocyte differentiation. CG8093 is a predicted acid lipase that is regulated by diet, and when cells experience an abundance of dietary sugars, suggesting that CG8093 serves as a cellular sensor of nutrient availability. However, the role of CG8093 specifically in the GSCs for the division and differentiation of germ cells is not known. Here, I show that depletion of CG8093 in germ cells results in a complete block to GSC establishment, manifesting as completely agametic ovaries. In contrast, depletion in the more differentiated germ cells does not alter oocyte differentiation. This data suggests that CG8093 is a key player in the division and differentiation of GSCs in Drosophila melanogaster. Understanding the complexity of proteins needed for successful division and differentiation of germ cells is necessary for understanding how these cells are maintained to support organismal fertility.

UPM05 10:00-10:15

Vitamin B12 regulates long chain fatty acid synthesis in macrophages: Implications for age-related inflammatory disease intervention

Abigail Diamond Dickerson

Michael Wheeler

Mentor: Wheeler, Michael D

Long-term dietary deficiencies in both B12 and n-3 essential fatty acids are associated with chronic systemic inflammation as well as some age-related neurodegenerative diseases. There are many published intriguing links between B12 metabolism, complex fatty acid synthesis, and pro-inflammatory mechanisms. B12 might directly or indirectly regulate the elongation and desaturation of dietary PUFAs required for the conversion of dietary a-linolenic acid (ALA) to complex anti-inflammatory n-3 fatty acids such as eicosapentaenoic (EPA, 20:5n-3) and docosahexaenoic acid (DHA, 22:6n-3) and specialized pro-resolution fatty acids, suggesting an interaction between B12 metabolism and n-3 PUFA synthesis. Thus, the specific hypothesis tested is that B12 is necessary for the synthesis and efficacy of long chain n-3 fatty acids, which are bioactive lipids with known anti-inflammatory function. To address this hypothesis, an in vitro model with RAW264.7 macrophage cell line was used. Cells were maintained in control media or media supplemented with 25mg/mL cobalamin, the bioactive form of B12. A multi-omics approach was used to assess the transcriptional, metabolic and protein modifications associated with B12 supplementation. Computationally alignment of omics profiles and pathways using the online tools loupe browser, DAVID, and iDEP has revealed that B12 directly regulates lipid biosynthesis and fatty acid metabolism pathways in macrophages. This finding supports a mechanistic link between B12 metabolism through PUFA synthesis pathways to inflammatory mechanisms. This finding has important clinical implications for the combined supplementation of vitamin B12 with n-3 polyunsaturated fatty acids (PUFAs), in reducing the basic pro-inflammatory mechanisms thought to underly age-related neurodegenerative disorders.

UPM06 9:30-9:45

Assessing Cloud Coverage with MATLAB Segmentation

Hannah L Blackburn, Dr. Zhen Zhu, Dr. Teresa J Ryan

Department of Engineering

Mentor: Ryan, Teresa Jean

This machine learning project is part of ongoing longitudinal long distance atmospheric acoustic propagation research being conducted at the East Carolina University Outer

Banks campus in Wanchese, NC. The overall project seeks to connect changes in the atmosphere by taking concurrent acoustic and meteorological readings and relating them to differences in sound propagation. Images are imported, segmented, and labeled in MATLAB and used as both a training and test image set. The results of this project enable more accurate characterization of cloud cover. This information supplements knowledge of heat flux between ground and the atmosphere which in turn supports improved modeling of long distance sound propagation.

UPM07 9:45-10:00

Sensor Integration Platform for Older Adults

Braxton Chambers, Dr. Ricky Castles, Dr. Kamran Sartipi, Dr. Donna Roberson, and Dr. Young Joo Kim

Mentor: Castles, Ricky

This project focuses on developing a virtual nurse (vNurse) & integrating smart home sensor data via HomeKit & Home Assistant to analyze activities of daily living and prepare sensor data for easy analysis. Operations involve sequential pattern mining to extract meaningful data and explore relationships between sensor data and a person's actions. As the number of older adults (age 60+) living alone in the United States increases, they may face difficulties such as managing medication, limited physical mobility, and dietary issues. Advantages of monitoring seniors living alone include improved communication with health care providers and patients feeling more secure in their homes. My role includes setting up a network of sensors, collecting and visualizing data using a database, and leveraging Google Cloud to explore data patterns. All testing for this project takes place in the Occupational Therapy Department located on the Health Sciences campus, which is a lab environment that simulates a home environment.

UPM08 10:00-10:15

Characterizing Vegetation by Surface Geometry Through LIDAR

Kyle J Kirian

Mentor: Ryan, Teresa Jean

The US Navy is investing in research to better understand sound behavior near shore. The purpose of the overall project is to improve computer modeling of how offshore sound is detected on shore. The loudness of offshore sound depends on the distance travelled as well as the condition of the land, water, and weather. The purpose of this specific study is to develop a way to characterize vegetation to support studies of how

sound interacts with vegetation. Existing acoustic measurement standards exist for low vegetation like grass or short crops when the geometry variation is less than about a tenth of the acoustic wavelength in air. This work will apply to larger shrubs and small trees, which are not accommodated by the current measurement standards. Apple's Polycam application generates point clouds of surfaces using LIDAR technology. The purpose of the study is to determine how rough or smooth the measured surface of different vegetation is using Polycam. Software has been developed to calculate the irregularity of the vegetation's surface in the horizontal and vertical planes. The irregularity is displayed as a single-valued surface index for each orientation, ranging from 0 to 1. A perfect sphere would have no irregularity (index value approaching 0), while a bush with few leaves would have a larger irregularity (index value approaching 1). Several test objects were used, including a basketball, a smooth cylinder, a compact regular bush, and a spindly house plant. The basketball, which is the closest resemblance of a sphere out of the test group, has the lowest irregularity value in all three axial directions. The spindly house plant, which is the least uniformly shaped object of the test group, has the highest irregularity value in the vertical direction. Based on these results, the calculated index correlates strongly with irregularity expected from visual inspection.

UPM09 10:15-10:30

Application of DFAM in Eastern North Carolina

Micah Gruninger, Sara Buna, Youssef Abdelfatah, Brianna Brown

Mentor: Agarwala, Ranjeet

The practice of additive manufacturing is becoming a standard practice in the modern world of manufacturing. In an era of rapid release of consumer products, personalized medicines, and internationally collaborated engineering, Design for additive manufacturing (DFAM) has a potential for better efficiency and convenience. DFAM allows the engineer and designer to work in unison allowing more frequent and faster-pace prototyping, while cutting cost of prototype construction. This is due to use of less materials and development time. One of the largest potentials for DFAM in Eastern North Carolina (ENC) is the application of DFAM in pharmaceutical companies and the world of healthcare. ENC has a large presence of large pharmaceutical facilities that create products that are shipped to various parts of the country. However, there is one thing that is not accounted for…and that is the lack of individuality for pharma products. For example, Thermo Fisher Scientific (TFS), a large pharma business in Greenville NC, creates hundreds of thousands of pills per day that are shipped out to different locations all over the state and country. Of these different pills, there are dozens of variations of each one, each having different doses (mg). What if utilizing DFAM, the variation would be mitigated? This is a very feasible opportunity as TFS

has the potential to enter the world of personalized medicines with DFAM. By incorporating DFAM, TFS could create a monopoly of 3-D printed medicines to be distributed to pharmacies across the state and country. These 3-D printed medicines allow easy variation of different strengths of medicines to be created right at the local pharmacy or even at home. As a bonus, TFS will have the right to own or have the license to these manufactured medicines. This has a wide job market opportunity for ENC. TFS would have the immediate request for dozens of engineers and employees to manufacture the personalized TFS brand 3-D printers to meet the demand of pharmacies and homes across NC. Not only can DFM lead to the creation of jobs, but also could provide a boost to public health for ENC.

UPM10 10:30-10:45

Real-Time Alerting for Advanced IoT Management and Deployment

Braxton Chambers, Henry Jones, Ciprian Popoviciu, and Colby Sawyer

Mentor: Popoviciu, Ciprian

This project presents a method for designing and implementing automation-based alerting workflows on Internet of Things (IoT) platforms. It is based on the sensing platform from the Center of IoT Engineering and Innovation. By creating alerts for environment-specific state changes, users can more accurately monitor and control their IoT systems and respond to new events quickly. The approach utilizes existing technologies to provide basic alerting services, such as email, SMS, Teams, and Slack integrations when our cloud platform detects state change. Our approach also includes alerting that is customizable to any-scale organization using various web hook integration options. This enables users to efficiently monitor and respond to events occurring in their IoT systems in real-time and empower them to leverage data in more meaningful ways.

UPM11 10:45-11:00

Design for Additive Manufacturing Applications in Eastern North Carolina

Abby Santos

Garret Raker

Patrick Waugh

Mentor: Agarwala, Ranjeet

Design for Additive Manufacturing (DfAM) is a methodology of designing and redesigning parts to be additively manufactured for end-use applications. In the past, additive manufacturing has been primarily used for model building, but DfAM has made it possible to work with complex shapes and lowering cost. Common applications of DfAM include environmental control systems, duct manufacturing, tooling for composites and UAV components.

In Eastern North Carolina (ENC), DfAM can be incorporated in the aeronautics sector at companies like NAVAIR and Collins Aerospace to be used for rocket engines components. DfAM is also used in Additive America located in Kinston, NC. Additive America uses DfAM for personalized custom medical devices and 3D printed keychains with intricate designs and cutouts.

ENC is home to many medical industries and institutions. Tierney Orthotics and Prosthetics located in Winston-Salem is a company that could potentially benefit from using DfAM. Tierney develop casts and impression molds that are created by the use of 3D scanning technology. One of their main focuses is partial hand prosthetics. Currently this process is time consuming and uses many materials that can be quite costly. Using DfAM, Tierney can develop partial hand prosthetics using organic shapes, semi-hollow structures, and assemblies in situ. This would allow these prosthetics to be much more flexible, use lighter materials without compromising durability and strength and allows reduced assembly. Working with 3D systems would also allow Tierney to optimize their designs to be used for printing. Overall DfAM can help industries like Tierney to cut down costs, and assembly time all while keeping their customers a priority. Although, DfAM is relatively a new technology process, it is proving to be on track as the future of additive manufacturing.

UPM12 10:00-10:15

Greek Life and Overdose Education

Jackson Alexander Cheek

Mentor: Egan, Kathleen Louise

Emerging adulthood is known to be a time for experimentation, including the use of illicit substances. Thus, the rise of substances, such as counterfeit pills and cocaine, being adulterated with illicitly manufactured fentanyl may put college students at a heightened risk of experiencing an opioid-related overdose. Members of Greek Life are more likely than other college students to know a peer who uses illicit substances putting them at greater risk of witnessing an overdose. Thus, members of Greek Life would benefit from receiving training to recognize and response to a drug overdose. The objective of this study was to develop, implement, and evaluate an opioid overdose

education program delivered to members of Greek Life at a four-year university. To inform development and implementation of the training, we conducted two focus group discussions with (IFC) leadership (n=15 participants). During the focus group discussions, IFC leadership recommended conducting the training in-person rather than virtual. Further, we learned that the training content should review the dangers of opioids, address that opioids may be in other more commonly used substances (i.e., cocaine), how to identify an overdose, where to obtain Narcan, and the appropriate way to respond to an overdose with Narcan. The training and associated evaluation will take place in late February. The primary measures of intervention efficacy include increased knowledge in recognizing and responding to an opioid overdose, increased self-efficacy in responding to an overdose, and an increased in intent to obtain naloxone in case an overdose is witnessed. The evaluating utilizes a longitudinal, within subjects design with three time points assessed: immediately before the training, immediately after the training, and 30 days post training. All surveys will be web-based and conducted in Qualtrics. Results pertaining to changes in knowledge in recognizing and responding to an opioid overdose, increased self-efficacy in responding to an overdose, and an increase in intent to obtain naloxone from baseline to immediate post training will be presented. This study will provide evidence of the utility of overdose education for members of Greek Life at four-year universities.

UPM13 10:15-10:30

Secondhand electronic cigarette aerosol in vehicles impacts indoor air quality

Luke Thomas, Emily Gold, BS, Sarah Fresquez, BS, Ronald Mooring, Vivien Coombs, BS, Anish Gogineni, Alex Tiet

Mentor: Soule, Eric Kendall

Impact of electronic cigarette use on indoor air quality inside of vehicles

Background: Indoor electronic cigarette (ECIG) use has increased in recent years. Policies have been implemented that prohibit indoor cigarette smoking including some policies that prohibit smoking in vehicles when children are present. Electronic cigarette (ECIG) aerosols contain toxicants, but few policies that limit cigarette smoking also include ECIGs, and many ECIG users report ECIG use inside of vehicles. ECIG use in vehicles represents a public health concern due to the potential for particulate matter (PM) concentrations to increase rapidly from use in a small space. This study examined the impact of ECIG use on air quality inside of vehicles.

Methods: Current ECIG users (n=60; 37.7% women; 83.6% white; mean age=20.5, SD=2.3) completed a brief survey and then a 30-minute ECIG use session in their own vehicle. Using their own ECIG device, participants first completed a 5 minute 10-puff

directed bout (30 second interpuff interval) followed by a 25 minute *ad libitum* bout in which participants could take as many puffs as desired, with total puff counts recorded. PM 2.5 μm in diameter or smaller ($PM_{2.5}$) were measured using aerosol sensors set up to sample air from the breathing zone of the passenger seat. The association between peak $PM_{2.5}$ concentrations and puff count was examined.

Results: Most participants (82.0%) reported ECIG use every day and the majority reported using a pod mod (34.4%) or disposable (60.7%) ECIG device. Participants reported ECIG use almost always (28%) or sometimes (42.6%) when they were in their vehicle. During the session, participants took a median 18 total puffs (i.e., 10 during the directed bout and 8 during the *ad libitum* bout). Median $PM_{2.5}$ concentrations increased from 4.78 $\mu g/m^3$ at baseline to 107.40 $\mu g/m^3$ after the directed bout. Median peak $PM_{2.5}$ concentration was 464.48 $\mu g/m^3$ and ranged from 9.56 $\mu g/m^3$ to 143,503.91 $\mu g/m^3$(IQR=132.72-1,604.68). After removing two extreme outliers for puff count and $PM_{2.5}$ concentrations, puff count was significantly correlated with peak $PM_{2.5}$ concentration during the *ad libitum* bout (r=0.32, p=0.015).

Conclusions: ECIG use in vehicles impacts air quality negatively and may pose health risks to non-tobacco using bystanders by exposing them to toxicants present in ECIG aerosol. Policies that prohibit tobacco use inside of vehicles should include ECIG use restrictions to prevent unwanted exposures.

UPM14 10:30-10:45

Project MOMS: Mothers, mOvement, and Maternal Health Care Providers Study

Abigail Elizabeth Ulffers

Mentor: Das, Bhibha Mayee

In the field of medicine, maternal health and its associated maternal and fetal outcomes are an area where significant health disparities exist in the US. One behavior that can positively influence outcomes is maternal physical activity (PA). Past research has found that PA prescription increases the likelihood of maternal PA participation. Mothers' PA participation is linked to better maternal and fetal outcomes with healthier moms and healthier babies resulting in a healthier population. A 2020 umbrella review found that mothers meeting the minimum PA guidelines for moderate-intensity exercise were more than 18% less likely to exceed the recommendations for healthy weight gain, more than 25% less likely to develop Gestational Diabetes Mellitus, and experienced fewer symptoms of postpartum depression. In a 2021 study, 96.6% of mothers perceived improved labor and delivery and health of both mother and baby due to physical activity during pregnancy. Despite the myriad of evidence of the

benefits of PA, especially in pregnant women, maternal healthcare providers often do not provide a PA prescription to pregnant women.

Prior research has demonstrated active health care providers are more likely to prescribe PA to their patients than inactive providers. The purpose of Project MOMS: Mothers, mOvement, and Maternal Health Care Providers Study was to examine the relationship between maternal health care providers' PA levels and their willingness to prescribe PA to their patients along with barriers to PA prescription. This cross-sectional study will be conducted via a Qualtrics survey. We obtained demographic information and health care providers' personal PA levels along with their and their perceived barriers and benefits to prescribing PA to their patients. We hypothesized health care providers with higher personal PA levels are more willing to prescribe PA to their patients. We also hypothesized providers with lower personal PA levels are less willing to prescribe PA to their patients.

UPM15 10:45-11:00

Can Trauma be an Opportunity to Identify and Treat Non-Injury Medical Conditions in Young Adults?

Jackson Alexander Cheek

Mentor: Irons, Paige Latham

Trauma is often the first point of contact for many people into the healthcare system and, following trauma, over 600k adults are hospitalized each year making the large influx of patients into the emergency department the optimal location for chronic disease screening.

Studies have shown that discrepancies in chronic disease screening are preventing young adults from receiving preventative care for chronic illnesses. In many cases early detection and treatment is key to preventing the long-term side effects of chronic disease. Investigating traumas to determine the presence of undiagnosed health issues could allow for insight into early detection of chronic disease. Often, young adults are not diagnosed with a chronic condition until trauma occurs. Further research is needed to characterize the relationship between undiagnosed chronic disease and trauma outcomes, as well as the sociodemographic characteristics that may increase the risk of undiagnosed disease.

The purpose of this study is to estimate the burden of undiagnosed hypertension, diabetes, obesity, and unmanaged substance use in young adult trauma patients, to assess the impact of disease on trauma patient outcomes and healthcare utilization, to identify potential patient demographic or trauma-associated characteristics associated

with undiagnosed disease, and to identify potential areas for intervention, further treatment, or referrals.

This study was designed as a retrospective cohort study with secondary data collection and will include young adult trauma patients (18-40 years old) who were admitted following a trauma activation at WakeMed, UNC, Duke, or ECU from 1/1/2018-12/31/2020. The exposure variables for this study will be Hypertension, Obesity, Diabetes, and Alcohol and Substance Use. Each of these variables will be recorded from the EMR and/or NC Trauma Registry as defined by their specific criteria for diagnosis in the scope of the project. In addition to the listed exposure variables, patient demographics and information pertinent to the trauma that was recorded in the Trauma Registry and/or in the EMR will be used as covariates.

For the purposes of this study, Hypertension, Obesity, Diabetes, and Tobacco and/or Alcohol and/or Drug Use will be dichotomous categorical variables. The proportion of all trauma patients with a primary care doctor or clinic will be calculated along with the frequency distribution of the exposure variables and the covariates.

UPM16 1:00-1:15

The Impact of Islamophobia and Social Media on Muslim American Students' Mental Health in School Settings in North Carolina.

Noorhan B. Abu Khalaf, Alice Richman, PhD, MPH, Essie Torres, PhD, MPH

Mentor: Richman, Alice Rose

The objectives of the study are threefold: 1) to understand the lived experiences of Muslim American students with Islamophobia in middle, high school, and university school settings, 2) to identify ways that Muslim American students cope with discrimination and/or mental health issues, and 3) to uncover the role social media might play in coping and/or experiencing discrimination among Muslim American students. We employed snowball sampling to recruit students currently enrolled in a middle school, high school, or a university (as an undergraduate) in North Carolina who self-identify as Muslim. University students must have attended middle school or high school in North Carolina to be eligible for participation. In total, 25 participants participated in the research study with a mean age of 18. The majority of the sample was female (72%) and in terms of race/ethnicity, 44% were Asian, 40% were White/Middle Eastern, 12% were Black, and 4% reported being of mixed ethnicity. There was a good representation of both college students (52%) and high school students (44%). We conducted 5 focus groups (4 in-person; 1 virtual) and 14 interviews (13 virtual; 1 in-person). All virtual interviews/focus groups were held via WebEx. As a thank you for participation, participants were provided with a $25 Amazon gift card at the end of the interview/focus group. Upon analysis, seven major themes emerged

from the data: Mainstream media, 9/11, the 2015 Chapel Hill shooting and their effects on Muslim American student; the negative effects of Islamophobia on students; the lack of resources available for students who experience Islamophobia in school settings; the positive effects of social media; the use of family and social media as a coping strategy for Islamophobia; and outward appearance, religiosity, culture and its relationship to experiencing Islamophobia. In this sample, multiple incidents of Islamophobia have been reported occurring in school settings. Participants who experienced Islamophobia reported feelings of self-doubt, insecurity, and isolation. Participants reported feeling that there is a lack of resources at school to support them when reporting discriminatory behavior and barriers to fulfilling religious requirements. This research supports the need for training of counselors, staff, and teachers regarding Islamophobia and cultural competency. Additionally, this research highlights the need for support systems and resources for Muslims in school settings.

UPM17 1:15-1:30

Body Positivity Influencers: Their Values, Impact on Retailers, and College Student's Opinions

Jenna Scott, Dr. Marina Alexander, Dr. Gina Pisut

Mentor: Alexander, Marina

Introduction

Womenswear industry is $163 billion per year in the U.S. alone (Statista, 2022). For many years, the fashion industry has dealt with concerns over the use of thin models and how consumers feel pressure to meet these "ideal" body types. This study explores the values of body positivity influencers and how consumers interested in the body positivity movement are responding to retailers who both embrace these values and those who have yet to integrate these messages into their marketing and communication. This study will also explore college students' opinions on body positivity, body image, and their responses to the practice of vanity sizing.

Methods

Five posts from the 30 influencers were evaluated with the following variables: mental health, healthy eating, fitness, promotion, degree of fit, garment types, and fashion brands mentioned. Fifteen retailers that were popular among college students were also chosen and evaluated with the same variables. A questionnaire has also been curated that will evaluate 150 students with questions pertaining to body image, vanity sizing, and body positivity. This will be launched at the end of February, 2023.

Results and Discussion

Evaluation of influencer posts revealed that many discussed anti-diet tendencies with less correlation for posts on healthy eating. Many emphasized health can come in many shapes and sizes. Many of these posts discussed body acceptance with mental health regularly discussed in over one fourth of posts of body positivity influencers. Influencers predominantly posted in fitted clothes, with hashtags like #everybodyisabikinibody.

Fifteen retailers were evaluated on variables including size ranges, body types featured, and movements or non-profits supported. Retailers who prioritizes size inclusivity with real bodies with no retouching and who have partnered with mental health and inclusivity non-profit organizations saw continual customer support grow over time (AEO, 2021) . This supports that consumers purchase from brands that value body positivity and who demonstrate values that align with body positivity influencers.

This research has begun to illuminate some key values of the body positivity movement through tracking body positivity influencers and their followers. Comparing these values to what top retailers in this age demographic espouse has shown where opportunities exist for retailers to incorporate body positivity and inclusivity in their marketing and communications.

UPM18 1:30-1:45

Use of Modular Therapy to Treat Anxiety for School Age Students with Autism

Madison Bille

Mentor: Walcott, Christy Mangione

Research has shown the significance of cognitive behavioral therapy (CBT) on the treatment of anxiety amongst school age children. But how does that translate to other populations of people, like children with autism? Roughly 1 in every 44 children are diagnosed with autism, and of those children, 70-90% also have one or more diagnoses of psychiatric disorders (McBride et al., 2020). This study aims to analyze the effectiveness and acceptability of *Modular Approach to Therapy for Children with Anxiety, Depression, Trauma, or Conduct Problems* (MATCH-ADTC), a type of CBT therapy, on children grades 3-8 with both anxiety and autism. In cooperation with a doctoral student in psychology, each child will be assessed on *The Screen for Child Anxiety Related Disorders* (SCARED) scale before treatment to determine which modules will be used in their therapy sessions. The study will utilize a nonconcurrent multiple baseline design (MBD) to assess treatment effectiveness by taking assessments before and during the intervention period. Children will be assessed with both the highest scored subsection of the SCARED scale and a feelings thermometer used during the sessions. Part of this larger study involves parent and teacher ratings of this intervention, which is the

subject of my Honor's Thesis. Data will be collected from parents and teachers pre-, during-, and post-treatment to assess perceived effectiveness and acceptability of MATCH-ADTC for the treatment of anxiety in children with autism. Findings will be presented about parent and teacher perceptions of the intervention.

UPM19 1:45-2:00

Did policing of immigration change during the Trump administration?

Nitika Jane

Mentor: Miller, James Kirk

In 2017, the Immigration and Customs Enforcement (ICE) renewed its implementation of the "Secure Communities" initiative. Ostensibly intended to intensify policing of undocumented immigrants who posed threatened public safety by violating criminal laws while in the United States. This policy expanded the scope of immigration policing by enabling local policing agencies to confirm the immigration status of all persons arrested during booking, collect biometric info about arrestees, and share it with Homeland Security (U.S. Department of Homeland Security (2010). This program was intended to reduce the cost of identifying illegal immigrants by broadening the scope of powers allotted to local law enforcement (Cox & Miles, 2012, p.88). A basic but important question that is not answered is whether the reinstatement of Secure Communities in 2017 led to racial profiling of Hispanics and other brown people. In order to empirically investigate the possibility that the reinstatement of Secure Communities led to racial profiling of Hispanics and Hispanic-looking people, I conduct a quantitative thesis project that analyzes demographic patterns about traffic stop characteristics using data from North Carolina law enforcement agencies between 2015 and 2019. The analysis will examine patterns in (the discretionary basis of the reasons for traffic stops such as speeding, equipment, and other administrative reasons), drivers stopped by police (race, gender, age, and other characteristics of drivers), and traffic stop outcomes (such as whether an arrest was made, a ticket issued or just a warning stop). This is done by analyzing traffic stop data from the two years before Secure Communities was re-instituted under Trump (2015-2016) and the 3 years after it was re-instituted (2017 -2019). The impact of the implementation of Secure Communities will be assessed by quantifying if there is a change in traffic stops for Hispanic individuals between the two time periods that coincide with its re-introduction. This project also includes a discussion of the current context of immigration in the United States and how that has impacted interactions between Hispanic residents and local police.

UPM20 2:00-2:15

Diving into the Realm of Politics

Braddock Rhodenhiser, Emma Gebel, Jackson Bostic, Emma Grace Primm, Andrea Knight

Mentor: Christensen, Timothy W

According to the 2018, National Study of Learning, Voting, and Engagement (NSLVE) report, Science, Technology, Education, and Mathematic (STEM) majors do not vote at high rates compared to non-STEM majors at East Carolina University and around the country. We believe this is a pressing issue that should be addressed. Going back to the fundamentals of education, we created the first ever East Carolina University Honors College Seminar developed by students, for students, to address the lack of voting among STEM majors. The seminar is currently being taught this semester (Spring 2023) by Dr. Mosier, a professor in the Political Science Department. The course emphasizes the importance of scientifically-sound civic engagement and political participation for STEM majors and other STEM interested students.

As a result of new research, we are shifting our efforts to the East Carolina University student body, but still with a focus on STEM-related topics. By the Fall of 2023, we plan to have this topic implemented into the COAD 1000-Student Development and Learning in Higher Education course.

In addition to this, we are planning conversational groups to discuss different topics surrounding the issue at hand. Open dialogues are essential to allow people to share their opinions in a safe environment. Our goal is to provide a platform where people can say I agree with “x” for this reason, not just state what they believe. We strive to create dialogue, and not debate.

UPM21 2:30-2:45

School-Based Programs that Address the Social Emotional Learning Needs of Traumatized Children

Samantha Lynn Brenz

Mentor: Golden, Jean Ann

Children in today's world experience trauma and Adverse Childhood Experieces (ACEs) more than we would like to admit. Due to the recent pandemic, racial aggresions and economic decline, families have reported that their children have experienced depression, anxiety, and a disconnection from society, leading to a child's struggle in mental wellbeing. Relevantly, a child's mental health affects not only their social interactions but their academic perfomance as well.

SEL is the knowledge that both children and adults can recieve, to understand and manage their emotions, set goals, maintain positive relationships, and make responsible decisions. An efficient and consistent SEL program in school systems can benefit the emotional awareness and decision making of *all* children.

Currently, there are a lot of different SEL programs that are being taught in schools. However, we need to consider the needs of the children who have undergone trauma or have had ACEs. The goal of this research is to review the literature regarding the SEL needs of children who have experienced trauma and to identify SEL programs that can meet those children's needs. From the literature that has been reviewed, several components of SEL have been found to be important to the improvement of social interactions and academic achievement of children who have experienced trauma. These include tools that support self-regulation and coping skills, to reduce the impact of trauma and improve student success.

UPM22 2:45-3:00

Healing from Racial Trauma: Identity Affirmation, Self-Awareness/Reflection, and Problem-Focused Coping

George Cherry

Mentor: Golden, Jean Ann

Healing from Racial Trauma: Identity Affirmation, Self-Awareness/Reflection, and Problem-Focused Coping

One of the factors that makes racism so appalling, and threatening is that it is a direct attack and injury to a person's identity and self-image. Therefore, identity-affirming strategies such as Africultural coping and religion and spiritually are highly effective in reducing the impact of racial trauma.Africultural coping is a form of cultural or racial socializationthat help affirm identity through promoting ancestral legacy, cultural pride, and heritage. Africultural coping mechanisms have been shown to increase the accuracy of appraisal and self-efficacy among Black Americans through emphasizing their intrinsic value, worth, beauty, and purpose. Another identity-affirming coping mechanism is religious and spiritual practice. Religious practice is the most utilized coping strategy because it establishes the groundwork for the existence and higher purpose of the whole person. Practicing religion or spiritually reminds Black people that they are created in the image of God and that their entire person is intrinsically worthy and valuable. Self- awareness and reflection coping mechanisms include self-care activities such as mindfulness meditation, individual psychotherapy,

aromatherapy, unplugging from social media, taking mental health days from work or school, and massage and relaxation. Even though in the literature, there is an abundance of documented benefits of self-care in recovery and coping with race-based stress and trauma, self-care is not often utilized as a coping mechanism among Black people. This could be becauseof how society views Black people when it comes to work and the negative stereotype of being slothful or lazy. Black people may feel as if it is not socially acceptable for them to take a mental health day or relax or embrace pleasure. This view is ironic considering the fact that African Americans are responsible for the work and unpaid labor of building this country. These coping mechanisms are functional and quite effective, however; they do not address the underlying structures and causes of systemic and institutional racism. The third type of coping mechanism is problem focused coping. Problem- focused coping includes activism and active confrontation and resolution. Activism is effective because it works to destroy and dismantle the systems that are the cause of racism in society.

UPM23 3:00-3:15

Don't Sit So Close to Me!: Life History, Disease Salience, and the Behavioral Immune System

Emily Lagnese

Mentor: Baker, Michael Drew

To what extent might disease avoidant behavior be shaped by early life experiences? Do the conditions under which a person grows up lead them to be more or less wary of disease related threats in their immediate environment? The current work employs an in-person between-subjects' study and a behavioral dependent variable in order to try to answer these questions. Participants were given the impression that they would be meeting a second participant and listened to a prerecorded introduction. This was, in fact, a recording of a confederate of the researcher, rather than an actual participant. This recording either included no coughing (control condition) or frequent coughing (disease salience condition). Then they were asked to complete questionnaires measuring disease avoidance, time perspective, life history, and unpredictability of the childhood environment. The participants determined how proximate they would be to the other participant by arranging chairs for a purported meeting with this person. Individuals with greater levels of childhood unpredictability were hypothesized to distance themselves less from a partner who displayed signs of illness. The objective of this study was to expand the current knowledge and understanding of the impact childhood experiences have on personality traits that influence disease-avoidant behaviors.

UPM24 3:15-3:30

The Effects of a Growth Mindset Intervention on Stereotype Threat of First Generation College Students

Gibely Elidah Cisneros

Mentor: Eppler, Marion A

First-generation college students (FGS) earn lower grades on average compared to non-first-generation college students (NFGS), and one factor hypothesized to contribute to achievement gaps for at least some groups (e.g., minority students) is stereotype threat. Stereotype threat causes individuals who are targeted by negative group stereotypes to perform significantly worse possibly by limiting working memory capacity. The stereotype addressed in the present study is that FGS are not as intelligent as NFGS. In this study a growth mindset intervention is used to combat the effects of stereotype threat on a working memory task. Two main hypotheses are addressed in this 2 (FGS vs NFGS) x 2 (mindset condition) x 2 (stereotype threat vs no stereotype threat) factorial design. H1: FGS should be affected by stereotype threat but not NFGS (in the control mindset condition, FGS will score lower than NFGS when both are under stereotype threat). This would demonstrate that we activated stereotype threat specifically to FGS. H2: The growth mindset intervention should interrupt the effects of stereotype threat, causing FGS in growth mindset condition to perform better than FGS in control condition when both are under stereotype threat.

UPM25 1:30-1:45

The Connection between Family: A representation of generational love and strength between women

Lorah Elizabeth Currin

Mentor: Blake, Beth A

In my family the matriarch is the keeper of our stories, the guardian of our traditions, and the embodiment of our love. The role of a matriarch is a position of leadership that is preserved through generations, emboldened by the comradery of women.

My art aspires to present the conversation from matriarch to the present generation of women.

I embrace and elevate traditional female roles like sewing and weaving by using textiles in a quilt like manner. I present these women as strong and warm through my

composition and color pallet. I use stitching to weave together the memory of these women while showing a harmonious contrast between their love and strength. They are not a remembrance of something once departed, but rather a blanket of comfort that will remain after one is gone.

UPM26 1:45-2:00

The Development of Young Adult Committed Dating Relationships

Apoorva Mutyala

Mentor: Taylor, Alan

In stage 6 of Eric Ericksons Psychosocial Development model, a young adult will form strong connections with others if their needs are met yet will become lonely and isolated if not. This being said, unmet relationship and commitment expectations are often associated with poor relationship outcomes. Individuals who promote and hold strong romantic beliefs also have greater expectations that an ideal relationship would conform to their standards. There are various articles that have been written about the world of dating, online dating culture, and the stage of life that young adults go through when looking for a committed romantic relationship. However, not much of this research has been focused on the general process of going from dating to a stage of commitment in young adults. By researching this process, I am able to gain insight into the mindset, values, and goals of young adults within their relationships. The problem I will be investigating is how the dating process impacts an individual's college experience and how the young adults on ECU's campus are establishing and preserving these committed dating relationships. Purpose: This study will determine what steps are taken towards creating a committed dating relationship within a community of young adults. A survey will be conducted to determine these measures and the impact they have on the ECU community to establish how human connections and relationships are formed and maintained.

Methods:

We will conduct a survey utilizing Qualtrics distributed to various HDFS classes. The questions studied begin by asking participants various demographic questions. These may include questions related to race, age, and gender. The demographic section is then be followed by research questions including: How is your relationship satisfaction and communication?, How did you meet? (Dating apps, at a party, high school, mutual friends, hooking up) and How did you develop your relationship from the "talking" stage? The data will be taken from the survey to analyze the steps taken to form relationships as well as the level of relationship satisfaction and communication present throughout the population. By observing the data collected I will be able to answer the

question of whether or not students are truly building strong and committed connections at ECU.

UPM27 2:00-2:15

Supportive School Administrative Leadership Practices for Beginning Teachers Retention

Emily Paige Bronson

Mentor: Lewis, Travis Earl

The United States is enduring an unprecedented teacher shortage. One leading factor impacting beginning teachers' decision as to whether or not remain in the profession is the leadership in their schools. This project has focused on gathering data from beginning teachers-those within their first four years in the profession-on what specific leadership practices of school administrators are most conducive to supporting teacher retention. The purpose for this project is to devise a professional development program for school administratos, based upon the restults of the data collection from beginning teacher focus groups and interviews, to help these teachers fell supported in overvoming what has led to their peers to leave the profession. The desired program outcome is to equip school administrators with an understanding of effective leadership practices that lead to a decrease in turnover. This study employs a grounded qualitiative design. Following an extenseive literature review, a set of focus group questions were developed, piloted, and refined for the use with beginning teachers to gain greater insight into what leadership practices are and are not beneficial towards their success and efficacy. Both in-person and virtual focus group options were provided to participants, with flexible scheduling to accommodate the demands of busy working professionals. Participants were recruited through an email list of teacher preparation program graduates from a regional public university in Easter North Carolina. Snowball sampling was employed to gather additional participants. Transcripts from the focus groups were analyzed using open coding and second-level coding. Emeregent themes from the data analysis were considered in realtion to the literature review to aid in understanding what beginning teachers need from their administrators, and subsequently what training is necessary for administrators to meet their begininng teachers' need. Teacher retention is a national crisis with detrimental impacts on our society. The significance of this project is that if teacher attrition is not met with some type of inhibitor, the vicious cycle of the failing teacher pipeline will worsen.

UPM28 2:15-2:30

Tolkien's Long Defeat and Final Victory: The Christian Triumph of King Théoden in *The Lord of the Rings*

Arthur Donald Schupbach

Mentor: Tedesco, Laureen

"Actually I am a Christian, and indeed a Roman Catholic, so that I do not expect 'history' to be anything but a 'long defeat' - though it contains (and in a legend may contain more clearly and movingly) some samples or glimpses of final victory."- J.R.R. Tolkien, Letter #195, The Letters of J.R.R. Tolkien.

The paper, "Tolkien's Long Defeat and Final Victory: The Christian Triumph of King Théoden in The Lord of the Rings" focuses on the concept of the "long defeat" in J.R.R. Tolkien's The Lord of the Rings trilogy and how it relates to his belief in a "final victory," that is, the future triumph of good over evil, as foretold in his Catholic faith. The paper argues that the long defeat, which represents the inevitable decline of people and civilizations, is rooted in Tolkien's Catholicism, his views on history, and his belief in original sin as the origin point for this decline. The long defeat is exemplified in The Lord of the Rings in characters such as King Théoden, who is introduced in a corrupted, fallen state, and Frodo, whose journey represents a descent into darkness resulting in the gradual decline of his character. The final victory, which represents the triumph of good over evil, is embodied in characters such as Aragorn, whose ascension is steeped in Christ-like symbolism, and Gandalf, who redeems Théoden in an event reminiscent of the healing undergone by the Apostles during the Pentecost in the Book of Acts. The paper argues that although Tolkien did not intend to write allegory, his Catholic beliefs are evident in the themes and characters of the trilogy, manifesting in a way consistent with his faith and his personal truths. Ultimately, the paper suggests that while Tolkien nevertheless believed that history was "a long defeat," he nevertheless seeded The Lord of the Rings with ample "glimpses of [the] final victory."

UPM29 2:45-3:00

Adapting Puddleglum: An Exploration of Artistic Liberty

Samuel Lanier

Mentor: Tedesco, Laureen

In a world as magical as Narnia, The Marshwiggle Puddleglum's dour demeanor and grim outlook on life are a relatable breath of fresh air. A creative project in English class gave me the opportunity to depict Puddleglum, my favorite character from C. S. Lewis's classic book The Silver Chair, through the visual medium of animation. My presentation will explore the key differences between Puddleglum as he is described in the literature vs. my illustrations. For example, one of the larger changes I made was to the character's color palette. In the fiction, Puddleglum's clothing and complexion are described with a range of muddy green and earth tones, but in order for him to be

visible in the muddy brown swamp he calls home, those colors had to change. This project began as a hand-drawn digital animation, with many of the creative liberties taken being informed by over a decade of personal experience, Ollie Johnson and Frank Thomas's The Illusion of Life: Disney Animation, Paul Wells's essay in "Classical Literature and Animation: All Adaptations Are Equal, but Some Are more Equal Than Others", and Richard William's The Animator's Survival Kit. My short animation and illustrations show Puddleglum in and around his swampy homeland, returning to his daily life after a grand adventure across the land of Narnia. I really wanted to convey the idea that a simple life can be just as beautiful and fulfilling as a life full of adventure, and my research was an integral part of capturing that feeling.

UPM30 3:00-3:15

Nefertiti, Hypatia, and Sappho: Reception History and Women in the Ancient Mediterranean

Anna Marie Roche

Mentor: Dixon, Helen Marie

The study of ancient women is made difficult for scholars for many reasons. Lack of sources about these women written during their lifetimes, issues of translation and interpretation, the desire to fictionalize women's stories and use them to make statements about modern issues, and the personal experiences or biases of artists and writers all affect the narratives available to scholars in the twenty-first century. This work surveys the ancient sources available to construct narratives of the lives of Nefertiti, Sappho, and Hypatia and examine the possible problematic aspects of these sources with attention to eighteenth and nineteenth century scholarship on these sources that established the histories available to modern scholars of these three women. This work also examines the artistic reception of these women and the effects of contemporary politics, perspectives on sexuality and gender, and the artists' backgrounds in the representations of Nefertiti, Sappho, and Hypatia in sculpture and painting from the eighteenth century into the twenty-first century.

UPM31 3:15-3:30

Carnatic and Western Post-Tonal Fusion: Asha Srinivasan's Exploration into Combining Western Post-Tonal Music and Carnatic Classical Music

Ella Elizabeth Green

Mentor: Huener, Thomas Joel

Asha Srinivasan's choral work Ipseity, commissioned by the ECU New Music Initiative, combines concepts from both Southern Indian Carnatic classical music and Western European classical music. The composition demonstrates clear evidence of the fusion of these musical cultures through the projection of musical concepts functioning in both. Western post-tonal set theory and research on the essential theory of Carnatic classical music were employed to establish the connections the composer created within Ipseity between cultures. The collection of pitches in each major section of Ipseity contains evidence of both an Octatonic scale, as well as the raga Ramapriya, simultaneously. The tenor solo and drone in the second section of the piece offer tribute to the vocal style of ragas found in Indian Carnatic classical music. Ornamentation such as glissandi and trills throughout the piece introduce themes found in both gamakas, a strict system of ornamentation found in Carnatic music, and Western electronic music. Asha Srinivasan's education in both spheres of music, Carnatic classical music and Post-Tonal Western classical music, allowed her to take individual ideas from either culture and apply them, so as to be applicable and functional within the parameters of the music theory of both.

UPM32 3:30-3:45

My Great Expectations: A Personal Narrative Portfolio

Olivia Jane Warren

Mentor: Miles, Gera S

Expectations are like a double-eged sword - they are just as swift to harm as they are to protect and pave the way for success. Our world is saturated with expectations, both real and perceived, that crush some and motivate others. In a world of countless possible expectations, one's perspective is a key determinant of how they are viewed and applied in one's life. In this creative endeavor, I am reflecting on expectations that have helped shape my life and evaluating their place in my future.

From the beginning of man, storytelling has been a foundational element of culture, language, faith, and the traditions that bind us together as people groups and as the human race. It is a proud tradition that all peoples of this earth have carried on for many years, sharing countless perspectives, and I am adding my proverbial drop in the ocean.

This project is a collection of short stories, essays, and other creative writings that shares my current perspective on how expectations have shaped my life and how they will

affect my future. Growing up, I felt very alone in my experiences, and the phrase be who you needed when you were younger"has always resonated with me. It is my primary motivation for teaching and one of the reasons I have chosen to teach high school - it was a pivotal time in my life when my world opened up and 16-year-old me would have truly benefitted from hearing from 22-year-old me. For anyone who is willing to listen, I am willing to share.

UPM33 2:00-2:15

Silicon DiOxide is The Most Abundant Mineral in the Earth's Crust: How Toxic is It?

Ankita Prakash

Mentor: Zhang, Baohong

Silicon DiOxide (SiO_2) is the most abundant mineral in the earth's crust and ubiquitous in commercial use. Although harmless in its native state, its nanoparticle counterpart can be highly toxic. Nanoparticles are materials with <100 nm at least one dimension, harboring unique physical properties which make them highly mobile. They are destined to enter terrestrial and aquatic systems. Despite their prevalance, little is known about their possible toxic effects on biotic factors. This study aims to understand the effects of increasing environmental abundance of SiO_2 on an important biofuel crop *Camelina sativa*. It is hypothesized that SiO_2 hinders plant growth and development, dysregulates biochemical metabolic processes, and increases the accumulation of reactive oxygen species (ROS). Five experimental groups were prepared with increasing SiO_2 concentrations of 0%, 0.01%, 0.05%, 0.1%, and 0.5%. Seeds were allowed to germinate for 14 days under consistent light and temperature conditions. Statistical data analysis proved 0.5% SiO_2 in the environment to significantly decrease the quantity, weight, and length of shoots and roots as compared to all other groups. However, 0.01% and 0.05% SiO_2 did not impact C. Sativa plant growth and morphology to a significant extent. Shoot weight and length were the most negatively affected by increasing environmental abundance of SiO_2 while root length saw the least impacts**.** Additionally, root vigor, H_2O_2 accumulation, superoxide dismutase activity, and the atomic dioxide radical anion ($O_2-\bullet$) content assay will be measured to quantitatively assess biomolecular impacts of SiO_2 under methodology created by Dr. Zhang. These results should provide supporting data on the mechanisms through which SiO_2 impacts *C. Sativa* cellular processes. Bioaccumulation of SiO_2 in food crops would have detrimental impacts on agricultural health, and biomagnify into species that consume these plants. Studies have demonstrated Silica nanoparticles to induce significant formation of ROS, cell membrane damage, and modifying DNA leading to chain destruction in human skin cells. Although nanoparticles have great potential for advancements in scientific and commercial fields, much is yet to be learned about their potential toxic side effects.

UPM34 2:15-2:30

Investigating the Seed Bank of a Wetland Plant Community in a Long-Term Mowing and Fertilization Experiment

Peyton S. Harrelson

Carol Goodwillie

Mentor: Goodwillie, Carol

The seed bank of a plant community—the store of viable, dormant seeds below the soil surface—holds a legacy of its past composition and may have potential for restoration following habitat degradation. An ongoing 20-year fertilization and mowing experiment studies the plant community of a nutrient poor wetland in the coastal plain of North Carolina. The experiment is replicated on eight blocks and features a hydrology gradient that is caused by a drainage ditch. Since the start of the experiment, unmowed plots have become less diverse and are dominated by trees and shrubs. This long-term experiment provided the opportunity to explore the persistence of the seed bank through time. Soil samples from each treatment plot were collected and placed in a growth room to allow germination. The number of seedlings that emerged was recorded to test for the effect of fertilizer, mowing, and drainage on species richness and abundance of the seed bank and compare its composition to that of current and past aboveground vegetation. Multivariate statistics were used to look for treatment effects on the composition of the plant community. Fertilizer and drainage did not have a significant effect on the density or species richness of the seed bank, but it had a strong effect on its composition. In contrast, mowing had a significant positive effect on species richness and seed density but did not affect the composition of the seed bank. In comparison between the seed bank and the current aboveground vegetation composition, the mowed plots showed greater similarity, suggesting that the seed bank retains the species of the past plant community. As the aboveground vegetation changes, the seed bank may hold the ability to serve in future restoration projects.

UPM35 2:30-2:45

Identifying Cu^{2+} binding to a novel cupredoxin from *Brucella abortus*

Alexa Kerkan[1], Kai Hart[1], Daniel W. Martin[2], Sambuddha Banerjee[*1]

1. East Carolina University, Department of Chemistry
2. Brody School of Medicine, Department of Microbiology and Immunology

Mentor: Banerjee, Sambuddha

Cupredoxins are a large group of proteins containing a single Cu-ion bonded to the monomeric protein using conserved HisHisCys residues. These proteins play an essential role in electron transfer in all kingdoms of life. The presence of the HisHisCys residues is required for this enzymatic function. Recently, several new putative cupredoxins have been predicted based on these proteins' Cu-ion sequestration ability or phylogeny, however, these do not conserve the HisHisCys residues. Periplasmic FtrB from Brucella spp. Is one such cupredoxin candidate and is predicted to bind Cu-ion using conserved H121, D55, and M81 residues. The aim of my project was to investigate if FtrB could show binding heat when Cu^{2+} was titrated in a buffered solution of FtrB in isothermal titration calorimetry (ITC). I further investigated Cu^{2+} binding by the FtrB mutants (H121A, D55A, and M81A) to determine the roles these residues play in metal binding. Circular diachroism (CD), ITC, and cyclic voltammetry (CV) experiments confirmed that FtrB can coordinate Cu^{2+} and, H121 and D55 residues might play important roles in this binding. Mutation of the M81 residue showed signs of protein structure loss indicating this residue is important for proper folding. This is the first experimental report showing Cu^{2+} binding by a predicted cupredoxin in a mono-his brace site described by HisGluX (X= unknown) site.

UPM36 2:45-3:00

Quantum Tunneling in AtLOX1

Delane Dixon, Caiya Laurel, Savannah Swink

Mentor: Offenbacher, Adam Richard

Enzymes are fundamental to all metabolic processes by catalyzing chemical reactions necessary to sustain life. The activation energy (Ea) is a measure of the energy barrier for reactions and is informative for the mechanism of an enzyme reaction. The model plant lipoxygenase enzyme from soybean has been determined to have a very low Ea for the oxidation of fatty acids – an important process for plant growth and development. The goal of this CURE project was to perform a kinetic analysis of the reaction of the plant LOX from *A. thaliana* (AtLOX1) to characterize its activation energy, which further informs us about the generalized kinetic features of plant LOXs. In this presentation, our team will present the isolation and characterization of *At*LOX1 enzyme from bacterial cultures.

The activation energy was 13.52 kcal/mol. Based on this value, the AtLOX1 reaction is consistent with a semi-classical transition. Understanding the reaction barriers of

the *At*LOX1 allows us to consider how factors like global temperature could impact crop production, immune defense and crop repair. These experiments were performed in a course-based undergraduate research experience (CURE) biochemistry lab in fall 2022.

UPM37 3:15-3:30

Trehalose Effects on Soybean Lipoxygenase-1 Catalysis and Activation Energy

Luis Alexis Guevara

Mentor: Offenbacher, Adam Richard

There is increasing evidence in the field of enzymology that conformational fluctuations of the protein play an important role in catalysis - the function of the enzyme. Viscogens, such as glucose and trehalose, can be used to test the functional impact of solvent on protein conformational fluctuations because viscogens influence the structure and dynamic interactions of bulk water. Lipoxygenases (LOXs) are a family of iron-containing enzymes that catalyze the oxidation of polyunsaturated fatty acids (PUFAs). Recently, it was shown that SLO-1 has a solvent-exposed loop that plays an important role in the activation barrier of catalysis. In this presentation, kinetic data for the reaction of SLO with its natural substrate, linoleic acid, as a function of temperature, both in the absence and presence of trehalose will be presented. Trehalose, a kosmotropic disaccharide, disrupts water-water interactions increasing the viscosity of the bulk solvent it is added to. The data show that while trehalose influences the substrate binding to SLO protein, there is no effect on the activation barrier associated with catalysis. The results will be discussed in the context of solvent-slaving processes in SLO-1. This information increases our understanding of how solvent affects enzyme catalysis through solvent-exposed surfaces. The results can also be used to provide insight on the effect of solvent on the role of different hydration shells of proteins that act as enzymes.

UPM38 3:30-3:45

Investigating the causes of hatching failure of Eastern Bluebird eggs

Hannah Grace Costa

Mentor: McRae, Susan B

Eastern Bluebirds (*Sialia sialis*) studied for 13 years at ECU's West Research Campus have shown declines in reproductive success via hatching failure in recent years. The purpose of our research is to determine the underlying cause. In 2022, hatching failure, defined as having 2 or more eggs in the same clutch fail to hatch, occurred in 17 of 53

nests by 31 pairs. Examining 41 eggs from 17 nests that failed to hatch revealed that 11 had partially developed embryos. We developed 2 hypotheses for hatching failure. First, since some birds hatched on-site are recruited as breeders, there may be elevated levels of breeder relatedness, and inbreeding depression could explain embryo mortality. While data has not revealed an association with incestuous matings, philopatric males are overrepresented in the population of individuals that have at least one hatching failure. Second, high seasonal temperatures in nest boxes during summer may have caused developmental failure. In support of this hypothesis, hatching failure affected mostly later clutches laid in June and July. To investigate the possibility that the eggs that did not survive were more sensitive to high temperatures, we will investigate sequence variation in heat shock proteins (HSPs). HSPs are molecular chaperones that become overexpressed in response to stress such as high temperatures. We will amplify and sequence segments of the Hsp90 gene to look for sequence differences and differences in methylation status by comparing failed embryo samples to surviving chicks. We will extract DNA from partially developed embryos collected from unhatched eggs and from blood samples collected from siblings in the same nests that survived and successful nests. Finding alleles corresponding to survival differences would strengthen the link between heat stress and hatching failure. Sequencing these genes is a step toward looking at possible modifiers of gene expression such as DNA methylation (possibly mediated through the philopatric paternal lines). This would be among the first studies to investigate the role of HSPs in a wild songbird.

UPM39 3:45-4:00

Clots and Chromatography: Analyzing the Role of Post-Translational Modifications on Blood Clot Formation

Caroline Elizabeth Daub

Mentor: Offenbacher, Adam Richard

Fibrinogen is a soluble glycoprotein found in blood plasma that is involved in forming blood clots. It is the precursor to fibrin, an insoluble protein that forms the structural scaffold of blood clots. Fibrinogen is converted to fibrin when fibrinopeptides A and B are cleaved off fibrinogen by the enzyme thrombin, exposing polymerization sites termed knob ‘a’ and knob ‘b.’ Blood clots are formed when fibrin molecules laterally aggregate through knob:hole interactions. In this preliminary study, a fibrinopeptide release assay (FPRA) utilizing high-performance liquid chromatography (HPLC) was developed. The FPRA measures the relative amount of fibrinopeptides released from fibrinogen/thrombin reactions at specific time points. The FRPA assay was extended to two fibrinogen variants that exhibit altered clot structures, related to different post-

translational modifications (PTMs) of fibrinogen. These results will be discussed in the context of human pregnancy, in which fibrinogen undergoes alterations in its PTMs that could impact blood clotting properties and increase women's risk of cardiovascular diseases.

Undergraduate Poster Presentations (In-Person) Abstracts

Ballrooms

UPR01

The effects of manipulated performance feedback on the individual performance of a rope-pulling task

John White-Singleton

Mentors: Habeeb, Christine, Rider, Patrick

Self-efficacy (confidence in oneself) is one of the strongest predictors of individual performance and collective efficacy (confidence in a team) is a strong predictor of team performance (Bandura, 1977). Lent and Lopez (2002) theorized that high levels of other-efficacy (confidence in a teammate) could also be important to performance outcomes of partners. This potential connection between self- and other-efficacy has been explored using manipulated feedback to determine the role other-efficacy plays on self-efficacy within small group settings (Dunlop 2011). These studies however are lacking an investigation into the effects of the group's abilities, or collective efficacy. The purpose of this study is to investigate the relationship between manipulated performance feedback on self-, other-, collective-efficacy and individual performance, measured by muscle activation and total force generated during a two-person team rope-pulling task. Strangers will be paired as teammates and electromyography sensors (EMG) are placed on the biceps, triceps, quadriceps, and deltoid muscles. These sensors measure the electromyographic signals in the body's muscles when they are moved. This study consists of a practice round rope-pull, introduction of manipulating feedback, and a competitive round rope-pull, with questionnaires gauging their self-, other-, and collective-efficacy beliefs administered before and after the feedback is introduced. This manipulated feedback, designed to affect levels of self-efficacy and other-efficacy. During each round participants, will complete four total attempts to pull the rope as a team, alternating positions with each attempt. Once completed, the participants will be informed of the experiment's deceptive techniques. Data will be analyzed to determine how diverse types of feedback impact individual performance, as well as self-, other-, and collective-efficacies. Twenty-two participants have been recorded so far with this methodology, with the plans for additional participants this year. This study can play a vital role in identifying connections between efficacy and individual performance and will promote greater understanding of how individuals' bodies respond when presented with external feedback.

UPR02

Combating bacterial biofilms: Functional characterization of the Vibrio fischeri biofilm regulatory protein SypE

Ehime N. Abhulimen[1,2] and Morgan E. Milton[2]

1. Department of Biology, East Carolina University
2. Department of Biochemistry and Molecular Biology, Brody School of Medicine, East Carolina University

Mentor: Milton, Morgan Eilise

Antibiotic resistance represents a notable and increasing threat to healthcare and its economics. Biofilms are directly associated with bacterial tolerance to antibiotics. These biofilms are tightly regulated communities of matrix-associated bacteria and are a major component of bacterial pathogenesis including drug tolerance. Approximately 80% of chronic and recurrent microbial infections within the human body are due to bacterial biofilms. This makes it imperative to understand how biofilms are made. In this presentation, I will share my progress towards revealing the molecular mechanism of an unusual regulatory protein essential for controlling biofilm formation, SypE, from the model organism *Vibrio fischeri*.. SypE regulates the synthesis of a component of the biofilm matrix necessary for host infection. Based on previous findings, SypE has atypical functions compared to well characterized homologs. I will present the initial biochemical and structural characterization of SypE's function and computational modeling the structure of SypE using artificial intelligence-based methodologies. My work is innovative because it focuses on a system that is crucial for biofilm formation and serves as a pioneer for an investigation that has only been previously explored using cellular and genetic approaches. The structure-function approach presented here will provide information to fill our knowledge gaps and answer key questions related to the molecular mechanisms of SypE. Learning how proteins like SypE function will allow us to develop ways to combat biofilm induced antimicrobial tolerance and reduce bacterial infections in hospital patients, medical devices, and healthcare workers.__

UPR03

Examination of ADAP/Centaurin-a1 in Cognitive Dysfunction Using Trace Eyeblink Classical Conditioning

Luke Davis Jackson[1], Liz Harris[1,2], Wyatt Bunner[3], Erzsebet Szatmari[3], PhD and Tuan Tran[1,2], PhD

[1]Multidisciplinary Studies Program in Neuroscience, ECU
[2]Department of Psychology, ECU
[3]Department of Physical Therapy, Allied Health Sciences

Mentor: Tran, Tuan D

Purpose: ADAP1/Centaurin-a1 (CentA1) is found in high concentrations within the brain, which is known to regulate dendritic differentiation and their structural plasticity. Recent 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, 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.

Significance: 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.

Methodology: 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.

Conclusions: Results from this study will provide novel insight on whether CentA1, a presynaptic protein, plays a role in mediating adverse learning outcomes in AD.

UPR04

Adhesion-Mediated Synapse Formation in Developing Neural Networks

Gaelle Desert, Daisy Perez, Michelle Cobb

Mentor: Litwa, Karen Ann

Autism is a neurodevelopmental disorder characterized by abnormalities in behavior, communication, and challenges in social environments. Autism is impacted by alterations in connectivity, impacting cognitive and neurologic functioning. In particular, autism patients exhibit synaptic alterations. This has led us to hypothesize that the process of initial adherence between pre- and postsynaptic compartments during brain development is altered in autistic individuals. The complexities of human synapse development prompt scientists to study and design neurons made from human-induced pluripotent stem cells (hiPSC) that develop synaptic activity. Brain organoids are also used to model structures of human brain development and reveal molecular events that lead to altered synapse formation in neurodevelopmental disorders (Wilson and Litwa, 2018). Dendritic filopodia, long, thin structures that are present in developing dendrites may mediate synapse formation. The goal is to research the mechanisms by which dendritic filopodia promote synapse formation and are altered in neuronal disorders. Prenatal synaptic alterations have been shown to be a result of autism-associated genetic mutations that affect synapse formation. My investigation will examine synaptic connections and dendritic filopodia by using immunofluorescence staining for proteins to identify neurons doublecortin (DCX), their associated spine precursors (drebrin), and the adhesion molecule N-cadherin (N-cad). We will assess whether the presence of the adhesion molecule, N-cad, in spine precursors corresponds with increased synapse formation by immunostaining for presynaptic neuronal partners using V-Glut1. One portion of research will focus on examining the effect of neuronal density on spine precursor and synapse formation in 2D neuronal cultures. The other portion will determine how these processes differ in 3-dimensional organoids that mimic human development. The cell samples gathered will then be imaged using a confocal microscope and analyzed with ImageJ software to determine the number of spine precursors with an N-cad cluster and their association with presynaptic partners. Our future research will determine how the quantitative results between the controls and the autism-derived neurons and cortical organoids differ.

UPR05

Exploration of Early-Stage Infection-Detection Bandages as Means for Increasing African American Health Outcomes

Marzuq Islam, Ono Abhulimen, Daniel Lee Dickerson

Mentor: Moore, Shawn Anthony

This study represents an effort to develop a low-cost diagnostic bandage for underserved populations. The US is facing a crisis with the rise of diabetes,

a disease that comes with a variety of impacts, including foot ulcers. This effect can pose serious issues to people with diabetes because without proper treatment, it can lead to nerve damage and amputation. These effects can be even more dangerous because if other wounds are gained, the person in question might not even feel any pain due to the nerve damage. This study builds upon work from
Dasia Taylor who produced a pH-sensitive color-changing suture that used a natural pH indicator to detect infection. In our study, like Taylor's, we use an indicator that monitors pH changes when applied to the bandages. A change in color would detect infection. What differentiates our product from the sutures is enhanced precision and connection with physicians in real-time to remotely assess wound treatment. This study leverages a prototype that consists of a color sensor connected to an Arduino to detect changes in pH related to the bandage. We will explore the use of various telemetry options, such as Bluetooth, to relay data to physicians to monitor their patients' status. Using data from the bandage, physicians could then recommend additional interventions. This study stands to directly benefit rural Black North Carolinians to positively address health disparity issues.

UPR06

A Self-Separating Colloid: A Stochastic Model of Sperm Cell Population Dynamics

Logan Michael Harrison

Mentor: Schmidt, Cameron Alan

Male gametes (sperm cells) occur in extremely large numbers relative to female gametes (eggs). Sperm are motile cells that 'compete' for fertilization of the egg. In mammals, sperm are not competent to fertilize the egg immediately following ejaculation but must gain fertilization competence during residency in the reproductive tract through a series of biochemical changes known as 'capacitation'. Sperm selection for use in assisted reproductive technologies is a substantial challenge because competent sperm from a sample must be identified and separated without altering or damaging them. Since the 1950's, molecular mechanisms of sperm capacitation have been thoroughly investigated. However, there is substantial variation in empirical observations within and between individuals and species that make generalization competent sperm features extremely difficult to define. The biological 'meaning' of individual sperm behaviors/phenotypes is only helpful when considered in the context of the whole population, which typically consists of an overwhelming number ($> 10^7$) of cells per ejaculate. Here we propose to re-frame sperm population dynamics using tools from complex systems theory. We developed an agent-based model of sperm motility using the Netlogo programming environment and existing empirical data from research publications. The model approximates microscopic sperm behavior at the population

level and facilitates novel examination of the complex interplay between sperm density, motility state, and self-separating properties in complex spatial environments.

UPR07

The role of mRNA translation mechanisms in germ cell and embryonic development in *C. elegans*

Hannah B. Umphlett, Molly Lasure, Eun Suk Kim

Mentor: Keiper, Brett

Reproductive cells and embryos use mRNA regulation as a primary means of gene expression. mRNA translational mechanisms rely on the eIF4 translation factors. These include eIF4E, which binds mRNA 7-methylguanosine caps, and eIF4G, which binds eIF4E and guides the mRNA to the ribosome for translation. Germ cells and embryos have the unusual capacity to use both cap-dependent and cap-independent translation mechanisms. Both use eIF4G (called IFG-1in *C. elegans*), but only cap-dependent uses eIF4G. Previous research in the model organism *C. elegans* has indicated that these mechanisms function at different times and for different mRNAs during germ cell development into sperm and oocytes. Germ cell development is also highly temperature dependent. Each of these aspects in turn impact the fertility of the nematode.

Genetic engineering by means of the CRISPR-Cas9 system allowed us to introduce N-terminal tags into the *ifg-1* gene. We noticed early that some of these tags had deleterious effects on fertility, specifically on embryo hatching, while others were fully tolerated. This study addresses the viability of IFG-1 tagged with short peptides including V5, 3xMyc, sGFP helix M3, and with the longer fluorophore mCherry. Embryonic lethality was compensated by balancer chromosomes in strains where tags were not tolerated. Addition of the short peptide sGFP M3 had no effect on fertility. Indeed, addition of 3xMyc and the full mCherry protein (3xMyc::mCherry) fused to IFG-1 was also fully viable. However, addition of the short peptide V5 and mCherry (V5::mCherry) caused full embryonic lethality at all temperatures tested (15C, 20C, 25C). To determine if the V5 *per se* was toxic, we used CRISPR-Cas9 to make an internal deletion in V5. Remarkably, deletion of just 3 amino acids within V5 (dV5) restored some embryo viability only at 25C. To exclude the possibility of a recombination event in the *dV5::ifg-1* gene, we will undertake genomic PCR in these strains.

Our results indicate that the N-terminus of the IFG-1 is very sensitive to structural changes that affect the protein synthesis required for embryo hatching. This portion of the protein also binds to eIF4E—the cap binding protein. Cap-dependent mRNA translation is known to be critical for cells in growing or differentiating stages. We are attempting to evaluate the importance of the balance between cap-dependent and -

independent mechanisms in the developmental processes associated with embryo hatching.

UPR08

The Effect of Landing Error Scoring System Performance on Femoral Articular Cartilage Deformation in Recreationally Active Females

Lily Szwejbka, Matthew Blount, Starrett Vesper

Mentor: Kulas, Anthony

Background: The Landing Error Scoring System [LESS] is a valid and reliable standardized tool used to assess biomechanical movements during jumping and landing activities thought to be high-risk for sustaining anterior cruciate ligament [ACL] injuries. While a poor LESS score suggests high risk for ACL injuries, the effect of LESS scores on femoral articular cartilage [FCT] deformation is unclear. A relatively extended posture at initial impact with the ground during landing is an error according to the LESS. This erect landing technique, which contributes to poor LESS scores, is also associated with greater femoral cartilage deformation. This study could potentially broaden the scope of the LESS tool in predicting lower extremity injuries.

Purpose: The purpose of the project is to investigate the effect of poor landing performance, as defined by the LESS, on FCT deformation in healthy, recreationally active females.

Methods: The study will consist of 20 recreationally active female subjects aged 18-25. The subject must have no current diagnosed knee or lower extremity injury, previous diagnosed knee injury, or history of knee surgery. After obtaining informed consent, ultrasound images are taken of the FCT. Using video cameras placed in the sagittal and frontal plane, 2 sets of 10 box jumps from a height of 30 cm are recorded for analyzation. Ultrasound images are taken again amid the two bouts of box jumps, and again at the end. Three jumps representing the most consistent performance of the subject from the 20 total jumps are exported for data reduction. Using Kinovea software, the 17 biomechanical components of landing in the LESS are assessed, observing and recording any errors. A high LESS score indicates a high number of landing errors, which implies poor overall landing technique.

Results: This is an ongoing research project with results presented at East Carolina University's Research and Creative Achievement Week.

Conclusions: Current literature has examined associations between LESS performance and lower extremity biomechanics thought to pose a risk for injury. This research project is evaluating the association between LESS performance and FCT deformation

in recreationally active females aged 18-25. Should the results show that poor LESS scores lead to higher FCT deformation, future studies should examine if poor landing technique inclines individuals to have increased risk of articular cartilage injury and joint conditions.

UPR09

Offspring Deficits Associated with Paternal Western Diet Are Replicated by Depletion of miR-10 in Drosophila Melanogaster Brain

Steven Bradley

Contributors: Elena Pak, Ethan Angell, Yousef Ahmed, Daniel Akhnoukh, Mohammed Ibrahim

Mentor: Murashov, Alexander K

Epigenetics refers to the study of heritable changes that do not involve alterations in the DNA sequence. DNA methylation, histone modifications, and noncoding RNAs play a major role in this process. Epigenetic factors play a significant role in offspring susceptibility to obesity. It is unclear, however, what mechanisms underlie these transgenerational changes. Several lines of evidence indicate that noncoding RNAs, especially microRNAs (miRNAs), are involved in many epigenetic processes due to their post-transcriptional binding with mRNA at the 3′ and 5′ UTRs. Preliminary data from our laboratory show that paternal Western diet (WD) consisting of high fat, sucrose, and salt lead to increased hyperphagia, sleep disturbance, triglyceride levels, and decreased mitochondrial function in offspring up to the fourth generation. Moreover, using the MIENTURNET prediction tool we found that miR-10-3p is an evolutionarily conserved miRNA predicted to target brain proteins dysregulated by paternal WD. The purpose of this study was to test if miRNAs, specifically miR-10, are involved in modulating epigenetic changes following a paternal WD. To test whether miR-10 is implicated in the behavioral changes induced by a paternal WD, a UASxGAL4 system was implemented with transgenic flies to overexpress or knockdown miR-10 expression. qRT-PCR was used to verify miRNA level and flies were tested on several assays including the Fly Liquid-Food Interaction Counter (FLIC), food preference, locomotor, respirometry, and passive avoidance. Our qRT-PCR showed increases in several miRNAs in offspring of WD fathers. Preliminary results found significant changes resembling those in F1-F4 flies, particularly decreased locomotor activity and increased performance on a passive avoidance assay for flies with knockdown of miR-10. miR-10 knockdown flies were also found to have increased food consumption and, in some cases, a preference for WD. According to these results, miR-10 alterations may be involved in programming transgenerational phenotypes. Further testing with multiple transgenic constructs is being conducted to validate the

data. Results of this study may provide insight into familial susceptibility to obesity and the obesity pandemic in general.

UPR10

Electrochemical Detection of Abasic Sites in DNA using Novel Azulene Derivatives

Samantha Brandt, Rachel Smith, Elizabeth LaFave

Mentor: Hvastkovs, Eli Gerald

DNA damage from exogenous molecules, radiation, or reactive oxygen species has been implicated in numerous diseases. DNA damage can lead to mutations in key DNA sequences, which impacts key transcription products, leading to a negative cascade effect in disease progression. Detection of DNA damage at early stages is important for more effective treatments of these types of diseases, such as cancer.

Detection of DNA damage is typically performed via PCR methods after mutations have occurred. Detection in this manner is at a later stage as the output is an altered base, not necessarily a damaged one. Electrochemical sensors have shown promise in the ability to detect *in situ* generated DNA damage from enzyme metabolites or *in vivo* DNA alterations from biological DNA. Electrochemical platforms offer a rapid and cost-effective screening alternative.

Here we present an electrochemical platform for DNA damage analysis by detecting novel redox-active azulene derivatives designed to interact preferentially at abasic sites within DNA. The azulene compounds were designed as DNA-base analogs that can preferentially sequester into DNA abasic sites based on their structure that mimics natural DNA bases. Square wave voltammetry was used to detect the presence of the azulene compounds, which exhibit oxidation currents at ~+0.5 V vs. SCE. The magnitude of oxidative currents was shown to be dependent on the compound concentration and the extent of DNA damage (abasic sites). The importance of chemical modifications on the azulene compounds will be discussed.

Overall, this research aims to present a novel, convenient means to detect and chart DNA damage in biological DNA samples without the need for modification, digestion, or amplification strategies. This work arose from the initial efforts of two Course-based Undergraduate Research Experience (CURE) lab sections in the ECU Department of Chemistry, which will also be discussed in this poster presentation.

UPR11

Developmental Toxicity and Immunotoxicity of Perfluorohexane Sulfonamide

Nia Moore, Qing Hu

Mentor: DeWitt, Jamie C

Perfluorohexane Sulfonamide (FHxSA) is a synthetic organic chemical that belongs to a class of per- and polyfluorinated substances (PFAS). FHxSA is used in older aqueous film-forming foams (AFFF) agents essential for fire suppression. FHxSA is introduced into the environment through AFFF uses with the potential of contaminating drinking water. PFAS studied for their health effects have been known to negatively affect the developing immune system. FHxSA has not been well studied toxicologically, but it is anticipated to have similar effects as other PFAS. We exposed pregnant C57BL/6 mice to 0, 0.05, 0.5, or 1 mg/kg of FHxSA from gestational day (GD) 1-17 and in offspring, evaluated endpoints known to be sensitive to developmental PFAS exposure, including generalized markers of development and immunotoxicity. Dam body weights, offspring body weights, and anogenital distance were collected during the study. We also included biomarkers specific to PFAS exposure, such as liver weight peroxisomal enzyme activity and the T-cell dependent antibody response (TDAR). In the 0.05 mg/kg group, female offspring body weights were lower than controls up until postnatal day (PND) 10. Peroxisomal activity measured in the livers of PND21 and PND56 offspring did not differ statistically among dose groups in both sexes. The TDAR in offspring did not differ statistically among dose groups in both sexes. While some of the developmental markers differed, most biomarkers evaluated in this study did not differ statistically, indicating that at administered doses during the developmental window examined, FHxSA was not developmentally toxic or toxic to the developing immune system.

UPR12

Investigating Fraud and Strategies to Decrease Fraud within Youth Sports Organizations

Mason W Hudnall

Mentor: Reisch, John T

Occupation fraud is one of the most common financial crimes. Occupational fraud is defined as fraud committed by individuals against the organization that employs them. Most people that commit occupational fraud have access to the organization's accounts. There are 3 common forms of occupational fraud but the most common is asset misappropriation. According to the report of nations, in 2020 86% of all occupational fraud cases were asset misappropriation. Asset misappropriation involves the theft of assets, fraudulent disbursement of funds, and misuse of assets. Youth sports organizations are a big part of every community. These Youth sports organizations are normally non-profit organizations that rely heavily on parents and other volunteers to

help. This study investigates occupational fraud within youth sports organizations. Using the fraud Triangle theory which shows the leading indicators for fraud. The main indicators for fraud are motivation (i.e. financial struggles), opportunity (i.e. accessibility to financial accounts), and rationalization (i.e. self-justification). The findings indicate that age, position within an organization, and time period of fraud play a large role in determining who is most likely to commit occupational fraud within youth sports organizations. This study also goes into various fraud prevention methods and training that should be in place for youth sports organizations.

UPR13

Student and Professional Perceptions of CPA Evolution

Jordan Patricia Anderson

Mentor: Quick, Linda Ann

The Uniform Certified Public Accountant (CPA) Examination is the professional exam administered to individuals who wish to become a licensed CPA. The CPA Exam is comprised of four sections: Auditing and Attestation (AUD), Business Environment and Concepts (BEC), Financial Accounting and Reporting (FAR), and Regulation (REG) (Elkins). However, rapidly changing skills and competencies required in the modern practice of accounting have led the National Association of State Boards of Accountancy (NASBA) Board of Directors and the American Institute of Certified Public Accountants (AICPA) Governing Council to adopt the CPA Evolution initiative. Through this initiative, NASBA and AICPA will develop a new core + discipline licensure model and implement a new CPA Exam in January 2024. The CPA core + discipline licensure model will be comprised of three of the former sections, AUD, FAR, and REG, as well as the option to choose one of the following disciplines: Tax Compliance and Planning, Business Analysis and Reporting, or Information Systems and Controls (CPA Evol.).

The purpose of this study is to better understand student and professional perceptions of the CPA Evolution initiative. We aim to understand which disciplines are a better fit for specific career paths including audit, tax, and consulting and whether a certain discipline will make the CPA more marketable to firms and corporations in various industries. Additionally, we will investigate the advantages of technology integration into the CPA Evolution core + discipline model including what CPAs should know about accounting technologies and what portion of this knowledge should be taught in undergraduate and graduate accounting programs versus in the field. Our study also examines whether the changes made to the CPA Exam will change perceptions of the difficulty of the exam and thus change individuals' willingness or desire to take the CPA Exam. We also aim to understand student and professional perceptions of

significant accounting changes facing the accounting industry and technical and soft skills desired by employers who aim to hire CPAs.

UPR14

Investor's Perceptions regarding Fraudulent Environment, Social, and Governance (ESG) Disclosures

Madison O'Neal Cullipher

Mentor: Reisch, John T

Investor's Perceptions regarding Fraudulent Environment, Social, and Governance (ESG) Disclosures digs heavily into how important the validity of ESG disclosures are to potential and current investors of a well performing company. The utilization of per- and polyfluoroalkyl substances (PFAS) is growing, without any regard to the dangerous side effects that these substances have to the environment and humans. A survey was conducted to ask students their likelihood of investing in a fictious company, who according to Morningstar has a rosy outlook, given their history of fraudulent ESG disclosures and current use of PFAS. To test this, there are two manipulations: the location of the illegal dumping of PFAS; in-state or out of the country, and the credibility of the whistleblower; internal or external. Each student was randomly given one of four versions of the survey that altered the manipulations, then answered manipulation check questions to ensure they thoroughly read the information. It was hypothesized that investors would be least likely to invest when the illegal dumping occurred in-state and the whistleblower was an internal source and most likely to invest when the illegal dumping occurred out of the country and the whistleblower was an external source. Data collection has been conducted and data analysis is currently underway. Once the data is analyzed, it will be determined which manipulation, location of the illegal dumping or credibility of the whistleblower, is the dominant factor over the other.

UPR15

InHouse Call- Business Plan

Grant Harrison Smith

Mentor: Harris, Michael Lee

InHouse Call is an information directory app that can be used to facilitate smooth communication between medical providers and other staff that are part of the healthcare team by eliminating call transfers within an organization. The application decreases the need for switchboard operators and is continuously updated to provide the most up-to-date information to its users. The key point of value is the efficiency that the app provides. It can be used by any internal hospital employee and saves an average of 59 seconds per call. The app will provide a streamlined, comprehensive database of nursing staff, charge nurses, unit secretaries, case managers, pharmacists, nutritionists, physicians, hospital administration, and other departmental numbers. The key to the app is validating the effectiveness, which will ensure that the hospital employees are happy with the effectiveness of the product. InHouse Call will need to ensure they are monetizing on the apps efficiency and need to maintain communication with the end users to ensure the app is providing the benefits they are seeking.

The app will be monetized through the number of users, in a tier system. The first 200 employees, then 201-325, 325-450, 450-650, 650-850 and then 850+. A limited number of package deals for customers to choose from creates options for customers based on their needs and add-on services provide opportunities for earnings after the applications sale. A standard package offering includes the application, onboarding of the phone numbers, and a few training videos. Add-on features will include services like the addition of new numbers, troubleshooting, data analytics, and maintenance. Outside hospital needs will be handled case by case. This comprehensive business plan includes detailed sections on team composition, product features, marketing/branding, operations, and financial projections. It is designed to help launch the business and set strategic direction for the next 5-10 years.

UPR16

Accounting Students' and Professional Perceptions of Work-Life Balance and Stress in Public Accounting

Noah Preston Fox

Mentor: Quick, Linda Ann

The accounting industry has always been perceived as stressful with studies dating back to the 1950s describing occupational stress in the field (Smith, 1990). This can still be seen when looking at the high employee turnover rates in public accounting. Inside Public Accounting surveyed 574 public firms in 2022 and found that 29% of the firms experience employee turnover higher than 20% (IPA, 2022). Using the Perceived Stress Scale (Cohen et. al., 1994), this study investigates accounting professionals' perceptions of stress and relates it to accounting students' perceptions of stress in public accounting. This study finds differences in stress levels in busy season compared to non-busy

season. Additionally, this study investigates extracurricular activities that professionals participate in that reduce stress. This study aims to help students gain a better understanding of stress in public accounting and ways to maintain a work-life balance.

UPR17

Covid-19 Effects on Commodity Pricing

Andrew Christopher Page

Mentor: Robbins, Thomas R

My work is based on how COVID-19 has affected commodity prices around the world. Commodities are something we use and depend on every day whether we realize it or not and I was curious to see how this is affected by major world events. I focused my research on four separate commodities, steel, crude oil, lumber, and wheat. I gathered the spot prices for each commodity dating back to 2009 and broke the data down weekly. After normalizing the data, I graphed the results to see if they were all affected the same way. What I found was that demand during 2020 was extremely high due to people stockpiling items in fear of having to quarantine. There was also extreme variation between all of the commodities I chose. This went against my initial idea that the commodities would track each other in some way. I also found that wheat is affected hugely by the recent war between Ukraine and Russia due to Ukraine producing 10% of the world trade for this commodity.

UPR18

Voices of the Silenced: A Musical about Domestic Abuse

Mikaela Eleanor Trank- Director, writer, lyricist

Graham Podraza-Music Director

Alex Scanlan- Partial Lyricist (one song only)

Emma Laughinghouse- Partial Lyricist (one song only)

Paige Oneil- Choreographer

Mentor: Doyle-Mekkes, Jessica Bligh

This show is about two sisters Anna age 24 and Janie age 26 who are both in different forms of abusive relationships. Janie with her partner Nicole who is emotionally and physically abusive and Anna, with her partner Mikel who is emotionally abusive. They

find a cafe owner named Donnie age 60 who left an abusive relationship with his ex-wife Evangeline 30 years ago. He helps show the girls the meaning of love and helps reconnect them with their parents to regain their self confidence and develop a life outside their respective partners. Evangeline comes back to find Donnie and "make things right" showing that with time and space people can change but that does not mean we need to go back to them. In the end, Anna and Janie leave their partners for good and find themselves along the way.

UPR19

Athelas the Healing Herb in Tolkien's The Lord of the Rings Books

Kelly Melissa Lizama

Mentor: Tedesco, Laureen

In the Lord of the Rings books *The Fellowship of the Ring* and *The Return of the King,* Aragorn wasn't just a king. He was wise, and a healer. J. R. R. Tolkien used Aragorn's wisdom and power to heal several of his friends when they are wounded. Tolkien created a healing herb in his books called Athelas and Kingsfoil. With this herb Aragorn was revealed king: In The Return of the King, the final book series, Ioreth, an 'old wife' that works in the Houses of Healing, remembers that "The hands of the king are the hands of a healer". With Ioreth displaying this, it leads to:Aragorn as the Rightful and Sacrificial King in The Lord of the Rings… his deeds winning him recognition and the name foretold for him the latter further cementing his acceptance. (Nikakis 89). In these books, Tolkien reveals the importance of healing herbs and reminds us that many pharmaceuticals were developed from herbs. He wants us to know the significance of native herbs. Tolkien is educating us on the history, sacrifices, wisdom, and leadership Chinese, Indian, European, and American Indian herbal healers (like Aragorn) had to learn and demonstrate. Being aware of the background of healing herbs in England and elsewhere helps us to value why Tolkien made Aragorn, the perfect king, a healer.

UPR20

Experiential Learning in the field of Social Work

Silvia Teresa Tyson

Mentor: Mayo, Margaret Rogers

The project I'll be working on throughout the semester will focus on what I am learning and doing at my internship. I will create a paper that explains how I learned and utilized all nine Social Work educational standards. My paper will include reflections

about the different roles social workers fill at agencies such as this one. It will also include the policy that the agency practices from and how these policies shape the program. I will also be creating a lesson plan to use in one of the classrooms we have at my internship to plan a few activities with the kids. These activities will have social work principles in mind when created and performed.

UPR21

Digital Mapping to Enrich Study Abroad Experiences

Presenter: Nina Marlyn Carrillo Corujo

Co-Presenter: Julia Marie Kohake

Mentor: Laura Levi-Altstaedter

Co-**Mentor:** Lily Johnson

This semester, we will be working on a directed reading research project with professor Laura Levi-Altstaedter and Lily Johnson. We are collaborating to construct a digital humanities project incorporating historical sites, cultural elements, and our personal experiences studying abroad this past summer in Buenos Aires, Argentina. Digital humanities is an upcoming discipline that combines digital technologies with the study of humanities. Our goal is to build an interactive and inclusive digital map that pinpoints some of the cultural artifacts of Buenos Aires. With each pinpoint, you can further explore the artifact through videos, photos, and a description of the destination and its cultural significance. We will be constructing this map using the digital platform, Omeka S. Omeka S is a web-based service tool that is useful for collecting images, videos, and audio to form a digital exhibit that tells a story about a central theme. Alongside this, we will also be using the platforms Canva and Shutterstock to create the visual elements of our project. Our interactive map will tell the story of the people, art, history, architecture, and lifestyle of Buenos Aires. This March 22-26th, we are going to Antigua, Guatemala to present our digital project at the conference of the Southeastern Council of Latin American Studies (SECOLAS). Furthermore, this project will be a digital archive that can be used in Spanish classrooms to teach students about the concept of digital humanities and provide a glimpse into Latin American culture.

UPR22

Compositional Analysis of Women's 19th Century Medicines by Liquid Chromatography-Tandem Mass Spectrometry

Grayson B. Sink[1], Elizabeth R. LaFave[1], Eli G. Hvastkovs[1]

1. Department of Chemistry,Thomas Harriot College of Arts and Sciences, East Carolina University

Mentor: Hvastkovs, Eli Gerald

Throughout history and into modern circles, male influence in female healthcare is an area of extensive debate. In both aspects, female ability to serve in the fields, as well as their access to specified healthcare have been severely truncated. These limitations can best be depicted through tracing the course of women's advancements in medicine, in both career and advancements and courses of treatments. The goal of this project is to conduct a series of compositional analyses utilizing liquid chromatography-tandem mass spectrometry (LC-MS/MS) to compare prominent female-manufactured remedies, in order to gain insight into their contribution and role during a divisive time. Previous studies have relied on LC-MS/MS to identify and account for both sucrose and plant-sourced additives in alternative medicines. As a result, two northern-based homeopathic remedies, Humphreys' Specifics and Boericke & Tafel remedies, have been compared assessing potential medicinal properties and additives (i.e. sucrose). Four remedies, Mrs. Joe Person's Remedy (CDM2003.650.0043), Mrs. Winslow's Soothing Syrup (CDM2003.562.0001), Mrs. Winslow's Syrup (CDM2003.563.0001), and Pinkham's Vegetable Compound (CDM2003.650.0144) were provided by the Country Doctor Museum. Each remedy obtained had an accompanying ingredients list and will be analyzed to validate the presence of listed ingredients through determination of base peak ions. These female-manufactured remedies will also be analyzed for unlisted additive ingredients, such as sucrose, to offer a comparison to the remedies offered by the male counterparts of this period.

UPR23

If I Had Known! Designing a Preparatory Course for Maximizing Study Abroad Experiences.

Samantha Nichole Odell

Mentor: Murphy, Larkin Dewey

Every year, thousands of American college students study at foreign institutions. Many of these students are traveling abroad for the first time in their lives. Upon their return, many of these same students declare that their study abroad program was one of the most influential parts of their educational experience while also admitting that they were ill-prepared for certain aspects of their time abroad. Indeed, preparing students to study abroad takes many forms, including pre-departure orientations, general information sessions, faculty-led discussions and even workbooks. There is, however, a

disparity between the resources that are generally presented to students preparing to study abroad and what preparations are described as beneficial for maximizing the range of experiences abroad. This project examines several options currently available to American students preparing to study abroad as well as considers the thoughts and comments of a group of study abroad participants. Informed with this knowledge, an asynchronous module-based online preparatory course for first-time study abroad students was created. While not a replacement for official pre-departure orientation materials, the online course serves to complement and enrich existing options. This course supports and facilitates the dissemination of useful information for a more seamless transition into studying abroad, thereby maximizing and enriching overall experiences.

UPR24

Does Black Gill Disease increase the likelihood of other parasitic infections?

Amanda Lynn Riggs

Chloe Gabriel (MS)

Mentor: Blakeslee, April Monica Houghton

My work represents an essential piece of a larger project in the Blakeslee lab, led by master's student Chloe Gabriel, which examines the prevalence, transmission, and environmental determinants of BGD (Black Gill Disease) in commercial penaeid and reservoir shrimp species within the Albemarle-Pamlico Sound. The cause of BGD is a parasitic ciliate, Hyalophysa lynni, which attaches to shrimp gill tissue and generates an immune response that produces melanized tissue in shrimp gills. The immune response causes damage in the shrimp gill and limits respiration leading to a weakened immune system, which can lead to co-infection with other parasitic diseases. Because of the weakened immunity BGD causes, we hypothesize that co-infection will be more prevalent when the infection intensity of BGD is high. By examining the parasites that plague penaeid shrimp, we can better understand the dynamics of co-infection and identify if new parasites are present in the Albemarle-Pamlico Sound system. My work includes dissection, microscopy, and data collection for the larger project. Dissected penaeid samples are categorized into three sections (anterior, mid, and posterior) and examined to determine parasite prevalence and diversity in each section. Data collected in each sample section will include collection site ID, species ID, size, reproductive status, parasite composition, and species richness. Although my research is just beginning, I have found trematodes cysts in both BGD-infected and uninfected shrimp specimens, which suggests that more will arise after further examination.

UPR25

Investigating the formation of Carolina Bays using ground penetrating radar

Jennifer H. Fulcher

Mentor: Horsman, Eric, Mallinson, David

The purpose of this research is to investigate the subsurface geometry and structure of Carolina Bays using Ground Penetrating Radar (GPR) to test different hypotheses about Carolina Bay formation. Carolina Bays are kilometer-scale elliptical sediment-filled depressions that are concentrated along the East Coast of the United States. Debate exists about the formation mechanism of the bays. The dominant hypothesis suggests these bays are best explained as oriented lakes that evolved over time through lacustrine and eolian processes [1]. However, some investigators hypothesize the Carolina Bays are craters formed due to the impact of thousands of pieces of glacier ice ejected into the atmosphere from an extraterrestrial impact on the Laurentide Ice Sheet approximately 12,800 years ago. These different hypotheses are being tested by evaluating the geometry of the Carolina Bays in cross-section, and the structure of the sedimentary layers that fill the bays. We used a 200 MHz Geophysical Survey Systems, Inc (GSSI) ground penetrating radar system to image the subsurface of several Carolina Bays in Pitt County, NC. Data are being processed using Radan software and reveal the structure to approximately 6 meters depth.

[1]C. R. Moore, *et al*. *The Quaternary Evolution of Herndon Bay, A Carolina Bay on the Coastal Plain of North Carolina (USA): Implications for Paleoclimate and Oriented Lake Genesis*. Southeastern Geology, (2016).

UPR26

Isolation and kinetic characterization of a plant lipoxygenase from maize, *Zm*LOX5

Yuri Ly Almonte

Kaylee Sagrero

Mentor: Offenbacher, Adam Richard

Plant Lipoxygenases (LOX) have been identified in different cellular parts that are associated with development, seed germination, stress resistance and many other physiological processes. LOXs are a class of enzymes that catalyze oxygenation of polysaturated fatty acids often found in lipids. The purpose of this study was to contribute to the collection of plant LOX kinetic data and potentially help address topics such as thermal adaptation, quantum tunneling, and microevolution. The isolation of a corn derived lipoxygenase (*Zm*LOX5) was performed from recombinant expression in *E. coli*. The rate constants for the reaction of ZmLOX5 with natural substrate, linoleic

acid, was analyzed by UV-visible spectroscopy, under varying temperatures. The activation energy, Ea, for ZmLOX5 was characterized after extensive kinetic data analysis. Methods used in this investigation included bacterial transformation, protein expression, protein purification, enzyme characterization, and UV-spectroscopy. The work was performed in a course-based undergraduate research experience (CURE) biochemistry lab. From these methods, we discovered that ZmLOX5 displayed a relatively low activation energy of 5.09 kcal/mol. Furthermore, we suspect that ZmLOX5 could be a promising enzyme due to the similarities of its activation rate to mutant soybean lipoxygenases (SLO), whose results have implicated quantum hydrogen tunneling associated with enzyme catalysis in previous studies.

UPR27

Identification and Characterization of Dry Detention Basins in the City of Greenville, NC: A Preliminary Assessment

Kaleigh Bell, Mike O'Driscoll, Rob Howard, Philip Van Wagoner, Charles Humphrey

Mentor: Iverson, Guy Joseph-Gene

Urban runoff contributes to flooding and degradation of water quality. These issues can be pervasive in underserved communities. Greenville, North Carolina (within the North Carolina Coastal Plain) is prone to flooding due to its proximity to the Tar River, low-lying topography, and frequent impacts from cyclonic storms. Approximately 30% of Greenville residents are below the poverty line and many live in areas that are prone to flooding. Dry detention basins (DDBs) have been used for decades to mitigate flooding but the location and condition of many DDBs was not catalogued and/or the records have been destroyed or lost. Therefore, the functionality and location of many DDBs is unknown. The goal of this project is to develop a geospatial approach to identify, inspect, and evaluate stormwater control practices to determine potential retrofit opportunities that will reduce the environmental impacts from stormwater, especially within underserved communities. Evaluations are made on various sites throughout Greenville through a combination of field observations, remote sensing, and GIS-based programs. GIS considerations including soil series data (e.g., permeability, water table depth) and socioeconomic status are being used to prioritize sites for potential retrofit activities to reduce flooding and transport of stormwater-related pollutants. Initial efforts have identified approximately 500 previously unmapped dry detention basins or other stormwater control practices in the City of Greenville. This poster will demonstrate preliminary observations on the effectiveness of various assessment tools to identify stormwater practices and determine potential retrofit opportunities in coastal North Carolina.

UPR28

Toxicity of nanoparticle titanium dioxide on the biochemical and physiological mechanisms in *Camelina sativa*

Shivangi Jha

Mentor: Zhang, Baohong

The uses of nanoparticles are growing rapidly on a global scale. The nanoparticle, Titanium Dioxide (TiO_2), is one of the most prominent nanoparticles being used as an ingredient in most industries that impact human and environmental health. Thus, it is imperative to identify the risks that they pose to living systems. We aim to identify specific biochemical and physiological mechanisms in the plant *Camelina sativa* that are unable to regulate normal growth and development when exposed to nanoparticles, specifically TiO_2. If the plant vigor and oxidative stress of *Camelina sativa* are negatively affected when grown with nanoparticle TiO_2, then TiO_2 is biochemically and physiologically toxic to *Camelina sativa* when grown under similar or lager concentrations of TiO_2. *Camelina sativa* seeds were sterilized and plated onto sterile agar growth plates prepared with five different concentrations of TiO_2. To analyze the level of toxicity that TiO_2 poses, *Camelina sativa* will be tested to measure plant respiration, photosynthesis, oxidative stress, Malondialdehyde (MDA) activity, superoxide dismutase (SOD) activity, peroxidase (POD) activity, and atomic dioxide radical anion content. My previous research has concluded that TiO_2 significantly inhibits the germination rate of *Camelina sativa* when exposed to concentrations higher than 0.05%. Thus, researching specific plant responses affected in *Camelina sativa* would be a continuation of my previous findings and these methods can be extended in research of other nanoparticles and plant species that are subject to environmental pollution.

UPR29

Effects of Localized pH Changes on Enamelin Phosphoserine Stability

Rachael Adair Johnson

Mentor: Allen, William E

To obtain a better understanding of the role of phosphoserine hydrolytic stability within enamelin, a section of the peptide containing a serine residue was synthesized. In this section, the arginine was substituted with a synthetic amino acid that fluoresces and liberates H^+ when irradiated with light. A control was first created to ensure the arginine was properly linked to the rest of the amino acid chain. After that, two different peptides were made, R*PPISNEEGG and R*PPISNQQGG. Both of these peptides contain the synthetic arginine. These peptides will be irradiated with light and analyzed using NMR. It is hypothesized that the phosphoserine hydrolytic stability can be controlled using the synthetic arginine. With the arginine, the manipulation will

cause an increase in the concentration of H^+. Since one peptide has two charged glutamic acids and one has two neutral glutamines, the impact of local electric charge on the decomposition of phosphoserine can be quantified. The purpose of this experiment is to understand if phosphoserine hydrolysis is a factor in the degradation of tooth enamel. With enamel being an important part of oral health, its degradation can cause individuals to have tooth damage and infection. Successful synthesis and analysis of the peptides can lead the way for new approaches in how to prevent the degradation of tooth enamel and how specifically it degrades. It will provide an understanding of the correlation between phosphoserine hydrolysis, calcium binding, and degradation. This understanding could potentially save the smiles of many individuals.

UPR30

Adamts9 Mutation Causes Ectopia Lentis in Humans and Zebrafish

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Mentor: Zhu, Yong

Congenital disorders of eye formation affect millions of patients each year. Unfortunately, these defects lead to blindness with no viable treatments in many cases. Mechanisms involved in morphogenesis of the eyes are still unclear. We used deep sequencing, genetic mapping, and candidate gene elimination to identify a missense mutation in ADAMTS9 (a disintegrin and metalloproteinase with a thrombospondin type 1 motif, member 9) as the likely cause of appeared ectopia lentis phenotype observed in a human patient. To establish an animal model for detailed studying of Adamts9's molecule mechanisms during the normal or disease processes, we used CRISPR and Tol2 generated knockouts and transgenic reporter zebrafish lines. We found high adamts9 expression in various tissues including ciliary, ciliary marginal zone, retina. In our zebrafish Adamts9 KO model, we observed eye and pupil defects that become progressively more severe as the fish ages. These defects include significantly smaller pupil size at five days post fertilization (dpf), constricted pupil, a dilated pupil, or an irregularly shaped eye with a consistent defect in the anterior portion in juveniles or matured adult fish. Currently, we are knocking in and

comparing the differential effects of human wildtype or mutant ADAMTS9 in our zebrafish Adamts9 knockouts, hoping to rescue the eye defects and to study the underlying mechanisms of ADAMTS9.

UPR31

DIVALENT CADMIUM AND LEAD INTERACTIONS WITH EF-HAND PROTEINS: AN INTRINSIC FLUORESCENCE STUDY

Taylor Falk, Tamara Vasquez

Mentor: Spuches, Anne M

Toxic metal exposure is an increasingly important issue that is impacting a growing number of people. Frequent exposure can lead to adverse health effects such as cognitive impairment in children, diabetes, and cardiovascular issues. Exposure can come from many different sources, including some spices, paint, and e-cigarettes. Metals such as Pb and Cd can mimic essential metals like Ca due to their similar atomic radii. This presents a threat to biological systems as it allows Pb and Cd to bind in place of Ca on protein active sites. Specific to this project is the protein Human Cardiac Troponin C (hcTnC), which is a calcium binding protein that helps to regulate the contractions of cardiac muscles. Protein function could be altered if Pb or Cd bind in place of Ca, potentially leading to life-threatening cardiac events. Understanding the molecular mechanisms occurring during the interruption of Ca signaling pathways will lead to greater understanding of toxic metals and may lead to therapeutic methods intended to prevent these harmful effects.

This study focused on the regulatory domain of hcTnC (NTD), and the impact metal binding has on protein structure. Specifically, the intrinsic fluorescence of tyrosine (excitation 280nm, emission 330nm) and phenylalanine (excitation 250nm, emission 280nm) residues were monitored in the apo and Ca(II), Zn(II), Pb(II), and Cd(II) bound states of NTD. Emission scans were obtained for apo and metal bound protein samples. Emission scans for both did not reveal a significant change in fluorescent intensity. While previous data in the Spuches lab does indicate that metal binding occurs, these data reveal that binding does not result in a large structural change. Future studies will focus on potential functional change of the protein.

UPR32

The Importance of Temporal Components of the Advertisement Call in the Peruvian Mimic Frog, *Ranitomeya imitator*

Otha Malik Whitney

Mentor: Summers, Kyle

The ability of an organism to communicate with other individuals in its environment can tip the scales between life and death. An efficient method of communication enables a higher success rate in terms of reception by the intended target. Acoustic communication is a key factor in reproductive behavior. The Peruvian mimic poison frogs, *Ranitomeya imitator,* are a model species of poison dart frog that uses acoustic communication to attract mates and defend critical resources. Even with access to modern technology, there is a dearth of information on calling behavior and communication in this species. The goal of this research is to identify specific call features, such as call frequency, pulse duration, and inter-note interval, that affect the response of males to an acoustic signal (the male advertisement call). In order to quantify the level of response, the number of jumps, path straightness, latency to move toward the speaker, and time elapsed will be analyzed. The subjects (receivers) in this test will be eleven male *R. imitator* males, which will be exposed to 7 synthetic calls each. Specific temporal/spectral aspects of the call will be manipulated, including call frequency, pulse duration, and inter-note interval. These acoustic traits will be altered to present a range of values from high to medium to low. In addition, subjects will be exposed to one unaltered natural call as a control. Individuals will be released in a grid-lined container, filmed with a Go-Pro7 video recorder, and allowed 6 minutes to come within a 30 cm radius of the speaker at the opposite side of the container. Video-recorded responses to the calls will be analyzed using specialized computer software. Preliminary results will be presented and discussed.

UPR33

Comparative Parasite Diversity in Panopeid Crabs

Carrie Adams

Mentor: Blakeslee, April Monica Houghton

The overall aim of this project is to determine the macroparasite composition and diversity in two native North Carolina Panopeid mud crabs, Rhithropanopeus harrisii and Eurypanopeus depressus and the role that seasonality and salinity play in determining parasite community composition and diversity. These two mud crab species occur along a broad salinity gradient in the Pamlico and Neuse estuaries, with R. harrisii being most abundant in low to mid salinities and E. depressus being most abundant in mid to high salinity waters. The specimens used in this project were collected through past efforts in the Blakeslee lab, and metazoan macroparasite composition will be determined through dissection and microscopy. Based on

preliminary findings, it is hypothesized that E. depressus will have lower infection prevalence and parasite diversity than R. harrisii, and it is hypothesized that parasite diversity will change with season – with higher diversity expected in the summer and fall and lower diversity in the winter and spring. The parasite data obtained will provide knowledge of seasonal and annual disease dynamics that are influenced by salinity on parasite diversity in mud crabs, including a fine-scale investigation of an invasive parasitic barnacle that infects both mud crab species. Preliminary data has shown a much lower infection rate in E. depressus compared to R. harrisii, despite both being native North Carolina species. Preliminary data also indicates the entoniscid isopod and the invasive rhizocephalan, Loxothylacus panopaei as being the two most prevalent macroparasites for both species. Thus far, cestodes and acanthocephalans have not been observed in either species, and nematodes and trematodes have only been observed in a few specimens.

UPR34

Examining the Cultural Validity of the Coping Flexibility Scale-Revised

Kolby Nicole Kinnaman

Mentor: Dolbier, Christyn, Vanacore, Sarah

Introduction: Coping flexibility refers to adapting coping strategies in response to different circumstances. The dual-process theory conceptualizes coping flexibility as stopping ineffective strategies (abandonment) and attempting more effective alternatives (re-coping). Previous research found greater abandonment and re-coping were associated with lower levels of anxiety, depression, and other mental health challenges. Researchers have questioned the applicability of coping flexibility in Western populations, speculating that individualistic values of self-consistency in behavior across situations and a self-contained locus of control would be incompatible with flexible coping.

A measure based on the dual-process theory and developed in Japan, the Coping Flexibility Scale-Revised (CFS-R), has yet to be used in the United States (U.S.). We are interested in whether the CFS-R has cross-cultural validity. The purpose of this study is to begin evaluating the psychometric properties of the CFS-R in a sample of U.S. college students. U.S. college students face multiple dynamic stressors, making them vulnerable to mental health issues.

Methods: This exploratory project aims to recruit 500 undergraduate students who are 18-29 years old from a public Southeastern university. A longitudinal design will be used to survey participants online three times across the spring 2023 semester. We will

examine the CFS-R's convergent, discriminant, predictive, cross-cultural validity, internal consistency, and test-retest reliability.

Results and discussion: We expect mixed results for the CFS-R's validity and reliability in the sample of U.S. college students. The findings will indicate whether or not this construct is valid in Western populations, as measured by the CFS-R. The findings may suggest clinical implications, e.g., if the CFS-R is predictive of depression and anxiety, this finding could guide interventions for more flexible coping.

UPR35

Prevalence and Correlates of Stress-Related Growth due to the Pandemic

Jordan Signorelli

Mentor: Dolbier, Christyn

Introduction:

The COVID-19 pandemic is a novel stressor that has had a profound impact on many university students, but most research only focuses on the negative outcomes resulting from stress. Stress-related growth (SRG) refers to positive psychosocial outcomes that may result from a traumatic or stressful experience. This study aims to examine the prevalence and demographic and psychological correlates of pandemic-specific SRG.

Method:

Participants are undergraduate students at a public university with the majority being female and White, *Mage*=19.3 years old. Participants were recruited in two academic years: fall 2020-spring 2021 after moving to remote courses (*N*=719); and fall 2021-spring 2022 after resuming in-person courses (*N*=1,243). Participants completed a two-part online survey which included the Stress-Related Growth Scale–Short Form-Revised, Perceived Stress Scale, Patient Health Questionnaire 8, Generalized Anxiety Disorder 7 Scale, UCLA Loneliness Scale, and Brief COPE.

Results:

In both samples, 79-82% indicated at least some SRG, with 47-50% reporting low levels, 21-27% moderate levels, and 7-8% high levels. Being female, $t(713)=3.14$, $t(1215)=5.27$; younger (*r*s=-.12, -.12), and Black, $F(6,710)=3.20$, $F(6,1204)=4.85$, related to more SRG (all *p*s<.05). Stress, loneliness, depressive and anxiety symptoms (*r*s=-.07 to -.29), and maladaptive coping strategies (*r*s=-.08 to -.27) negatively related to SRG, and adaptive coping strategies (*r*s=.18 to .47) positively related to SRG (all *p*s<.05). Further analyses will examine if amount and types of SRG vary over different phases of the pandemic.

Conclusion:

The findings show that university students did experience some pandemic-specific SRG in the two years following the onset of the pandemic. Psychological distress along with maladaptive coping strategies negatively related to SRG, while adaptive coping strategies positively related to SRG. These findings can guide approaches to enhance adjustment and resilience to stress.

UPR36

The Relationship between Stigma and Mood in College Students with Disabilities

Caroline Penny Knox

Mentor: Walcott, Christy Mangione

Approximately 20% of college students report having a disability (NCES, 2018), including physical (visible), cognitive, and psychiatric (non-visible) disability types. Decades of research have documented negative stereotyping and perceived discrimination against students with disabilities (e.g., DaDeppo, 2009; Lyman et al., 2016). To understand the negative effects stigma may have, it is important to consider how stigma might influence one's feelings and intent to persist with college. It is also important to find factors that may mitigate negative effects, such as one's ability to bounce back from stress (resilience). My Undergraduate Thesis will explore correlations between the perceived stigma of students with various types of disabilities, their resilience, affect, and intent to persist from one semester to the next. It is hypothesized that college students with disabilities with higher levels of stigma will have higher negative affect and lower intent to persist, but their level of resilience will moderate this. Using established measures, I will survey college students with different disability types, including those who receive accommodations and those who don't. This project is significant to college life for people with disabilities so we can understand how they feel and if they have experienced stigmatization. Additionally, it can be beneficial to identify if resilience plays a role in better outcomes. Findings can identify if improvements are needed in college climate and if building resilience could help. I am the primary researcher for this project along with my faculty mentor, Dr. Walcott, and lab volunteers. I will be drafting a survey that, pending IRB approval, will be sent to Psyc 1000 students who self-report a disability, students in the STEPP program, and students who use Disability Support Services at ECU. Students with disabilities will anonymously share basic demographic information, then complete an online survey consisting of the Postsecondary Student Survey of Disability-Related Stigma (PSSDS), Brief Resilience Scale, Positive and Negative Affect Schedule (PANAS-SF), and 3 items on Degree Commitment (Gore, 2010). This quantitative survey design seeks sufficiently

variable data across participants on these measures. Survey results will be presented and discussed.

UPR37

The Relationship between Athlete Efficacy Beliefs, Decision Making, and Eye-gaze

Emily M Ryan, Sophia Garcia

Mentor: Habeeb, Christine

Athletes continue to express the idea that there is a relationship between efficacy, decision making, and attention during performance. However, there has not been an explicit study of efficacy and its impact on athlete decision making and attention. Therefore, the purpose of this study was to investigate if athlete efficacy plays a vital role in their decision making and attention during performance. To further understand efficacy it is important to examine perception of self and others through visual cues. Hintz et al. (2021) implies that an athlete uses visual cues such as posture and positioning of an opponent or teammate to anticipate their intentions and desired actions. Temporal occlusion is a strategy used to help identify the relationship between decision making and efficacy by identifying cues that influence predictions of future actions or to distinguish better and worse players. Better understanding athletes' attention in relation to efficacy and decision making may improve understanding on why athletes make the decisions they do, and to help identify weak areas of efficacy within the individual and team. Thirty collegiate female athletes are to complete a questionnaire assessing self-, other-, and collective efficacy prior to watching game clips based on their primary position. For each position (midfield, forward, defense) a good, bad, and neutral clip is shown. A GP3 eye tracker is used to gather information on athlete eye gaze when watching the clips. Each clip is played until a decision is made with the ball. Then video is occluded and the athlete will take a questionnaire that assesses decision making and efficacy. The data will be analyzed through correlations and mean comparisons. Correlations will be run to compare participants' eye gaze and their efficacy levels. Mean comparisons will be used to analyze athlete how low and high efficacy relate to decision once the temporal occlusion occurs. Data collection is to be completed in the last week of February. The goal is to have all members of a collegiate soccer team participate. This study aims to support their assertion and help to increase confidence in individuals, teammates, and the team as a whole. Coaches can use the data from this study to help build confidence between individuals and the team which in turn will create a positive team dynamic.

UPR38

The Impact of FIA's 2022 Rule Changes on Competitive Balance in Formula 1

Cameron Prince, Jonathan Lee, and Lester Zeager

Mentor: Lee, Jonathan Michael

In 2022, the Fédération Internationale de l'Automobile (FIA) implemented a number of rule changes regarding car design to promote closer racing in Formula 1. This study constructs a balanced sample of race lap times from the 2021 (pre) and 2022 (post) seasons to investigate the impact of these rule changes on competitive balance. After controlling for driver, track, and lap fixed-effects, results from recentered influence function regressions suggest that the 2022 regulations improved competitive balance in Formula 1 racing. Specifically, we estimate that the standard deviation and Gini coefficient for lap times declined by 8.8% and 6.8%, respectively. These results are driven by a general increase in lap times across the distribution in the 2022 season except for a decrease in the 95th (slowest) lap time vigintile. Interestingly, the Lorenz curves for lap times are generally shifting up post-regulation with the exception of the fastest 20% of laps, for which there is no statistically distinguishable change in their share of overall lap times. Collectively, these results suggest that the estimated improvements in competitive balance in 2022 are being driven by closer racing among drivers outside of the fastest two deciles.

UPR39

Oral Health Care Providers Retention Across ENC

Quaid Lawler

Mentor: Sastre, Lauren Rogers, Pardi, Vanessa

In the state of North Carolina (NC), an estimated 2.4 million residents in 2019 struggled to obtain adequate dental care, many of those fell into an underserved population subset. Dental care in North Carolina has historically struggled when compared to the rest of the country, and even further in Eastern NC (ENC) so much so that East Carolina University sought to build a dental school in 2006 to combat this issue. Despite a recent uptick in overall oral health care & quality, North Carolina still struggles to provide adequate dental care to an underserved population. For example, 27% of dentists participated in Medicare in North Carolina as opposed to the 42% nationwide average. In addition, out of existing free clinics serving uninsured patients across the state, only 27 out of 68 were able to provide some level of dental care to patients. This project and research focus aims to examine barriers and promoters for dentists to initiative movement as well as remain in ENC. It will also examine current in-play reasonable practices and perceptions around sliding scale fees, Medicare usage, and pro bono care for under and uninsured patients of ENC. This study will utilize qualitative

methodology with purposeful sampling and surveying to identify practices and professionals within ENC and invite dentists to participate in brief semi-structured, audio-recorded interviews. An interview guide will be developed specifically for this study with input by faculty in the School of Dental Medicine for quality and appropriateness. Phone based recruitment and sampling will continue until theme saturation occurs. The sample goal is n=20 participants. Results from this study can be used to address existing barriers, support promoters and resources for dentists to come and stay in rural ENC as well as support improved access to oral care for under/uninsured patients. The lack of dentists in specifically ENC can make oral care even harder to access for resource limited patients across ENC. Poor oral health can lead to a decrease in overall body health and factors such as heart disease, cancer, and diabetes: all which are elevated in rural and underserved areas. Increasing overall oral health can reduce not only oral health based afflictions, but also improve these areas of overall health for a limited resourced population. Understanding what extrinsic and intrinsic factors go into establishing dental retention is crucial to maintaining the health of these populations.

UPR40

An Analysis of the Effectiveness of the Essential Air Services Program

Kaylee Brett Warren

Mentor: Rupp, Nicholas G

Background: The Essential Air Services (EAS) Program is one that provides air carries subsidies to rural airports so that these airports can maintain flights to larger airports and continue to provide necessary services to their community. This program was put together after the 1978 Airline Deregulation Act that gave airlines almost total freedom to where they provide services, automatically causing concern for the fate of the rural airports.

Significance: The Essential Air Services Program was only meant to be a short term program, but has stayed for almost 50 years. There is debate on whether this program is actually necessary, and how the criteria is used to choose which airports get the Essential Air Services and which do not.

Methodology: The data being used is the DB1B data from the Bureau of Transportation that contains information about flights that have been taken since 1993. We have three treatment groups to test the effects of the success of the airports on each. Our three treatment groups are airports that have been EAS Participants for the entirety of the data period, those who started as EAS Participants but left in the middle of the period, and those who were not originally EAS participants but joined later. We will compare

various aspects of the data in order to compare which airports have more traffic than others, and more success than others.

Results: Once the analyses have been performed the goal is to understand whether the EAS program has significant effects on the successes of these rural airports, or if it is a program that is not longer serving its original purpose. It will be important to note whether airports that have came into the program or left the program over time still remain successful without the success of the EAS program.

UPR41

PREA protections for incarcerated transgender individuals: An updated comparison of state correctional policies in the United States

Tyler Shane Hug

Mentor: Malkin, Michelle L

The Prison Rape Elimination Act (PREA) act was established in 2003 for the purpose of reducing sexual harassment and assault in prisons. All states were mandated to comply with PREA by 2015 or risk loss of state correctional funding. One area of controversy within PREA are the thirteen provisions intended to increase protection for transgender individuals. These 13 provisions can be grouped into three categories: definitions, housing and classification, and staff training and abuse prevention/response. This research is an update on state-by-state compliance of PREA transgender provisions from an earlier study conducted in 2017.

Secondary analysis of state policies from 2022 was conducted to see whether their correctional policies complied with each of the 13 relevant PREA provisions pertaining to the incarceration of transgender individuals. Compliance level was assessed by determining how many of the PREA provisions each state included in their policies. Additional evaluations of state policies occurred to determine whether the state had conflicting policies and/or additional protections of incarcerated transgender individuals that went beyond the mandated PREA protections. Additional analysis will include whether level of PREA compliance is associated with the political leanings of state government.

Initial findings indicate that approximately half of state policies complied with a majority (11+) of the PREA transgender protections. This is a substantial difference from the earlier study that showed only approximately 25% of state policies met the majority of PREA transgender protections (Malkin, M. L., & DeJong, C., 2019). Additionally, while a few states had policies that conflicted with PREA, there was a greater prevalence of states adding protections beyond those mandated by PREA. This included some states requiring correctional facilities to create specialized committees

dedicated to treating and protecting transgender inmates. Overall, this research indicates a substantial move toward protection of transgender individuals in correctional policies, although some states refuse to comply with the transgender specific protections. More effort continues to be needed to ensure that all state policies conform with the requirements set forth in PREA.

UPR42

Functional Connectivity Alterations for Oculomotor, Cognitive, and Fine Motor Tasks Across Disease States in Neuroborreliosis

Jenna Grissam, Maanav Desai

Mentor: Murray, Nicholas P

Neuroborreliosis is the result of Borrelia Burgdorferi spirochete infection from an Ixodes tick bite. Patients present with a wide range of symptoms including but not limited to cognitive, oculomotor, fine motor, sensory, sleep, and mood disturbances. There is a high degree of variability in symptomology and a lack of understanding about various aspects of the disease. For example, it is currently unknown whether the observed neurological manifestations are a result of ongoing meningeal inflammation or neurodegeneration from direct spirochete penetrance. This leads to low accuracy and precision in diagnostic testing with several patients suffering undiagnosed or misdiagnosed. Those that are fortunate enough to get an accurate diagnosis are further impeded by the lack of an FDA approved treatment option when the initial course of antibiotics doesn't work. This multimodal research study is designed to address these obstacles to patient care. Forty-five participants from ages 11-55 are grouped based on their level of infection. The control group is free of known neurological issues, the acute infection group have proven Borreliosis with antibiotic treatment attenuated symptoms, and the chronic group consists of post-treatment patients with persisting symptoms. Participants are fitted with a functional near-infrared spectroscopy (fNIRS) system to record and analyze neural network activation patterns while they complete oculomotor performance tasks on the RightEye eye-tracking system. We hypothesize that observed deficits in oculomotor performance will strongly correlate with the altered hemodynamic response functions seen in the fNIRS data and will vary predictably based on the level of infection. These could then be non-invasive tools for future diagnoses. To account for the diverse symptomology, participants will also be completing a series of standard neuropsychological and fine motor tasks while remaining in the fNIRS headcap. This data will be aggregated with the oculomotor data and analyzed using brain network analysis techniques to identify areas of decreased functional connectivity. We hypothesize that those in the chronic infection group will exhibit significantly less overall functional connectivity than the other two groups and that these damages will be worse in particular brain regions. This would highlight

important sites for treatment and transcriptome research while elucidating the level of spirochete penetrance.

UPR43

Neuroinflammation in Gulf War Illness

Olivia Marie Glazer

Mentor: DeWitt, Jamie C

Gulf War Illness (GWI) is a neurological disorder that impacts Veterans who fought in the first Gulf War. It is commonly seen in the nervous system and presents as neuroinflammation; however, it can produce symptoms in all of the body's systems. In the lab, we worked to understand pharmacological interventions that could lessen central nervous system (CNS) symptoms in those diagnosed. However, it was previously discovered that anti-inflammatory drugs would not provide neuroinflammatory symptomatic relief that the Veterans needed, implying that there is an issue that has not yet been discovered. We decided to try and understand why the anti-inflammatories would not work in relieving CNS symptoms and focused on impacts of microglia on neuroinflammation. These resident immune cells in the CNS are thought to mediate the neuroinflammatory profile. Groups of male Sprague-Dawley rats were injected with 0.5 mg/kg s.c. diisopropyl fluorophosphate (DFP) or saline for five days, which induced GWI in rats. Three months after exposure, which is when rats develop GWI symptoms from DFP exposure, rats were separated into A) saline only group, B) DFP treated group, C) drug treated control group, and D) drug treated DFP group. Rats in groups C and D were treated with naproxen (15 mg/kg i.p.) and misoprostol (100 ug/kg i.p.) twice daily for six weeks. These agents were chosen as we hypothesized that they would restore microglia to an anti-inflammatory phenotype. After euthanasia, brains were harvested and cut in half longitudinally. The rostral half of the right hemisphere was then immersion fixed in formalin and processed into paraffin blocks. Tissue was sliced on a rotary microtome at 10 μm and then immunohistochemically stained with a microglial marker (Iba-1). After the slices were imaged, microglia were counted and assessed for relative staining density of Iba-1. An ANOVA and post hoc pairwise t test illustrated that microglial markers were statistically different between the GWI expressing rats and all other groups. However, the three other groups showed no statistical differences when compared to one another. We interpret this to mean that microglia in brains of rats treated with the drug combination of naproxen and misoprostol are not altered when there is no disease phenotype. Thus, the combination of naproxen and misoprostol in a rat model of GWI may be efficacious in relieving some neuroinflammatory symptoms for Veterans who suffer from GWI.

UPR44

Role of Ferlin Family in Human T-cell Leukemia Virus Type 1 Infection

Abigail Fruge, Kimson Hoang, Nicholas Polakowski, Isabelle Lemasson

Department of Microbiology and Immunology, Brody School of Medicine

Mentor: Lemasson, Isabelle

Human T-Cell Leukemia Virus type 1, HTLV-1, infection can cause diseases like aggressive Adult T-Cell leukemia and HTLV-1 Associated Myelopathy. These diseases are resistant to numerous forms of treatment; meaning patients typically have a poor prognosis. Our laboratory has focused its research in understanding how HTLV-1 spread within the infected host to hopefully design therapeutic to suppress it.

The CD4+ T-cell are the main target of HTLV-1. HTLV-1 infection between T-cells requires cell-to-cell contact between an infected cell and a healthy cell. This contact allows the HTLV-1 envelope glycoprotein (Env) and the other viral structural proteins to move to the cell-to-cell juncture and form a virion. Env plays a vital role in the infection in mediating the entry of the virion to the non-infected cell.

Our laboratory recently reported that HBZ, a protein encoded by HTLV-1, plays a role in HTLV-1 infection. We found that HBZ activates transcription of a host cellular gene called MYOF. This gene encodes myoferlin, which functions in membrane sorting and endosomal trafficking in muscle cells. We found that myoferlin is abnormally overexpressed in HTLV-1 infected T-cells due to HBZ expression. We have identified MYOF as having several roles in HTLV-1 infection by stabilizing the Env protein levels in infected cells and enhancing cell-to-cell contact. Consequently, we found that reduced expression of myoferlin in HTLV-1 infected T-cells inhibits viral infection of new cells by reducing the level of Env and cell-to-cell adhesion. Furthermore, we have identified a drug, WJ460, that targets myoferlin function and inhibits HTLV-1 infection.

My project has been to determine whether other members of the Ferlin family, otoferlin (OTO) and dysferlin (DYSF), are also expressed in HTLV-1 infected cells and have similar roles than myoferlin. Using quantitative real-time PCR, I found that DYSF mRNA is expressed in HTLV-1 infected T-cells while OTO mRNA is not. I have obtained preliminary results showing that dysferlin overexpression does not seem to stabilize Env level. Experiments to knock-down DYSF expression in HTLV-1 infected cells and determine whether it affects cell-to-cell adhesion and HTLV-1 infection are in progress. Overall, this study will help to understand the role of the Ferlin family in HTLV-1 transmission to adequately target them and reduce HTLV-1 spread within a host.

UPR45

Investigating the effects of inherent and applied fiber tension on fibrinolysis

Mason Lee Verhaeghe

Mentor: Hudson, Nathan E

Fibrin is an insoluble fiber-forming protein polymerized from the blood plasma protein fibrinogen when the enzyme thrombin is a catalyst. Fibrin fibers are the structural component of blood clots formed at the site of vascular injury. The breakdown of these fibers due to degradative enzymes such as plasmin is known as fibrinolysis. Tissue plasminogen activator (tPA) is responsible for cleavage of plasmin from the plasminogen bound fibrin. The role of tension in regulating lysis is important due to the extremely variable amounts of tension applied to fibrin networks by blood flow and cellular components during the wound-healing process. To better understand the impact of tension in fibrinolysis, we've invented a novel mechanism for testing fibrinolysis under tension. Tension was applied to individual fibrin fibers on a microscale level using a substrate made from fugitive glue stamped with micropatterned ridges. Tissue plasminogen activator was added to the tensioned sample and digestion was observed under fluorescent microscopy. Lysis times for 100 fibers parallel to the direction of applied tension will be recorded. Other studies have suggested that application of tension has a negative impact on fibrinolysis, but it has since been found that the methods used to determine this could have skewed the results. Using revised methods, I hypothesize that lysis will slow or stop under applied tension as a result of reduced access to binding sites for lytic enzymes.

UPR46

Exploring the Relationship Between Migraines, Hemoglobin, and Oculomotor Controls

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Mentor: Murray, Nicholas P

Migraines are a neurovascular disorder that cause extreme headaches, autonomic nervous system dysfunction, and sometimes aura. Aura is experienced by

approximately 20% of migraine sufferers, it can consist of electrical or chemical waves that move across the visual cortex of the brain, causing visual, sensory, motor, or verbal malfunctions. Evidence has shown abnormal ocular functioning 7 or more days after a migraine in those who experience migraine with aura. Evidence has also shown a correlation between migraine sufferers and iron deficiency. The results of this data will allow us to investigate how migraine sufferers, with and without aura, differ in oculomotor controls and blood hemoglobin levels compared to healthy controls. Our hypothesis is that migraine sufferers with visual aura will experience damage to their neuro-optical pathways causing their oculomotor controls to differentiate.

Twenty-two participants (*N* =22, 11 migraines) completed two trials each. Participants were first fitted with an fNIRS system. The experiment consisted of two trials of six different oculomotor tasks simultaneously recording fNIRS data. Preliminary data analysis was done on the baseline recordings of the fNIRS data. The data shows an average concentration change of 0.71 +/- 0.19 in oxyhemoglobin in the temporal region of migraine sufferers and a 1.06 +/- 0.35 average concentration change in oxyhemoglobin in the frontal region. This is compared to the 0.06 +/- 0.10 average concentration change in healthy controls in the temporal region and 0.24 +/- 0.29 in the frontal region. Additionally, an average concentration change of 0.19 +/- 0.09 in deoxyhemoglobin of the temporal region of migraine suffers, compared to 0.07 +/- 0.06 in health controls. In the frontal region of migraine sufferers, there was an average concentration change of -0.04 +/- 0.07in deoxyhemoglobin, compared to 0.09 +/- 0.04 in healthy controls.

Preliminary data analysis was performed on the Righteye data as well. Efficiency values (mm) of the Circular Smooth Pursuit task were compared between groups because it shows the error of the user's gaze from the ideal pathway, the lower the number, the more efficient the oculomotor controls. Migraine sufferers presented an efficiency value of 17.8 +/- 1.0, and healthy controls presented a value of 15.5 +/- 0.75.

UPR47

Setting Up an EEG Laboratory for Language Research

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Mentor: Rothermich, Kathrin

Background: An electroencephalogram (EEG) is a method that measures electrical brain activity using small electrodes attached to the scalp. EEG provides a low-cost, feasible

way to test human cognitive neuroscience and allows us to track rapid brain responses in the range of milliseconds. We are currently setting up an EEG laboratory in the Communication Sciences and Disorders department to investigate language perception and production in healthy and brain-injured adults. For most of our studies, we will analyze event-related potentials (ERPs; short snippets of averaged EEG time-locked to the onset of experimental stimuli) and brain oscillations in frequency bands that have been identified as reflecting cognitive processes (i.e., alpha band).

Equipment: Our equipment includes a 64 channel EGI EEG system to allow electrophysiological recordings while participants engage in a variety of tasks. We use HhydroCel Ggeodesic sensor caps that are easy to apply and do not require any scalp preparation. E-Prime will be used to present participants with visual and auditory stimuli. The laboratory includes a sound-proof booth for a low-distraction testing environment.

Challenges: There are many challenges in setting up an EEG laboratory. One of the main problems is timing, as the EEG device and the stimulus computer need to be kept in sync with each other. Precise timing of event codes, i.e., the onset of when a stimulus was actually presented to the participant, and precise timing of their button press response to the stimulus, is the key to a good ERP stimulus presentation. Another major challenge is the managing of artifacts, such as interference from nearby electrical infrastructure. These environmental electrical fields are high in amplitude and easily overwhelm the small ERPs. Temperature control is also a problem as high temperatures can lead to sweat on the scalp, which distorts the signal.

Current status: The laboratory is being organized and prepared for pilot experiments. Most of the equipment and hardware has been acquired and set up, and a user training run by the manufacturer of our EEG system has been scheduled for March 2023.

UPR48

The Influence of Fatigue on Decision Making in Adults with mTBI

Karen Warlick (PI), John Mallett, Emily Smith

Mentor: Murray, Nicholas P

Mild traumatic brain injuries, often referred to as mTBIs or concussions, are a pervasive and serious form of injury that are of growing concern in the medical community. Concussions are caused by trauma to the head, usually violent and sudden, and result in a wide range of instant neurological symptoms. These can include physical or mental disorientation, dizziness, nausea, light sensitivity, headaches, and loss of consciousness.

These and other symptoms, along with knowledge of the mechanism of injury, are used to diagnose a concussion by a practitioner. The aforementioned effects of concussions are widely understood in the medical community. What is of growing concern within the past decade has been the long term effects of concussions. Long-term effects can include oculomotor dysfunction, diminished dynamic postural control, and impairment with general reaction time and information processing. These long-term effects are especially pertinent to athletes, who may return to play before these symptoms diminish. This leads to an increased risk for lower extremity injury, as well as further neurological damage if another mTBI is sustained. This study explores the impact of fatigue on concussed individuals as it relates to balance, reaction time, and brain activity. Participants will include 15 adults with no history of concussion and 15 adults that have been diagnosed with a concussion within the past year. Concussed individuals will fill out a questionnaire that includes details relating to their concussion history. All participants complete a PAR-Q+ physical activity readiness questionnaire. They will then be fitted with a Polar heart rate monitor, dry EEG cap and virtual-reality headset. After this, they will perform a 60 second go/no-go reaction-based task through the virtual reality headset and a hand-held controller. This will be done while standing on a force-plate that monitors balance. The participant will then complete a volitional fatigue protocol before performing the virtual reality task once more. This concludes data collection. I hypothesize that the volitional fatigue protocol will exacerbate existing concussion symptoms. This can manifest in less consistent balance, slower reaction times during the virtual-reality game or more erratic eye movement on targets while in virtual reality.

UPR49

Sensorimotor and Visuomotor Characteristics of Baseball Pitching Performance

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Mentor: Murray, Nicholas P

Introduction: In today's game of baseball, pitching velocity is increasing, in effect this success is leading to a decline of balls in play. Sensorimotor and visuomotor components must be evaluated in a batting simulation to understand the role reaction time, response selection, and response execution play in batting performance. Live-batting requires a higher level of sensorimotor coordination to produce an accurate high-speed full body movement. Batters no longer have time to accurately track the ball trajectory from ball release, but must analyze pitcher kinematics of movement initiation and make precise saccades. This study takes a biomechanical approach to analyze the kinetic chain principle and ground reaction forces to lead to greater exit velocity for batters.

Objective: To investigate the effects of ball occlusion on pitch identification accuracy and swing kinematics as well as visual motor components related to fixation duration and location at ball-release.

Methods: Local baseball players will be recruited from high school varsity teams, club teams, and a division two varsity level team associated with the National Junior College Athletic Association (NJCAA). Data collection will occur at Next Level Training Center in Greenville, NC. Participants will complete 40 total swings against a Junior Hack Attack Pitching Machine, with 20 swings performed in a pre-pitch occlusion condition and the other 20 swings without the occlusion condition. Qualisys Oqus motion capture data will be analyzed to gather kinematic variables such as rotational velocity, joint angles and temporal characteristics. A Blast Motion bat sensor will be used each swing to measure bat kinematic variables including bat velocity, vertical bat velocity, and attack angle. The HitTrax system will measure exit velocity, launch angle, spray angle, point of contact and pitch speed for each batted-ball. Each swing will identify the beginning load phase and lead foot contact analyzed by the novelÓ Loadsols. Areas of interest for fixation location and duration will be analyzed at movement initiation and ball release of each pitch using Tobii Pro 3 glasses, MATLAB code, and iMotions.

Anticipated Results: We hypothesize decreased final fixation accuracy, increased variation of swing phase durations, and decreased total trunk-axial displacement will result from occlusion of the ball. Additionally, we hypothesize that increased exit velocities will correlate to increased fixation accuracy.

UPR50

Expression and purification of the regulatory domain of human cardiac troponin C: A protein optimization study

Luis Felipe Oliveira (Author)

Mentor: Anderson, Eric Shawn, Spuches, Anne

Human cardiac Troponin C (HcTnC) is a protein that resides in the troponin complex on actin thin filaments of muscle and is responsible for binding calcium to activate muscle contractions in the heart. HcTnC is comprised of two protein domains, N and C-domains, each containing a pair of EF-hand peptide units. The C-domain has two high-affinity calcium binding sites and is considered the structural domain. The N-domain has only one calcium binding site and is considered the regulatory domain. In this study, the focus is only on the N-domain. The N-domain has two cysteine residues, one cysteine residue lies in the EF-hand, and the other lies near the linker region. Our labs are interested in understanding the fundamental thermodynamic and kinetic driving forces between proteins and essential divalent metal ions such as Ca(II), Zn(II), as well

as toxic metal ions such as Cd(II) and Pb(II). Specifically, we are interested in the binding of these metals to HcTnC an EF-hand containing protein that uses the binding of Ca(II) to initiate heart muscle contraction in cardiomyocytes. Since studies often include utilizing large quantities of biologically active protein, we would like to find a purification method that will produce higher yields than currently obtained Size Exclusion Chromatography.

The goal of this project is to optimize the purification of the N-domain of HcTnC. Current methods include size exclusion chromatography, ion exchange chromatography, as well as fast performance column chromatography. In this study, we examined the use of a Phenyl Sepharose column and evaluated alternate lysis techniques such as the French press and bead milling to determine if modified procedures would increase the yield of active HcTnC protein.

The purification experiments and comparisons are currently underway with the hope that these studies will help to streamline the purification process for subsequent HcTnC studies.

UPR51

Intracardiac Dopamine Receptor 1 and 3 Expression in Angiotensin II-Induced Hypertension

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Mentor: Katwa, Laxmansa C

Introduction: Cardiovascular disease (CVD) is the leading cause of death in the United States. Myocardial fibrosis is a significant complication correlated with many subcategories of CVD. Further understanding of the mechanisms related to fibrosis can lead to the development of interventions that can mitigate CVD. It is suggested that intracardiac dopamine receptors play a role in cardiac fibrosis, and heart remodeling. Previously, our lab has shown the expression of dopamine receptors in the mouse heart. However, the role of dopamine receptors in cardiac fibrosis in hypertension has not been studied. In this study, we hypothesized that the expression of the excitatory dopamine receptor 1 (D1R) will increase and the inhibitory dopamine receptor 3 (D3R) will decrease in hypertensive hearts.

Methods: Wild type mice (C57Bl/6NJ) were infused with either saline or Angiotensin II (600 ng/kg/min) for 14 days. The hearts were then harvested, fixed in 4% paraformaldehyde, embedded in paraffin, and cut into cross sections. A double

immunofluorescence staining was performed for D1R or D3R in conjunction with vimentin to identify cardiac fibroblasts, or a-smooth muscle actin (aSMA) to identify myofibroblasts. Slides were counterstained with DAPI to label nuclei.

Results: Immunofluorescence staining revealed that Ang II infused mice expressed more D1R and less D3R compared to their WT controls ($p<0.05$). Ang II induced-hypertensive mice also expressed higher levels of aSMA ($p<0.05$) and vimentin ($p<0.05$).

Conclusions: Our data shows that Ang II-induced hypertension is associated with increased expression of cardiac aSMA and D1R, and decreased expression of D3R.

UPR52

Building Emotional Intelligence Through LGBTQ Children's Books

Madison Alexander

Mentor: Ticknor, Anne Swenson

Educational settings tend to hold a heteronormative status quo; however, this study asks the question of how LGBTQ children's books are being used in early childhood education settings, and how do they influence the children being exposed to them. Research shows that opening conversations about LGBTQ family structures is important for building children's world view and challenging heteronormativity in early childhood classrooms has been proven to help build children's emotional intelligence. However, many early childhood educational settings do not include LGBTQ literature on a regular basis. This study aims to dive deeper into the perspectives and opinions of daycare owners and directors about LGBTQ children's literature. As a part of this study, anonymous Qualtrics surveys were sent to owners of four and five star daycares to determine their view on LGBTQ literature in early childcare centers. Preliminary results show that some daycare owners and directors do not recognize the LGBTQ community in their definition of diversity. These results also showed that participants were unfamiliar with popular LGBTQ children's books, but mostly had a positive response when exposed to them later in the study. Some recommendations for moving away from a heteronormative classroom include professional development related to diversity and inclusion with a focus on the LGBTQ community, and the use of LGBTQ booklists when adding to the classroom library. Providing daycare owners and directors with information on how to make an inclusive classroom, will allow access to a more diverse worldview and promote the growth of emotional intelligence in their children.

UPR53

The Pitt Perspective Podcast

Kamryn S Scott and Ashley H Wolfe

Mentor: Christensen, Timothy W

The Pitt Perspective is an interview-based podcast created to share the stories of minority communities located in Pitt County, North Carolina. Research done by our group showed us that Pitt County's current local histories often miss important information regarding events that have affected various marginalized communities in the area. Our goal has been to amplify the voices of these communities in order to assist in the healing of those that have faced generations of subjugation.

UPR54

Handwriting Abilities of Low-SES Elementary Students Compared to Grade-Level Expectations

Ashley Grace Jones

Mentor: Donica, Denise

Background: Satisfactory handwriting is important for elementary students to demonstrate their knowledge and produce academic achievements, as well as to foster a sense of competence. Pre-pandemic research has shown that students from low-socioeconomic status (SES) backgrounds were more likely to have handwriting difficulties than same-grade peers. In this study, I looked at the post-pandemic handwriting legibility scores of local low-SES elementary students compared to grade-level expectations.

Methods: Handwriting legibility was measured in second (n=19), third (n=19), and fourth (n=15) grade students at a low-SES elementary school in Greenville, NC, using the Screener of Handwriting Proficiency (orientation, memory, placement, and sentence). The means and standard deviations were calculated for total score and placement score to show differences by grade.

Results: The majority of students (second n=13, third n=17, fourth n=11) scored below grade-level expectations. The mean handwriting placement score was consistently the lowest component score across all grade levels.

Conclusion: Overall, data collected in this study shows post-pandemic low-SES elementary students have handwriting difficulties consistent with pre-pandemic research. Recommendations include providing handwriting instruction and remediation for students in all grade levels, especially for handwriting placement.

UPR55

Researching and Writing a Children's Book for Underrepresented Groups in Literature

Lauren Anastasia Price

Mentor: Gregory, Kristen Howell

In the world of education and children's literature, there are many different types of books. Having diverse literature available for students in one's classroom is arguably one of the most impactful things an educator can do for their students. When children are young it is important for them to be able to see themselves in the materials they are reading in school. There has been an increasingly diverse collection of children's books published each year, and educators have more options than ever to diversify their classroom libraries. For my Senior Honors Project, my goal was to add to this diverse body of literature. Through extensive research I was able to learn about what it means to be colorblind and the experiences and struggles that go along with this disability. Colorblindness is quite common, yet it is rarely written about or talked about in the classroom. I wrote and illustrated a fictional story about a child, Johnny Drew, who is colorblind. Johnny is new in school and the other children don't know what to think about him. When the class is tasked with creating a mural for the school, Johnny is bullied by some of his peers, but through perseverance and encouragement from his teacher and a friend, Johnny shows everyone just how special he really is. My 30-page book also includes lightbulbfacts throughout to provide more information to readers about what it means to be colorblind. Bringing light to a group of underrepresented people allows more students to be able to see themselves in a book as well as learn about others.

UPR56

Effectiveness of Phonological Interventions with Students At-Risk for Reading Difficulties

Noelle Rose Halverson and Shelby Marie Hoggard

Mentor: Holt, Yolanda Feimster

The purpose of this limited literature review is to determine which phonological approaches to intervention results in greater improvement in test scores for older elementary students at-risk for reading difficulties. Two studies were selected for inclusion. Hempenstall et al., (2008) evaluated the Corrective Reading program of phonics and letter-sound correspondences (e.g., st-, bl-), rhyming, blending, and segmenting with children aged 7-13. Vaughn et al., (2003) evaluated Supplemental

Reading, a program of fluency building, vocabulary building, and the development of phonological awareness (PA) in individual, small, and large group instruction, with children aged 6-9 including English language learners (ELL). Both studies showed score improvement following intervention. Common intervention features found to be effective were small group instruction (1:1 and 1:3) and 30-60 hours of intervention. Follow-up measures conducted 6 weeks to 7 months after interventions ended showed a decrease from post-test scores for all participants, except ELL. Future research should address whether older children continue to use strategies learned during the intervention period and why improvements in PA in older children do not correlate to improved reading skills for all students.

UPR57

Spring Evaluation of Low-Cost Aerosol Instruments

Joanna Mathew

Neha Joseph

Mentor: Sousan, Sinan

The increase of environmental aerosols greatly impacts the severity of respiratory illnesses as a high concentration of aerosols can exacerbate symptoms. Therefore, it is important that individuals with respiratory illnesses, like asthma, can monitor air quality and make informed decisions about their health to effectively evaluate their risk. However, the Environmental Protection Agency (EPA)-regulated air quality monitors are scarce due to the high operation and maintenance costs. Currently, there is only one EPA-regulated air quality monitoring site in Pitt County. One site cannot effectively be used as a standardized measure of air quality for a whole county because the site averages air quality and introduces exposure misclassification. Expanding the EPA's air quality monitoring is not possible due to the cost associated with each site. Our research aims to determine the accuracy and precision of a low-cost aerosol instruments (PMSA003, OPC-N3, BlueSky, AirBeam3, and Clarity) by comparing their data to a real-time high-cost filter-corrected aerosol sensor (ADR-1500). In addition, a linear regression model will be derived for each of the low cost instruments compared to the ADR-1500 filter-corrected data. Any of the low cost instruments, if proven reliable after calibration, would be an economically friendlier option for aerosol monitoring. Filter measurements from the ADR-1500 will be used to quantify the discrete aerosol

concentrations using a microbalance. The filters will be replaced every 24 hours and pre/post weighed. Strict humidity and temperature acclimation measures will be used during the post-weighing process to ensure that the measured weight difference on the filter indicates only aerosol content. The deployment site is at the intersection of Greenville Blvd and Charles Blvd in Greenville, NC. This research and data are important to those living with respiratory illnesses and will help affected populations make informed decisions about their health in their microenvironments. A network of low-cost aerosol sensors can also help the EPA get a better picture of the true air quality across North Carolina and potentially create new air quality standards and regulations to improve air quality measurements in underrepresented areas.

UPR58

Improving the Quality of Nasopharyngoscopy Data for Management of Velopharyngeal Insufficiency: A Multisite Experience

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Taylor Danielle Snodgrass

Kathryn Grace Fennie

Imani Rochelle Gilbert

Thomas James Sitzman

Mentor: Perry, Jamie L

Introduction: Nasopharyngoscopy involves passing a narrow camera through the nostril posteriorly and advancing inferiorly into the nasopharynx. This procedure is often used to speech movements in patients with velopharyngeal insufficiency. Velopharyngeal insufficiency is a result of a gap between the patient's velum and pharyngeal walls during closure for speech, resulting in hypernasal speech. The goal of nasopharyngoscopy is to assess speech movements to inform surgical decision making; however, up to 40% of VPI speech surgeries fail to improve the quality of speech

(Lithovius et al., 2014). It has been hypothesized that certain factors relating to scoping may negatively affect its useability for surgical planning (Pigott, 2002; Gilleard et al., 2013).

Aims: 1. To describe the instrumental data analysis for a multisite study involving nasopharyngoscopy data, and 2. to determine the factors that negatively impact scoping across clinical sites.

Methods:12 hospitals uploaded routing VPI scope data into a secure database that the instrumental data coordinating center (ECU) has access to. A quality assurance checklist was used to check the quality of data (e.g., ability to visualize structures and speech movements) and provide feedback to sites in order to improve quality of data collection throughout the study. Based on quality of data, sites were contacted with instructions to improve future data.

Result: When reviewing nasopharyngoscopy data from sites, it was determined multiple factors were negatively impeding assessment for surgical planning. Common factors included articulation errors, mucous on the scope camera, scope placement, scope movement, limited speech sample, and issues with audio quality. Because of these factors, 36% of scopes collected initially had to be excluded from clinical interpretation. To combat this, the instrumental data coordinating center (ECU) created a standardized quality assurance process in order to help improve the techniques used for scoping across sites. This process ensures the visualization of structures is clear, the scope is in the correct location, and the speech sample is adequate.

Conclusion: Initial scopes provided limited data and each site had extensive variability in how the collected and interpreted data. The hospitals benefited from the quality assurance feedback to improve their scope reliability which could positively impact surgical planning and care for patients with velopharyngeal insufficiency.

UPR59

The effect of gravity on velopharyngeal soft tissue and muscles

Haley M. Masterjohn; Imani R. Gilbert, MS; Eshan Schleif, PhD

Mentor: Perry, Jamie L

The use of specialized imaging to evaluate and measure the soft tissue and muscles in and surrounding the velopharyngeal port is imperative to determine the effect of gravity on speech production, deglutition, and sleep breathing. The purpose of this study is to conduct a literature review to assess whether the velopharyngeal size and function changes from the supine to the upright position.

Speech production, deglutition, and sleep breathing were evaluated across various studies to determine the effect of gravity on the velopharyngeal mechanism, the oropharyngeal mechanism, and upper airway structures.

Findings suggest that postural changes do not significantly influence the velopharyngeal port size and function during phonation and sleep breathing. These results support the notion that magnetic resonance imaging of patients can be run in the supine position. The results from deglutition suggest there is a significant difference in the velar movement in both positions as the upright position allows for greater posterior movement and end position in swallowing compared to the supine position.

The results of this study suggest that patients can be scanned in a supine position during phonation, as differences between upright and supine positions have negligible effects on the position and function of the velopharyngeal mechanism during speech production.

UPR60

The Role of the Right Temporo-parietal Junction in Social Language Processing: A tDCS Study Protocol

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Mentor: Rothermich, Kathrin

We plan to investigate how the ability to process social aspects of language, e.g., verbal irony, changes with modulating brain activity in the right temporoparietal junction (rTPJ). The rTPJ has been shown to play a critical role for processes that underlie verbal irony perception, for example theory of mind (ToM) and cognitive empathy (Frith & Frith, 2001). Transcranial direct current stimulation (tDCS) has been used to explore the role of the rTPJ in social cognition, and results show that cathodal stimulation of the rTPJ leads to decreased accuracy in ToM and empathy tasks (Mai et al., 2016). However, the exact role of the rTPJ in social language processing is still under debate. Additionally, most previous studies have used still images or written materials, ignoring the dynamic nature of face-to-face interaction. In the current study, we plan to use video materials of people engaging in using forms of verbal irony, and participants' task is to decide if somebody is being sarcastic, uses teasing, or is being blunt (% accuracy as outcome measure). We will also measure their reaction time as an indicator of task efficiency. Before participants are performing the task, we will inhibit brain

activity in the rTPJ using cathodal tDCS (20 minutes of either 2 mA or sham). Additionally, we will record eye tracking behavior to be able to better quantify how brain stimulation influences the processing of these complex social scenes. Participants will also fill out questionnaires pertaining certain aspects of their personality, such as anxiety traits, empathy, psychopathy, and sarcasm use. Preliminary results from a pilot study revealed that after receiving tDCS, reaction time is slower in videos that display blunt interactions [N=2] when compared to the sham condition. Our goal is to test N=30 participants to shed light on the relationship between brain regions related to perspective taking (ToM) when processing social aspects of language. In the future, we would also like to test clinical populations that exhibit social cognitive deficits, such as Autism Spectrum Disorders, schizophrenia, or Parkinson's Disease.

UPR61

Dialogic Reading and the Impact on Emergent Literacy and Developing Literacy Skills

Meghan Grace Whalen

Mentor: Holt, Yolanda Feimster

Dialogic reading is scripted shared book reading. This evidence-based intervention encourages language and literacy skills in preschool-aged children. A scripted interaction is used to promote vocabulary development and longer sentences. The child is prompted to elaborate on their knowledge of the text. This practice promotes phonological awareness, a foundational skill for reading. This work was completed to determine whether dialogic reading techniques increase the emergent literacy skills after the intervention has ended. Dialogic reading provides children with the techniques to facilitate better understanding of text and stronger emergent literacy skills. The purpose of this limited literature review was to assess the current state of knowledge on independent carry-over of dialogic reading techniques in preschool-aged children. It is unknown whether or not children who have had dialogic reading intervention continue to use the techniques independently. Further research evaluating independent reading attempts by young children is needed to determine what long-term effect dialogic reading intervention has on the development of literacy in this population.

UPR62

Neuroplasticity mechanisms of Remote Ischemic Conditioning in Children with Unilateral Cerebral Palsy

Destiny Alling

Mentor: Surkar, Swati Manoharrao

Unilateral cerebral palsy (UCP) elicits heterogenous sensorimotor impairments in the contralesional side of the body and is a leading cause of childhood disability. Children with UCP have difficulty in bimanual coordination which restricts the child's independence. Although research in children with UCP has identified several efficacious interventions to improve bimanual coordination, these interventions often require higher training doses and have modest effect sizes. **Thus, there is a critical need to find an effective priming agent that, when paired with upper extremity task-specific training, will facilitate neurobiological processes to change the maladaptive plasticity and enhance the magnitude of training effects in children with UCP.** Ischemic conditioning is an endogenous phenomenon to protect an organ from injury by exposing it to controlled, short-term, local, sublethal ischemia. Remote ischemic conditioning (RIC) is a clinically feasible way of performing ischemic conditioning where episodes of ischemia and reperfusion are delivered with cyclic inflation and deflation of a blood pressure (BP) cuff on the arm/leg. Recent studies suggest the effects extend into neuroprotection and motor learning. Therefore, it's imperative to probe the mechanisms of RIC in augmenting skill-dependent plasticity in the affected motor cortex (M1). The non-invasive brain stimulation technique, transcranial magnetic stimulation (TMS), is a reliable method to assess cortical excitability, inhibition, and plasticity. **Our hypothesis is: the multifactorial mechanisms of RIC can be harnessed as a priming agent to enhance the effects of rehabilitation and to augment neuroplasticity in children with UCP.** This study consists of an analysis of 25 children with UCP, ages 6-16 years. Children received RIC or sham conditioning on the affected arm with standard conditioning protocol combined with a total of 30 hours of Hand Arm Bimanual Intensive Therapy (HABIT). Pre- and post-TMS measures to assess brain excitability and behavioral measures to assess hand function and bimanual coordination were collected. The objective is to analyze the effects of RIC and HABIT on bimanual coordination and M1 plasticity. Furthermore, the secondary objective is to assess the responders and non-responders to RIC/Sham training based on brain excitability and severity of hemiplegia. We hypothesize that children who received RIC will be responders to training and will have greater M1 plasticity.

UPR63

Creating Methods for Measuring Individual Muscle Force through Ultrasound Elastography and Motion Capture

Nancy Chizorom Imoh

Mentor: Domire, Zachary J

Every movement in the body has multiple muscles contributing to that movement. Consequently, there is not a straightforward way of knowing what muscles are contributing to a specific movement or how much force is being generated by each muscle to complete a movement. Muscle forces are a major contributor to internal loading on the body, so in order to understand these loads, it is important to determine the individual force created by a muscle. The following study aims to create a method of measuring individual muscle forces across a joint in order to better understand the extent to which certain forces are acting upon a muscle. The study focuses on the elbow flexor muscles, biceps, brachialis, and brachioradialis as they are superficial musculature and easier to image than deeper muscle tissue.

Current methods of determining individual muscle forces generally rely on prediction-based estimations rather than measuring actual forces. The use of electromyography (EMG) is a popular method for making these estimates; however, accurate estimations are not always obtained, leading to inaccurate predictions of muscle forces and joint movements (Gatti et. al, 2008). Having knowledge about individual muscle forces is pivotal in understanding how internal loads impact individual muscles which is important for injury prevention and rehabilitation.

The project uses a technique combining ultrasound elastography and motion capture similar to the methods used by Manal, Crowder, and Buchanan (2013). Ultrasound shear-wave elastography (SWE) is used to measure shear wave speed and shear modulus. The ultrasound transducer sends sound waves to the muscle tissue and records the resulting wave that moves away from the transducer. It is then able to measure how fast the wave moves with stiff tissue moving faster than relaxed tissue. The equation $c^2=(\mu k+\sigma)/\rho$ represents the relationships between shear-wave speed and muscle stress, so once shear-wave speed has been determined, the muscle's cross-sectional area must also be determined. Since $\sigma=F/A$, after finding the muscle's cross sectional area, the individual muscle force can be solved. With the combination of ultrasound and motion capture, the path of a muscle and its relation to the joint center is identified to get the muscle's individual moment arm. Finally, once the moment arm and measured individual muscle force have been found, the elbow flexion can be tested against a dynamometer to confirm the findings of the measurements.

UPR64

The Relationship Between Speech Recognition in Noise vs Dichotic Digits Performances

Katelyn Nichole Overcash

Mentor: Vermiglio, Andrew J

Background: The American Academy of Audiology (AAA, 2010) claims that a dichotic listening test may be used to evaluate speech recognition in noise (SRN) ability and the need for an FM system. However, Vermiglio et al. (2018) reported a weak relationship between SRN ability vs. dichotic listening results. It is unknown if the same result would be found when comparing the AzBio SRN scores (Spahr, 2012) vs. dichotic listening results. It was hypothesized that a nonsignificant relationship would be found between AzBio scores and dichotic listening results.

Purpose: The primary purpose of this study was to investigate the relationship between AzBio scores and dichotic digits results. The secondary purpose was to investigate the relationship between the right ear advantage for the AzBio test vs. dichotic digits results.

Method: Forty-five native speakers of English (mean age = 21 years, SD = 2.15) with normal pure-tone thresholds (< 25 dB HL, 0.25 – 8.0 kHz) participated in this study. SRN ability was determined using the AzBio test. The sentences were presented binaurally under supra-aural headphones in ten-talker babble at 65 dBA (0 dB SNR). The results are presented as the percentage of words correctly repeated by the participant. Dichotic listening was evaluated using the dichotic digits test (Musiek, 1983) where the participants were asked to repeat the digits presented to either left or right ear first. Results are presented as percentage of correctly repeated digits. The right ear advantage (right ear – left ear) was calculated for both tests. All test conditions were randomized.

Results: A statistically significant relationship was found between AzBio vs. dichotic digits for the right ear scores (r=0.30, p<0.05). However, a nonsignificant relationship was found between AzBio vs. dichotic digits for the left ear scores (r=0.28, p=0.06). A nonsignificant relationship was found between the right ear advantages for the AzBio vs. dichotic digits tests.

Conclusion: The study results for the left ear scores do not support the presumption from AAA (2010) that dichotic listening scores may be used to predict SRN ability. This is consistent with Vermiglio et al. (2018). However, this presumption to some degree is supported by the right ear scores where a weak but statistically significant relationship was found between variables. No significant relationship was found for the right ear advantages for AzBio vs. dichotic digits results.

UPR65

Exploring the Relationship Between Stuttering, Tinnitus, and Other Hearing Difficulties

Anna Scott Ivey

Mentor: Briley, Patrick Minton

Stuttering is a communication disorder that is commonly characterized by observable behaviors such as repetitions, postural fixations, and other aberrant motor movements. Stuttering is also a disorder that has repeatedly been shown to co-occur with other conditions such as ADHD, learning disabilities, and sleep issues, among others. Conditions whose co-occurrences remain unclear are those related to hearing loss. Findings from studies reporting on the occurrence of hearing issues among people who stutter have been mixed and, overall, have been lacking. Clarity on this issue is important, as adaptations to the auditory system are one method that ease of speech is induced in people who stutter. A preliminary method of disentangling the influence of the auditory system on the presence and remediation of stuttering is to understand the rate at which hearing issues co-occur among the condition of stuttering. Therefore, the purpose of this project is to profile the rate of hearing issues among people who stutter and to further assess these rates across genders and ages.

UPR66

The Effect of COVID-19 Infection on Behavioral Measures of Auditory Function

Laney Pope, Virginia Driscoll, Erin Kokinda, Drew Huffman, Gabriela Musumeci, Kaitlin Abrams, Alyssa Alford, Trenton Barnett, Morgan Deans, Kelly Dorman, Emily Harrison, Katelyn Overcash, Caitlyn Paulson, McKenzie Perry, Melissa Rafaniello, Olivia Sullivan

Mentor: Vermiglio, Andrew J

Background: Kopral and Yilmazer (2021) measured pure-tone thresholds from 250-8000 Hz for groups with and without COVID infection. The COVID group had higher (poorer) pure-tone threshold averages than the non-COVID group. A review of the literature revealed no published studies on the effect of COVID-19 infection on speech recognition ability. It was hypothesized that the COVID group would perform poorer than the non-COVID group on the behavioral measures.

Purpose: The purpose of this study was to investigate the effect of COVID-19 infection on behavioral measures of auditory ability._These measures included pure-tone thresholds and speech perception thresholds in quiet and in noise.

Method: Forty-three native English speakers aged 19 to 28 years (mean = 21.07, SD = 2.15) with normal pure-tone thresholds (≤ 25 dB HL, 0.25 – 8.0 kHz) participated in this study. Twenty-six subjects reported testing positive for COVID-19 and were placed in the COVID group; 17 were placed in the non-COVID group. The Hearing in Noise Test (HINT; Nilsson et al., 1994; Vermiglio, 2008) was used to evaluate speech perception ability. The level of the sentences varied adaptively for the quiet and steady-state noise conditions. The noise was presented at 65 dBA. HINT results are reported in dBA (quiet) and dB SNR (noise). Binaural pure-tone averages (BPTA) were calculated for thresholds from 0.5-6.0 kHz.

Results: For combined groups, the average BPTA was approximately 5 dB HL. The mean HINT-Quiet threshold was 15.32 dBA. The mean HINT threshold in noise was -0.89 dB SNR.

Group differences were evaluated using t-tests. For the BPTA, the COVID group performed 1.83 dB worse than non-COVID group (p = 0.03). For the HINT Quiet thresholds, the COVID group performed 0.84 dB poorer than the non-COVID group (p = 0.36). For the HINT Noise thresholds, the COVID group performed 0.56 dB better than the non-COVID group (p = 0.22).

Conclusion: In support of the hypothesis, poorer performances were found for the COVID group than the non-COVID group for BPTA and the HINT Quiet thresholds. Contrary to the hypothesis, the COVID group performed better than the non-COVID group on HINT in Noise (non-significant).

UPR67

Association Between the Bindex® and CT Bone Parameters

Bridget Kenny

Mentor: Meardon, Stacey Augusta

Bone stress injuries (BSI) are common in young active adults and servicemembers. Females who participate in high-impact, vigorous physical activities have 1.5-3x increased risk of BSI compared to males. Most common in adolescents and young adults, BSI are linked with smaller bone geometry and lower bone mineral density (BMD). Decreased cortical thickness and low BMD contribute to lower bone strength and higher risk for fracture. Knowledge of bone strength and risk factors for bone injury

at a young age has the potential to identify the need for early intervention to prevent bone stress injuries and improve bone health in at-risk populations.

The Bindex device is a portable, quantitative ultrasound that measures apparent cortical thickness and estimates proximal femur bone mineral density cost-efficiently without radiation. It is reported to be a reliable and valid screening tool for bone health in older adults; but research in female young adults is lacking. The purpose of this study is to characterize the relationships between Bindex and CT based bone parameters in young, active females at risk of bone stress injury.

Subjects
22 females currently participating in regular vigorous activity, 18-25 years of age.

Methods
Bindex measurements were taken at proximal 1/3, midpoint, and distal 1/3 of the left tibia. Cortical thickness and DI and recorded for analysis. Participants also underwent computed tomography (CT) of the tibia. Using image segmentation software, cortical thickness measures and tibia BMD will be obtained from CT, our criterion measure, at slices corresponding to Bindex measurement sites. The relationships between Bindex and criterion measures will be examined using Pearson correlation coefficients and linear regression; differences in cortical thickness will be examined using t-tests (a=.05) and Cohen's dz effect sizes.

Clinical Relevance

Cost-effective bone health screening tools are needed to identify female athletes and servicemembers at risk for bone injury, allowing for early invention and optimization of long-term bone health. The knowledge gained from this study has the potential to lay the groundwork for future large-scale studies examining the use of Bindex to screen bone health in at-risk athletes and servicemembers. Additionally, the results from this study could provide information on the utility of Bindex to inform subject-specific bone modeling inputs minimizing the need for radiation exposure in future studies._

UPR68

The Effect of a History of Noise Exposure on Speech Perception in Noise Ability

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Mentor: Vermiglio, Andrew J

Background: Noise exposure negatively affects an individual's ability to hear speech in noise. Liberman et al. (2016) evaluated two groups of listeners; one had a history of noise exposure, the other had no history. The authors found no significant differences in speech perception in quiet between groups. However, the noise-exposed participants performed significantly poorer than the non-exposed group. Hope et al. (2013) demonstrated that pilots with a history of noise exposure in aircraft had poorer speech-in-noise perception abilities than subjects with no noise exposure history. In contrast, Smith et al. (2018) found no significant difference between similar groups on a speech-in-noise test. It was hypothesized that subjects with a history of noise exposure would have poorer speech recognition in noise abilities using two different tests.

Purpose: The purpose of this study was to investigate the effect of noise exposure on speech perception ability in quiet and in noise.

Method: Sixty-five native English speakers with normal pure-tone thresholds (<25 dB HL, 0.25-8.0 kHz) participated in this study (mean=20.8 years, SD=2.24). All participants completed a questionnaire regarding their exposure to noise. Participants who indicated a past noise exposure were placed in the noise-exposed group (n=8); all other subjects were placed in the control group (n=57). Speech perception in noise ability was evaluated by using the Hearing in Noise Test (HINT; Nilsson et al., 1994; Vermiglio, 2008) in quiet and steady-state noise (at 65 dBA) and the AzBio test (Spahr et al., 2012) in 10-talker-babble at 65 dBA (0 dB SNR). The tests were administered binaurally under supra-aural headphones in a sound-treated booth. All sentence lists and test conditions were randomized. Results were reported as thresholds in dBA (HINT quiet) and dB SNR (HINT in steady-state-noise) and percent correct for the AzBio (presented with 10 talker babble).

Results: An analysis using t-tests showed no significant difference between the non-exposed and noise-exposed groups for any of the speech perception tests ($p > 0.05$).

Conclusion: The results did not support the hypothesis and are contrary to previous investigations. This may be due to the small number of individuals with noise exposure in the sample.

UPR69

The Effect of Musical Experience on Speech Recognition in Noise Ability

Melissa Rafaniello, Virginia Driscoll, Caitlyn Paulson, Erin Kokinda, Drew Huffman, Gabriela Musumeci, Olivia Sullivan Kaitlin Abrams, Alyssa Alford, Trenton Barnett, Morgan Deans, Kelly Dorman, Emily Harrison, Katelyn Overcash, McKenzie Perry, Laney Pope

Mentor: Vermiglio, Andrew J

Background: Speech recognition in noise (SRN) ability has been evaluated for experienced musicians and non-musicians (Soncini & Costa, 2006; Parbery-Clark, et al., 2009), with musicians significantly outperforming non-musicians on tasks of SRN ($p <$ .01). It is unknown if this same effect would be found for less experienced musicians. It was hypothesized that minimally experienced musicians would have better SRN performance than non-musicians.

Purpose: The purpose of this study was to investigate the effect of musical experience on SRN ability using four different tests.

Method: Thirty-five native English speakers (mean=21 years, SD=2.27) with normal pure-tone thresholds (< 25 dB HL, 0.25-8.0 kHz) participated in this study. Participants were asked if they ever played a musical instrument and were divided into musician and control groups based on their responses. SRN ability was determined using the Hearing in Noise Test (Nilsson, et al., 1994; Vermiglio, 2008), AzBio (Spahr et al., 2012), and Listening in Spatialized Noise-Sentences (LiSN-S; Cameron & Dillon, 2006) tests presented binaurally under headphones. The HINT and LiSN-S were presented adaptively in four-talker and two-talker babble, respectively. The AzBio sentences were presented in steady-state speech-shaped noise and ten-talker babble at 65 dBA (0 dB SNR).

Results: No significant differences were found between the musician and control groups on HINT or LiSN-S tests ($p> 0.05$). A multivariate analysis revealed no main effect of musical experience ($p>0.05$) for AzBio performances. For the AzBio steady-state noise condition, a significant difference was found between groups ($p <.0001$), where the musicians performed better than non-musicians. No significant group difference was found for the AzBio scores in ten-talker babble.

Conclusions: No effect of musical experience was found for the AzBio ten-talker babble, HINT, and LiSN-S tests. However, the effect was found for the AzBio steady-state noise condition. This is consistent with Soncini and Costa (2006) and Parbery-Clark et al. (2009). Differences in study results may be related to the age and musical experience of the participants.

UPR70

Physical Recovery versus the Usage of Analgesics for chronic pain among ECU Students

Kunj Chintankumar Patel

Mentor: Das, Bhibha Mayee

The use of physical recovery versus painkillers among college students is an essential topic of discussion. Physical recoveries, such as stretching, massage, and other forms of physical therapy, can be beneficial for college students who are dealing with chronic pain or injuries. Analgesics, on the other hand, can provide temporary relief from pain but also have serious side effects. While this issue is not well-researched in the United States, a study in Norway reported that 54% of students reported chronic pain in at least one location(Grasdalsmoen et al., 2020). Physical fitness and exercise can often be used to address these issues coherently with pain relief medications rather than relying solely on them. Students with chronic pain are more likely to use analgesics and alcohol(Thomas et al., 1992).

The use of physical recovery for pain management has been gaining popularity in recent years. Physical recovery techniques, such as stretching, massage, and other forms of physical therapy, can help to reduce pain and improve mobility. These techniques can also help to reduce stress and improve overall well-being. Additionally, physical recovery techniques are generally safe and do not have the same potential for side effects as painkillers.

Analgesics, on the other hand, can provide temporary relief from pain but also have serious side effects. Analgesics can be addictive and can lead to long-term health problems. Additionally, analgesics can interfere with the body's natural healing process and can mask the underlying cause of the pain.

The aim of the research is to increase knowledge of pain relief practices used by ECU students and increase the use of physical therapy in contrast to decreasing the use of pain relief medications. I'll conduct a need-based assessment to see the prevalence of chronic pain among students and the need for physical therapy services. We hypothesize that ECU students would be more interested in physical recovery sessions if they were offered at ECU recreational center free of cost. We will recruit 50 students that attend East Carolina University, that is 18 years and older through a combination of digital marketing and listserv. We will examine the results by using a combination of the PROMIS pain intensity, physical therapy questionnaire, and International Physical Activity Questionnaire (IPAQ). This combination will be used to examine chronic pain in students as well as their physical activity levels.

UPR71

Standardizing Brake Force

Makenzie Raine Steidl

Mentor: Dickerson, Anne

Introduction: As people age, their physical and cognitive abilities are proven to decline, and the majority of the people killed in crashes involve older drivers who are 65 and older (*Older Drivers*, 2022). Many times these individuals are not identified, putting themselves and others at risk when driving. What is needed are consistent standardized assessments for screening and evaluation of one's driving abilities. The purpose of this study is to develop the norms for brake force.While there are studies offering norms for brake reaction time (Dickerson, A.E., et al., 2008), there are very few that address brake force. This is particularly important when an adult has a knee or hip replacement. Being able to apply enough force to the brake to suddenly stop a vehicle is essential for returning to drive after surgery. This research is focused on recording and analyzing the brake force exerted on a brake pedal and brake reaction time on individuals aged 18 and up by using a Brake Force Simulator.

Methods: This is currently an ongoing study. The data is collected using a Brake and Time Reaction Tester. Participants press down on the accelerator until the red light turns on. When the red light turns on, participants push the brake down as hard and as fast as they can.

Results: While data collection is not complete, there are 112 participants with 39 (34.5%) males and 73 (64.6%) females between 18 and 83 years of age. The mean brake force is 68.2 pounds of pressure with a standard deviation of 25.34. There is a significant difference in brake force between males and females ($t=3.16$, $p<.001$) but not between age groups (young, middle, older) ($F(2, 109) = 1.28$, $p = .2830$ or race ($F 5, 106) = 1.50$, $p = .195$.

Conclusion: After collecting the data on a larger sample size and analyzing the trends, it is hoped to create a standardized table of the ideal and expected brake forces an individual should be able to demonstrate depending on their age and gender. By standardizing this information, future therapists can gain a better idea of whether their patient may be safe and confident enough to drive. This research can be applied to future driving rehabilitation programs. Although brake force alone is not the only aspect that can or should effectively determine an individual's ability to drive, it does serve as a reliable component of safe driving evaluations.

UPR72

Gastrocnemius Stress and Stiffness Research in Relation to High Heeled Shoes

Brandon Waugh, Coni Heinemann

Mentor: Domire, Zachary J

Gastrocnemius Stress and Stiffness Research. Anecdotally, studies that have been completed by the research team have suggested that women generally have stiffer calves than men. A likely mechanism for this is that high heeled shoes keep the gastrocnemius muscle in a shortened position for great lengths of time leading to increased stiffness. As a result, researchers will be examining the effects of heeled shoes and how they play a role in calf stiffness, and potentially leading to increasing pain.

In years past, numerous studies have been completed on footwear products, but are typically only limited to athletic type shoes and their benefits to increasing abilities on and off the field. Not much research has been done on the negative effects of professional shoes and how they play a role in the changing structures of the lower extremities that result in pain for the wearer. Studies have also shown that there is a direct correlation between pain and stiffness in muscles, so the goal of this study will be to determine how heeled shoes effect women's pain and stiffness and, if possible, attempt to change designs or workplace policies regarding what is deemed as a professionalshoe.

This study will be conducted by using shear wave ultrasound imaging of the gastrocnemius and the flexor digitorum brevis showing change in stiffness from the beginning to end of a typical eight-hour workday. The purpose of shear wave ultrasound imaging is to send sound waves through tissue of the body to induce a shear wave through the tissue and observe how quickly it moves. These shear waves sent through relaxed muscles tend to move much slower than in stiff muscles. Once sheer modulus is determined by the reading on a relaxed muscle at the beginning of the day, another reading will be taken at the end to determine how stiff the gastrocnemius actually became throughout the day. In order to definitively state that heeled shoes play a negative role in calf stiffness, researchers will be examining numerous women wearing all different kinds of shoes, with ultrasounds taken at both the beginning and end of the day. These different populations will allow researchers to determine if the heeled shoes really cause immense stiffness and pain compared to their heelless counterparts.

UPR73

The effect of risk for cochlear synaptopathy and musical experience on speech recognition in noise ability

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Mentor: Vermiglio, Andrew J

Background: Liberman et al. (2016) demonstrated that a history of noise exposure can have a negative impact on speech recognition in noise (SRN) ability for individuals with normal pure-tone thresholds. Individuals with musical experience have demonstrated better SRN ability than those without musical experience (Parbery-Clark, 2009). However, there are contradicting results on how musical experience impacts SRN ability when there is risk for cochlear synaptopathy (Liberman et al., 2016). It was hypothesized that a statistically significant effect of risk for cochlear synaptopathy and musical experience would be found for SRN ability.

Purpose: The purpose of this study was to investigate the effect of risk for cochlear synaptopathy and musical experience on SRN ability.

Method: Forty-three young native English speakers with normal pure-tone thresholds (≤ 25 dB HL, 0.25 – 8.0 kHz) participated in this study. Participants who reported exposure to high levels of sound were placed in the high-risk group for cochlear synaptopathy. Musical experience was assessed with the question, "Have you ever played a musical instrument?" SRN ability was determined using the AzBio test (Spahr et al, 2012) in ten-talker babble and steady-state noise (65 dBA, 0 dB SNR). All stimuli were presented under supra-aural headphones. All conditions were randomized. AzBio scores were reported as percentages of words correctly repeated.

Results: Two-way ANOVAs were conducted to investigate the effects of musical experience and risk for cochlear synaptopathy on AzBio scores for both masking conditions. These analyses show no statistically significant main effects for group or interaction. However, a statistically significant main effect was found for musical experience in the steady-state noise condition (F value was 5.4333, $p = 0.0250$). A t-test revealed a statistically significant difference between groups with and without musical experience. The musician group scored 6.16 percentage points worse than the non-musician group ($p = 0.0229$).

Conclusion: Results demonstrated no effect of risk for cochlear synaptopathy on AzBio scores in either noise condition (contrary to Liberman et al. 2016). An effect of musical

experience was found for AzBio sentence perception in steady-state noise only, where individuals without musical experience outperformed those with musical experience. These results are consistent with Liberman et al. (2016) and contrary to Parbery-Clark et al. (2009).

UPR74

Morphology of the Levator Veli Palatini Muscle: Volumetric Assessment

McKenzie Renee Perry

Neda Tahmasebifard

Eshan Schleif

Mentor: Perry, Jamie L

Velopharyngeal (VP) closure needs the coordinated actions of velopharynx muscles and structures include soft palate, posterior pharyngeal wall, and lateral pharyngeal walls. Function of the VP closure is necessary for speech and swallowing. During the VP closure, elevation and retraction of the soft palate, movement of the lateral pharyngeal walls, and movement of the posterior pharyngeal wall is necessary to separate oral cavity from nasal cavity. The levator veli palatini (LVP) muscle is the most important muscle for soft palate elevation and achieving VP closure. Previous studies have evaluated the features of the LVP muscle using linear measurements and volumetric measurements. However, volumetric measurements of the LVP muscle provide more accurate differences between cleft and non-cleft anatomy. Kotlarek and colleagues (2020) compared the total volume of the LVP muscle between three groups of children without cleft palate (CP), children with repaired CP and velopharyngeal insufficiency, and children with repaired CP and velopharyngeal competency ranging between four to eight years old. Non-significant differences were reported between these three groups for the total volume of the LVP muscle. However, the sample size of this study was small and the effect of race, sex, and cleft type were not considered. Therefore, the purpose of this study was to examine differences in the total volume of the LVP muscle between nine- to ten-year-old children with repaired CP and those with non-cleft anatomy. Participants included eight children with different ages and types of cleft lip and palate matching with 40 children with non-cleft anatomy.

UPR75

A Mixed Methods Review of the Fresh Start Program

Grace Corrine Regan

Mentor: Sastre, Lauren Rogers

According to the Centers for Disease Control and Prevention, 11.3% of the U.S. population is affected by type 2 diabetes. The annual cost of diabetes totals $327 billion, making it the most expensive chronic disease in the United States. Diabetes self-management education (DSME) programs reduce blood glucose, lessen complications, and lower medical costs associated with type 2 diabetes. DSME programs provide knowledge and skills to help the individual learn how to manage their diabetes. Partnering with the North Carolina Association of Free and Charitable Clinics, the Fresh Start program addresses underlying knowledge and behavior risk factors to improve diabetes management for uninsured, patients with diabetes by providing culinary medicine, produce RX, nutrition education, and health coaching.

Objective:

Examine impact of the Fresh Start program on patient satisfaction, participation, and food literacy.

Methods:

This mixed methods, program evaluation study that included phone interviews (n=15) and quantitative surveys (n=27) at the end of the 2022 pilot Fresh Start program. Following participant consent; interviews were recorded using REV, transcribed verbatim, and analyzed using content analysis to identify themes. Quantitative data were collected via REDCap and were analyzed using descriptive analysis via IBM SPSS 28.0.

Results:

Quantitative results demonstrated 92.3% (n=24) of participants agreed the program helped them follow nutrition information given by their medical provider, 96.3% (n=26) of participants believe this program helped them control their blood sugar, and 96.3% (n=26) reported that the program improved their overall health. Themes revealed patient participants "learned how to make healthier food choices, were able to lower their blood sugar, and built relationships through peer and instructor interactions."

Discussion:

A patient centered approach to DSMEs is achieved by tailoring the lesson plans to the patient's needs and is crucial in the success of the program. The Fresh Start program was successful because social needs of the patient population were addressed in addition to nutrition education and intensive health coaching support. Multiple components integrated into one program is ultimately what drove positive patient perception and impact. Future programs should focus on addressing barriers in

vulnerable patient populations (e.g., food access) and offer more one on one support to participants (e.g., health coaching).

UPR76

Perceptions of disposal options for prescription opioids among community members in Greenville, North Carolina

Cassidy Nicole Joyce

Mentor: Egan, Kathleen Louise

The nonmedical use, use of any medication not for its intended purpose or only for the feeling it creates rather than solving a medical problem, of prescription opioids continues to be a national crisis resulting in large numbers of overdose deaths and emergency rooms visits. In an attempt to combat the opioid crisis by preventing intentional or unintentional medication diversion, unused medications should be disposed of correctly and immediately after treatment is complete. The overall purpose of this study was to better understand the perceptions of 5 FDA-recommended disposal options among community members in North Carolina. A qualitative data collection method was used. In Spring 2022, focus groups were conducted with participants who received an opioid medication in the last 12 months to gain information to develop an intervention related to storage and disposal of opioid medications (12 focus groups; 37 participants). The focus groups were conducted via Webex by two research members. Participants were shown a slide with the FDA recommended disposal options - flushing pills down the toilet, mixing pills with an undesirable substance, using an at home drug deactivation kit, or taking medications to a disposal box at a pharmacy or police station – and asked about their perceptions of each option. NVivo was used to analyze this data and compile common themes about disposal perceptions among the focus group participants. We found the following 9 themes: (1) preference of low cost disposal options, (2) unclear meaning of specific disposal language used, (3) which disposal methods were perceived to be easier to use and more accessible, (4) lack of sufficient education on proper disposal is provided by medical providers, (5) past disposal behaviors, (6) preferred disposal methods, (7) failed disposal attempts inform future disposal intentions, (8) environmental concerns, and (9) concern about law enforcement. Participants in the focus groups expressed common concerns about the lack of education about proper storage and disposal options. The study also found it important for disposal options to be convenient and low-cost to promote proper disposal behavior. This study will inform future education efforts by identifying perceptions of disposal options among community members in North Carolina. Further, the study may also provide guidance on which disposal options should be provided or discontinued.

UPR77

The relationship between Working Memory and Speech Perception in Noise Ability

Emily Harrison, Virginia Driscoll, Caitlyn Paulson, Erin Kokinda, Drew Huffman, Gabby Musumeci, Kaitlin Abrams, Alyssa Alford, Trenton Barnett, Morgan Deans, Kelly Dorman, Katelyn Overcash, McKenzie Perry, Laney Pope, Melissa Rafaniello, Olivia Sullivan

Mentor: Vermiglio, Andrew J

Background: Parbery-Clark et al (2009) evaluated the relationship between speech recognition in noise (SRN) performance vs. working memory. The authors reported a statistically significant relationship between the Quick Speech-in-Noise test (QuickSIN; Killion et al 2004) vs. working memory results and between Hearing in Noise Test (HINT; Nilsson et al 1994; Vermiglio 2008) vs. working memory results. McCreery et al (2017) reported weak but statistically significant relationships between SRN and working memory test results for three types of target speech: low-predictability sentences; zero-predictability sentences; monosyllabic words. Neither of these studies used the Digit Span test to evaluate working memory or the Listening in Spatialized Noise-Sentences (LiSN-S; Cameron and Dillon 2007; Brown et al 2010) test to evaluate SRN ability. It was hypothesized that a statistically significant relationship would be found between Digit Span (Wechsler, 1955) memory scores vs. SRN ability using the LiSN-S and HINT protocols.

Purpose: The purpose of this study was to determine the relationship between working memory scores vs. SRN thresholds.

Method: Fifty-two native English speakers, ages 19-26 years, participated in this study. All participants had normal pure-tone thresholds (< 25 dB HL at 0.5-6 kHz). SRN ability was evaluated using the HINT (with steady-state noise) and LiSN-S (with two talker babble). Both SRN tests were administered using an adaptive protocol.. For both tests, the target speech and maskers were presented at 0 degrees virtually under headphones. Working memory was evaluated in quiet using the Digit Span test in both forward and backward recall, at 65 dBA. The Digit Span score was the longest correctly repeated number string. All test conditions were randomized.

Results: Spearman rho correlations were used to determine the relationships between the three variables. No statistically significant relationships were found between any of the SRN thresholds vs. working memory scores ($p > .05$). Forward vs. backward Digit span scores were significantly correlated ($r = .36$, $p < .01$).

Conclusion: The results of this study do not support the hypothesis, nor do they agree with the findings of previous research (Parbery-Clark et al., 2009; McCreery et al., 2017).

Study differences may be due to a lack of convergent validity across study protocols. In other words, the protocols across studies may be measuring different constructs.

UPR78

Investigating the Relationship Between Compensatory Articulation Errors and Severity of Hypernasality: A Preliminary Literature Review

Hannah Ragsdale; Jessica Williams, MS; Imani R. Gilbert, MS

Mentor: Perry, Jamie L

Intro: Cleft palate is amongst the most prevalent congenital birth defects, occurring in approximately 1 out of 1700 live births. Despite surgical advances to repair cleft palates, velopharyngeal insufficiency is frequently reported in patients after primary palatoplasty, resulting in hypernasal speech which is structural in nature and can only be treated with surgical intervention. In addition to structural insufficiency of the velopharyngeal mechanism, individuals with cleft palate may produce atypical speech sound errors as a way to compensate for their insufficient anatomical structures. The resulting errored speech sounds are known as compensatory misarticulation patterns (CMAs). CMAs can be treated with skilled speech therapy intervention and do not require surgical intervention. Both hypernasality and CMAs have a direct impact on overall speech intelligibility, and their presence may potentially have negative impacts on a patient's overall quality of life. These two speech characteristics (CMAs and hypernasality) often occur simultaneously in patients; however, there is limited understanding on how each of these speech variables influence each other.

Aim: To complete a literature review investigating the relationship and possible interactions between hypernasality and an individual's use of compensatory misarticulation errors in patients with a history of cleft palate.

Methods: Only articles that discussed the interconnectedness of hypernasality and compensatory misarticulation use in individuals with a history of repaired cleft palate were included in this study. All study age and subject criteria were considered. In total, 28 articles were identified and used for this preliminary review. 20 articles pertained to speech outcomes and age of primary palatoplasty, 17 pertained to the presence of hypernasality and the use of CMAs, and 10 pertained to overall lexicon development as the patient aged.

Preceding this review, several studies have discussed the co-morbidity of CMAs and hypernasality. However, there continues to be limited knowledge regarding the relationship between the severity of hypernasality and the overall occurrence of CMAs. Further investigation is needed to understand the true relationship between the two communication diagnoses. These investigations can aid in identifying optimal timing of

secondary surgery to treat hypernasality and speech therapy to correct the compensatory errors.

UPR79

Simulation of Autonomous Vehicles for Safe Transportation Network

Sophie M Arruza

Mentor: Lee, Jinkun

Over the past decade, a surge of interest in Autonomous Vehicle (AV) technology has been supported by the electric cars' significant portion of the market. A transportation network with fully electric and autonomous vehicles may reduce human errors, increase traffic efficiency, and support a sustainable future. However, the timeline to the fully AV transportation network will be affected by various factors where socio-economic cost might be the most important when determining the adoption rate. Collision by AVs will be a critical issue that may increase public resistance against the early adoption of AVs. Recent research of AV models takes the safety as a hard constraint when optimizing AV model parameters: minimum gap distance to a leading vehicle, response time for a hard break, maximum acceleration/deceleration, etc. We focus on developing a transportation network simulation model where AVs are running together with human drivers with two objectives: (i) understand how the increasing penetration rate of AV will affect the safety issue and (ii) refine AV model to mitigate the safety concern while improving the performance of transportation network. If successful, we will be able to improve the prospective adoption rate of AVs into the current road network and make the future transportation network more sustainable.

UPR80

Determination of nutrient adsorption capabilities of 3D-printed ecomodules

Ariel R'Monie Lineberger

Mentor: Bell, Natasha Lynn

This study aims to determine the nutrient adsorption capabilities of 3D-printed ecomodules created by Natrx Adaptive Infrastructure, located in Raleigh, North Carolina. The objective of the study is to explore the different ecomodule medias composed of a concrete with zeolite mix, a concrete and biochar mix, and a standard concrete mix and their capabilities to adsorb nitrogen and phosphorus when subjected to simulated stormwater run-off. These mixed media ecomodules will also be compared to recycled concrete aggregate and gravel (as a control). The Natrx material has been

shown to be a lightweight, cost-effective, customizable, and readily produced material that targets sustainable practices in erosion mitigation and ecological damage. Although the materials are typically used to support coastal resiliency, this study aims to determine their potential use in the Catawba River Basin in North Carolina. With increasing nutrient loading from agriculture and urban/suburban areas, monitoring stations located in study areas in McDowell County, NC, and as far south as Mecklenburg County, NC, have seen increases in phosphate, nitrate, and ammonium in receiving waters. With the purpose of providing erosion control, existing research has shown that zeolite can adsorb up to 98% of ammonium and 92% of nitrate from a source concentration ranging from 10 mg/L to 80 mg/L for ammonium and 80 mg/L for nitrate. Concrete has demonstrated 90% phosphate reduction for inputs up to 20mg/L, and biochar has been shown to be effective for run-off mitigation and reduction of nitrate and phosphate by 86% and 47%, respectively, from starting concentrations of 27mg/L for nitrate and 0.57 for phosphate. With the customized Natrx ecomodules, the media selected provides nutrient adsorption capabilities that will aid in protecting waterways from increased nutrient loading. We hypothesize that the mixture of different filter media types within the ecomodules will result in an increase in varying nutrient adsorption capabilities. The hope is to be able to implement adsorptive materials like these as ecological filters to protect receiving waters of the Catawba River Basin and other watersheds throughout NC and beyond.

UPR81

Concrete Crack Sealant in Infrastructure Repair Literature Review

Caleb Lane Messer

Mentor: Akhnoukh, Amin Kamal

Concrete is the most popular building material today due to its versatility, availability, and affordability. Concrete is able to withstand large compressive forces, making it a staple material for load bearing assemblies; and when combined with reinforcing steel it can be used for different construction applications. Unsurprisingly, concrete is the main material used in infrastructure projects including roadways, sidewalks, bridges, and tunnels. Despite concrete's very high compressive strength, it displays very low tensile strength. As a result, it often develops cracking, which can compromise the integrity of an assembly putting people in danger. In order to determine which types of sealants are the most effective in repairing cracks of differing types, a literature review of every state department of transportation (DOT) is being carried out to analyze not only the types of sealants being used, but also the application methods, surface preparation, curing process, quality control, and testing procedures. The outcomes of this research will support NCDOT personnel develop better regimens for concrete crack sealant. Thus, improve the infrastructure conditions within the State of North Carolina.

UPR82

Simplifying and Improving a Near-Point Convergence Test Tool

Jamie Bonfiglio[1], Claire Jenkins[1], Emma Cole[1] , Nigel George[1], Barbara Muller-Borer, PhD (Mentor) [1], Chia-Cheng Lin, PhD (Mentor and Sponsor) [2]

1.Department of Engineering, 2. Department of Physical Therapy

Mentor: Muller-Borer, Barbara Jean

Concussion protocol has become very prominent in the world of sports and the event of head trauma. One alternative to testing for symptoms of a concussion is by performing the near-point convergence test. Currently, there are different methods of performing the near-point convergence test. However, these current methods and devices lack accuracy, portability, and repeatability, and are often expensive. Working with East Carolina University's Department of Physical Therapy, the goal of this project was to design a more portable and accurate near-point convergence test tool to measure the point where single to double vision was attained. Working through the design ideation process, four prototype alternative solutions were developed. The prototypes were designed in SolidWorks, 3-D printed on a MakerBot Replicator. The team is working with the project sponsor to evaluate and improve the designs. Overall, the goal of the project is to develop and provide a portable, accurate, and cost-effective tool to perform the near-point convergence test that can be used in the field and in clinical settings.

UPR83
Bioplastic production for food packaging application: A proof of concept

Luciano DeRose

Mentor: Duba, Kurabachew Simon

Plastics are one of the most widely used materials on the planet; however, it is known to have a detrimental effect on the environment. This study focuses on the using green chemistry to produce biodegradable plastic without losing the necessary properties displayed by current plastic materials. Our preliminary research has focused on using citric acid and glycerol under varying temperatures and times to form material that mimics plastic. The citric acid and glycerol materials have proven to be 100% water soluble when submerged in water for 1-2 hours with applied forces such as stirring. To fulfill the need of the food packaging industry, the solubility of the material in water will need to be decreased. Furthermore, guar gum will be added to the formulation as a carbon source. The guar gum will be used to decrease solubility while maintaining biodegradability of the material. The generated material will be tested for solubility, biodegradability, and tensile strength to compare it with current plastics on the market.

UPR84

Development of a Virtual Reality Assessment of Oculomotor Function

Austin Finlason, Chia-Cheng Lin, Brian Sylcott

Mentor: Wu, Rui

People with undiagnosed neurological disorders may present early oculomotor deficits, especially smooth pursuit, and saccadic functions. Current oculomotor examination equipment is expensive and most primary care clinics can't afford the cost. The recently developed VR headset has built-in accelerometer sensors and an eye-tracking system. To tackle this issue, we develop virtual reality (VR) based oculomotor examines. Our research is conducted based on the hypothesis that the designed VR scenes will be able to 1) provide reliable measures for smooth pursuit and saccadic functions and 2) detect head-turning speed in one of the oculomotor examination batteries. In this project, we build a VR application using Unity using the built-in accelerometer sensors and eye tracking functions. The oculomotor variables include the speed of saccadic movement, accuracy, latency, eye positions, tracking pattern, and head-turning speeds. Sample data and result images can be generated using our VR application. Further study will validate the results with the clinic's standardized oculomotor examination device.

UPR85

A Student-Centered Personalized Learning Framework to Advance Undergraduate Robotics Education

Nicholi William Kaminky
Carlos Ochoa
Austin Conner Finlayson
Zhen Zhu
Marjorie Campo Ringler

Mentor: Wu, Rui

Robotics is a growing industry with many opportunities for undergraduate students, but there is a gap between industry standards/demands and content taught in universities. This project aims to prepare course content to fill the content gaps based on our survey results, provide a user manual for professors and students to find answers to questions on the course content, and conduct a user study to collect students' opinions on the course content. The course content can be utilized by smaller or less-resourced institutions to still provide their students with access to an introduction to the robotics field. The need for this kind of educational content is apparent in universities that do not have access to specialized robotics equipment as this can prevent their

students from exploring the robotics field. The content is also designed in such a way that graduate students should be able to teach it, even if they do not have a background in robotics. We will evaluate the effectiveness of this content by presenting it to undergraduate students in a classroom environment. We will then evaluate and compare their progress and learning to that of students receiving traditional instruction in the same concepts. We hope to use this data to improve the efficacy of our delivery method and content to maximize the number of universities and students that would be able to access the otherwise obtrusive field of robotics.

UPR86

Walking Into Wellness

Gracie Reavis, Ana Cabrera-Perez, Bianca Martinez, Gauri Patel

Mentor: Swain, Amy Elizabeth

Recent attention has been focused on the mental health of college students in the U.S. Recent studies have shown that the decline of mental health across the United States for college students has been constant over the past 8 years resulting in 135% increase in depression and 110% increase anxiety (Maio et al., 2022). The broad spectrum of mental health addresses and incorporates mindfulness, brain health, decompression, well-being, and community. Roughly 36 percent of US college students have major or moderate depression which contributes to their overall health and wellness (Pedrelli et al., 2015). In the 2022-23 school year alone, almost 15 lives have been lost between four North Carolina schools (ASU, Duke, UNC-Chapel Hill, UNC Charlotte, and NC State). These numbers do not reflect an adequate level of wellness at the universities in North Carolina. Over 71% of college students indicated that they experienced increased stress and anxiety due to COVID-19. Their stress stemmed from worries about their own health and the health of their loved ones, irregular sleeping habits, decreased socialization, difficulty concentrating, and concerns about their academic performance (Son et al., 2020). Student wellness is an important factor in a student's life, which contributes to their success.

We associate well-being with mindfulness, fulfillment, having control in our lives, maintaining good physical health, and involving ourselves with engaging relationships. To practice wellness, we must become aware of present events, approach these situations calmly, and accept our feelings, thoughts, and bodily sensations. We recently conducted a survey which briefly investigated the overall wellness of honors college students at ECU. Respondents indicated that they are mostly sleeping well at night and feel a sense of community. However, close to 40% of students in the Honors College have thought about dropping out of school, and over a quarter of students reported that school negatively affects their life. To address these concerns, we have created a series

of wellness workshops and events which address various elements of health and wellness, focused specifically on enhancing students' knowledge of mental health coping strategies. Participants are self-assessed prior to participation and at the close of these sessions to determine the impact and efficacy of this programming. Our hope is to create communities of wellness across campus, and this work is toward that end.

UPR87

Latino Families Experiences with Science in Their Daily Lives

Natalia Figueroa-Bernal and Adamari Calixto-Benitez

Mentor: Hegde, Archana

Background: Hispanics are underrepresented among the ranks of scientists and those in allied health professions. Hispanic adults make up 17% of the U.S. workforce but just 8% of those working in Science, Technology, Engineering, and Mathematics (STEM) fields. Since 2010, more Hispanics are attending and graduating from college and earning bachelor's degrees in a STEM field, but still, Hispanics remain underrepresented among college graduates and other higher levels of education (Funk & Lopez, 2022). This low turnout in education and jobs among Hispanics are partially impacted from Hispanic parents having a lack of knowledge in science, making it difficult to assist their children in this area. One study found that parents who participated in family science nights in Texas acknowledged how disadvantaged their children were in that they had no expertise with science, and they also expressed that they felt disadvantaged in having no outside help (De Leon & Westerlund, 2021). This study aims to understand what science-related activities Latino parents in North Carolina engage in with their children (ages 3-5) in their daily lives. We are unaware of a study that examined the role of science activities, careers, and general experiences with science in the lives of Latino parents and their children in North Carolina.

The objectives of this study are as follows:

1. Determine what indirect/direct science activities Latino parents in North Carolina engage in with their children.
2. Identify Latino parents' personal experiences with science careers.
3. Identify how Latino parents' personal experiences with science influence how they raise their children.

Methods: This research employs a mixed method research design (qualitative and quantitative methods). Focus group discussions will be utilized to gather data on this topic with a group of parents. We plan to hold 3-4 focus group sessions with 5-6 parents in each group. Following which a brief survey will be completed by parents on their

understanding of science and professions related to science. Sessions will be held in English and Spanish, and surveys will be translated into Spanish as well.

Expected Results and Conclusion: We hypothesize that Latino parents engage in science-related activities with their children that are not typically captured within research, however, it might be lower in comparison to other racial and ethnic minority groups.

Participant requirements and work cited can be provided upon request.

UPR88

Centering Family Voice- A Multi-Dimensional Examination of Family Engagement

Ashley Zuniga, Pooja Deshpande

Mentor: Richman, Alice Rose

Background: The goal for my summer internship with the MCH Title V Internship Program was to *define and develop recommendations for equitable family engagement*across Virginia's Title V programs and partner agencies. My partner, Pooja Deshpande, a current graduate student, and myself, an undergraduate student, had to accomplish the task of discovering the effects of Virginia's Title V's programs for center family engagement and if the results of these strategies had a positive and/or negative effect on families with children and youth special healthcare needs.

Methods: Throughout this process, we had to create a qualitative study by interview several groups of representational demographics. We held interviews of specific focus groups, such as healthcare professionals who have had hands-on experience of working with children and youth with special healthcare needs.

Expected Results: Though these communities had knit-close connections with one another through the experience of either having children with special healthcare needs or had the knowledge of assisting these youth, there was proof of lack of expertise in the family engagement area. For example, there were several common points that were presented in our interview studies that we were able to identify. We pinpointed that there was awareness of healthcare access barriers, along with miscommunication errors between healthcare providers and families.

Conclusion: Our suitable definition for equitable family engagement was defined as "Equitable engagement with families can be best summed up by the phrase, "nothing about us, without us" that honors family wisdom and experiences by centering the family voice in all aspects of care and community. This requires that the family's perspective is included from the onset at all levels of care systems through shared

responsibility and decision-making. We adjust our approach based on each family's experiences and needs. It is essential that families are treated in the same manner, regardless of available resources, socioeconomic status, race, ethnicity and all other factors. Equitably engaging with families requires communicating through the preferred information channels of the family, connecting families to other families for support, and fostering a trusting relationship that provides families with every opportunity to voice themselves and make their own decisions."

UPR89

A Closer Look at Mothers in Rural North Carolina

Simona Adhikari

Mentor: Richman, Alice Rose

In rural areas, there is a big health disparity that exists for individuals. Specifically, for maternal and child health, there are even fewer resources available to new mothers during their pregnancy and early motherhood. The importance of comprehensive and effective maternal and child healthcare in these areas should be a priority. The purpose of this study is to conduct a qualitative study of mothers in rural areas of North Carolina to gather information about their experiences during their pregnancies and how healthcare could improve. The study will explore anecdotes from these mothers and learn about the struggles of accessing healthcare in these remote areas. By telling the stories of these mothers, I hope to spread awareness of how poor healthcare delivery and access are in some parts of this country. The interviews will be filmed and edited into a creative video project to showcase the data collected from this study. Each woman will have a chance to tell her story through a one-on-one interview. My role will be lead researcher which includes finding participants, conducting interviews, reviewing data, and creating the video. Long-term, I hope this project can gain the attention of future healthcare providers to showcase this target population and encourage small changes in the way healthcare can be delivered and accessed in rural areas.

UPR90

Exploratory Program Evaluation of BabyCare, a Medicaid-Funded Home Visiting Program in Virginia

Leslie M Osorio Pascual, Candace Jarzombek

Mentor: Richman, Alice Rose

]The BabyCare program addresses the medical and social needs of high-risk pregnant people and infants through behavioral health screening, case management, resource connection, and expanded prenatal services such as individual education classes, substance use disorder services, nutrition services, and homemaker services for those on bedrest. The need for an evaluation of the program was identified by a supervisor of one of the largest BabyCare programs in recognition that funding for the program was not keeping up with costs and that additional funding sources were difficult to access as BabyCare is evidence informed, but not evidence based.The BabyCare program impacts pregnant people and their families who have at least one risk factor, as identified by the program. These risk factors include, but are not limited to, history of intimate partner violence, lack of a positive support system, lack of financial resources, communication barriers, previous pregnancy complications, or multiple gestation.This evaluation was intended to impact Local Health Districts who provide BabyCare services by identifying their needs and additional supports that could be provided by VDH or DMAS.

The BabyCare program benefits pregnant people, infants, and their families by connecting them to community resources, providing social support and an additional contact to reach out to with medical and developmental questions, and providing developmental screenings and education about child development. For public health nurses providing BabyCare services, our evaluation deepened understanding and built support for the BabyCare program at the state level. Recognizing that BabyCare programs were looking for strategies to build financial sustainability, the evaluation brought to attention ways that becoming an evidence-based program could both positively and negatively impact LHDs implementing BabyCare. Recommendations resulting from the evaluation included working with LHDs to develop a statewide curriculum for the program and other statewide resources, establishing partnerships with local university researchers to collect and evaluate data on program effectiveness, and strengthening collaboration with the Virginia Department of Medical Assistance Services to assess reimbursement rates and covered services under the program. These recommendations were informed by input from LHD staff and aim to bolster state-level support of BabyCare, both for existing programs and for program expansion.

UPR91

Dentists and Dental Hygienists' role in Human Papillomavirus (HPV) vaccination uptake in North Carolina

Rory Moore

Mentor: Richman, Alice Rose

This project involves research into understanding how dental health providers may play a role in facilitating Human papillomavirus (HPV) vaccination uptake for under-

vaccinated populations. HPV is the most common sexually transmitted infection (STI) in the United States and is associated with causing approximately 70% of oropharyngeal cancers (OPCs) in the US [1]. HPV vaccination is the most effective primary prevention strategy and can prevent most of HPV- related OPCs [2].

The increase in HPV-related OPC provides dental health providers with a unique opportunity to engage in primary and secondary prevention with their patients to reduce the burden of OPC. The American Dental Association (ADA) encourages clinicians to provide oral cancer and oropharyngeal cancer examinations [3], identify suspicious lesions, and either perform or refer patients for biopsies and diagnosis [4-5]. The ADA also encourages dentists to educate themselves and their patients about the relationship between HPV and OPC [4-5]. Despite these recommendations and increasing need, numerous studies have shown that dentists are not well prepared to engage in OPC prevention practices with their patients, as there is great variability in their knowledge about OPC and in performing oral cancer examinations [6-15]. OPC prevention strategies can include patient education, recommendation of HPV vaccines, risk assessment, and oral cancer screening exams.

We are proposing to conduct a quantitative assessment to measure HPV and OPC knowledge, current OPC screening practices, education on HPV risk behaviors, HPV vaccine recommendation, and self-efficacy in providing OPC prevention among dentists and dental hygienists in North Carolina. We will use a mixed methodology through web-based surveys and mail-based surveys. First, an email will be sent to all NC dentists and hygienists with an email address on file with the NC Dental Board Examiners. The email will include a link to the survey using a personal link on Qualtrics. We will remove responders from the list of NC dentists and hygienists and will send a mail-based survey via a postcard with a QR code where they can access the survey. The postcard will be sent to a random sample of licensed and active dental health providers in NC. We will send a second postcard reminder to our random sample two to three weeks after the initial postcard was sent.

UPR92

'If you just tell me you're 18, I'll still sell to you': A qualitative study of underage tobacco product purchasing experiences in a tobacco 21 compliance study

Tyler Austin West**,** Mahdi Sesay

Mentor: Lee, Joseph G

BACKGROUND: Tens of thousands of underage tobacco purchase attempts are conducted each year for research, compliance, and public health surveillance. However, little research has qualitatively examined the perceptions and experiences of underage buyers. We sought to understand underage buyers' experiences and gather

recommendations for protocol improvement from those conducting the purchase attempts.

METHODS: We used semi-structured interviews to assess experiences with underage product purchasing. Participants (N=19, 58% male, 42% white) were data collectors aged 18-20 in New Jersey (n=6), New York (n=6), or North Carolina (n=7) who were participating in a tobacco 21 policy compliance purchasing research project. Interview guides focused on experiences encountered and how external factors like store type and location, internal factors such as race/ethnicity and gender, and training influenced their experiences. Interviews were conducted fall 2022 by a trained research assistant and transcribed. We used thematic coding with deductive and inductive codes in NVivo v.12/PC.

RESULTS: We identified three overarching themes: (1) Store type matters: non-chain stores create a more unpredictable environment for buyers when compared to chain stores; (2) data collectors experiences vary based upon identity, gender being most prominent; (3) focusing on confidence and colloquial language to request products during training may lead to increased research validity. Buyers recommended trainings focus on slang and natural language and noted the importance of role plays, practice buys, and strategies for deflecting requests for IDs without seeming adversarial.

DISCUSSION: Differences between chain and non-chain stores in their process for requesting identification indicate the importance of corporate policy. Implementation of ID scanners and vertical license orientation knowledge may help standardize how clerks respond to purchase attempts. Female buyers are more subject to unwanted attention during buys, and research procedures should keep that in mind. No other negative outcomes from participating in underage purchase attempts were identified. Training for buyers should ensure confidence, promote colloquial language for products, and include interactive role plays.

UPR93

A Group-Based Approach to Addressing Postpartum, Lactation, Pregnancy, and Mental Health Needs of Women

Miranda Faith Gavin

Mentor: Richman, Alice Rose

Background: This group-based intervention aims to address the underrepresented health needs of women by facilitating a women's health group that deals with postpartum, lactation, pregnancy, and mental health needs in collaboration with a licensed professional counselor (LPC). This intervention will involve a comprehensive review of current literature and best practices in the field._

Methods: We will be conducting informational group sessions, offering Q&A sessions with available therapists from Anchor Family Therapy, and targeting women through community outreach to raise awareness about the importance of women's health issues such as pregnancy and childbirth, postpartum care, breastfeeding, and mental health which will be led by competent professionals in the field of maternal and child health (MCH); I will help assist with the curriculum and research for the sessions this Spring 2023. Participants will engage in interactive discussions and activities designed to promote education and skill-building related to prenatal and postnatal care, childbirth, and mental health by offering support groups for women to share their experiences and concerns, providing access to lactation consultants, offering prenatal and postpartum group sessions, involving Anchor Family Therapy to provide mental health resources and virtual telehealth options, and conducting research to inform best practices._

Expected Results: The expected outcome of the program is to increase the knowledge and skills of mothers to improve the overall mental health and well-being of women, especially those dealing with postpartum and related issues who participate in our group and informational sessions. We also look to foster a greater sense of support and community among our participants.

Conclusion: This intervention will contribute to the field by providing a practical and evidence-based approach to addressing womens health needs and helping birthing people develop the necessary skills in improving maternal and child health.

UPR94

The Effects of Hand-Arm Bimanual Intensive Training (HABIT) on Real-world Bimanual Performance in Children with Unilateral Cerebral Palsy.

George Grant Kirkman

Mentor: Surkar, Swati Manoharrao

HABIT improves affected upper extremity (UE) function and bimanual coordination in children with unilateral Cerebral Palsy. Historically, numerous studies have evaluated UE function using standardized tests that reflect UE capacity. However, growing evidence indicate that improvements in UE capacity may not translate to enhanced performance of real-world bimanual tasks. Accelerometers are a valid tool to objectively measure UE performance in daily life. The goal of this study is to quantify the dose of

30-hour hand arm bimanual intensive training (HABIT) using accelerometers and to assess changes in the upper extremity (UE) performance and capacity following HABIT in children with unilateral cerebral palsy (UCP). This study included 24 children with UCP (age: 10.88±3.55 years; M=18, F=6) and MACS levels I-III. HABIT in a camp-based setting including structured, task-specific, bimanual activities for 6 hours/ day for 5-days, totaling 30-hours. To assess real-world bimanual performance, children wore GT9X Link accelerometers on bilateral wrists for 3 days pre- and post-HABIT. HABIT dose was quantified with the bimanual performance during real-world activities through accelerometer derived variables– affected use count (number of movements), use ratio (UR), magnitude ratio (MR), bilateral magnitude (BM), median acceleration (MA), and acceleration variability (AV). UR and MR quantify the relative contribution of affected UE to bimanual tasks in terms of hours and magnitude. BM, MA and AV quantify the magnitude of bilateral UE and affected UE movements. Performance gains were analyzed with paired t-test. During HABIT, the average affected UE performed 76,997 movements in total; There were significant improvements ($p<0.05$) from pre- to post-HABIT in UR (pre=0.74±0.12, post=0.78±0.11), MR (pre=-1.58±1.57,post=-1.05±0.60), BM (pre=105.20±29.04, post=118.13±24.85), MA (pre=22.59±15.23, post=29.85±17.83) and AV (pre=71.04±15.75, post=76.98±16.67) indicating improvements in real-world bimanual performance immediately after HABIT. Although HABIT enhances performance of real-world bimanual tasks, it's unclear how long these gains in performance last. Further research should be conducted on the retention of these improvements.

UPR95

Mapping and Analyzing the Pressuring Points and Structural Inequities of Maternal Healthcare

Shakira S Jones

Mentor: Black, Kristin Zenee

Racial inequities in maternal mortality in the U.S. has garnered national attention, which is warranted given Black women are 3 to 4 times more likely to die from pregnancy-related causes than white women. Even more startling is the inequity in severe maternal morbidity (SMM), an occurrence that is far more common than maternal death and is characterized as the unexpected outcomes of labor and delivery that result in significant short- or long-term consequences to the health of a birthing person. SMM can be considered a near miss of a maternal death. A large body of literature has emerged using both national and local data and has repeatedly shown the steady incline of SMM. The overall rate of SMM has increased almost 200% from 1993 to 2014, and the prevalence of SMM is nearly 2 times greater among Black women compared to white women. Mapping and Analyzing Pressure Points and Structural

inequities in Maternal Healthcare (MAPPS-MH) Project has 2 aims. The first aim will involve conducting interviews with birthing people and healthcare providers to identify the structural pressure points in the maternal healthcare system that contribute to racial/ethnic inequities in SMM. The second aim will focus on examining the 21 SMM indicators by maternal race/ethnicity and other key variables (e.g., age, household income, health insurance type) using eastern NC- based electronic health record (EHR) data. The objectives of these aims are to: 1) identify structures (e.g., policies, programs, practices) inherent in healthcare systems that make maternal care vulnerable to structural and system-level bias and contribute to racial/ethnic inequities in SMM; and 2) determine the groups at high-risk for experiencing SMM. Ultimately, I want to use this formative research to develop a real-time registry that uses EHR data to track key SMM risk factors and indictors by race/ethnicity to inform and improve medical provider response time to maternal health complications.

UPR96

Care Management for High-Risk Pregnancies

Lindsay Jean McCoy

Mentor: Richman, Alice Rose

Background: Care Management for High-Risk Pregnancies (CMHRP) promotes healthy babies in each county in North Carolina. The goal for the CMHRP program in Greene county is for Greene County to continue to have healthy babies. CMHRP works with pregnant women from the time their Pregnancy Risk MIIS score comes back, until the baby turns 2 months old. If additional services are needed after the baby turns 2 months old, they will be referred to Care Management of At Risk Children (CMARC). CMHRP is for pregnant women who are at higher risk to have adverse birth outcomes who are Medicaid recipients. CMHRP is provided in local health departments to continue to foster the relationships between Obstetrics and Gynecology Case Manager and OB Providers. CMHRP provides services to help schedule transportation through the patient's insurance, setting up WIC while the patient is pregnant, educating patients on birth control after, how to obtain a birth certificates, social security cards, circumcision costs, etc. Barriers/Challenges patients face in Greene County are transportation, food insecurity, prenatal attendance, safe living environments, and lack of support systems.

Methods: I will be presenting on the OB-Comprehensive Needs Assessment and the Pregnancy Risk Screening components of my internship with Greene County Health Department. The OB-Comprehensive Needs Assessment includes talking to the patient to see if they have WIC, supportive Father of Baby, tobacco use, exposure to smoke, alcohol use, transportation needs, if the pregnancy is planned or unplanned, breast feeding or bottle feeding, any depression, anxiety, allergies, eating disorder, PTSD,

bipolar, schizophrenia, or a mental health counselor. The Pregnancy Risk Screening will indicate their pregnancy history, health history, and a survey regarding emotional and mental health. The OB-Comprehensive Needs Assessment cane take place over the phone, at a home visit, hospital visit, or a scheduled office visit.

Excepted Results: Those who need services will have all referrals made and know how to schedule an appointment. We also can connect pregnant women to the Pregnancy Center for parenting classes and cooking classes.

Conclusion: This project showcase the important components of the CMHRP program, the benefits it has to offer pregnant and parenting women in Greene County, and the benefit of having a social worker present through high-risk pregnancies.

UPR97

Vaping Prevention Among the Youth Population in Pitt County

Alisia Ling Tseng

Mentor: Matthews, Jennifer Cremeens

Vaping and nicotine products have been identified as an increasing problem in schools in the U.S. Although electronic cigarettes are relatively new, they pose a significant issue. Nicotine usage amongst adolescents have spiked according to the CDC. Since 2014, electronic cigarettes are identified as one of the most used nicotine-containing products among the youth. To aid in the prevention of nicotine usage in the youth, national, state, and local programs have been implemented. The primary focus of this study will be analyzing and implementing the program Catch my Breath in Pitt County schools. Coordinated Approach to Child Health (CATCH) My Breath; is an evidence-based vaping prevention program that utilizes a "peer-led teaching approach"; is currently one of the few school-based vaping prevention programs that is used to reduce nicotine usage among adolescents. Select ECU students will undergo a training process for the Catch My Breath program curriculum. After training, ECU students will present the Catch My Breath program to the students in Pitt County Schools. A post-survey will be conducted for the staff and students at participating Pitt County schools. Research results can aid in the discussion towards implementing an effective vaping education program for adolescents in schools. Results from this study can provide more insight on how to effectively engage students during presentations; and gage how much information students and staff from participating schools are retaining.

UPR98

The Impact of Dialogic Reading Techniques on Individuals with Autism

Katherine Manning Whitehurst

Mentor: Holt, Yolanda Feimster

Dialogic Reading (DR) is an intervention believed to increase language and literacy skill development in children. Dialogic Reading Intervention involves scripted-shared book reading between an adult and a child. The adult connects information in the text to real world ideas, events, and concepts. The adult prompts the child to interact with the text that they are reading by expanding on the child's sentences and encouraging the child to tell the story in their own words. Children with autism, a developmental language disorder, often have difficulty communicating in context and in unfamiliar social situations. Many children with autism have a restrictive or repetitive set of speech and language behaviors that are negatively viewed by neurotypical adults. This work is a limited review of research on the impact of DR on the speech and language behavior in children with autism. Literacy skills of word recognition, reading comprehension and reading fluency were also evaluated.

UPR99

North Carolina Foster Care Systems

Audrey Bell

Mentor: Alice Richman

Background: The Department of Social Services provides resources for oppressed and marginalized populations. The child protective services side of DSS focuses keeping families together and having reunification between children and their parents through a case plan. The NC LINKS program is one example of a service offered that provides services for adolescents 13-21 who are in or have aged out of the foster care system. The goal of the program is to assist adolescents in the development of independent living skills such as budgeting, living, nutrition and culinary skills, educational, and potential career paths to ensure their future to a higher quality. Reunification and permanency panning is the goal for children who are in the foster care system. For those who do not have the opportunity to be adopted, the LINKS program provides basic life needs to enhance independent living skills.

Methods and Expected Results This presentation will demonstrate the path once a child is removed from the home: child protectives services first initiate a case plan with the parent, the case moves from assessments/investigations, to in home services where they assess a family's strengths and needs, then the case will go to foster care if needed to find temporary or permanent placement, then will go to adoptions if no parental

progress is being made. This presentation will also outline the components of the LINKS program (home visits, strength and needs assessments, medical appointments, Permanency Planning Meetings (PPAT), Child and Family Team Meetings (CFT), transportation of children, finding appropriate housing placement for foster children, referrals for treatments, doctor's visit, monthly collateral contacts and weekly supervised visits.

Conclusion: To conclude the foster care system is a temporary hand who will assist their clients in any resources they need that best accommodate their needs. The Department of Social Services is a helping hand that provides resources for families and individuals in the county the reside in. This presentation will showcase my work with the Beaufort County Department of Social Services and how the Foster Care LINKS program benefits children who have aged out of the system.

UPR100

Using DNA Barcoding and Fouling Plates to Identify Cryptic Species

Rachel Gittman & Charles Michael Brooks

Mentor: Blakeslee, April Monica Houghton

The long-term impacts of climate change on marine ecosystems are not fully understood. Through the use of a Rapid Assessment Survey (RAS) of North Carolina's coastal ecosystems, the Blakeslee and Gittman labs aim to produce an accurate estimation of how climate change is impacting organisms residing on the US East Coast. The RAS will allow for a better understanding of organism demographics and the potential for range expansions and species invasions in different natural habitats (marsh, restored and natural oyster reefs, mudflats) along the coast of Beaufort, NC. Examinations of how marine communities are changing in North Carolina's coastal ecosystems will provide data on the migration, invasion, and adaption of species in this pivotal region where coastal temperature rise is disproportionally high in recent years. Predictions indicate that recruiting organisms to the fouling plates will represent a mix of native, established non-native, and recently range-expanding (migrant) species. Based on past datasets (species records from the 1970s-2000s), the expectation is a major shift in species composition towards non-native/migrant species that will be higher in density than the native species. This data will contribute to a broader exploration of changes to North Carolina coastal communities by the Blakeslee and Gittman labs.

UPR101

Design of a pDronpa1.2-based optogenetic switch for control of disease-associated cytoskeletal structures

Hasitha Sri Tatineni

Mentor: Hughes, Robert Murray

Actin is a protein present in all eukaryotic cells and is essential in muscle contraction and cell movement and structure. In order for actin filaments to function properly, it is important for them to be able to bind to ATP. However, stressful conditions can convert actin to a primarily ADP bound state which can alter its normal function and even cause the formation of actin-cofilin rods. These rods are a common feature in neurons of those who suffer from neurodegenerative disease such as Alzheimers, Parkinson's, and Huntington's disease. Additionally, actin post-translational modifications are hypothesized to play a potential role in disease brains. Although there is a correlation between malformation of actin and neurodegenerative disease, not much is known about the formation of these structures and the role they play under stressful conditions. Previously, research on this topic has been conducted using the CofActor (Cofilin Actin optically responsive) system, which allows insight into the clustering of actin and cofilin through light activation. To analyze the behavior of these clusters independent of stress conditions, mutations were made at the ATP interaction sites. Using PCR amplification, sequencing, and widefield fluorescence microscopy, it was noted that three mutations had notable formations of actin-cofilin rods and inclusions, even in absence of energetic stress. One drawback of using the CofActor system is that most of the accumulation of the actin happens in the dark. To gain more knowledge on the behavior of actin before clumping, we incorporated the pDronpa1optogenetic system instead. It allows for a wider range of experimentation due to its photocaging abilities. In other words, the pDronpa1 vector surrounds the actin in the dark so that there is no interaction. Once it is light activated, the pDronpa1 will open up, allowing for formation of the actin clusters and for a clearer analysis of cytoskeletal dynamics in neurons. Experiments conducted so far have proven the photoswitchable capabilities of the pDronpa1 vector.

UPR102

Anisotropic Cross Section for Elastic Scatterings Within the Quark Gluon Plasma

Jennifer H. Fulcher

Mentor: Lin, Ziwei

The shear viscosity is an important property of the quark-gluon plasma, and it is closely related to the thermal average of the cross section for 2_2 elastic parton scatterings. We examine typical differential cross sections by analytically calculating the transport cross section for both isotropic and anisotropic scatterings. We then derive the thermal

average of the transport cross section assuming the Maxwell-Boltzmann statistics for massless partons.

UPR103

Testing models of subvolcanic magma system growth using geochemistry and rock magnetism

Joseph Mohamed Abuarab

Mentor: Horsman, Eric

Volcanism at Earth's surface is driven by changes in the magma plumbing system that underlies every active volcano. These dynamic systems grow and evolve through periodic injections of magma at depths generally between 1 and 5 kilometers. Because they are located below the surface, modern magma plumbing systems cannot be studied directly. However, ancient examples now exposed at the surface due to erosion provide an excellent opportunity to study magma plumbing systems. The Henry Mountains of southern Utah includes exceptional outcrops of a ~25 Ma hypabyssal magma plumbing system. We present results of in-progress work to study the development of this system through multiple different analysis techniques. These results are integrated with previous work to aid our interpretation.

This project focused on samples from three separate ancient magma systems in the Henry Mountains: 18 from Mount Pennell, six from Mount Ellsworth, and one from Mount Hillers. Anisotropy of magnetic susceptibility (AMS) was used to quantify the orientation of fabrics within the igneous rocks and infer the magma flow direction prior to lithification. Scalar parameters of the magmatic fabric evaluated include bulk magnetic susceptibility, degree of anisotropy, and overall shape of the fabric (oblate versus prolate). Most samples show a range of weak-moderate oblate magnetic fabric, but just under a third of the samples show a weak to moderately strong prolate fabric. The range of bulk susceptibility values spans several orders of magnitude and correlates closely with differences in geophysical and geochemical properties (e.g., diorite porphyry versus soda syenite porphyry). Preliminary analysis of whole-rock major and trace element geochemical data suggests observed variations correlate strongly with rock type and magnetic fabric. Further analysis will allow us to refine our understanding of the growth and evolution of these shallow magma plumbing systems.

UPR104

Identification of polyphosphate accumulating organism (PAO) candidates for biosensor development in WWTP

Ananya Koirala

Mentor: Field, Erin Kirby

Polyphosphate-accumulating organisms are responsible for a majority of phosphorous removal in enhanced biological phosphorous removal (EBPR). These organisms have developed the capability to absorb dissolved phosphorous from wastewater, in higher concentrations than required for normal growth, and store it in the cell as polyphosphate (polyP). The development of electrochemical biosensors will aid in monitoring the phosphorous uptake of PAOs. Previous literature has highlighted various known PAO which were analyzed and selected as primary PAO candidates for this study upon review. The four primary PAO candidates identified for this study *were Acinetobacter johnsonii* 210A, *Acinetobacter junii*, *Pseudomonas putida*, and *Tetrasphaera japonica*. These PAO candidates were characterized according to their oxidative metabolism, biological safety levels, growth requirements, temperature ranges, and published experimental evidence to date. *Acinetobacter johnsonii* 210A a facultative microbe, is noted as a model organism for polyphosphate metabolizing enzyme. *Acinetobacter junii* has been ranked in the top three among reported PAOs and noted for its high efficiency in cost and phosphorous removal.
Additionally, *Pseudomonas putida* has been observed in culture-based techniques exhibiting PAO capabilities and *Tetrasphaera japonica* has been cultured from EBPR plants reporting phosphorous removal. Ongoing laboratory research studies focus on identifying temperature classifications of known PAOs to understand their tolerances to different environmental conditions. By identifying prominent PAOs with high efficiency in phosphorous uptake, the development of sustainable ecological engineering treatment technologies (EETTs) can be used to monitor real-time phosphorus removal in water treatment systems.

UPR105

Temperature study and genome analysis of marine *Pseudoalteromonas* sp.

Opal E. Moore

Mentor: Field, Erin Kirby

Aluminum is a metal prized for its versatility. In the marine environment, aluminum is used in a variety of applications including ship building and oceanic equipment. However, constant seawater exposure corrodes aluminum and allows for biofouling, or the accumulation of organisms on the surface, which can damage the integrity of marine structures over time. To discourage this, man-made coatings are often applied, but serve as a source of environmental concern due to toxic chemical leach.
Marine *Pseudoalteromonas* sp., isolated from an aluminum coupon submerged in the Pamlico River, is an aluminum-coating bacteria that form uniquely protective biofilms which prevent degradation and excrete anti-biofouling compounds. This property

makes the bacteria a potential source for a natural aluminum-preserving coating. To determine the optimal conditions for growth, the *Pseudoalteromonas* sp. was measured over twenty-four hours using an optical density plate reader at temperatures representative of a variety of marine environments; 22_, 25_, 30_, and 35_. DNA was extracted and sequenced using fluorescence-based detection and PCR amplification to better understand the metabolism, anti-biofouling properties, and toxicity resistance unique to the isolate. The resulting DNA contigs were then analyzed into an annotated genome with Rapid Annotation using Subsystem Technology (RAST). When compared to isolates from the same source, the *Pseudoalteromonas* sp. displayed fewer iron-regulatory genes, more metal resistance genes, and a tendency to secrete androgen-binding proteins (ABPs). Being able to recognize the environments associated with *Pseudoalteromonas* sp., and understanding on a genomic level what sets it apart, we can begin to answer the questions posed for research in addition to facilitating methods for preserving and prolonging the existence of current and future marine structures in ways that are environmentally sound.

UPR106

Investigating the role microRNAs play in the root-knot nematode *Meloidogyne incognita's* viability, reproduction, and parasitism in cotton

Wesley Jennings Shepherd

Mentor: Pan, Xiaoping

Functions of four microRNAs (miRNAs), min-miR1, min-miR71, min-miR100a, and min-miR-124, were investigated in the parasitic nematode *M. incognita's* overall behavior and mortality. *M. incognita* is the most damaging root-knot nematode to the United States' agriculture industry, negatively impacting crop yield for the cotton plant. Much of the current fight against cotton parasites involves chemical pesticides often restricted for environmental concern. Discovering new, biotechnical ways to overcome parasitic infection in cotton plants is more effective in retaining agricultural revenue. I used the common model organism, *Caenorhabditis elegans* (*C. elegans*) in order to perform miRNA gene knockdown. MiRNA inhibitors and anti-miRNAs were designed and used to infect the worms at their second juvenile stage. Multiple concentrations of each inhibitor were chosen at the levels of 100nM, 200nM, 400nM, and 800nM with three biological replicates of each. I used a soaking procedure with an optimized transfection solution for the uptake of small miRNAs. Survival data from the treatments was collected, analyzed, and compared. Inhibition efficiency was tested using miRNA expression levels via Nanodrop and a routine PCR procedure. Gene expression levels were gathered from these procedures and compared amongst the control and each other. Survival data thus far has proven that inhibition of the miRNAs affects worms' survival in a dose-specific manner. Findings from gene expression experiments should

give way to the success of miRNA gene knockdown in these plant parasites. The results of this experiment can aid in the advancement of biotechnology to combat plant parasitic nematode infection. With these advances, survival of cotton plants should increase in the agricultural realm.

UPR107

Mitochondrial genome evolution suggests where the eukaryotic root connects to the tree of life

Ryan Leigh Griffin

Mentor: Stiller, John W

Evolution brought about three domains of organisms known as Archaea, Bacteria, and Eukarya. Eukaryotes are composed of complex cells defined by having their metabolic functions compartmentalized into internal structures know as organelles. Cellular metabolism is driven by one of these organelles, the mitochondrion, through its production of ATP, the chemical energy currency of cells. According to the endosymbiosis theory, it is thought that mitochondria evolved into an organelle through ingestion and integration of a bacterium. Mitochondria retain a genome with a small number of genes compared to their gene-rich bacterial ancestor. Research on the mechanism by which the mitochondrial endosymbiosis occurred leaves many questions unanswered, with implications for the origin and evolution of eukaryotes. In nearly all organisms studied to date, a viral RNA polymerase, encoded in the nuclear genome, carries out transcription of genes in the mitochondrial genome. On the other hand, one enigmatic group of single-celled protists stands out from this norm; they are called the jakobids. They instead retain a bacterial RNA polymerase from the free-living ancestor of mitochondria, which is still encoded in their mitochondrial genome. How this significant change occurred during mitochondrial evolution is difficult to evaluate, but it leaves open the possibility that jakobids are one of the first, or even the first, lineage of eukaryotic evolution after the mitochondrial endosymbiosis. Although one feature possessed by jakobids cannot pinpoint the root of the eukaryotic tree of life, its presence contradicts widely presumed roots from other research methods. As new scientific techniques and approaches have advanced and revolutionized genomics over the years, the first complete nuclear genome of a jakobid, *Andalucia godoyi*, was published. Analyses conducted on this jakobid nuclear genome suggest other primitive bacterial-like features present within the jakobid mitochondrial metabolome. My research assesses their distribution among other diverse eukaryotic groups, and in additional genomic resources now available for jakobids. The goal is to determine whether existing evidence supports jakobids as the earliest branching group of eukaryotes.

UPR108

Design and Application of an Immobilized Protein Kinase

Anna M. Schulz, Charles E. Booth

Mentor: Hughes, Robert Murray

Protein Kinase A (PKA) is a biologically important enzyme for cell regulation, often referred to as the Òcentral kinaseÓ. An immobilized PKA that retains native substrate specificity and activity would be a useful tool for laboratory scientists, as it would allow for targeted phosphorylation of various substrates while harnessing the benefits afforded by enzyme immobilization: namely ease of enzyme capture, repeated reuse, and increased enzyme stability in various temperature and pH conditions. In this research, we utilized a recombinant PKA fusion protein that incorporates the HaloTag covalent immobilization system to moderate enzyme immobilization. In addition, we investigated the importance of protein fusion order for optimal heterologous expression in E. coli. Furthermore, various applications of our immobilized PKA were demonstrated, including the phosphorylation of endogenous PKA substrates in a cell lysate. Overall, these results hold promise for a generalizable strategy for the production immobilized protein kinases and wide variety of applications that will be demonstrated through examinations of the reusability of the immobilized PKA under variable experimental conditions.

UPR109

AN ANALYSIS OF PUBLIC OPINION ON HUMAN TRAFFICKING LEGISLATION IN NORTH CAROLINA

Aimee Corinn Heroux

Mentor: Alexander, Patrice Elaine

Human trafficking presents an enormous issue for the United States and the state of North Carolina. Current estimates from sources such as NC Stop Human Trafficking and the Polaris Huma Trafficking Hotline estimate that the number of Americans currently being trafficked is approximately 16,650, with North Carolina consistently ranked in the top ten states for prevalence of human trafficking. According to the federal government's definition, human trafficking is the procurement of a person for sex work or labor through force, fraud, or coercion. Although efforts to stop human trafficking are evident in the Trafficking Victims Protection Act of 2000 and the North Carolina statutes, the current legal framework is inadequate, as evidenced by the number of individuals identified as being trafficked in the United States. Moreover, the lack of public knowledge surrounding human trafficking may inhibit efforts to pass further legislation to strengthen current laws. To gauge public opinion on human trafficking policies, a literature review of the human trafficking situation in the United

States and North Carolina was conducted. Then, policy recommendations from expert organizations were analyzed and the most commonly supported by expert groups were selected for study. A public opinion poll, using fixed-ended questions, was conducted to determine public support for the bills proposed by expert groups. The poll was disseminated virtually in the Greenville area via Facebook and Next-Door and the data was disaggregated. It was found that most of the proposed bills received strong support, with the most popular concerning education and awareness, however some bills remain controversial. These findings indicate that ongoing training and education initiatives concerning human trafficking would most likely receive public support and would result in stronger laws. However, the research also showed that the general public lacks an awareness as to the interdependent relationships between traffickers and legitimate industries which has led to a lack of support for legislation that includes targeted, industry-specific measures against human trafficking.

UPR110

Relationships among Cumulative Life Stress, Interoception, and Psychopathological Symptoms

Isabella Renee Benitez, Alia Simon

Mentor: Dolbier, Christyn

An individual's ability to sense internal signals from the body such as hunger cues, irregular heartbeat, or a full bladder is known as interoception. Interoceptive accuracy involves one's ability to accurately appraise their internal sensations and bodily signals. In contrast, interoceptive awareness encompasses interpretive attentional styles when receiving internal signals. With this in mind, stress exposure may influence one's ability to demonstrate adaptive interoceptive accuracy and interoceptive awareness. To date, research has yet to examine interoception as related to stress exposure and psychological disorders with somatic features. While some research has begun to speculate the influence of interoception, as related to the severity of psychological disorders, no research to date has explored interoception as a mediator accounting for the relationship between stress exposure and psychological disorders with somatic features.

Data collection will begin in the spring semester of 2023, with the administration of a two part online survey to 600 undergraduate students between the ages of 18 to 22, at a public Southeastern university. Participant data will be collected via Qualtrics and the Stress and Adversity Inventory (STRAIN) portal. This will be a cross-sectional design that assesses cumulative life stress as measured by the STRAIN, interoceptive accuracy and awareness as measured by self-report screeners (Multidimensional Assessment of Interoceptive Awareness, Interoceptive Accuracy Scale), along with a variety of

psychometrically sound screeners for common psychological disorders with somatic symptoms (i.e., panic disorder, eating disorders, post-traumatic stress disorder, somatic symptom disorder, major depressive disorder, social anxiety disorder).

Data has yet to be collected. However, it is hypothesized that interoceptive accuracy and awareness will be low among individuals who have experienced extensive cumulative life stress, and that interoception (i.e., interoceptive accuracy, interoceptive awareness) will account for the relationship between cumulative life stress and the severity/frequency of symptoms of psychological disorders with somatic features. Findings from this study could be used to inform future longitudinal studies, contributing to our understanding of temporal relationships among cumulative life stress, interoception, and psychological disorders with somatic features.

UPR111

How 17th Century German Law Affected the Witch Trial of Katherina Kepler

Regan Moore and Christina Dolan

Mentor: Zipf, Karin L

This ArcGIS project discusses the introspection of law from 17th-century Europe in the context of the German witch hunts. We have used the book The Astronomer and the Witch by Ulinka Rublack as a tool to examine the impacts of such laws at a case-study level. More specifically, we examine how 17th-century German Laws on witchcraft cases affected the trial of Katharina Kepler. The book is about Katharina's son, the famed astronomer Johannes Kepler, who defended his mother during her trial with his extensive knowledge of German law. Kepler proved his mother to be innocent after she was accused of witchcraft. Our project uses this story to bring a new perspective to the study of law by humanizing its effects on real people. We will briefly trace the legacy of these witch hunt era laws in the American system. This project also describes Katharina Kepler's journey; she was forced to flee her home to evade vigilantism while awaiting trial. We used ArcGIS maps to depict her journey across Germany.

UPR112

Aegean Frescoes and Their Correlating Myths

Shannon Shields Dugan

Mentor: Mazow, Laura B

The interpretation of frescoes at an archaeological site can provide significant information on the function of the room in which they're located, as well as provide insight into the past culture and its relation to other successive cultures. Through two case studies, Dr. Mazow and I compared written and visual expressions of Greek myths to scenes painted on the walls at two different Bronze Age Aegean sites. Based on our research we have found strong parallels between these frescoes and their depictions in later Greek myths. In the first example, we suggest the two women facing each other reflects the myth of the weaving contest between Athena and Arachne. For the second example, we suggest it depicts the story of Demeter and the descent of Persephone. Showing that these myths may have an earlier visual expression that predates their written record provides insight into how images were used in communication, a connection between Bronze age cultures and Classical Antiquity, and further enhances our identification of room and building function.

UPR113

School-Based Mental Health Services in Students with Autism Spectrum Disorder

Alicia Taylor Ringgold

Mentor: Golden, Jean Ann

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that is characterized by impaired social/communication skills, repetitive behaviors, and limited areas of interest (American Psychiatric Association, 2013). People with ASD are commonly diagnosed with mental health disorders as well, such as anxiety, depression, and ADHD. Despite the high rates of mental health disorders in this population, they lack adequate mental health resources and treatment options. School-based mental health services (SBMHS) are widely accepted as an efficient and effective way to deliver these services to students, but youth with ASD are continuously overlooked in these programs (Dickson et al., 2021). In order to better understand the disparities in delivering SBMHS to students with ASD, we have developed a survey for school personnel to assess their knowledge of and willingness to participate in training about mental health conditions and services in this population. The long term goal of the study is to provide training to teachers, administrators, and student support staff regarding the mental health needs of students with ASD.

UPR114

Public Opinion and Catholic Infrastructure's Impact on the Fluctuation of Dignity USA Chapters

Michelle Ann Voyles

Mentor: Kane, Melinda D

People who identify as both LGBTQ and Catholic have struggled with reconciling these identities as the larger Catholic church is anti-LGBTQ. There is little research on positive relationships between LGBTQ and Catholicism because most studies point out barriers between the two. This research will focus on a group that works to retain and bridge religious and sexual identities through social activism.

DignityUSA is an activist group that primarily works for change in the larger Catholic church regarding its stance on the LGBTQ community. Founded in 1969 in Los Angeles, California by Father Patrick X. Nirdof, DignityUSA was originally a ministry that offered support and acceptance to those who identify as both Catholic and LGBTQ. LGBTQ Catholics often had a hard time merging their conflicting identities, so this ministry aimed at reliving their guilt and offering a safe space for them to be who they are. While DignityUSA started as a single ministry offering refuge to local community members, its presence became known nationally and other chapters began to open with the same mission. DignityUSA's presence alone was an attempt at activism because it allowed people to not surrender their same-sex identities to be Catholic, which directly goes against Catholic beliefs, and nationally, various anointed priests, brothers, seminarians, and other leaders of the Catholic church were supportive of DignityUSA.

There has been a large fluctuation in the number of DignityUSA chapters, with the general trend being a sharp increase, hitting a maximum number of chapters, then a sharp decrease. This research serves to analyze the fluctuations in the number of DignityUSA chapters per state and the years 1973-2009. This will be done through qualitative analyses of several independent variables' impact on the number of DignityUSA chapters, including the number of social movement organizations, the number of Catholic Universities, the general religious and Catholic adherence, and the social and government ideology. By using multivariate analyses, I hope to identify correlations to help explain the fluctuation in chapters of this social movement organization.

UPR115

Nativity differences in cardiovascular disease outcomes among Blacks in US, National Health Interview Survey (2013-2017)

Madison Barnhill, Haley Tailor

Mentor: Cofie, Leslie E

Cardiovascular diseases (CVD) including stroke and coronary heart disease (CHD) are more prevalent among Blacks than Whites. Despite the heterogeneity of Blacks in the US, less is known about differences in their CVD outcomes. This study examined the association between nativity status and CVD among Blacks, and factors that may impact this relationship.

Methods
Data from the 2013-2017 National Health Interview Survey on Black adults, aged 18-65 years were used for this study (N=5,071). Differences in nativity status by sociodemographic and health access factors were examined using chi-square tests. Multivariate logistic regression analysis was used to examine whether nativity status was associated with stroke and CHD, adjusting for risk factors including hypertension, high cholesterol, and diabetes.

Results
Foreign- and US-born Blacks reported significant differences in CHD (1.96% vs. 5.29%) and stroke (1.62% vs. 4.03%), $p < 0.05$. The foreign-born were less likely to report CHD than US-born Blacks, after controlling for sociodemographic and health-related factors (aOR: 0.46 CI: 0.22-0.96). This relationship was mitigated after further adjusting for hypertension (aOR: 3.51 CI: 2.25-5.50), cholesterol (aOR: 2.67 CI: 1.97-3.63), and diabetes (aOR: 2.1 CI: 1.54-2.87). Similarly, although foreign birth was associated with stroke (aOR: 0.40 CI: 0.16-0.98), this relationship was attenuated after adjusting for hypertension (aOR: 6.25 CI: 3.64-10.71), cholesterol (aOR: 1.61 CI: 1.15-2.27) and diabetes.

Conclusion
Public health intervention strategies to prevent CVD risk factors among foreign-born

Blacks are critical for reducing the CVD outcomes among foreign-born Blacks. Also, more robust sample size is needed to further explore acculturation factors.

UPR116

Juvenile Court Outcomes across Race/Ethnicity

Taylor C Kibble

Mentor: Bryson, Sara

Prior research in juvenile court research examines how decision-making at final disposition is impacted by legal and extralegal factors. Despite past work, less research investigates how extralegal factors influence the likelihood of receiving a more rehabilitative disposition versus a more punitive outcome. Using all adjudicated juvenile complaint data from one eastern state in 2018, this study examines the impact of extralegal factors, with an emphasis on race/ethnicity, on the type of disposition juveniles receive. Results suggest disparities in punitive versus rehabilitation-driven outcomes. Implications for policy and practice within the juvenile justice system will be discussed.

UPR117

Effect of H-10 on Flexural Strength of Methacrylate-based Adhesive

Sarah Gillespie[1], Joesph Hampton[1], Saulo Geraldeli[2]

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Mentor: Geraldeli, Saulo

Objective: The purpose was to test the hypothesis that adding antibiofouling 2-aminoimidazole (H-10) small molecules into universal dental adhesives will maintain their flexural strength.

Method: Two commercially available dental adhesives, Clearfil Universal Bond Quick (CUBQ) and Ambor APS (Amb), were selected to receive or not a subset of 2-AI small molecule family. One part H-10 (10 mM) that had been dissolved in dimethyl sulfoxide (DMSO) was mixed with ten parts of each adhesive to get a 1mM concentration of H10 in the adhesives. Bars for control (no H10) and experimental (with H10) were prepared by pouring the adhesive material into hydrogel mold (2 mm x 2 mm x 20 mm), covered with mylar matrix, and polymerized with 16 J/cm^2 of radiant exposure using an LED light curing unit. Each adhesive bar-shaped specimen was kept at room temperature for 24h before testing. Samples were tested for three-point bending flexural strength (FS) using a mechanical testing machine (ODEME 150) at a crosshead speed of 0.5 mm/min. The maximum load at fracture point was recorded and the σ_f calculated using the following equation: $\sigma_f = 3FL/(2bh^2)$. Two-way ANOVA and Tukey test (a=0.05) were used to analyze the data.

Results: FS mean values were CUBQ: 9 MPa, CUBQ-H10: 8.5 MPa, Amb: 35 MPa, Amb: 25 MPa. There was no difference in FS between CUBQ and CUBQ-H10. However, there was a significant difference between Amb and Amb-H10 dental adhesives.

Conclusion: The addition of a subset of the 2-AI small molecule family, H-10, to dental adhesive is material specific.

UPR118

Immune Checkpoint Inhibitors-Induced Colitis is Mitigated in GPR4 Knockout Mice via TNF-α Downregulation

Luke W. Boldt**,** Mona A. Marie, Ashely J. Williams

Mentor: Yang, Li

Immunotherapy medications have become very prevalent in the field of oncology as an effective treatment against many forms of cancer. Sometimes patients who begin immunotherapy develop inflammatory side effects such as colitis forcing them to pause treatment temporarily or indefinitely. The occurrence of inflammation has been shown to be linked to pH-sensing G-protein coupled receptors including GPR4 which acts as a pro-inflammatory receptor largely expressed in endothelial cells and blood vessel rich tissues. Inflammatory cytokine TNF-a is commonly upregulated in inflamed issues which contain GPR4 receptors.

It was hypothesized GPR4 upregulates inflammatory cytokine TNF-a in inflamed tissues and the implementation of an immune checkpoint inhibitor increases the occurrence of colitis. Our results confirm our hypothesis and show in the absence of GPR4 the severity of colitis was significantly reduced as well as the levels of TNF-a expression. Furthermore, an increase in the severity of colitis in the immunotherapy treated mice associated was noted with an increase in TNF-a expression. A GPR4 antagonist could be developed as a possible approach to lessen the severity of colitis.

UPR119

Altered Hypothalamic Transcriptome in a Mouse Model of Multiple Sclerosis

Kristy M. Lau, Jonathon C. Carver

Mentor: Didonna, Alessandro

Multiple Sclerosis (MS) is an autoimmune disease of the central nervous system (CNS) that is the first cause of disability among young adults. In addition to presence of inflammatory white matter lesions and neurological symptoms, MS patients are also more likely to report mood and energy disturbances including anxiety, depression, chronic fatigue, and weight loss. The hypothalamus is a critical integration and regulation center of neuroendocrine signaling and plays a central role in regulating mood, stress, and energy balance. Experimental autoimmune encephalomyelitis (EAE) is an animal disease that recapitulates several features of MS and represents the election model to explore MS pathogenic mechanisms *in vivo*. Few studies have directly examined the impacts of autoimmune disease on hypothalamic function. To fill this gap, here we investigated the impact of the myelin oligodendrocyte glycoprotein 35-55 (MOG35-55)/C57Bl6 EAE paradigm on the hypothalamus transcriptome. RNA-seq technology was employed to capture the gene expression profiles of hypothalamic tissues dissected from EAE-immunized female mice and mock-injected controls at key disease stages, namely the pre-symptomatic phase (10 days post-injection, dpi), disease peak (20 dpi) and the chronic phase (40 dpi). Notably, differential expression analysis identified statistically significant changes already at 10dpi, providing support to the notion that altered CNS functions precede clinical symptoms. Gene ontology (GO) enrichment highlighted persistent inflammatory signatures at all timepoints, even though the hypothalamus is typically spared from lesions. Among the differentially expressed genes, orexigenic neuropeptide (*Agrp)* was initially downregulated pre-onset, but then significantly upregulated during the acute phase when EAE mice experience severe weight loss. During the acute phase of the disease, there was also significant reduction in *Pomc* which encodes a peptide precursor for several relevant hormones including α-Melanocyte Stimulating Hormone and Adrenocorticotropic hormone. Further, we found upregulation of several genes involved in glucocorticoid response including clinically relevant *Fkbp5* which has been linked to depression in human

patients. Our results show that hypothalamic function is perturbed in response to an encephalitogenic challenge and offer mechanistic clues to the neuroendocrine disruption underlying mood and energy symptoms in the context of autoimmune demyelination.

UPR120

HIIT Training and preservation on muscle and mitochondrial function in mice

Hayden Gary Carter

Mentor: Graber, Theodore G

As individuals age, their physical functioning declines and they have an increased risk to chronic disease, such as diabetes. Sarcopenia is the age-related loss of muscle mass and strength which leads to the development of frailty. Exercise has been shown to reduce the risk of chronic health diseases and is a validated therapy to preserve physical function. In our lab resistance training among rodents has shown to increase muscle hypertrophy or strength, while endurance training has shown improvements in cardiovascular function. These findings have been tested using squat mimic devices, weighted backpacks, and various forms of resistance and endurance training. High intensity interval training (HIIT) is a form of training that produces similar or superior results when compared to moderate-intensity endurance training. In our preliminary work we found that with the use of HIIT workouts, older mice preserved their physical performance and had a 19.5% decrease in body fat compared to the control group (Graber et al., 2019). It has also been seen that exercise power production increased by 39% at 80% maximum isometric contractile force and 47% at 90% maximum isometric contractile force (Graber et al., 2019). By doing this research, our results can be used to create a plan of action for human studies to show how HIIT workouts can be used to help preserve physical functioning.

UPR121

Student Assessment of $PM_{2.5}$ Concentration at ECU Transit Bus Stops Using a Low-Cost Aerosol Monitor

Will Murray

Mentor: Sousan, Sinan, Balanay, Jo Anne G.

Particulate matter 2.5 μm and smaller ($PM_{2.5}$ or fine particles) in high concentrations is known to cause respiratory issues, including irritation of the airways, sneezing, coughing, and difficulty breathing. Due to incredibly small particle size, airborne $PM_{2.5}$ travels deeper into the lungs through inhalation than other larger particles. Long-

term exposure to this fine particulate matter can have a much more severe effect on individuals with pre-existing conditions such as asthma, chronic obstructive pulmonary disorder (COPD), and heart disease, potentially causing a worsening of the condition, hospitalization, and even death. A primary source of $PM_{2.5}$ is the exhaust and emissions from cars, trucks, and buses. The Environmental Protection Agency (EPA) has in place a daily $PM_{2.5}$ standard of 35 $\mu g/m^3$. College students are not typically regarded as a population that experiences significant $PM_{2.5}$ exposure, but emissions from East Carolina University's transit bus system likely create zones of high $PM_{2.5}$ concentration at ECU bus stops. To carry out the research study, 3 to 7 students who regularly use the ECU Transit system will be selected to use a low-cost personal aerosol monitor each time they arrive at a campus bus stop. These small, lightweight sensors will measure airborne $PM_{2.5}$ concentration in the student's personal breathing zone. Selected students will repeat this procedure each time they are at an ECU Transit-served bus stop over the course of four weeks. $PM_{2..5}$ concentration data will be retrieved remotely from the aerosol monitors on a daily basis and compared with average EPA measurements for Pitt County, as well as with measurements from a reference instrument, the ADR-1500, located in Greenville. This methodology will allow for the identification of higher-than-average concentration zones at ECU Transit bus stops compared to average measurements for Pitt County. By increasing access to microenvironmental data, this project will contribute to public health efforts of protection and prevention by allowing individuals to measure and understand their exposure to $PM_{2.5}$ at the bus stop. Commuters, especially those with pre-existing conditions who use public transportation, can make more informed health decisions and better protect themselves against new or worsening respiratory conditions.

UPR122

Centaurinα1-Bid Signaling in Alzheimer's Disease Progression

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Mentor: Szatmari, Erzsebet Maria

The brain-specific Ras-anchoring protein, ADAP-1/Centaurinα1 (CentA1) is required for Aβ42-induced neuronal dysfunction. In the hAPP-J20 mouse model of Alzheimer's disease (AD), lack of CentA1 reduces amyloid deposition, neuroinflammation and prevents synaptic dysfunction. We used transcriptome profiling to elucidate the mediators of this effect. In forebrain samples of wild type (WT), hAPP-J20 and hAPP-J20 x CentA1 KO mice, we identified several neurodegeneration-related and differentially expressed genes (DEGs) between genotypes. The pro-apoptotic factor Bid

(BH3-**i**nteracting domain death agonist) was one of the DEGs with the highest increase in the hAPP-J20 and rescued in hAPP-J20 x CentA1 KO brains. As a member of the Bcl-2-family, Bid promotes death receptor-mediated apoptosis in neurons. Therefore, the goal of this study was to validate the Nanostring transcriptome data at individual gene level using qPCR and at protein and subcellular compartment level, using western blotting of mitochondrial fractions.

METHODS:

Three different groups of mice were tested: WT, hAPP-J20, and hAPP-J20 x CentA1 KO. Nanostring *transcriptome profiling for* gene expression analysis; *qPCR* for individual gene analysis; *Mitochondrial isolation* to extract mitochondrial proteins from mouse forebrain samples, and *Western blotting* to evaluate Bid level and translocation between cytosol and mitochondrial compartment.

RESULTS AND CONCLUSIONS:

We compared the expression of 880 genes across NanoString's mouse Neuropathology and Neuroinflammation gene expression panels in matched forebrain samples from WT, hAPP-J20, and hAPP-J20 x CentA1 KO mice (n=5 mice/genotype; age 6-8 months). Neurodegeneration-related genes upregulated in hAPP-J20 and rescued in hAPP-J20 x CentA1 KO mice included: Bid, Rab3c, Nf1, Stx1a, Mmp16, Grin2a and Grin2b, Adam10, Gsk3b and Epha6. Among the pro-survival genes downregulated in hAPP-J20 and rescued in hAPP-J20 x CentA1 KO mice were: Lpar1, Gpr4, Nts and Bcl2l1. The role of Bid as a DEG was validated by qPCR performed on RNA isolated from corresponding frozen brain tissue. Our results indicate significant increase in Bid gene expression in hAPP-J20 mice vs. WT and hAPP-J20 x CentA1 KO mice. Next, we will evaluate the level of Bid protein in cytosol (inactive form) and in mitochondrial fractions (active/cleaved Bid). In conclusion, our data suggest involvement of Bid in AD-like phenotype in hAPP-J20 mice, which can be rescued by lack of CentA1.

UPR123

Effect of Drop Jumping and Knee Valgus on Femoral Cartilage Thickness

Matthew G. Blount (presenting author), Starrett Vesper, Lily Szwejbka

Mentor: Kulas, Anthony

Background: The incidence of anterior cruciate ligament (ACL) ruptures is 30-78 per 100,000 people a year. While the main treatment for an ACL rupture is surgery, only 61-89% of athletes return to sports after surgery. Females are at a 3-5X higher risk for ACL

injuries than males. In a prospective study, knee abduction angle, also known as valgus angle, of women who later suffered an ACL injury was ~8° greater vs women who did not tear their ACLs. When landing with high knee valgus angles, it is theorized that the knee joint compresses the lateral femoral cartilage more vs. the medial femoral cartilage. Due to this unequal distribution of compression across the knee joint, the lateral femoral cartilage is hypothesized to be thinner compared to the medial femoral cartilage after experiencing jumping and landing loads experienced in sports.

Purpose: The purpose is to investigate the effect of frontal plane landing technique on femoral cartilage thickness (FCT) in healthy, recreationally active females performing drop jumping activities.

Methods: After completing the informed consent process, all subjects will have both knees imaged using ultrasound and will then perform two series of drop jumping activities. Ultrasound images will be taken before and after each drop jump series. Knee FCT will be measured in Horos software. Based on recorded videos, subjects will be placed into one of two groups based on whether they naturally landed in knee valgus vs those who did not.

Results: This is an ongoing research project and results will be reported during research and creative achievement week.

Significance: If the results show that females landing with more knee valgus experience greater lateral FC changes in thickness after the drop jumping tasks, this will support the need for future research investigating 1) whether or not landing technique is indeed a risk factor for FC injury and 2) whether changing landing technique to reduce knee valgus would result in relatively more equal cartilage deformations comparing medial vs lateral FC.

UPR124

Investigating Mechanisms of Synapse Formation in Developing Neural Circuits of a Human Brain Model

Daisy Perez, Gaelle Desert, Michelle Cobb

Mentor: Litwa, Karen Ann

In the developing brain, synapses are among the most important structures involved in neuronal connections and communication. As the building blocks of cognitive function, synapses play a large role in various brain activities including learning, memory, and problem-solving. However, the specific molecular mechanisms behind synapse formation during brain development are unknown. To investigate the factors responsible for altering synapse formation, we are strongly interested in their relation to neurodevelopmental disorders, specifically autism spectrum disorder. Using human cortical spheroids (hSCs) made from human induced pluripotent stem cells (hiPSCs), we can study the complexities of synapse development and mechanisms responsible for altered synapse formation in neurodevelopmental disorders. Critical to the mediation of synapse formation are dendritic filopodia. The molecular composition of these long, thin structures found in developing dendrites will be examined in association with synapse formation. Prenatal synaptic alterations have been found to be a consequence of autism-related genetic mutations. Based on this finding, we will investigate if autism-derived brain organoids exhibit differences in dendritic spine densities in comparison to those found in neurotypical individuals. Further, we will examine whether the presence of the adhesion molecule, N-cadherin (N-cad), in spine precursors corresponds with increased synapse formation. N-cadherin is a major cadherin subtype of the brain that is enhanced at excitatory synapses. It serves as a mediator of synaptic plasticity, neural network formation, and synaptogenesis. We hypothesize that N-cad will stimulate synaptic formation and that the presence of increased N-Cad-positive filopodia will aberrantly increase synapse formation in autism spectrum disorders.

This study will elucidate fundamental molecular mechanisms of synapse formation in the developing human brain and how alterations drive the emergence of neurodevelopmental disorders, such as autism.

UPR125

Sensorimotor and Visuomotor Characteristics of Baseball Pitching Performance

Samantha Morgan, Carolyn Baylee Haynes, Taylor Kinney, Baylor Fish, Jeremy Praski

Mentor: Murray, Nicholas P

Introduction: In today's game of baseball, pitching velocity is increasing, in effect this success is leading to a decline of balls in play. Sensorimotor and visuomotor components must be evaluated in a batting simulation to understand the role reaction time, response selection, and response execution play in batting performance. Live-batting requires a higher level of sensorimotor coordination to produce an accurate

high-speed full body movement. Batters no longer have time to accurately track the ball trajectory from ball release, but must analyze pitcher kinematics of movement initiation and make precise saccades. This study takes a biomechanical approach to analyze the kinetic chain principle and ground reaction forces to lead to greater exit velocity for batters.

Objective: To investigate the effects of ball occlusion on pitch identification accuracy and swing kinematics as well as visual motor components related to fixation duration and location at ball-release.

Methods: Local baseball players will be recruited from high school varsity teams, club teams, and a division two varsity level team associated with the National Junior College Athletic Association (NJCAA). Data collection will occur at Next Level Training Center in Greenville, NC. Participants will complete 40 total swings against a Junior Hack Attack Pitching Machine, with 20 swings performed in a pre-pitch occlusion condition and the other 20 swings without the occlusion condition. Qualisys Oqus motion capture data will be analyzed to gather kinematic variables such as rotational velocity, joint angles and temporal characteristics. A Blast Motion bat sensor will be used each swing to measure bat kinematic variables including bat velocity, vertical bat velocity, and attack angle. The HitTrax system will measure exit velocity, launch angle, spray angle, point of contact and pitch speed for each batted-ball. Each swing will identify the beginning load phase and lead foot contact analyzed by the novelÓ Loadsols. Areas of interest for fixation location and duration will be analyzed at movement initiation and ball release of each pitch using Tobii Pro 3 glasses, MATLAB code, and iMotions.

Anticipated Results: We hypothesize decreased final fixation accuracy, increased variation of swing phase durations, and decreased total trunk-axial displacement will result from occlusion of the ball. Additionally, we hypothesize that increased exit velocities will correlate to increased fixation accuracy.

UPR126

The Hidden Role of Dopamine Receptors 1 and 3 in Cardiac Fibrosis

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Introduction: Dopamine receptors (DR) are a class of G-protein coupled receptors that work with the well-known neurotransmitter dopamine (DA) to regulate movement, emotions & the reward system. These receptors are prominent and well-studied in the central nervous system (CNS), but only in recent years have the effects of DRs in peripheral tissues come into light. Formerly, the presence of DRs outside of the CNS, especially in cardiac tissue, was heavily debated. We were able to confirm the presence of all five dopamine receptor subtypes in rat and mouse models at both tissue and cellular levels, as well as in human cardiac fibroblasts (HCFbs). This study is particularly interested in how DRs and signaling may affect cardiac tissue structure through influence on the cardiac fibroblast, which is the cell type primarily contributing to the extracellular matrix (ECM) remodeling. We are interested in how these receptors, specifically dopamine receptor 1 (D1R) and 3 (D3R), affect the gene and protein expression of collagen type 1, collagen type 3, Angiotensin II (Ang II), transforming growth factor beta-1 (TGF β-1), alpha smooth muscle actin (αSMA), and whether or not they affect expression of one another.

Methods: HCFbs were cultured in T75 flasks in DMEM F-12 and regularly washed with DPBS until 80% confluent. The cells were moved to well plates and treated with D1R and D3R agonists and antagonists. Those treatment groups were then used to extract RNA to use for Real Time Quantitative PCR and protein for Western Blot Analysis.

Results: Our lab has previously demonstrated that the loss of D3R causes development of fibrosis through influence on collagen type 1 and 3, TGF β-1, Ang II, and through crosstalk with D1R in mouse models. Here we demonstrate similar results in the HCFb model, where the pharmacological inhibition of D3R leads to an imbalance in collagen types and the upregulation of D1R and profibrotic markers, which suggests that D3R is important in maintaining healthy cardiac tissue.

Future Directions: These experiments will give us an understanding of the role of dopamine receptors in mediating the expression of profibrotic markers in the heart, and insight on if fibrosis can be mitigated or imitated by pharmacological stimulation of dopamine receptors in the cardiac tissue.

UPR127

Hyde County Dental Project: Providing Oral Healthcare in a Health Professional Shortage Area

Wrenn McCrae Whitfield

Mentor: Tempel, Thomas R

Hyde County is the second smallest county in North Carolina (NC) with a total population of 4,589 residents according to the 2020 census . Currently, there are no practicing dentists within county limits, and many of the private practices in surrounding counties do not accept Medicaid/Medicare benefits and/or are not accepting new patients. Therefore, the East Carolina University School of Dental Medicine has created the Hyde County Dental Project to provide Hyde County residents with access to oral healthcare. By addressing the community's barriers to dental care, the project is meant to improve residents' oral and systemic health.

UPR128

Bringing Diversity to the ECU Honors College

Kyia Lanae Riddick

Mahogany Roper

Fosua Dadson

Mentor: Hargrove, Jarvis Lamar

The Honors College Diversity Academic Day is an idea proposed as a possible solution to the lack of minority students in East Carolina University's Honors College. The goal of this project is to meet high school students from minority demographics to discuss the opportunities and experiences that would await them at East Carolina University by hosting an academic day. Based on the information gathered thus far, a percentage of minority students in the Honors college is estimated to be around six percent. However, the purpose of this project is to reassure high school students who are in the minority population that the honors college would be a safe and rewarding experience if they choose this university. Finally, this project would encompass a mentorship program for incoming minority freshman after the completion of the academic day, as a way to guide the students throughout their college experience.

UPR129

Impact of the HNRS 2000/3000 Course Sequence

Taylor Katherine Lee

Allison Nicole Werner

Nia Gilmore

Mentor: Das, Bhibha Mayee

Many students within the Honors College do not immediately realize the true impact of the mandatory HNRS 2000 and 3000 course sequence on their personal and professional development. For this reason, it is imperative that we identify what common themes are prevalent amongst student reflections to ensure that these courses generate a positive impact on the student population.

PURPOSE: The aim of this study was to analyze first-year student reflections to determine the impact the HNRS 2000/3000 sequence had on Honors College students' personal and professional development.

METHODS: Student reflections (N = 132) from the Spring 2021 HNRS 3000 course were analyzed via content analysis for overarching themes. Three undergraduate research assistants along with the faculty mentored individually developed themes. The research team condensed these themes into four overall themes.

RESULTS: The final four themes centered around course expectations, mental health, shifts in perspective, and team dynamics.

CONCLUSION: The students' opinions on course expectations, their mental health, having a shift in perspective, and team dynamics were analyzed as the main areas to clarify or focus on to improve the impact of the HNRS 2000/3000 course sequence. For more explicit results, this study should continue over time to evaluate the changes made to the course and how those changes impact the perspective of the students taking the course sequence at the time.

UPR130

Portfolio of informative materials for prospective East Carolina University students seeking accommodations from Disability Support Services

Aurora Shafer

Mentor: McMillan, Amy

This project aims to address the lack of knowledge disabled high school students have about disability-related support at East Carolina University. In the United States, there is a large difference in what disability accommodations and support look like when comparing kindergarten through twelfth grade and higher education. This difference occurs due to a discrepancy in federal laws which dictate what the school is legally required to provide to disabled students. Disabled high school students are often not aware of this legal change and as a result frequently enter college with the misconception that their disability-related support will remain the same. Additionally,

the vagueness of disability legislation that applies to higher education institutions results in a lack of standardization in disability support services across the United States as each institution interprets the legislation differently. To address this lack knowledge, I designed, produced, and distributed a portfolio of informative materials containing information demonstrating the differences between kindergarten through twelfth grade and higher education disability-related support. The information contained in the materials was compiled from research papers, East Carolina University Disability Support Services, and interviews with disability support services offices at several other higher education institutions. The materials included a flier, PowerPoint presentation, and video. Finally, I distributed the portfolio to high schools known to have a large percentage of graduates that attend East Carolina University.

UPR131

African American English (AAE) Usage and Its Impact on African American Children in an Academic Setting

Kira Mariah Stith

Mentor: Holt, Yolanda Feimster

This research reports on student perceptions on the use of African American English in the academic setting. African American English is a dialect used by Black people; more specifically, a dialectal variation of English. Previous research by Craig and Washington indicates a negative relationship between the use of AAE and academic performance. It has been observed that children who use a high proportion of AAE speech forms in their speech, also defined as dialect density measures (DDM) demonstrated lower performance on standardized tests of language and literacy (Craig & Washington, 2004). Following a limited literature review, the purpose of this study was to survey college student perceptions of AAE use in their own language practices and compare their perceptions of AAE use with their current practice of AAE use. Eight informal interviews were conducted with current ECU student. Four students who self-identified as African American (AA) and four who identified as not African American (NAA). Results will be discussed with respect to previous research findings and the student's opinions.

UPR132

The evolution of my identity as a literacy educator througout my English Language Arts methods course

Molly Ryanne Baile

Mentor: Gregory, Kristen Howell

The focus of this research was to discover how my perceptions, beliefs, and practices within early literacy development would evolve throughout my English Language Arts (ELA) Methods course. The project began after taking a course about kindergarten through second-grade literacy, where I began to question my capability and desire of being a literacy educator, particularly for younger grade levels. This apprehension led to a drive to discover if literacy education was still what I wanted to pursue. I conducted a self-study with critical friendship over the course of five months. I investigated the following research question: How do my perceptions, beliefs, and practices within early literacy development change throughout my English Language Arts Methods course? Multiple sources of data were collected, including coursework from the ELA Methods course, weekly journal entries, and recorded conversations with a critical friend. I analyzed these data using open and axial coding.
I triangulated the data sources, had another researcher review and confirm my coding, and engaged in researcher reflexivity. These
strategies enhanced trustworthiness. Several themes emerged from the data specific to how my identity as a literacy educator evolved. Because of the nature of this project, I was able to dive deeper on my own and with a critical friend into a more meaningful understanding of my personal beliefs and values in regard to classroom literacy instruction and my role as a literacy educator.

UPR133

How do Children Respond to Fairytales?

Mallory Blair Smith

Mentor: Wrenn, Melissa Joy

Critical literacy theory says that students can make connections between a text and the meaning of its words, connecting it to societal ideas around them. Critical literacy in the classroom has often been tied back to various texts, including fairytales. When most think of critical literacy, the common idea is that it is used in an upper elementary classroom and the grades following. These various articles provide lots of insight into the minds of students in relation to critical topics, however, one age group has not been given much of an opportunity to participate in these discussions. This paper applies critical literacy to this age group; preschoolers. Through four fairytale lessons, students engaged in critical discourse with questions preplanned and facilitated by the teacher. This study aims to show that even young students can think critically about topics if they are challenged and provided with questions that push them to think about a topic.

UPR134

Investigating Co-planning and Co-teaching in Higher Education Statistic

Emma Rebekah White

Mentor: Grady, Maureen M

Studies have shown that students entering mathematics programs and mathematics education struggle with statistics. My honors project prioritized finding ways to increase the statistical knowledge of East Carolina University college students, learning how to locate and evaluate resources for teaching statistics, and developing a co-planning and co-teaching relationship with Dr.Grady. Throughout this project, we collaborated to resolve the statistical gaps of the math education majors in our course, increase teacher identity in the math education majors, and improve the introductory statistics course for all math majors. We approached these goals by working together through co-planning and co-teaching. Combining the efforts and perspectives of an experienced professor and an undergraduate student provided this project with a unique approach and an effective outcome.

UPR135

PBIS through an International Lens

Calli Jon Massengill

Mentor: Owens, Tosha Lynn

The purpose of this study is to understand the lack of behavioral support in schools in the Czech Republic and design a Positive Behavioral Intervention and Support (PBIS) framework that best fits their needs, with contextual fit in mind. Although there is strong evidence for the effectiveness of PBIS in the United States, research on the effectiveness of PBIS in other countries, particularly the Czech Republic, is limited. PBIS is so successful in the United States because of its contextual fit (OSEP National Technical Assistance Center on PBIS, 2018). PBIS consists of three tiers within the framework: Tier One, which is for all students, Tier Two, which includes targeted practices for students who need support past Tier One, and Tier Three, which provides intensive and individualized practices for students who need support beyond Tiers One and Two (Center on PBIS, 2023).

PBIS can be adapted to fit a school and their unique context. Designing a PBIS framework for the Czech Republic needs significant input from all parties involved to

fully understand their needs. In this study, three surveys were distributed: one for staff, one for administration, and one for parents/guardians, all at primary schools in Prague who were currently in the beginning stages of implementation of PBIS. The purpose of the surveys was to gain a better understanding of where they currently are in the implementation process, along with what challenges they are facing. The findings from these surveys will help us to design a PBIS framework that best fits the needs of Czech schools, helping them to maintain and expand PBIS across the Czech Republic.

UPR136

A Survey of Perceptions of Cheating on Exams by Undergraduate Students

Jeremy Pope Dawson

Mentor: O'Reilly, Dennis M

Academic dishonesty is a behavior that every college wants to minimize in order to maintain the value of its degree. I surveyed a large business class to gain an understanding of the current state of academic dishonesty at East Carolina University. I specifically looked at cheating on exams, both in class and online. Eighty-four students completed the survey. Students were asked about their own history of cheating as well as their perception of the extent of cheating by others at ECU. My results suggest that the most common method of cheating is by discussing with another student the content of the test prior to taking the test. Students were also asked about their experience with the use of Lockdown Browsers during online exams. Respondents had mixed opinions on whether Lockdown Browsers are effective at reducing cheating.

UPR137

Recycled and Manufactured Adsorptive Materials to Reduce Phosphorous Concentrations in Wastewater Loads

Deja Alexis Drummond

Mentor: Bell, Natasha Lynn

Elevated concentrations of phosphorous (P) and other nutrients common in wastewater treatment plant (WWTP) effluent have been shown to contribute to the proliferation of harmful algal blooms (HABs) which commonly lead to fish kills related to aquatic hypoxia. Increased understanding of the negative effects associated with elevated P concentrations have prompted more strict regulation of WWTP effluents in recent years. The use of low-cost and potentially regenerative phosphate sorption filters has the potential to sequester P from water and decrease phosphorous concentrations in WWTP effluent released to natural waters. The course of this ongoing research focuses on the

ability of expanded slate, recycled concrete, expanded clay, and gravel to adsorb phosphorous. The materials were first used in a flow-through study to understand how much phosphorus they could remove under representative field conditions. Then, these same materials were exposed to varying phosphorous concentrations in a batch study to determine their phosphate sorption capacity. Desorption capacity of these same materials will also be investigated to determine the potential for beneficial reuse of phosphorus as a plant fertilizer. Results from the flow-through study indicated that the materials with higher effluent pH were associated with the highest phosphate sorption In the flow-through study, concrete removed 98% of PO_4-P and expanded clay removed 79% of PO_4-P. Out of the five materials tested previously, concrete and expanded clay had the highest phosphate sorption capacities in the batch study. The maximum sorption capacity for concrete was 15.65 mg P g^{-1} while expanded clay had a maximum sorption capacity of 4.60 mg P g^{-1}. By comparing data from the previous batch experiment and lab-scale flow-through experiment, a better understanding of sorption and desorption capacities of each material can be understood and further studied to determine their feasibility as a substrate for plant growth.

UPR138

Investigating the impact of flow rate on the structural and mechanical properties of clots formed under flow

Hannah Kristen Sowers

Mentor: Vadati, Alex, Hudson, Nathan

Blood clots are vital to our survival, created by the body to halt life-threatening bleeding. Unfortunately, while blood clotting is usually a life-saving mechanism, it can also become a life-endangering problem. Blood clots that are structurally weaker are more likely to break off and embolize. This embolus can travel through the body and cause numerous dangerous conditions, including deep vein thrombosis, organ death, strokes, and heart attacks. Understanding which clots are weaker, based on the conditions under which they are formed, could allow for predictions of which clots might embolize. This type of analysis could enable both prevention and treatment.

Methods
Fibrin clots were created by mixing wild-type and ALEXA-488 labeled fibrinogen and thrombin to form fibrin, the structural component of blood clots. A pump was used to add the components to a microfluidic channel causing them to mix under flow. These channels were created by adhering PDMS onto a glass slide using heat. The channels had a notch to create turbulent flow and stimulate clot formation. The resulting clots were imaged using a Leica DMI 8 epifluorescent microscope.

Results
The fibrin structure of clots was found to change depending on the flow conditions under which it was formed. Clots were formed in straight channels with laminar flow and channels that had notches cut into the sides, creating a more turbulent flow. Clots formed in a straight channel demonstrated aligned fibers contrasting clots formed in turbulent flow with unaligned fibers.

Conclusions
Results showed that clots created in laminar flow had aligned fibers, while clots formed in turbulent flow had unaligned fibers. This phase of the project successfully provided the preliminary results for the next phase of this project: characterizing the mechanical properties of blood clots using nanoindentation testing. The project's next phase will consist of mechanically testing them by an Optics 11 Piuma Nanoindenter to measure individual clot strength as a function of flow rate.

UPR139

Evaluation of Hydraulic Spread Calculations for NC Bridges

Preston Lewis Skinner

Mentor: Akhnoukh, Amin Kamal

Hydraulic spread calculations dictate the number and spacing of bridge deck drains and closed drainage system locations. Closed drainage systems require routine maintenance to function properly, but typically maintenance is not performed until the drainage system has failed, and problems become apparent.

Current procedures for calculating hydraulic spread result in a closely spaced bridge deck drains which present a construction challenge and require regular maintenance during the life span of the bridge. Current drainage system adopted by North Carolina Department of Transportation routinely fails and is difficult to maintain. The main objective of this research is to update NCDOT's guidelines for bridge deck drainage system design and investigate potential alternative drainage systems to be used by NCDOT in future bridge construction projects. The afore-mentioned objectives are attained through conducting extensive literature search, surveying hydraulic calculation procedures and drainage construction practices conducted by the Federal Highway Administration and Different State DOTs. The outcomes of this research will provide NCDOT personnel with recommended procedures to optimize the bridge drainage systems and avoid maintenance problems during bridges life span.

UPR140

Furcation Involvement Detection in Dental X-Ray imaging using Machine Learning

Jordan Welborn

Mentor: Herndon, Nic

A furcation involvement pertains to the phenomenon that bone loss occurs in teeth at the branching point of the tooth. This is typically caused by a bacterial infection and usually occurs from periodontal disease. During furcation involvement, the tooth condition can lead to the loss of the affected tooth. If left untreated the tooth can become loose and eventually fall out. Treating it early can help prevent any further damage to the tooth and improve the chances of saving it. Furcation involvement is currently detected manually with X-ray imaging and examination of the tooth by a dentist or dental hygienist. The examination inspects for any signs of inflammation or receding gums. These X-ray images can provide details on changes in bone density and structure of the tooth. There are some limitations to this method. The challenge in detecting it, however, is the usage of low-resolution X-ray images which make it hard to distinguish between tissue and bone. Another challenge in furcation involvement is that there are so many variations in size and shape. It may take quite some time for the dentist or dental hygienist to evaluate an appropriate diagnosis for the patient. However, there could be a better way with the use of machine learning and using a CNN model. We can predict the probability of a given X-ray image that has furcation involvement. For this project, we are going to train a model to distinguish between furcation involvement and normal tooth health using X-ray images. Firstly, we will need to prepare the datasets, normalize them, and split them. After training, we will evaluate our model, and see if it could be improved. This alternative method makes it more efficient in determining a diagnosis by reducing the time and effort required for dentists and dental hygienists. Additionally, improves the accuracy and consistency of detection and reduces the risk of misdiagnosis.

UPR141

The Benefit of Machine Learning Techniques to Aid Breast Cancer Recurrence Prediction

Madison Rose, Jarred Desrosiers

Mentor: Herndon, Nic

Breast cancer is a leading cause of cancer death in women and is one of the most common cancers among women. Treatment looks different for every patient due to a variety of factors. One factor that can change a patient's treatment plan is how aggressive their cancer is. Aggressive cancers are more likely to reoccur and require intense treatment options such as chemotherapy. Cancer aggression is currently measured by a recurrence score which can be determined by a pathologist viewing hematoxylin and eosin-stained slides (HE slides) from breast biopsies. Recurrence

scores are an important factor considered by oncologists when crafting a treatment plan for their patients. However, these tests are costly and in high demand which limits patient access. In this research, we study applications of machine learning to the issue of breast cancer recurrence. The use of machine learning could greatly benefit the medical field by providing diagnoses faster and cheaper as well as potentially helping scientists discover new markers for cancer. The proposed methods use digitized HE slides to train and test machine learning algorithms on tasks related to breast cancer recurrence. One method discussed is the use of convolutional neural networks (CNNs) to predict a recurrence score from an image. CNNs are skilled at image classification and have previously been applied to other medical diagnosis tasks. This method could aid pathologists in determining recurrence scores and could provide better access for patients. The use of a clustering algorithm to sort images into groups based on similarity of recurrence score or cell type is also discussed. This method has the potential to create a better understanding of the similarities between cancers and individual cells. This could aid the discovery of new markers of breast cancer or recurrence that were previously unknown. This work aims to implement machine learning methods to aid pathologists and oncologists in breast cancer diagnosis and treatment.

UPR142

Identification of Iron-Oxidizing Bacteria on Steel Structures in Freshwater Environments

Meredith Cox

Mentor: Field, Erin Kirby

Microorganisms found on steel structures within aquatic systems impact the integrity of the structures and environmental factors surrounding them. Iron-oxidizing bacteria (FeOB) in particular, can cause damage and corrosion of steel. Understanding how the presence and growth of these microbes in freshwater environments affects local aquatic habitats, as well as the preservation of steel complexes, allows us to identify the best materials for construction, while ensuring that the surrounding environment remains healthy. To begin identifying the species of FeOB present, a freshwater site containing wreckage in Mallows Bay, Maryland, the *Accomac,* was used for sample collection and analysis. I hypothesized that FeOB communities would be found on the corroded portions of the wreck, where they would be identified as freshwater species due to the surrounding conditions. They will play a significant role in the health of the surrounding aquatic environment, and the integrity of the sampled structures. 49 samples from multiple corroded regions of the wreck, and the surrounding habitat, were collected. Estuary Media, field site filtered water, and Modified Wolfe's Mineral Media (MWMM) are used in the enrichment cultures to grow FeOB from the samples

collected. Enrichment results suggested that FeOB have grown primarily in MWMM from fully submerged samples and those collected at the waterline on the wreck. I conducted a serial dilution to obtain a pure culture to sequence the 16S rRNA gene to identify the organism and sequence the whole genome for future studies. However, we could only obtain enrichment cultures with multiple organisms for identification based on the time frame of the study. Data analysis showed that many of the present FeOB can be considered chemolithoautotrophs that grow in freshwater conditions, with the majority falling under classes of gammaproteobacteria or alphaproteobacteria. Investigating these microorganisms can further our understanding of present microbial assemblies and the effects they have had on the structures.

UPR143

Reliability of *E. coli* as a Water Quality Parameter in Monitoring Urban Streams

Roman A. Mirra, Andron Adams, Tyra Denning, Surinder Gill, Eryn Meads, Scott Siebor, Christina Skinner, Randall Etheridge, Michael O'Driscoll, Ariane L. Peralta

Mentor: Peralta, Ariane Legaspi

Aquatic ecosystems provide valuable services such as improved water quality and habitat for biodiversity. However, urbanization has disrupted nutrient and water cycles in ways that lead to increased contamination, decreased water quality, and decreased flood protection. This general decline in stream health described in urban aquatic ecosystems is known as the urban stream syndrome. Tracking contaminant sources can be used to inform management for improving urban water quality. For example, *E. coli* are commonly used as indicator bacteria for the presence of fecal contamination in water quality testing. Although the presence of *E. coli* in a water sample does not confirm the presence of pathogens, it does indicate recent fecal contamination as *E. coli* generally do not survive long outside of their natural habitat, the intestines of humans and other warm-blooded animals. Therefore, a positive *E. coli* test reveals an elevated risk of the presence of potentially harmful bacteria and viruses, and their use has long been recommended as the best indicator of health risk from water contact in recreational waters by the US EPA (1986). Past research involved water quality monitoring during both storm flow and base flow conditions in the Greens Mill Run (GMR) watershed (13.4 mi^2), a member of the 303d list of impaired waters for North Carolina located in Pitt County, NC, measuring several water quality parameters such as *E. coli* and total coliform, turbidity, total suspended solids, and dissolved organic carbon. Results showed that *E. coli* concentrations exceeded EPA recommended guidelines more often and displayed higher variability during storm flow in comparison to base flow along GMR. These results, along with several other studies, indicate a heightened risk of fecal contamination in recreational waters from stormwater runoff in urban areas, posing public health concerns, especially in coastal

areas where stormwater discharges. However, an understanding of the extent to which urban development influences stream water quality, streamflow, and groundwater recharge as well as the reliability of *E. coli* tests as parameters of water quality in this context are lacking. Currently, ECU students enrolled in microbial ecology, environmental engineering, and geology courses are taking a multidisciplinary approach in combining their unique knowledge and skills to generate testable hypotheses and design valid experiments to tackle these challenging multidisciplinary concepts.

UPR144

Characterization and Synthesis of Brucebactin Conjugate

Rodney Emmanuel De Diavoukana

Mentor: Banerjee, Sambuddha

Prior research in bacteria pathogenicity has shown that iron is one of the most vital micronutrients needed for bacteria to maintain virulence. However, in humans, "free" iron complexes are maintained at a level far below what bacteria require to survive. As such, bacteria employ a number of iron acquisition and transport mechanisms in the host environment to get the iron they need. One of the most studied mechanisms is the secretion of siderophores, small molecules with a high binding affinity for ferric iron (FeIII).

Brucella ssp, a zoonotic bacterium, is no different. Brucella causes an infection known as brucellosis and can affect both animal and human hosts. Due to its extreme virulence, the containment of animals suffering from brucellosis often involves killing the complete herd. The human infection is hard to diagnose because the symptoms are very similar to the flu, and multiple antibiotics are required to treat the infection.

Practical strategies to treat *Brucella* infection have become more critical with the recent Yellow Stone National Park outbreak. One potential strategy for treatment is to target brucella's active transport system (siderophore complex) via a trojan horse approach. Brucella exhibits a native high iron affinity siderophore, Brucebactin, which aids Brucella in acquiring iron. Although many siderophores have been characterized 270 of the 500 identified; Brucebactin remains one of the few uncharacterized siderophores. Therefore, the first aim of this project is to chemically synthesize Brucebactin. The second aim of the project involves investigating if the synthesized Brucebactin binds to its periplasmic protein (FatB), which translocates the Fe^{3+} cargo to the inner membrane permease.

Based on literature evidence and structure elucidation methods, a di-catechol siderophore, which is believed to be Brucebactin has been synthesized. Moving

forward, the project's goal is to purify and confirm the Brucebactin product and investigate if this synthetic BB can recognize the recombinant FatB using Isothermal titration calorimetry (ITC).

UPR145

Invasive species, *Petrolisthes armatus*, documented in North Carolina waters for the first time; New demographics and parasite diversity of the green porcelain crab

Chloe Elisabeth Manning Moore

Carter Kathleen Stancil

Mentor: Blakeslee, April Monica Houghton

For the first time in mid-coast North Carolina (NC), *Petrolisthes armatus*, the green porcelain crab, has been discovered. This species is native to tropical and subtropical waters of Central and South America, and this expansion represents the northernmost location the species has invaded. Northward range expansions are not unique to *P. armatus* but have been seen in many coastal species as a response to rising global temperatures. These "climate migrants" have the potential to bring with them novel selective pressures, species interactions, and even parasites to their new ecosystems. Our project represents the first effort to establish the crab's demographics, distributions, establishment success and interactions with native species in the newly invaded region. Our research will account for important demographics measures, like species, sex, and size of the crabs. We have also tracked the co-occurring densities of native crab species in the region for comparison. Data thus far have been collected from 50 sites between 2018 to 2022. Furthermore, we will investigate parasite diversity in *P. armatus* and other native crabs to better understand the potential for community-wide impacts. During range expansions, both native and non-native organisms can be greatly affected by parasites. Organisms may encounter novel parasite infections, co-introduced parasites, or escape parasites from their native ranges. For example, if a species invades and co-introduces a parasite, this may strongly affect native species that have not developed resistance to the parasite, which may be damaging to the species' survival and reproduction. We will determine parasite infection prevalence, parasite composition, and diversity by dissecting porcelain crabs from the novel range and using microscopy to detect and identify any parasites. We will also compare these results to parasite data from native panopeid crabs. To date, we have documented at least one case of a parasitic infection in a NC population of *P. armatus* that has been found in the crab's native range, possibly suggesting that the parasite was co-introduced with its host. Overall, we know very little about the impacts of invasive green porcelain crab in our region, but our research aims to provide a baseline foundation of the effects of the new range expansion at both a species and community level.

UPR146

Microglial changes in the brains of mice exposed to individual per- and polyfluoroalkyl substances (PFAS) specifically whether exposure affects basic locomotor activity and number/morphology of microglia in the brains

Jessica Ann Bartram

Mentor: DeWitt, Jamie C

Per- and polyfluoroalkyl substances (PFAS) are a large group of structurally diverse aliphatic compounds, distinguished by a fully (per-) or partially (poly-) fluorinated chain of carbon atoms, often connected to at least one functional group. Due to the carbon-fluorine bond, they are extremely chemically stable, resistant to degradation, and persistent in the environment. Their widespread use and ability to remain intact in the environment means that accumulation of certain PFAS is occurring in living organisms, including humans. While the science surrounding potential health effects of bioaccumulation is developing, exposure to some types of PFAS has been linked to serious health effects such as cancer, reproductive and developmental toxicity, behavioral effects, and alteration of multiple aspects of the immune system. . The main objective of this study is to explore microglia, the resident immune cells of the central nervous system, to determine if PFAS exposure alters their numbers and/or phenotypes. Two different PFAS found in surface waters of North Carolina, perfluoro hexanoic acid or sodium tridecafluoro-2,4,6,8,10-pentaoxadodecan-12-oate were given to male and female C57BL/6 mice for 30 days (about 4 and a half weeks) via gavage. One day after exposure ended brains were collected, weighed, fixed, and then processed and embedded in paraffin. Sections of the frontal cortex were sliced at 10 microns and stained immunohistochemically with Iba-1 for microglia. Regions of interest were photographed at 20X magnification, microglia were counted, and their staining density was calculated. Preliminary data suggests that 30-days of exposure to these PFAS alters microglia. Additional analyses will determine the direction of the alteration.

UPR147

The Effects of the Metal Ions Zn and Ca on TTR Amyloid Formation

Ashton Nichole Norris

Mentor: Lim, Kwang Hun

Amyloidosis is the family of diseases that causes Alzheimer's, cardiomyopathy, and other such ailments. These diseases are caused by the misfolding and aggregation of the

transthyretin (TTR) (ATTR amyloidosis). Various single point mutations in the TTR gene were shown to accelerate the misfolding and aggregation.[1] Investigation of this mechanism of misfolding and aggregation will lead to more potent therapeutic strategies. In this study, the effects of Zn^{2+} and Ca^{2+} metal ions on ATTR-V30M were studied by looking at the aggregation kinetics and structural features of the protein. This is the most common pathogenic mutation and is responsible for familial amyloid polyneuropathy.[2] Higher levels of Zn ions were observed in ex vivo TTR aggregates from patients with amyloidosis than those without amyloidosis. It was hypothesized that metal ions increase TTR misfolding and aggregation.[3] In this study, the effects of the two metal ions on aggregation kinetics of ATTR-V30M were compared. Structural features of the TTR aggregates derived by the metal ions will be examined by using CD spectroscopy. The biophysical studies will provide valuable information on the differential effect of the two metal ions on ATTR amyloidosis and molecular basis for TTR misfolding and aggregation promoted by the metal ions.

UPR148

Coastal Stressor Effects on Sediment and Salt Marsh Cordgrass (*Spartina alterniflora*) Root-Associated Microbiomes

Surinder Kaur Gill, Mary-Margaret McKinney, Rachel Gittman

Mentor: Peralta, Ariane Legaspi

Coastal marshes provide ecological benefits such as processing upstream contaminants, protecting coastlines from high energy storm surges, and providing habitat for a multitude of species. Coastal marshes are dominated by only a small number of key species such as marsh cordgrass *Spartina alterniflora* (also known as *Sporobolus alterniflorus*), and the establishment and productivity of this species is essential to successful coastal marsh restorations. However, human activities (e.g., drainage, development) and climate change (e.g., increased duration and frequency of storms, sea-level rise) have contributed to increased coastal marsh loss. Moreover, environmental conditions, sediment microbiome composition, and *S. alterniflora* growth all play a vital role in the restoration and maintenance of coastal marshes. Therefore, examining how chemical (e.g., sediment nutrients) and physical (e.g., wave properties) factors relate to *S. alterniflora* root microbiome composition can inform future

management approaches for enhancing marsh restoration efforts. However, composition of the *S. alterniflora* root microbiome associated with established coastal marshes in high and low wave energy coastal sites is unknown. This project examines the role that environmental conditions and the resident sediment microbes play in *S. alterniflora* root-associated establishments. We hypothesize that the root microbiome of *S. alterniflora* will vary depending on the sediment microbiome composition and wave energy, however, *S. alterniflora* root-associated microbes will be more similar in composition in more stressful, high wave energy sites compared to low energy sites. We will test this hypothesis by comparing microbiome composition in response to wave energy status (high vs. low) and sample type (bulk vs. root-associated) using permutational multivariate analysis. This work will serve as foundational knowledge for future studies promoting beneficial plant-microbe relationships in a coastal marsh restoration context.

UPR149

The Effects of Horizontal Gene Transfer on the Evolution of Land Plants

Memphis C Jandron

Mentor: Huang, Jinling

This study seeks to understand how horizontal gene transfer (HGT) has affected the evolution of land plants. Land plants evolved from charophyte green algae. A list of candidate genes derived from HGT was generated from the genome of the charophyte green alga *Chlorokybus atmophyticus,* which in turn will be subjected to detailed phylogenetic analyses to investigate their evolutionary origin. The flowering plant *Arabidopsis thaliana* will be used as a reference organism to understand the functions of the investigated genes, which in turn are used to assess the contribution of acquired genes to the evolution and adaptation of plants. I will perform more detailed investigations on three acquired genes, including *Chrsp45S09062* in the Cupredoxin superfamily that encodes a protein with multicopper oxidase activity, *Chrsp52S06587* that encodes a calcium-dependent phosphotriesterase superfamily protein, and *Chrsp22S08802* that encodes for a protein with histidine kinase 1 activity. A BLASTP search will be performed against the NCBI nonredundant protein sequence database. Identified homologs will be compiled based on the E-value, max score, and total score. The sequences will be sampled from representative groups of both prokaryotes and eukaryotes and then input into the computer program MEGA to perform a multiple sequence alignment (MSA). A phylogenetic tree will be generated for each gene using MEGA and the resulting MSA. The phylogenetic trees generated will be analyzed to identify true cases of HGT, and function will be further researched on each acquired gene to determine the effects of HGT on plant evolution. In the evolution of plants, the expected impact of HGT is a mechanism that aids in the

exchange of genetic information to benefit the adaptation of land plants to their environment.

UPR150

Incorporating Team Science in Undergraduate Research

Seth E. Green

Mentor: Walker, Joi Phelps

Across many environments today, including work, education, and research, it has become increasingly common to use interdisciplinary teams to perform science and research to tackle a variety of complex challenges and advance innovation. The productivity of these interdisciplinary teams has been shown to benefit from an understanding of the Science of Team Science (SciTS), defined as scientific collaboration conducted by more than one individual in an interdependent fashion. Students in research at the undergraduate level receive limited training in the development of team competencies - knowledge, skills, and attitudes (KSAs). Course-Based Undergraduate Research Experiences (CUREs) provide a context for embedding team science to collect empirical evidence on student development of KSAs. This work investigates the impact of team communication and research plans, and individual writing on team science. Focus group discussions of the team science elements and team experience are used to support the findings.

UPR151

Intersectionality and Burnout in Medical Residency Programs

Kassidy Johnson

Tolu Joaquim

Dr. Corin Davis

Dr. Angela Lamson

Mentor: Lamson, Angela Lynn Smith

Background: A growing number of research publications and training programs have focused on the role of burnout in the healthcare system. Concerns about and implications for burnout have only been exacerbated during the COVID-19 pandemic. However, there is a dearth of research focused on the experiences of medical residents, especially those with underrepresented identities. The purpose of

this study was to understand experiences associated with medical residency through the lens of residents with multiple intersecting underrepresented identities (ethnicities, gender, and sexual orientation). There was additional interest in how these experiences resemble or differ from those of their counterparts who hold historically represented identities in health care (e.g., white, male, heterosexual). Method: This analysis was made possible through a mixed-method parent study; N= 195 for the quantitative phase and 27 from the qualitative phase. Participants were medical residents at a residency program in the United States, one-third of which were in ECU residency programs and of whom identified with at least one underrepresented racial, ethnic, gender, and/or sexual orientation social location. The quantitative survey included measures pertaining to demographics, discrimination, harassment, compassion fatigue, burnout, and compassion satisfaction. The qualitative interviews included open-ended questions regarding residents' experiences with burnout and its protective factors during their residency. Colaizzi's method of descriptive inquiry was used for data analysis and led to an in-depth understanding of the participants' residency experiences. Results: Based on the qualitative responses, the following themes emerged: (a) Hospital Culture, (b) Additive Stress, (c) The Role of Exhaustion, Cynicism, and Inefficacy, (d) The Influence of Discrimination/Harassment; additionally, six subthemes emerged. Conclusion: The results reflected that larger hospital systems and residency program structures have a significant impact on the experiences of residents with multiple intersecting identities. Wellness programs with a direct focus on the needs of medical residents, and diverse faculty/hospital leadership, are two factors that support medical residents with multiple intersecting identities.

UPR152

Pain Acceptance and Anxiety in Adolescents with Sickle Cell Disease

Anna E. McMillan

Dhanashree R. Bahulekar

Aimee W. Smith, PhD

Mentor: Smith, Aimee West

Sickle cell disease (SCD), an inherited blood disorder, causes a patient's red blood cells to form into a sickle shape and clot in the vessels. Individuals with SCD can suffer from severe pain due to the restricted flow of blood. Pain acceptance is a crucial component of a patient's quality of life. The ability to accept the pain that comes with SCD can enable patients to have more productive and fulfilling lives. Anxiety in adolescents with

SCD can have a significant impact on their functionality and overall development. The many factors contributing to anxiety in adolescents can worsen when combined with the stress of having a chronic illness. The aim of the current study was to explore the relationship between pain acceptance and anxiety in a sample of adolescents with SCD. Data for the following study was collected at a children's hospital in the Midwest. Participants included 30 adolescents, aged 12-18 years (M=14.5). The data set included male (46.7%) and female (53.3%) participants. Participants identified as either African American (85.2%) or biracial (14.8%). The Chronic Pain Acceptance Questionnaire (CPAQ) a 20-item self-report measure, was used to gather data on pain acceptance in children. The Spence Children's Anxiety Scale 44-item self-report measure was used to assess anxiety in children. Higher scores represent better ability to accept pain and higher levels of anxiety, respectively. A bivariate correlation between adolescent self-report scores on the CPAQ and SCAS showed no significant association between pain acceptance and anxiety in adolescents with SCD, r=.10, p>0.05. There is insufficient evidence to conclude a significant linear relationship between self-report scores on the SCAS and the CPAQ is present among adolescents with SCD. Limitations to this study included a narrow sample size. The influence of an unidentified third variable such as the development of strong coping skills or having already come to terms with the reality of their diagnosis could be present. Unknown contributing factors to participants' anxiety could have potentially impacted results. Including, pain levels on the day of the survey and their mindset when taking the survey. Further research regarding contributors to high levels of anxiety in patients with SCD is needed to determine if additional factors influencing anxiety are present in their daily life. Potential examples include participants support systems or the type/severity of their SCD diagnosis.

UPR153

The Effects of Racialized Poverty Within the Health Care System of Eastern North Carolina

Kendra Renee Brent

Mentor: Page, Sarah

Structural violence is integrated into the structures of society by means of social, economic, and political factors and aims to prevent marginalized vulnerable populations from meeting their basic needs. While they often intertwine, groups of people are marginalized based on race, gender, and other forms of embodied identity. Reflections of its syndemic and synergistic influence has been implemented into society as conditioned and sustained suffering among populations. Though structural violence affects many factors, the primary focus of this study will be on the limitations based on class status and race in obtaining health care within different geographical districts.

Many individuals affected by poverty tend to receive low quality education, limiting them in their job endeavors and establishing financial constraint. As a result, living conditions tend to be inadequate and food insecurity more prevalent. Because of these conditions, individuals in poverty are more likely to become ill, but are unable to seek appropriate medical attention. Moreover, those who do seek medical attention are burdened by medical debt. Thus, the beginning of a cycle of using these causes to blame the poor for being poor and/or sick. This endless cycle and overlapping factors can be concluded as racialized poverty.

To elucidate the connection between racialized poverty and how it affects individuals seeking healthcare, participant observation at local health clinics in different counties of eastern North Carolina will take place. The research design for this project will emphasize observations that aim to help determine the most vulnerable segments of this population. In addition to these observations, surveys will also be given to individuals of the region to gather baseline quantitative data regarding demographic information and access to health care resources. While the identity of these participants will be kept anonymous, information such as their zip code and health status will be collected. The data will be analyzed using manual analysis methods such as MS Excel.

Since racialized poverty is structural, there is little hope in providing full solutions. However, this study seeks to achieve recommendations on practices and elements that could be implemented and operationalized to induce less harm than the current systems. Additionally, it will critique organizations designed to help marginalized groups within society obtain health care resources.

UPR154

Understanding the factors which influence the choice to pursue a career in accounting among Hispanic students.

Evelyn Gonzalez

Mentor: Furner, Zhan Zhang

According to the 2020 census, the Hispanic population makes up 18.5% of the U.S. population, making them the largest minority group in the country. Although the Hispanic population has increased over the years, they only make up a small portion of the accounting profession. Studies have found Hispanics feel like they cannot be accountants because of a lack of successful role models in the profession. There has only been a small number of studies done on diversity and inclusion in the accounting field. My study will focus on why this number is low and what is causing Hispanic students not to pursue a career in accounting. For this study, we will be surveying and interviewing ECU Hispanics students who did not choose to major in accounting. We will explore the factors Hispanic students consider when choosing a major and explain

why they believe accounting is not for them. Many Hispanic students have also expressed a lack of connections and career guidance support. Through this study, we also hope to find resources or programs to help Hispanic students enhance their careers in accounting. We hope these findings will help the university's business program provide support, resources, and coaching to help ECU students.

UPR155

Factors that Impact Infidelity Forgiveness

Ruby Claire Bradford

Mentor: Eppler, Marion A

Each romantic relationship has unique qualities and circumstances. However, there are ways to predict the behaviors that people engage in while in these companionships. Carol Dweck's Mindset theory has many domains that it can be applied to, however in this paper the focus is romance. This paper reviews relevant literature and the completed undergraduate study that examined the connection between the two implicit theories, growth and destiny, and its impact on people's willingness to forgive. In this study infidelity is split into four subtypes: emotional, online/technology, sexual/explicit, and solitary. After replicating the methods of Thompson et al. (2020) with recruited PSYC1000 students and using additional priming techniques, we assessed the similarities and differences between the results of the previous study and the current study. We found that the priming techniques, a short article and reflection questions, were not successful in enforcing either of the implicit theories. These findings were not consistent with Thompson et al. (2020). However, in line with the previous study, women were less likely than men to forgive all subtypes of infidelity. Also, among all participants, the most forgivable subtype was solitary infidelity and the least forgivable was sexual/explicit infidelity.

UPR156

Differences in cannabis strains and product types used most often by a cross-sectional sample of people who use cannabis to relieve pain, nausea in the United States

Devin William Sabatino

Mentor: Egan, Kathleen Louise

In the United States (US), 17% of people reported using cannabis within the past year. Laws around cannabis use in the US are changing; currently, 37 states and the District of Columbia have legalized cannabis for medicinal use. With policy change has come a

proliferation of cannabis product types available for sale. The current landscape of cannabis products includes flower, vapes, dabs, edibles, oils/tinctures, and lotions/topicals. In addition to the differentproduct types, cannabis is marketed and sold based on three main strain categories: sativa, indica, and hybrids. While there are studies on products used for recreational use, little is known about products used primarily for medicinal use. The objective of our study was to assess difference in strains (e.g., indica, sativa, etc.) and product types (e.g., edibles,vapes, etc.) used most often by people who use cannabis to relieve pain and nausea. To examine our objective, we conducted a cross-sectional, web-based survey using Qualtrics panels in December of 2021. For the analysis, we restricted the sample to participants who endorsed cannabis use within the last 30 days [n=920]. We assessed 18 different motives for using cannabis products, including to treat pain and nausea. Motives were assessed on a three-point scale: "all/most of the time," sometimes," or "never." We used descriptive statistics to examine which product types and strains the full sample and participants who endorsed the use of cannabis for pain or nausea preferred. We found that 48.7% always used cannabis to treat pain and 32.0% always used cannabis to treat nausea. The top three product types used by people who reported using cannabis to treat pain and nausea were bud/flower (42.7% and 51.7%, respectively), pre-rolls (13.4% and 13.5%), and vapes (13.8% and 12.2%). There were no differences in preferred product types between people who use cannabis to treat pain and recreational-only users. There was a difference between nausea and recreational-only users with recreational-only users preferring edibles over pre-rolls. Hybrid strains were the most popular strain endorsed by participants to treat pain (36.6%) and nausea (35.4%) most/all the time. People who do not use cannabis for pain are most likely to use sativa. These findings provide insight into the preferred cannabis product types and strains among people who always use cannabis to manage pain and/or nausea.

Undergraduate Student Posters (Online) Abstracts

MCSC Room 237

4/3/23 9:30-10:30

Why are Women Less Motivated to Become Financially Literate?

Lexi McCoy

Mentor: Beierlein, Jaclyn J

A previous group in the honors college at East Carolina University wrote a research paper about women's motivation to become financially literate. One problem with this study was the low response rate and small sample size. Alongside my mentor, Dr. Beierlein, we increased this survey size and survey staff and faculty at ECU in addition to students. We also reached out to people beyond ECU. Another limitation of the study is that although the survey was based on surveys used in published papers on financial literacy, it was not written to directly test implications of the Expectancy Theory of Motivation. Our research helped us understand why women are less motivated financially and what can be done to motivate them. In my presentation I will revisit the hypotheses/research questions examined in the previous study to see how differences in age, marital status, and professional status affect the results. I will also examine the variance in education, income, degree of financial independence, and whether a person has children affects motivation to learn personal finance. In my presentation I hope to answer several questions: Do our female respondents exhibit less financial literacy, confidence, and interest in personal finance than the men do? Do they think finance is less important than men do? Do they feel less confident in their abilities to understand it? Are they more likely to expect that their spouses or family members will help them make financial decisions? How do the variance in education, income, degree of financial independence, and whether a person has children affect motivation to learn personal finance?

4/3/23 9:30-10:30

Palliative care providers and administrators' perspectives on integrating social determinants of health to provide community-based palliative care

Savannah Gail Blalock

Mentor: Dias, Nancy

Purpose: The purpose of the study is to examine the perspectives of palliative care providers about the needs, barriers, and disparities to integrate palliative care into the community setting. The United States Department of Health and Human Services' (USDHHS) social determinants of health (SDOH) framework, including: economic stability, education, health/care, neighborhood built environment, and social and community context, was used to guide research.

Methods: This study used a descriptive qualitative design. Palliative care providers and administrators completed a phone interview using a semi-structured interview guide that incorporated the USDHHS' SDOH framework domains, as well as a demographic survey through REDCap. The interviews ascertained their perceptions about community-based palliative care, care policies/protocols, challenges to provide community-based palliative care, and disparities related to the SDOH domains. Convenience and snowball sampling was used to enroll the participants for this study until data saturation was achieved. All interviews will be recorded and transcribed verbatim. Qualitative content analyses were be conducted using Hseish and Shannon's conventional content analysis. Thus, the data will informed the themes that were examined using SDOH domains.__

Results: Several sub-themes were ascertained under the five Social Determinants of Health as themes: affordability to transportation, health system financial structure, population palliative care literacy, budgetary restrictions related to resource and personnel, curricula recommendations for providers, healthcare fragmentation, and distrust of medicine and medical providers._

Discussions & Conclusions:_ The results from this study provide foundational evidence to help identify potential barriers to planning necessary community-based palliative care interventions that are based on potential SDOH disparities. To address these barriers, there is a need for palliative care policy changes related to accessibility and insurance coverage, increase curriculum inclusion around end-of-life care, increased recruitment of diverse palliative care providers, and the utilization of telehealth to improve accessibility of palliative care services._

4/3/23 9:30-10:30

The Effects of Per- and Polyfluoroalkyl Substances on Testosterone and Erectile Function through a Liver Peroxisome Proliferation Assay and Lipid Liver Histology

Anjalee J Hou, Molly Alexander

Mentor: Hannan, Johanna

Per- and polyfluoroalkyl substances (PFAS) are organic compounds widely found in surfactants and produced in cookware, clothing, and firefighting gear. From 2002 to 2015, PFAS has been slowly taken out of production by its largest U.S. manufacturers. However, PFAS' strong carbon-fluorine bonds allow them to bioaccumulate in water, soil, and animals which continues to make them a risk to humans. Previous research has shown that PFAS exposures can adversely affect human health leading to reproductive toxicity, specific types of pelvic cancers, and liver toxicity. Our research study focuses on a subset of PFAS called perfluoroalkyl acids (PFAAs). These PFAAs are long-chained structures that can be found in two forms: perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS). While we know that PFAS exposure increases the incidence of pelvic cancers, we do not know if it also impacts pelvic physiology such as testosterone production and erectile function.

The purpose of this research is to understand the effects of PFOA and PFOS on testosterone availability and erectile function in a rat model. My specific role in the project is to confirm that rats exposed to PFOS and PFOA exposures in drinking water demonstrate systemic toxicity like what has been shown in the literature. An indicator of PFAS toxicity is increased liver size, liver lipid build-up, and dysfunction in the liver. I will perform a liver peroxisome proliferation assay and examine liver histology.

I hypothesize that PFOA and PFOS will increase liver mass, peroxisomal fatty acid oxidation, and lipid build-up indicating liver toxicity.

In our pilot study, 12-week-old, male Sprague Dawley rats were separated into control, PFOA (10 mg/kg), and PFOS (10 mg/kg) groups (n=4 per group). After four weeks of PFOA/PFOS exposure, rats were placed back on regular drinking water for two weeks. Six weeks after the initiation of PFOA/PFOS exposure, rats were humanely euthanized and tissues harvested. The livers were significantly larger in the PFOS rats (56.5 +/- 1.88g/kg, $p<0.001$) compared to both PFOA (34.0 +/- 3.45g/kg) and control rats (32.5 +/- 2.30g/kg). Segments of the liver were frozen and stored at -80_ and others were fixed in 4% paraformaldehyde and frozen for histology.

4/3/23 9:30-10:30

Exploring Facilitators and Barriers in Advance Care Planning with Latino Leaders

Abby Harris

Mentor: Larson, Kim L

Purpose: The aim of this project is to explore factors that facilitate and hinder conversation about advance care planning among Latino leaders. **Significance**: Latinos are one of the largest minority groups in the United States who suffer from health disparities in end-of-life care. Advance care planning aids individuals, their families, and clinicians with critical decision making in end-of-life situations. Latino adults are the least likely ethnic group to make use of advance care planning, which impacts their quality of life. Advance care planning should be tailored to the individual needs and without planning decisions are left in the hands of the health care system. This project intends to discover ways for Latino leaders to initiate the conversation around advance care planning through focused communication, awareness, and accessibility. **Methodology**: This qualitative descriptive study is based on a parent study entitled, Community-based Palliative Care Model for Latinos with Advanced Cancer, that trained Latino palliative care lay advisors in sharing palliative care information with Latino adults with cancer. The research question analyzed was: What facilitates and hinders conversations about advance care planning? We examined the perspectives of 25 Latino leaders who participated in one of six focus groups conducted between 2020 and 2021. **Preliminary results**: Initial analysis identified three major concepts of family, spirituality and wants (desires) were related to facilitating advance care planning. A major barrier was not talking about death and dying until death was imminent. The inclusion of Latino sociocultural values in advance care planning warrants consideration to address end-of-life disparities.

4/3/23 9:30-10:30

Purple vs. Gold: An Exploration of Tabletop Exercises for Collegiate Cybersecurity Training

Collin Garrett Roach, Isaiah Bradshaw, Tyler Allen Brown, Matthew Maurice Castelo. Donovan Earl Bernard

Mentor: Lesko, Charles John

As the field of cybersecurity grows, there is a growing number of colleges and universities that are starting to offer cybersecurity training and degrees. The issue with training cybersecurity is that a lecture-only training method creates a disconnect from what students learn and makes it challenging to turn that into something that they can do. As attacks grow in prevalence, the delivery of prepared students into the workforce is needed. The purpose of this study is to investigate supplemental forms of hands-on training to aid in a classroom setting. In a class, several groups of students will be allocated machines to attack with and defend, competing against other students to determine who can keep their systems secured and available. After completion of the exercise, participating students will be surveyed on their experience with the

tabletop exercise. I predict that students will find the tabletop exercise stimulating and inciteful about what they learned in their cybersecurity courses.

4/3/23 9:30-10:30

Facilitating Conversations About Advance Care Planning with Latino Leaders Using the Hello Game

Teresa A Hupp

Mentor: Larson, Kim L, Mathews, Holly

Purpose: This study explored how the Hello Game, an interactive, community tool facilitated conversations about advanced care planning (ACP) with Latino leaders. Latinos have disproportionately low engagement in ACP compared to White and Black adults.

Significance: North Carolina has a growing Latino population with an increasing cancer mortality rate. The Hello Game breaks down barriers and encourages ACP engagement. The game has been studied in White and Black populations, but not with Latinos. A nurse-led research team, in collaboration with Latino leaders, aimed to address health equity and disseminate new findings.

Methodology: This qualitative descriptive study, derived from a parent study, focused on the Hello Game. The parent study, initiated in 2020 in North Carolina, trained Latino leaders in palliative care principles to share information with Latinos with cancer. Five of these leaders and five leaders from a Latino advocacy group came together to participate in one of three focus groups to discuss the Hello Game. Transcripts were reviewed by research members who used first and second level coding to identify themes. Limitations included small sample and one geographic area.

Results: The themes that promoted ACP conversations were: Identifying kinship networks; Preferring homecare at the EoL; and Passing “Thank you chips.” Themes that limited ACP conversations were: Migration from homeland and separation from family and Minimal clinician input. Extensive kinship networks took on decision making roles. Homecare at the EoL was hindered due to distance from homeland. Passing “Thank you chips” inspired ACP conversations. These leaders did not mention nursing involvement in ACP conversations.

Discussion: The collective nature of the Hello Game created a trusting environment to discuss ACP. Results suggest ways for nurses to address Latino health inequities in

ACP by identifying healthy kinship networks and discussing EoL preferences. Nurses can partner with advocacy groups to carry out the Hello Game in Latino communities.

4/3/23 9:30-10:30

Impact of Parental Substance Abuse on Children Involved with the Child Welfare System in the U.S.: A Literature Review

KaLynn Mae Toler

Mentor: White, Kevin Robert

Background: In 2017, an estimated 19.7 million adults suffered from a substance use disorder (SUD). SUD affects more than just the individuals with the disorder, including children of parents with SUD. On average, 8.7 million children (17 and under) a year had at least one parent with a SUD between 2009 and 2014. Parental substance abuse puts children at a higher risk of maltreatment, injury, and medical and behavioral problems. The previous literature is not entirely clear about which services and programs are effective for parental SUD or improve outcomes for their children.

Aim: The purpose of this literature review is to identify and investigate the effects of parental substance abuse on children in the U.S. child welfare system, as well as what efforts are being made to mitigate these effects by addressing the impact of parental substance abuse on families.

Methods: Literature was collected using online databases such as Wiley Online Library, ScienceDirect, and PubMed. Each article was reviewed and organized into topics. Then, these themes were synthesized to answer the research questions presented in this literature review.

Results: Sixteen articles were retrieved and analyzed for this review. The themes from this research included the negative and often long-lasting effects of parental substance abuse on children and families, the relationship between parental substance abuse and child welfare system involvement, and integrated services as a solution to parental substance abuse and child maltreatment.

Conclusion: The results of this literature review were first, child welfare cases in the U.S. are greatly affected by parental substance abuse; second, children experiencing parental substance abuse are not only at risk of maltreatment and neglect but also traumatic experiences, psychological and psychosocial disorders, and the development of substance abuse issues of their own; and third, there is a deep need for an increase in integrated services and collaboration when it comes to parental substance abuse and

child welfare in the U.S., including research on interventions that can effectively address both issues, such as family-based residential treatment programs.

4/3/23 9:30-10:30

The Utilization of Interprofessional Education (IPE) in Nursing Education to Close the Communication Gap Among Healthcare Teams: An Integrative Review

Jillian Irene Harvey

Mentor: de Jesus Toderick, Elizabeth

Interprofessional education (IPE) has become an increasingly important area of interest in the realm of nursing education and research across the country. IPE is defined by the World Health Organization (WHO) as, "an experience that occurs when two or more professions learn about, from, and with each other. Through a multitude of studies, IPE has been identified as a necessary component of nursing education to promote future interprofessional collaboration and to close the communication gap among healthcare teams. IPE has also been called upon by *The Future of Nursing 2020-2030* report to be included in an education reform that requires nursing programs across the United States to properly implement IPE. Yet, even with extensive research, many programs have failed to do such. As nursing education programs move into competency-based curriculums, it is critical for IPE to be identified as necessary and be treated as such. The purpose of this integrative review is to explore relevant literature that identifies the significance of and current advancements in interprofessional education, in order to make needed recommendations for nursing education programs to intertwine IPE into undergraduate nursing curricula.

4/3/23 9:30-10:30

Genre Immersion

Jaela Angelique Fisher

Mentor: McIntyre, Amy Elizabeth

My senior year, I chose to focus on character design, as I wish to go into visual development when I graduate from school. This semester, I have delved into five different genres: Slasher, Fantasy, Mystery, Western, and Sci Fi. For each genre, I will be doing research and creating a character with all that information in mind.

My designs will be presented in the form of an animation reminiscent of a video game, specifically the character select screen. In doing so, I will be able to show my skills in character design as well as Adobe After Effects.

At this moment in time, I am still in the research and exploration phase. My designs have not been solidified yet and can change at any time. The goal is to create diverse designs that avoid harmful tropes and let the underrepresented be seen, hence why it is taking a lot of time to do research. However, by the time of the presentation, everything will be set in stone.

4/3/23 9:30-10:30

A Needs Assessment for a Physical Activity Intervention for Caregivers

Kristen E Somma

Mentor: Das, Bhibha Mayee

Introduction: Informal caregivers provide care to people who cannot take care of themselves. They are not paid for their work, and it is often so time consuming that they cannot work another job to earn money. This, in addition to the stress of the job, leads to a poor quality of life for the caregiver. While informal caregiving can be very rewarding, it can also lead to burden, caregiver burnout, and increased levels of stress, depression and anxiety. Studies show that physical activity has positive impacts on the physical and mental health of the general population. Physical activity reduces levels of stress, depression, and anxiety as well as improves a person's physical and mental health while improving overall quality of life. Purpose: The purpose of this study is to examine what aspects of a physical activity intervention for informal caregivers are feasible and whether it will positively impact their mental and physical health.

Methods: We have conducted a mixed-methods needs assessment to examine types of physical activity interventions that caregivers may be interested in. We surveyed 17 people via Qualtrics that met the inclusion criteria of being 18 years of age or older, speak English, and had been an informal caregiver either currently or in the past. Demographic questions were asked to obtain participant representation mirroring the U.S. caregiving population. Survey questions included items on physical activity feasibility, acceptability, and effectiveness.

Results: Fourteen of the 17 caregivers mentioned their occupation having negative impacts on their mental, physical and emotional health. They reported having little time for exercise but were interested in a physical activity intervention. Ten

participants preferred to have virtual physical activity programs and 11 said they would prefer for the programs to be provided in a group setting.

Discussion: A physical activity intervention would improve the quality of life of the caregivers as well as their care recipients. Improving the mental and physical health of caregivers by decreasing caregiver burden, anxiety, depression and stress, as well as increasing their levels of physical activity will improve their quality of life. It was found that a virtual, group program consisting of aerobic classes, walking and strength training would be the most beneficial.

4/3/23 9:30-10:30

The Relationship Between Breastfeeding and Postpartum Depression

Kendall Lynn Tingen

Mentor: Wagner, Jennie Maria-Nora

Background: Postpartum depression is a psychological complication experienced by the mother post-childbirth, and the time it lasts varies from woman to woman. This mental health disorder is diagnosed by a healthcare provider and can be treated. It is important to note that postpartum depression can occur in mothers regardless of being previously diagnosed with depression. It typically presents anxiety, excessive sadness, feelings of loneliness, mood swings, panic attacks, and more. For moms who have never previously experienced depression, it can be a very intimidating. The main issue with this topic is that it does not have efficient advocates to speak about what it entails. Researchers have begun to study this psychological complication due to its specific nature (postpartum) and the way that it affects each woman differently. **Purpose**: This study aims to examine the evidence gathered by researchers to further explain the correlation between breastfeeding and mother's mental health. This information will focus specifically on the relationship between breastfeeding and postpartum depression (PPD). **Methodology**: An Integrative Review will be conducted with the purpose of including non-experimental research to answer the proposed research question. An exhaustive review of the literature has been conducted with the assistance of HSL Liaison Librarian Amanda Haberstroh, information extracted from the Whittemore and Knaff (2005) article, and the Covidence systematic review software package has been employed to assist in the analysis. The Integrative Review is a robust statistical analysis to examine the research question, "*What are the psychological effects and correlation, both positive and negative, that breastfeeding has on mothers in association with postpartum depression?"* This analysis will add to the current body of literature regarding human lactation. The goal is to do a poster presentation for Sigma Theta Tau (Spring 2023) and ultimately

submit my honor's paper for publication in a nursing journal. **Results:** 1,556 articles were reviewed and 46 were extracted from the Covidence Database using specific inclusion criteria. Out of the 46 total articles, 28 will be utilized in the final analysis. There has been sufficient information discussed regarding the relationship between breastfeeding and postpartum depression that will give insight into the correlation between them. The proposed Integrative Review is currently ongoing.

4/3/23 9:30-10:30

Monkeypox Vaccines: Importance of the Vaccina Virus O1L Gene

Marina Nichole Boatman

Mentor: Roper, Rachel L and Fan, Ming

While smallpox virus has been eradicated since 1980, poxvirus infections have remained prevalent to this day, as shown by the worldwide monkeypox outbreak occurring in 2022-2023. Research has shown that poxviruses have large viral genomes that encode various proteins with the ability to control infected host cells' physiology and immune responses. Vaccina virus, the vaccine used for protection from smallpox and monkeypox (mpox), encodes a large protein (O1L/OPG074) with little research conducted on its function and capabilities. Our lab constructed O1L deletion mutant viruses to aid in the study of its function, and we have shown that the mutant is less virulent making it a safer vaccine option. However, our data have shown that O1L does not affect replication or spread of the Vaccina virus in vitro. To further explore the possible functions of O1L, we now assess the environmental stability of the wild type and O1L deletion mutant viruses to determine whether the presence of O1L increases the stability of virus particles, thus creating a higher chance of spread to humans/animals. Currently, the ÆO1L mutant has been tested for stability under various conditions, including proteases, changes in acidity levels, and different temperatures over time. Our data suggest that O1L protein may increase virion stability and contribute to virus survival in the natural environment, giving it a selective advantage. These results will increase our understanding of the O1L gene/protein functions and why it is highly evolutionarily conserved in poxviruses.

4/3/23 10:45-11:45

The novel function of PUF-9 RNA-binding protein in C. elegans Parkinson model

Savannah Jean Marie Lipski, Mariah Jones

Mentor: Lee, Myon Hee

Neurodegeneration refers to a significant loss of functional neurons, which is present in neurodegenerative diseases such as Alzheimer's (AD) and Parkinson's disease (PD). Despite considerable progress in our understanding of neurodegeneration, how to integrate this information to gain fundamental insights into the molecular mechanism is still severely lacking.

The long-term research objectives are to identify key regulators of neurodegeneration using the nematode *C. elegans* as a model organism. Although the *C. elegans* is an invertebrate, they contain a well-studied nervous system. Its nervous system has extensively been characterized and found to be similar, in structure and function, to mammals. Their nervous system has been completely mapped, laying out the various neurons and their interactions within the animal. Specifically, PD is a neurodegenerative disease that is the result of dopaminergic neuron cell death. In addition to this loss of DA neurons, there is an accumulation of Lewy bodies. Lewy bodies are classified as clumps of protein such as aggresomes. Lewy bodies are a common phenotype in neurodegenerative disorders in humans. In PD, α-Synuclein (α-Syn) has been identified as the primary protein that Lewy bodies are comprised of. α-Syn proteins are mainly expressed in the brain at presynaptic terminals, but it is not naturally expressed in the *C. elegans.* Notably, overexpression of alpha-synuclein (a-Syn) in *C. elegans* dopaminergic neurons mimics key symptoms of PD patients, including neurodegeneration and abnormal behaviors. Using this model animal, we have identified PUF-9 RNA-binding protein as a potential regulator of PD. PUF-9 protein is a conserved post-transcriptional regulator, but its role in neurodegeneration has not yet been reported.

Using multiple approaches, we found that *puf-9(ok1136)* mutation significantly delays a-Syn-induced neurodegeneration during aging. Expression analysis using CRISPR/Cas9-*puf-9::gfp* worms reveals that PUF-9 is highly expressed in the intestine and hypodermis, but not highly expressed in dopaminergic neurons. These preliminary findings led us to test the hypothesis that PUF-9 may induce PD phenotype non-cell autonomously. Our ongoing genetic experiments will elucidate the novel function of PUF-9 in a-Syn-induced neurodegeneration. Since PUF-9 is highly conserved in most eukaryotes, a similar mechanism may control neurodegeneration (e.g., PD) in other organisms, including humans.

4/3/23 10:45-11:45

Health Coaching Course Data Analysis and Evaluation

Maya B. Cowan

Mentor: Das, Bhibha Mayee

ECU has a strong commitment to training healthcare providers to serve ENC, yet has no course integrating interdisciplinary learning to provide undergraduates with health coaching training. Health coaching uses evidence-based knowledge and strategies to encourage individuals to engage in health behavior change to improve health through self-management strategies. Notably, the same knowledge, skills, and attributes that make a successful health coach are critical for success as a health care provider. It is imperative to develop, implement, and evaluate an interdisciplinary health coaching course to prepare pre-professional students. The goal of this research is to examine the impact of a health coaching class on pre-professional undergraduates' content knowledge, skills, and attitudes to be successful health coaches.

METHODS: Researchers will analyze knowledge assessment quizzes, self-assessment quizzes, and course evaluations to examine the impact of a health coaching class on pre-professional undergraduates' content knowledge, skills, and attitudes to be successful health coaches.

4/3/23 10:45-11:45

DRUGS CLASSIFICATIONS AFFECTING CHILDHOOD MALNUTRITION AND TIME-TO-RECOVERY IN GUATEMALA

Alexia L. Woodward

Morgan E. Braxton, PhD, RN, PED-BC - Primary Investigator, Arizona State University

Mentor: Larson, Kim L

Background: Malnutrition in Guatemala affects 47 percent of children under 5 years. There is conflicting research on best practice for drug use among malnourished children, and a lack of strong evidence on how drug classifications affect time-to-recovery. The purpose of this study is to explore drug classifications prescribed and their relationship to recovery and specific demographic characteristics in children 0-5 years, with malnutrition at a Nutrition Rehabilitation Center (NRC) in Guatemala.

Methodology: This descriptive correlational study used previously collected data on the drugs prescribed to 155 children treated in a Guatemalan NRC between 2019 and 2020. All medications in the dataset were translated into English and organized into a

matrix by drug classification. Each child cases' prescribed drugs were then coded in SPSS. SPSS was used to evaluate associations between drug classifications and time-to-recovery.

Results: Overall, the most frequently used drug classifications were vitamins (95%), respiratory agents (75%), analgesics (68%), antibiotics (61%), and gastrointestinal agents (54%). Antibiotics, respiratory agents, corticosteroids, analgesics, and gastrointestinal agents were prescribed significantly more in cases with a time-to-recovery ≥ 6 weeks. Antiparasitics were used significantly more often in children > 24 months of age. Antibiotics and neurologic agents were used more often in severe malnutrition cases, and topical agents were used more often in mild or moderate malnutrition cases.

Discussion: Drugs classifications most prescribed are related to common comorbidities of malnutrition and common illnesses affecting children in Guatemala, which include respiratory illnesses, diarrhea, and bacterial infections. Although there were no TTR benefits related to vitamins in this sample, the potential benefit of vitamin supplementation in malnourished children outweigh the risk of overprescribing vitamins. Additionally, the drugs used in the cases with longer recovery times could indicate that those cases had more comorbidities which reflects their increased use of drugs and longer recovery times. Secondary diagnoses were not available for this sample. Because of the potential for antibiotic drug resistance and decreased renal function when overprescribing antibiotics, it may be beneficial to reexamine current recommendations about prophylactic antibiotic use.

4/3/23 10:45-11:45

Evaluating the Impact of Social Media Influencers on Exercise Addiction in College-aged Women

Leah Sky Darby

Mentor: Das, Bhibha Mayee

A large percent of college-aged women spend a significant amount of time per day on social media. Research has demonstrated that spending a large amount of time on social media has a negative impact on self-esteem and confidence levels in women's everyday life due to encouraging comparison and unrealistic body standards. A specific niche in the social media space is the current popularity of fitness and personal training influencers. With social media increasing in popularity and everyday use, fitness and personal training influencers continue to become increasingly more common. Those who exercise regularly may be at a higher risk for developing

compulsions related to exercise, or an unhealthy obsession with physical fitness and exercise. These compulsions may also be driven by social media and its influences. Therefore, there is likely to be a link between time spent consuming content from fitness influencers and rates of exercise addiction. The purpose of this pilot study is to determine the relationship between women's exercise routines and social media. Women aged 18-25 will be asked to fill out an anonymous questionnaire about their habits regarding time spent exercising, time spent on social media, what types of content they consume, and what kinds of accounts followed on social media. Results will be shown in terms of correlation between the variables. Findings may be used to develop programs to help women manage exercise behaviors in healthful ways.

4/3/23 10:45-11:45

The Community Resiliency Model and Community Well-being

Michaela Elmore

Mentor: Matthews, Jennifer Cremeens

The Community Resiliency Model (CRM)® is a research-informed biological model of intervention based on emerging neuroscience that teaches participants wellness skills to reset the natural balance of the nervous system. CRM teaches six wellness skills that can be easily integrated in one's daily life in various settings across diverse cultures. Research on CRM has shown promising results in improving mental well-being across several population groups, including the community, but few studies include long-term follow-up. This research study will evaluate the effectiveness of using the CRM wellness skills to stabilize the nervous system and improve well-being among community members, in addition to their perceptions of the usability of the wellness skills to increase resiliency. In turn, we hope to better equip workshop participants with the skills needed to regulate trauma and employ effective resiliency mechanisms.

The intervention is a 3-hour experiential workshop that teaches participants about adverse life experiences, stress, and trauma, and common reactions to stress, adversity, and trauma. The intervention introduces participants to the Resilient Zone, or "Ok Zone," to help them understand their capacity to handle life's stressors. The intervention teaches participants about the neuroscience behind trauma and stress and introduces six wellness skills that can be easily learned and applied in various settings and across multiple cultures. Lastly, the intervention guides participants through the process of creating a self-care plan to widen their Resilient Zone and become more resilient.

CRM workshops were offered at various times throughout the year. Individuals self-registered for the CRM workshops. During the registration process, individuals provided their name and email address to receive a link to an online pre-test survey. Immediately following each workshop, participants were urged to complete a post-test survey. One-month and three-month follow-up surveys, with reminders, were sent subsequently.

Results that determine the effectiveness of CRM workshops in the community setting are to come pending analyzation and interpretation of the survey responses.

4/3/23 10:45-11:45

Introduction of Gender Affirming Care to the APRN Curriculum

Carly Marie Hebert

Mentor: Spain, Renee O

This research will aid in implementing gender affirming care education for the advanced practice nursing curriculum at a southeastern state university. Throughout this research, a refined curriculum will be created to best prepare students and eliminate the negative stigma around the LGBT community in healthcare.
Gender affirming care consists of medical, social, and psychological interventions that support an individual's gender identity. Healthcare providers today have not been receiving education regarding how to provide equal and exceptional care to patients who identify as transgender. The advanced practice nursing curriculum does not currently include gender affirming care in the reproductive health care portion of the curriculum. The lack of education on gender affirming care is not strictly isolated to one school or program, but rather a nationwide issue. Due to the lack of education, there continues to be a negative stigma surrounding the LGBT community in nursing. The data for this research will be obtained through quasi-experimental methods. A pre and post survey will be administered to advanced practice nursing students. The pre-survey will be conducted prior to the students being educated in gender affirming care during the reproductive curriculum. The students will then complete the course including gender affirming care, and then will take a post-survey. They will be asked about their attitude towards gender affirming care. The data obtained from the pre- and post-survey will be compared to evaluate the addition to the curriculum. Participation in the surveys is voluntary and will not influence student grades. All students will receive the same curriculum regardless of participation in the study.

4/3/23 10:45-11:45

The Unmet Psychosocial Needs of Patients with Sickle Cell Disease from the Perspectives of Family, Patients, and Caregivers

Quinton Direll Braswell, Julie Danielle Doran

Mentor: Smith, Aimee West

Introduction

Sickle cell disease (SCD) is an inherited blood disorder that affects approximately 200,000 people in the United States each year (Centers for Disease Control [CDC], 2021). Patients with SCD overcome many obstacles in their everyday lives, including accessing healthcare for treatment. With most of the focus of research involving treatment of SCD symptoms, their psychosocial health is oftentimes overlooked. To address this gap in research on the psychosocial needs of those with SCD, this study aimed to: 1) identify the most common concerns that patients, caregivers, and medical providers have regarding patients' psychosocial needs, and 2) compare these three groups to see if there are differences in what are considered the most important concerns.

Methods

Participants are healthcare providers, patients (ages 12-30) with SCD, or caregivers of patients. Participants completed an online survey that asked about the unmet psychosocial needs of patients with SCD. The survey listed potential concerns in three main areas including medical, social, and mental health concerns, as well as open-ended questions that allowed participants to elaborate on any needs that the survey may have missed or other concerns. Data collection is ongoing, but once finished, all data will be analyzed.

Results

Among patients with SCD, qualitative data analysis revealed that one of the most common themes was associated with mood swings caused by SCD symptoms. The analysis also revealed that financial concerns were common among patients with SCD and their families. Many caregivers of youth with SCD expressed the emotional toll that SCD has on the caregivers themselves. Parents expressed feeling overwhelmed from balancing everyday life with the demands of caring for someone with SCD. Many of the patients and caregivers also expressed that they had no concerns.

Conclusion

The findings from this study have revealed themes that are consistent among patients with SCD and their caregivers. Healthcare professionals could work to provide

supports for this population in line with the concerns participants expressed. For instance, they could offer workshops for parents that provide them with strategies to support their children with SCD to reduce feelings of uncertainty in being there for their children. Findings from this study also indicated that many participants didn't have any concerns regarding their care, which may mean that they are satisfied with their psychosocial care.

4/3/23 10:45-11:45

Groundwater Quality Improvements at a School in Eastern North Carolina after Installation of a Permeable Reactive Barrier

Lucas Colby Mebane, Mike O'Driscoll, Guy Iverson

Mentor: Humphrey, Charles Pittman

There are approximately two million onsite wastewater systems (OWS) in North Carolina that provide soil-based treatment of wastewater for half of the State's population. Wastewater contains elevated concentrations of environmental pollutants including nitrogen. Prior studies have shown that many OWS are efficient at oxidizing nitrogen, but groundwater plumes enriched with nitrate (NO_3) may extend beyond required setback distances to surface waters and/or wells creating various environmental and public health risks. Previous groundwater monitoring near the OWS drainfield of a school in Eastern North Carolina showed NO_3 concentrations routinely exceeded the 10 mg/L groundwater standard. In 2014, a permeable reactive barrier (PRB) was installed between the OWS and monitoring well (with elevated NO_3) to enhance nitrogen removal via denitrification. The PRB was constructed by excavating a trench with the approximate dimensions of 1.2 m wide x 6 m long x 8 m deep. The bottom of the trench was excavated below the water table. Woodchips were used to fill the bottom 2 to 3 m of trench, and the rest of the trench was filled with the excavated soil. The woodchips were used as a carbon source for denitrifying microorganisms. Groundwater samples were collected from the well and analyzed for NO_3 three times each year (2005- 2023) following the installation of the PRB. Groundwater NO_3 concentrations were lower post (most < 10 mg/L) relative to pre (mean = 12.8 mg/L) PRB installation. Additional ground water monitoring samples collected in December of 2022 to assess changes in the PRB's NO_3 removal effectiveness indicate preliminary findings that PRBs may be effective practices for reducing the groundwater transport of NO_3 for many years with little to no maintenance.

4/3/23 10:45-11:45

Nurses' Use of Chiropractic for Relief of Back and Neck Pain

Regan Taylor Vellan

Mentor: Gantt, Laura T

Purpose
Because of the physical demands of the profession, nurses often experience back and neck pain. Chronic pain can affect productivity at work and push nurses to seek less taxing positions. With an increased demand for nurses, the wellbeing of these healthcare workers must be taken into consideration to maximize retention, patient care, and job satisfaction. Few studies exist that describe nurses' use of chiropractic therapy to manage back and neck pain. This study sought to fill that gap.

Methodology
The primary investigator had permission to recruit nurses from one chiropractic office in Greenville, North Carolina. Those sought for this study frequented a chiropractor when dealing with back or other areas of discomfort and had work-related musculoskeletal pain. Narrative inquiry was employed for the study and participants engaged in one face-to-face interview in the chiropractic office.

Results
Six women ages 45 to 70 were recruited by word of mouth and reference from the chiropractors. Participants had experience in the nursing field and a nursing degree, but not all were still in nursing practice. From the interviews, nurses' experiences with back and neck pain before and after chiropractic were revealed. Chiropractic proved to be a beneficial treatment for those suffering pain who were both in and out of work. Nurses described the healing process as gradual, but all participants benefitted. The nurses still in practice mentioned that chiropractic improved their productivity at work; lifting and turning patients became easier. By going to a chiropractor, they received therapy ranging from adjustments to interferential therapy along with insights on nutrition and stretching.

Discussion
Nurses' self-care is a frequent topic in current literature. However, use of chiropractic therapy as a strategy for self-care has received limited attention. Future research related to self-care by nurses should include chiropractic among the therapies nurses may find beneficial.

4/3/23 10:45-11:45

Differences in Neurological Connectivity Between Right and Left Limb Dominant Individuals in Implicit Motor Sequence Learning

Jennifer Lee Painter

Mentor: Mizelle, John Christopher

Limb dominance has a substantial influence on implicit motor sequence learning, a critical aspect of our ability to interact with the environment in a goal-directed way. Current research has concluded that left hand dominant (LHD) individuals are often more bilateral than their right-handed (RHD) counterparts, as LHD individuals were found to utilize neural connections within both the right and left hemispheres of the brain. Thus far, 27 volunteers have been recruited for this study. Thirty healthy male and female volunteers (15 RHD, 15 LHD) ages 18 to 35 years will be recruited to participate. The participants perform all tasks with the dominant hand, and brain activity will be recorded for all tasks using EEG. A fixed 10-element movement sequence was created and inserted in a longer 13-element movement sequence at random locations. Participants will not be told of the repeating sequence. Four white rectangles will be displayed on a screen. When one rectangle turns black, the participant will press the corresponding button on a keypad. EEG activation patterns will be compared across RHD and LHD individuals, and behavior will be assessed by the rate of error reductions during the task. We expect that RHD and LHD will not show different rates of motor learning, but will demonstrate different neural mechanisms for how learning occurs. We also expect more complex, bilateral patterns of motor activity in LHD versus RHD individuals. Studying this fundamental difference in limb dominance and neural connectivity could greatly improve our understanding of human anatomy and physiology. This study challenges the theory of lateralization of brain function by analyzing the differences in neural connectivity between RHD and LHD individuals. This information can be used to determine if alternate treatment methods exist that may be more beneficial for LHD individuals and if the handedness of their healthcare provider is a crucial part of their learning and recovery process.

4/3/23 10:45-11:45

Veteran-centered health care: A mandate for nursing curriculum integration

Olivia Leigh Kingman

Mentor: Fazzone, Patricia Anne

Background/Purpose
The consequences of war can drastically alter the lives and well-being of veterans and their families in physical, emotional, psychological, and spiritual ways that are seen and unseen. The concern for veterans' health and well-being has become a national priority. Nurses and other health care providers often lack the veteran-specific clinical and culturally sensitive knowledge needed to ensure quality care and positive outcomes for this population, that too often leave veterans frustrated and resistant to seeking much needed health care. The ECU College of Nursing has committed to integrating evidence-based, culturally sensitive veteran-centered content throughout the curricula using a three-phase process: 1) literature synthesis and survey development of existing curricula content, 2) survey assessment, and 3) dissemination of findings. The purposes of this Phase I presentation are: a) offer an overview of the relevant synthesis of evidence supporting the need for culturally sensitive veteran-centered care content throughout ECU nursing curricula, b) identify key content domains and themes for inclusion in nursing curricula, and c) highlight the survey generated from the evidence.

Methodology
Methods included a narrative literature review of articles and books published from 2010-2022. Selections were based upon rigor, relevance, and diversity of methods. Search of key databases used the keyword option included PubMed, Ovid, ScienceDirect, CINAHL, MEDLINE, Clinical Key, ProQuest, and Cochrane Library.

Results
Synthesis yielded 11 domains with 67 themes. Domains included military culture, reintegration, TBI, PTSD, physical health, physical trauma/polytrauma, pain management, mental health and family functioning, spiritual needs, general resources and supports, and provider concerns and potential referrals. Domains informed curricular survey development.

Discussion
Evidence supports a professional nursing mandate to effectively address the health and well-being of veterans and their families. Preparing nursing faculty and students to carry out this priority mandate is the focus of this three-phase project.

4/3/23 10:45-11:45

MCH Development & Support - An Evaluation

Peri Katrina Palmer

Mentor: Richman, Alice Rose and Black, Kristin Z.

Background: Maternal and child health (MCH) focuses on health issues affecting women, children, and families, and includes the care that both a mother and her child(ren) receive before, during, and after pregnancy. The Maternal and Child Health Scholars, Training, & Enrichment Program (MCH-STEP) is funded by an MCH Bureau grant-funded training program. It encourages diverse cohorts of undergraduate students (e.g., BIPOC, low socioeconomic status, rural) from 3 units in the College of Health and Human Performance (HEP, SSW, HDFS) to explore the MCH field and educate and train diverse scholars who seek to serve historically marginalized women and children by increasing their access to satisfactory care. Through MCH-STEP, we are raising awareness about the importance of MCH to ECU students, the university, and the larger community. We are evaluating the effectiveness of the monthly seminar components of MCH-STEP employing a mixed-methods approach of close-ended and open-ended survey items.

Methods: Monthly seminars are evaluated by collecting survey responses from attendees. Each cohort attends an average of 8 monthly seminars per year and is highly encouraged to submit survey responses evaluating their experiences. The survey includes 5 close-ended and 5 open-ended questions, and provides feedback regarding things scholars learned, liked, disliked, and any suggestions they may have for future cohorts. The close-ended questions are analyzed to produce mean percentages of how many scholars highly rated the seminar based on the 5 survey questions. The open-ended questions are analyzed by question using a thematic analysis approach.

Results: Using close-ended data (08/2021 – 03/2022), we found that the mean percentage of scholars that reported being extremely or very satisfied with monthly seminar speakers was 90%. About 82% of scholars said that the length of discussion for each seminar was ‘about right’, meaning 18% of scholars thought the time allotted for discussion was too long or too short. Open-ended questions provided scholars with an opportunity to provide feedback. Many scholars mentioned their appreciation for how MCH-STEP opened their eyes to MCH career possibilities beyond the medical field.

Conclusion: We will use this program evaluation data as an improvement strategy for MCH-STEP and have already incorporated feedback into subsequent activities.

4/3/23 2:00-3:05

Neurocognitive Processes in Children During Talk in the Classroom

Denisse Rosales-Mercado

Mentor: Lamb, Richard Lawrence

In elementary classrooms, talk is commonly used by teachers to relay information for learning through whole-group instruction, one-on-one conversations, etc. Due to the frequent use of talk-based teaching methods, it can be proposed that talk is essential to learning in the modern classroom. The purpose of this study is to examine brain neural coupling between the speaker (i.e., teacher) and listener (i.e., student) while engaged in talk-based learning activities. Brain neural coupling is the time-locked synchronization of brain activity that occurs when a speaker's talk is understood by the listener. The study is an observational-stimulus response study taking place in a semi-naturalistic classroom setting. It involved 32 participants consisting of 16 speaker-listener pairs. The participants engaged in 4 talk-based activities with various levels of complexity. Neural responses taking place between the speaker-listener pairs were measured using a functional infrared spectrometer. This study aimed to gain a better understanding of how significant individual differences related to specific student variables impact brain neural coupling and individual student learning outcomes related to differentiation. Results of this study showed significant and predictable brain neural coupling patterns occurring between the speaker and listener when the speaker's talk was successfully understood by the listener. Moreover, results demonstrated how individual differences in cognition impact the occurrence and intensity of coupling between the speaker and listener due to cognitive resources or background knowledge varying between student to student. This study promotes the application of findings in cognitive neuroscience in the elementary school classroom through teaching strategies and pedagogies that consider neural processes occurring during classroom instruction. This study contributes to research findings suggesting the effectiveness of brain neural coupling as a reference system for predicting students' learning outcomes. Future research can focus on how the reference system can be utilized to inform instructional decisions regarding differentiation and accommodation for varied needs of specific student populations.

4/3/23 2:00-3:05

Perspectives of Latino Adults on Cancer Pain, Spirituality, and Advance Care Planning

Kylie Elizabeth Latino

Mentor: Larson, Kim L

Purpose: This research aims to examine the connection between pain, spirituality, and intentions to discuss advance care planning among Latino adults with cancer. **Significance**: Latinos are the largest minority group in the United States and experience inequality in their use of palliative care resources and services. In some states, a component of palliative care is Medical Aid in Dying, which may assist persons suffering from unmanaged pain. The North Carolina legislature is considering a bill related to this, called the End-of-Life Option Act. In addition to eliminating health disparities, the End-of-Life Option Act may impact the field of nursing and palliative care services. **Methodology**: This descriptive study is one part of a parent study entitled, A Community-based Palliative Care Model for Latinos with Advanced Cancer under the direction of Dr. Kim Larson, which trained Palliative Care Lay Advisors to be a community resource for Latino adults with cancer. A secondary dataset was used to address the research question: How does pain and spirituality influence advance care planning among Latino adults with cancer? This data is based on a subset of participants who completed the Edmonton Symptom Assessment System scale, a 12-item spirituality scale, and a 4-item Advance Care Planning scale before talking with Palliative Care Lay Advisors. **Preliminary Results**: We examined a subsample of 11 participants, 6 men and 5 women with ages ranging from 36-72. These participants self-reported their pain as four or greater (e.g., not well managed) at the time of the survey. The initial analysis evaluated how persons with unmanaged pain perceived their spirituality and whether they had discussed advance care planning. Only one of the 11 participants had signed official advance care planning documents. The majority had never thought about it, including participants with the most pain. Still, most participants reported a high sense of spirituality which may have allowed them to cope better with their pain.

4/3/23 2:00-3:05

Relationships of Religious Affiliation, Coping, and Support with Symptoms of Psychopathology in College Students

Daisy Kathleen Edmondson

Mentor: Dolbier, Christyn

Research has shown increases in mental health concerns in college students over the years that have worsened during the pandemic. Identifying factors that are protective in this context can aid in informing prevention and treatment efforts. Religiosity/religiousness has been shown to be generally beneficial regarding mental health, however, less is known about the mechanisms that account for that relationship. Some evidence indicates positive religious coping and religious support

may be mechanisms. No/little research has examined if religiousness is beneficial regarding mental health in college students during the pandemic, and if so, if positive religious coping and religious support are mechanisms. This study aims to investigate the relationships of religiousness, positive religious coping, and religious support with symptoms of depression, anxiety, and post-traumatic stress disorder (PTSD) in college students during the COVID-19 pandemic. Specifically, the objectives of this study are to: 1) examine whether religious-affiliated college students have lower levels of symptoms of depression, anxiety, and/or PTSD compared to nonreligious affiliated students; and 2) if so, examine whether positive religious coping and religious support help account for the relationships observed between being religiously affiliated and lower symptoms.This senior honors thesis project will use pre-existing data from an cross-sectional online survey study that examined psychosocial and demographic risk and protective factors of PTSD during the pandemic (2020-21 academic school year) in a sample of undergraduate students (*N*=769). Psychological symptomology was assessed with measures of 1) generalized anxiety disorder symptoms (Generalized Anxiety Scale-7); 2) depressive symptoms (Patient Health Questionnaire – 8); and 3) PTSD symptoms (PTSD Checklist for DSM-5). Religious affiliation, coping, and support were assessed with a modified version of the Brief Multidimensional Measure of Religiousness/Spirituality. I hypothesize that religious-affiliated college students will have fewer symptoms of depression, anxiety, and/or PTSD compared to nonreligious affiliated students. I also hypothesize that positive religious coping and religious support will help account for the observed relationships between religious affiliation and lower symptoms. Results will aid in improving the identification of at-risk college students and the development of effective coping and support strategies.

4/3/23 2:00-3:05

Surveillance and Dental Health

Alexandra Lynette Marks

Mentor: Moss, Mark Eric

My research project is Surveillance and Dental Health conducted at the ECU School of Dental Medicine; this study investigates the environmental lead surveillance to improve caries risk assessment in primary care. The goal of this study is that leveraging the environmental surveillance system will enhance prevention of dental decay in young children. Tooth decay often occurs in infants, toddlers, and children. The enamel is much thinner on baby teeth which puts them at a higher risk of decay. This study allows us to find ways to prevent dental decay in these younger children.

We have had 30 children come in so far for their oral exam and sample collections. Every child is different, some have very healthy and well-maintained teeth, while others have not visited their dentist in years with multiple cavities and missing teeth. We hope to assemble a cohort of children with existing data on blood lead levels collected at 12 months and 24 months to show the association between lead exposure and dental caries at age 4-8 years. We also will assess the relationship between salivary gland function at ages 4-8 and blood lead values from 1 year old to 2 years old. Finally, we will store the saliva samples and a cheek swab for future research. These steps will overall help us to correlate lead levels to tooth decay and how we can further prevent tooth decay in young children.

The patients of ECU General Pediatrics with birthdates in the range of Jan 1, 2014, to Dec 31, 2018, are eligible to participate in this study. When the patient comes in, we first conduct a single dental health assessment to identify the number of filled teeth, decayed teeth, and missing teeth. The plaque score and the Gingival health will be assessed visually. The height and weight of the child will be measured. The biospecimens collected include a cheek swab, saliva sample, Cari Screen plaque sample, and Sill-Ha sample. The exfoliated primary teeth will be examined (if available) and the sterile toothpick plaque samples from 6 buccal/facial sites will be taken.

I have been going to Ross Hall weekly during the fall and spring semester to work on this dental pediatric research project. We have been working diligently on finding eligible participants and collecting data. We have our IRB created and approved, which contains a lot of important information on this topic and our next steps.

4/3/23 2:00-3:05

Rural Dwelling Women Living with HIV in the South: Facilitators and Barriers to HIV Care

Justine Nakanishi Caskey

Mentor: Caiola, Courtney Ellis

Currently, the Southern states in the United States (US) are facing an epidemic of HIV that disproportionately affects the region more than any other region of the country. Southern rural communities have the highest proportion of new diagnoses of HIV compared to all other regions in the US. Additionally, women living with HIV (WLWH) were found to have lower viral suppression rates compared to all other people diagnosed with HIV. The purpose of this project was to determine the facilitators and barriers to HIV care engagement and antiretroviral (ART) medication

adherence for WLWH who reside in rural areas of the Southeast region of the US. This qualitative descriptive study utilized secondary data collected in my project mentor's parent study titled "*Modeling perceptions of social location and decision-making to develop targeted messaging promoting HIV care engagement and ART adherence among women living with HIV in the South*" [NIH/NINR: 1R21NR020164] The parent study included 40 in-depth interviews using a semi-structured interview guide with WLWH from the Southeast region of the US. Nine (N=9) of the 40 women interviewed, the sample for this project, reported residing in a rural area based on their zip code of residence and the US Census designations for urbanized locations. Using first level in vivo coding and second level pattern coding, analytic lines for further thematic analysis of the entire data set were identified in collaboration with my project mentor and organized under the overarching categories of either facilitators or barriers to HIV care engagement and medication adherence. For WLWH in rural areas, the themes identified as facilitators were accessibility to care: personal resources and structural facilitators. The themes identified as barriers were lack of accessibility to care due to proximity, lack of accessibility to care: personal resources, structural barriers, lack of social support, and issue of anonymity. These findings differed from the findings in a review of the literature. The literature identified the main rural facilitators as social support and telemedicine and the main rural barriers as HIV-related stigma and confidentiality concerns. Therefore, this research adds to the literature on the specific experiences of rural dwelling women living with HIV in the South and can assist in developing strategies that may enhance their engagement in HIV care and adherence to ART medications for this population of women.

4/3/23 2:00-3:05

Fresh Start Program at ECU

Jenny Bryant Harris

Mentor: Elliott, Daniel Wayne

North Carolina is one of the leading states with the highest cases of diabetes. Diabetes is where your body either doesn't produce enough insulin or doesn't use it productively. The Fresh Start program aims to help diabetic patients by offering a variety of classes on topics such as diabetes management, carbohydrates, fruits and vegetables, stress, and mental health. This program also offers health coaching that involves weekly check ins. The program also offers fresh vegetables gleaned straight from the field. Fresh Start focuses on physical activity as well as a variety of resources to change the patients diet to manage their blood sugar. Patient participating in this program have shown substantial progress in managing their blood sugar and

complications from diabetes. They also improve their physical activity by practicing the many physical activities given during group classes.

4/3/23 2:00-3:05

Soul Food: An Examination of Physical Activity in Black Women

Jalen J Walker

Mentor: Das, Bhibha Mayee

Overweight and obesity diseases lead to various critical health issues, including heart disease, high blood pressure, and type 2 diabetes. These diseases severely and disproportionately affect the Black female population as obesity rates are increasing at an alarming rate. Studies show that 80.6% of African-American women ages 20+ are overweight or obese and African American women have the highest rates of physical inactivity in comparison to other gender/ethnic groups. With African American women having the highest rates of overweight and obesity related diseases and physical inactivity, it is a public health priority to develop and promote a program to develop and promote weight loss strategies to this underserved population. Intensive Lifestyle Interventions are used as a framework to combat obesity by providing increased physical activity recommendations, reduced caloric intake, and behavior therapy. These interventions have shown success in primarily White populations, but there has yet to be a feasible option provided specifically to the Black female community. Interventions guidelines such as physical activity recommendations and a reduced-calorie diet must be presented in a different manner than the way its traditional way. We have develop a program that not only provides intervention that is feasible and attractive to the African-American females community, but also creating a community amongst this population to continue to promote physical activity and healthier diet choices within the African-American female population. . While ILIs incorporate behavioral counseling, they lack the individualized tailored health coaching and the support for “how” to make the change. Focus group data collected in the Fall 2021 provided data to develop a physical activity and nutrition program for Black woman by Black woman. This program was delivered virtually, due to COVID, to Black women to examine the impact of a tailored physical activity and nutrition program. Each week, Black women engaged in health behavior classes, social media groups, buddy programs, and either a physical activity or nutrition class. Women were provided with a Garmin physical activity tracker throughout the duration of the study and were asked to log their physical activity levels. We will examine physical activity data from the project to determine the impact the Soul FOOD intervention had on Black women’s physical activity levels.

4/3/23 2:00-3:05

Examining stress and quality of life in women who undergo and forgo infertility treatment

Melvin S Swanson, Emily R Thomas

Mentor: Swift, Alison D

Background: Infertility treatments have been known to cause high levels of stress and low quality of life (QoL) in women who experience infertility, or the inability to conceive after a year of unprotected sexual intercourse. Women may discontinue infertility treatments for a variety of reasons; however, relationships between infertility-related stress and QoL have not been examined among women who discontinue or do not initiate treatments. The purpose of this research is to examine infertility-related stress and QoL among women in infertility treatments and women who discontinue, or do not follow through with infertility treatments.

Methods: Using the parent study, infertility-related stress was measured with the COMPI-FPSS tool (martial, social, and personal stress), and the Fertility Quality of Life (FertiQoL) scale to measure 4 core QoL subscales (emotional, mind/body, relational, and social). Results were examined and compared among 70 women who were not receiving infertility treatments and 166 women receiving infertility treatments. Statistical analysis using SPSS software included descriptive statistics, crosstabs, independent t-tests, and a binary logistic regression analysis to examine variables that predicted treatment withdrawal.

Preliminary Findings: No statistically significant differences in infertility-related stress and QoL were found between the two groups. The logistic regression showed the Cox & Snell R^2 =.115 and the Nagelkerke R^2 =.163 for the full model. Three of the predictors were statistically significant, with odds ratios 2.50 for income, 2.49 for QoL dissatisfaction, and 2.40 for infertility duration 3 years or greater. Significant differences were found between the groups' QoL satisfaction rating and health rating.

Discussion: The results from this study found similar levels of infertility-related stress and QoL among women who forgo treatments compared to women who underwent infertility treatments, indicating similar levels of distress among women with infertility, despite their treatment status. Income, three or more years of infertility duration, and QoL dissatisfaction were significant predictors explaining 11.5-16.3% of the variance in treatment withdrawal. Providers should consider emotional support to women who forgo infertility treatments. Future studies should explore

psychological well-being of women who forgo or discontinue infertility treatments and further examine reasons for infertility treatment withdrawal.

4/3/23 2:00-3:05

LoRa Signal Mapping and Modeling for Deployment Planning

Henry H Jones, Braxton Chambers

Mentor: Popoviciu, Ciprian

Long Range (LoRa) is a communication technology rapidly adopted for Internet of Things (IoT) based solutions to environmental and industrial problems, to enable smart city and smart agriculture services. The radio coverage of LoRa gateways in urban and rural areas is dependent on a variety of factors. Understanding these factors and dependencies is critical to planning and managing LoRa gateways and the sensors they would enable. In this project I will collect radio coverage data for LoRa gateways managed by the Center for IoT Engineering and Innovation (CIEI), two in Greenville and two on the coast of North Carolina and map the objective footprints they generate. I will use the data to model coverage and verify the accuracy of predicted coverage. The results of this research will be compiled into an expert system algorithm for guiding the deployment of LoRa gateways. The algorithm will be evaluated in upcoming LoRa gateway deployments by CIEI. The individual coverage maps and the algorithm will be published.

4/3/23 2:00-3:05

Faculty Competency in Nursing Informatics: An Integrated Literature Review

Natalia Grace Biser

Mentor: Nimmo, Mary Jo Bankhead

The use of technology is increasingly prevalent in hospitals, clinics, and other healthcare venues, so nursing programs across the country should integrate it into their curricula by 2022. In 2021, the American Association of Colleges of Nursing (AACN) released new essential core competencies for nursing education, including an expanded informatics domain. Academic integration requires nursing faculty to be competent in technology and informatics to teach the material to students effectively. In addition, the National League of Nursing (NLN) created a vision for nursing education on their changing role in maintaining education about nursing informatics

in the class curriculum. However, a common complaint among students and faculty is that nursing faculty are not knowledgeable in nursing informatics.

The purpose of this integrative review is to summarize the evidence of the nursing faculty's knowledge, competency, and attitudes regarding the benefit and use of nursing informatics in the baccalaureate programs. Understanding the faculty's knowledge of nursing informatics is the first step in adapting nursing informatics into the curriculum. A review is needed to assimilate evidence-based nursing informatics practice into the classroom.

This integrative review was conducted following the PRISMA 2020 guidelines; the level of evidence and quality were analyzed using Joanna Briggs Institute (JBI) Critical Appraisal Tools. A literature search was conducted using the databases Cumulative Index of Nursing and Allied Health Literature (CINAHL), Medline via Pub Med, and ProQuest with the assistance of the University Librarian. Inclusion criteria included articles published in English, international, and academic settings. Exclusion criteria will be articles from nonacademic settings or conference proceedings. The following key terms were utilized during the review of nursing informatics and faculty competency and curriculum: nursing informatics, informatics competency, and nursing faculty. Each article was reviewed for inclusion and exclusion criteria.

The review noted three main themes: lack of knowledge in informatics, barriers to implementing the curriculum, and an understanding of nursing informatics. Each theme was analyzed for areas to implement nursing informatics into nursing curricula.

4/3/23 2:00-3:05

Data at Integrity

Trek Emerson Thorne

Mentor: Swift, Alison D

Cybersecurity is a fundamental piece of any business. No matter how big or small your business is, neglecting to fix your business's vulnerability could have devastating effects on your profits, effectiveness, and success. Unfortunately, small businesses tend to neglect this need in their businesses and only view cybersecurity as a ‘means to an end’. I have partnered with Integrity Church with the mission of finding and fixing most (if not all) of their information technology vulnerabilities. The goal is to not only make sure that Integrity Church is secure from both external and internal

threat actors, but also make their organization run more efficiently. I will be working with four other information and computer technology students throughout this endeavor. The project deliverables are first, running a vulnerability scanner on their network to spot potential vulnerabilities. Second, create a policy for their on-premise cameras that will mitigate as much risk as possible with resources available. Third, setup a network-attached storage (NAS) that will be able to store the cameras' video. Fourth, fix their auditorium access point (AP) that is experiencing consistent below-expected levels of throughput. Fifth, give their employees a presentation on best practices and on some of the most common threats that bad actors will use on organizations. While a vulnerability scan will be conducted at the start of this project, we will also be performing one at the end of each step to make sure we did not make a mistake or expose Integrity's network to other potential threats. By the end of this project I hope to gain a greater understanding for how information technology is put into practical use within small businesses and gain familiarity with the tools we are using to accomplish the above tasks.

4/3/23 2:00-3:05

Type IQ: A Typographic Research & Design Project

Savannah Renae Harris

Mentor: Elliott, Daniel Wayne

Typography expresses meaning not only through the formation of words and phrases, but also through the visual components of how the typeface is designed and how each individual character has unique qualities. The design and characteristics of a typeface determine its application, meaning how it will be used and on what platform, such as print, digital, letterpress, or a combination of platforms. The design characteristics of a typeface are what define it and allow it to be sorted into one of many type classifications. These classifications include but are not limited to the following; serif, sans serif, script, decorative, etc. Each of these classifications have subcategories and have specific uses where they are most successful, depending on the intended message and platform being used. Understanding type characteristics, classifications, and how that affects how a typeface is used is vital to the success of any designer.

Strong use of typography serves as the foundation of any successful piece of design, whether that be a poster, website, logo, etc. It is the responsibility of the designer to have a complete understanding of the connotations and personalities that a typeface can display, and make typographic decisions based on this knowledge to create a successful product. The most efficient way to gain this understanding is through experimentation, research, and application.

The cornerstone of this project is a unique typeface design, created based on a theoretical brand within a specific industry. This typeface is applied to the sample brand to display how the typeface can be used in a real design setting. This application demonstrates how the typeface translates across platforms throughout the brand identity.

4/3/23 2:00-3:05

Pandemic miscarriages: Social determinants of health and patient experiences

Anna Whaley

Mentor: Fernandez, Madeline

Background/Purpose: Miscarriage is considered the most common complication of pregnancy in the US, with 750,000-1,000,000 cases reported annually and 15-20% being clinically reported. Women suffering from a miscarriage are subjected to poor healthcare experiences that are exacerbated by their social determinants of health (SDOH). The purpose of this secondary data analysis was to examine the relationships between the SDOH and the patient experience of women in North Carolina who miscarried during the COVID-19 pandemic.

Methodology: This cross-sectional study examines demographics and the patient experience survey data collected in the mixed-methods parent study. Using SPSS-28, chi-square tests of independence and independent-sample t-tests were conducted to examine relationships between SDOH and the patient experience (good vs. poor).

Results: Over half of participants (52.1%) reported a poor patient experience. Those with higher levels of income and who are employed full time reported significantly better patient experiences. Age, education, insurance, residential area, marital status, and race/ethnicity were not found to be significantly different between women with good versus poor patient experiences.

Discussion: This study's results indicate that there may be some implicit bias within healthcare providers interacting with low socioeconomic status patients. There is an existing evidenced-based relationship between socioeconomic status (SES) and provider implicit bias. This relationship should be continually explored and effective interventions to reduce healthcare provider implicit biases should be developed.

Graduate Student and Postdoctoral Scholar Podium Presentation Abstracts

GPP 1

Cox6a2 in skeletal muscle: a marker of and therapeutic target for chronic limb threatening ischemia

Makenzie G. Kolasa, Emma J. Goldberg, Zoë S. Terwilliger, Reema Karnekar, Thomas D. Green, Ananya V. Pentakota, Feifei Li, Dean J. Yamaguchi, Kelsey Fisher-Wellman, Espen E. Spangenburg, Joseph M. McClung

Mentor: McClung, Joseph Matthew

Chronic limb threatening ischemia (CLTI) is the most severe clinical manifestation of peripheral artery disease (PAD), and is associated with severe limb skeletal muscle myopathy, gangrenous tissue necrosis, and high mortality rates. CLTI is the leading cause of major amputations in the US and there is a need to develop novel therapies. Mitochondria are a key descriptor of CLTI myopathy, although we understand very little about their role in determining disease severity. We developed a lifelong knockout model of Cox6a2, a protein binding subunit in Cytochrome C Oxidase (complex IV of the mitochondrial electron transport system) and a genetic determinant of tissue loss in preclinical models of PAD. We hypothesized that skeletal muscle Cox6a2 is necessary for tissue regeneration after hindlimb ischemia (HLI). Muscle contractile ability, mitochondrial enzyme activity, blood flow restoration, and skeletal muscle morphology were assessed at baseline and after HLI. Cox6a2 deletion using a PAX7-Cre promoter at baseline reduced oxygen consumption rates and enzymatic activity of complexes I, II, and IV in skeletal muscle mitochondria. After 7-days of HLI, genetic deletion of Cox6a2 resulted in further reductions in mitochondrial function and muscle force production, although overall limb blood flow restoration was not impacted further. Extended (28-day) HLI revealed Cox6a2 deletion to be detrimental to limb muscle morphology indicative delays in regeneration from the initial ischemic insult post-surgery. Together, these data indicate that Cox6a2 is required for efficient limb muscle mitochondrial respiration, enzyme activity, and muscle regeneration during acute and prolonged ischemic events.

GPP 2

Postural Control Following COVID-19 Infection: Pilot Data

Brittany Trotter; Kendall Nelson; Delaney Brumback; Sydney Nestor; Dr. Nicholas P. Murray

Mentor: Murray, Nicholas P

Declared a global pandemic in March of 2020, coronavirus disease 2019 (COVID-19) continues to impact our world. While initially thought to exert acute effects primarily on the respiratory tract and lungs, there are increasing reports of individuals experiencing a wide range of long-term symptoms following infection, regardless of the severity of infection or presentation of initial symptoms. Such evidence indicates a more expansive disease course than previously thought. Many of the long-term symptoms illustrate involvement of the central nervous system (CNS) with COVID-19 infection. Interestingly, the presentation of long-term symptoms and evidence of CNS involvement is like that incurred from mild traumatic brain injury (mTBI). An area of impairment that may present following mTBI includes dysfunction in postural control, particularly alterations in postural sway. Given the similarities seen between long-term COVID-19 symptomatology and CNS involvement with that of mTBI, it is pertinent to explore the potential impact of COVID-19 infection on postural control. Thus, the purpose of this study is to investigate the effects of COVID-19 infection on postural control through the assessment of postural sway. We hypothesize that significant differences in center of pressure (COP) velocity will be seen between individuals who have experienced at least one COVID-19 infection and those who have no known history of COVID-19 infection. The following results were obtained from our pilot work of this ongoing study. COP velocity was measured during quiet standing on a force plate in both eyes-open and eyes-closed conditions. Participants were instructed to stand comfortably on the force plate with their gaze focused straight ahead and their arms at their sides. Three thirty second trials were collected for each condition. Significant differences (p = 0.0003) were found in average COP velocity in the mediolateral direction for the eyes-open condition between the COVID (M = 5.44 mm/s) and non-COVID (M = 8.69 mm/s) groups. In addition, significant differences (p = 0.0027) were also found in average COP velocity in the mediolateral direction for the eyes-closed condition between the COVID (M = 6.53 mm/s) and non-COVID (M = 10.03 mm/s) groups. Thus, our pilot data indicates that those with a history of COVID-19 infection display significantly slower COP velocities in the mediolateral direction than those with no history of COVID-19 infection.

GPP 3

Net Charge Distributions from High Energy Heavy Ion Collisions

Mason Alexander Ross

Mentor: Lin, Ziwei

Abstract: In nature, net baryon number and net electric charge are both conserved quantities. Using a multi-phase transport model (AMPT) simulations of heavy ion

collisions, we study the distributions of the net charge and net baryon number distributions versus the particle rapidity (y). In particular, we examine the relationship between the distributions net baryon number or net electric charge and the A/Z values of the incoming nuclei.

GPP 4

CRISPR/Cas9-mediated deletion of FGF Receptor 1 in AgRP neurons results in obesity and impaired glucose metabolism

Daniel Shookster[1,2,3] and Hu Huang[1,2,3]

1: East Carolina Diabetes and Obesity Institute, East Carolina University, Greenville, NC

2: Department of Kinesiology, East Carolina University, Greenville, NC

3: Human Performance Laboratory, College of Human Performance and Health, East Carolina University, Greenville, NC

Mentor: Huang, Hu

Obesity remains a growing epidemic as current treatment approaches have limited success. We have recently identified hypothalamic α-Klotho as a novel metabolic regulator; however, the downstream pathways remain unclear. Using a Cre-dependent CRISPR/Cas9 system alongside transgenic mice to investigate the role of FGFR1 in defined neuron populations of adult mice, we have demonstrated that deletion of FGFR1 in AgRP neurons results in increased weight gain and adiposity, decreased energy expenditure, worsened glucose tolerance, and increased liver lipid accumulation. Mechanistically, deletion of FGFR1 negates pERK signaling and the ability of α-Klotho to reduce fasting-induced AgRP neuron activity in mice. While in hypothalamic cells, knockdown of FGFR1 prevents FOXO1 phosphorylation by α-Klotho, providing evidence of an α-Klotho-FGFR1-PI3K-FOXO1 signaling axis in AgRP neurons. Taken together, our data demonstrate the metabolic role of FGFR1 in AgRP neurons and identify it as a critical regulator of energy and glucose homeostasis.

GPP 5

pH-sensing G protein-coupled receptor GPR68 inhibits proliferation and migration of vascular smooth muscle cells

Madison D. Williams[1], Joshua S. Morgan[1], Michael T. Bullock[1], Cindy Kukoly[2], David A. Tulis[1]

Department of Integrated Physiology and Metabolism, Brody School of Medicine, East Carolina University, Greenville, NC[1]

Department of Internal Medicine, Brody School of Medicine, East Carolina University, Greenville, NC[2]

Mentor: Tulis, David Anthony

Cardiovascular disease (CVD) continues to be the leading cause of morbidity and mortality in the United States and worldwide, despite decades of well-conducted basic and clinical research. Key features of CVD pathogenesis include abnormal proliferation and migration of vascular smooth muscle (VSM) cells, altered extracellular matrix biology, flow alterations with blood pressure changes, and ischemia of downstream tissues. These events lead to decreased oxygen levels in affected tissues and, in turn, promote development of localized extracellular acidosis; however, the regulatory impact of extracellular acidosis on CVD pathogenesis and namely, VSM cell proliferation and migration, is not known. A recently identified G protein-coupled receptor with capacity to sense extracellular proton load is GPR68. GPR68 has shown promise in various experimental settings, yet its regulatory role in VSM cell growth in the context of CVD is not known. This project aims to determine if and through what cellular mechanisms GPR68 controls VSM cell proliferation and migration in the context of CVD. Our hypothesis is that GPR68 inhibits VSM cell proliferation and migration through mechanisms dependent upon actin cytoskeletal proteins as key elements of CVD pathogenesis. Using gain-of-function (growth stimulation; acidosis treatment) approaches in wild type (WT) VSM cells, we found that GPR68 was upregulated in acidic culture media compared to normal media. In GPR68-deficient knockout (KO) VSM cells, results suggest that GPR68 inhibits VSM cell proliferation following growth stimulation and under acidic conditions. We also observed that GPR68 inhibits VSM cell migration following a scratch wounding assay. Additional preliminary results suggest involvement of cyclic AMP-dependent PKA, the actin-binding protein calponin, and collagen in the growth-inhibitory actions of GPR68. These early results provide evidence for continued study and potential therapeutic utility of GPR68 in ischemic CVD.

GPP 6

GammaTile Brachytherapy with 5-Aminolevulinic Acid Fluorescence-Guided Resection in an Adolescent with High Grade Glioma

Julian Gordon (ECU Brody School of Medicine)

Melisa Pasli (ECU Brody School of Medicine)

Cathleen Cook (ECU Brody School of Medicine, Department of Pediatrics)

Rainor Connor (ECU Brody School of Medicine, Department of Radiation-Oncology)

Andrew Ju (ECU Brody School of Medicine, Department of Radiation-Oncology)

Stuart Lee (East Carolina University Health, Department of Neurosurgery)

Kathleen Knudson (East Carolina University Health, Department of Neurosurgery)

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Mentor: Peach, Matthew Sean

GammaTile® (GT Medical Technologies, Tempe, Arizona) is a surgically targeted, FDA-approved source of radiation brachytherapy in patients suffering primary and secondary brain neoplasms. Each tile consists of a postage stamp-sized collagen sponge containing four cesium-131 radiation-emitting seeds designed to provide instant, constant, and dose-intense radiation therapy to a resected tumor bed. Although utilization of this novel therapy is becoming widespread in adult populations, virtually no data pertaining to its use in pediatric populations exists in current literature. Likewise, minimal data is available concerning the use and effectiveness in pediatric populations of 5-Aminolevulinic acid (5-ALA), a fluorescent marker designed to provide intraoperative aid in the identification of malignant tissue for resection. Here we describe the first ever documented case of GammaTile brachytherapy in a patient under the age of 17, simultaneously representing a rare case of 5-ALA utilization in a pediatric patient.

The patient was a fifteen year-old male who initially presented to our institution two years previously, at age thirteen, with seizures. MRI demonstrated a mass in the patient's right occipitoparietal lobe which was ultimately resected and pathologically designated as an anaplastic astrocytoma, WHO grade III. Despite subsequent radiation and chemotherapy, this patient presented again one year later with tumor recurrence warranting a second craniotomy. Pathology at this time was consistent with the previous diagnosis and the patient began salvage chemotherapy. He ultimately presented a third time, one year after the second surgery, for growth recurrence, warranting a third craniotomy with 5-ALA assisted resection and GammaTile placement.

We found 5-ALA to be instrumental in assisting with intraoperative tumor resection and its use did not present any acute postoperative complications, with the exception of having to isolate the patient in darkness for the first two postoperative days. Likewise, GammaTile brachytherapy was superior to conventional external beam radiotherapy, its application was seamless and expeditious, and it was not a cause of any acute postoperative complications. We conclude both 5-ALA and GammaTile to be effective and recommended treatment adjuncts in pediatric populations.

GPP 7

Silencer/Counter-Silencer Interactions Coordinate Virulence Gene Expression in *Brucella* spp.—Role of Zn-Finger Protein MucR as an H-NS-like Gene Regulator

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Mentor: Roop, Roy M

Correct timing of virulence gene expression is critical for successful infection and the persistence of pathogens within the host environment. The global transcriptional silencer H-NS is a nucleoid-associated protein (NAP) that is important for coordination of virulence in many bacteria including *Escherichia coli*, *Shigella*, *Salmonella*, and *Vibrio*. In these bacteria, H-NS-mediated silencing is overcome through direct antagonization via transcriptional counter-silencers that bind to gene promoter regions, displace H-NS, and permit transcriptional activation. *Brucella* spp. and related members of α-proteobacteria lack functional H-NS homologs, so it is unclear whether other proteins are involved in performing analogous functions during host-association and pathogenesis.

Here, we have identified the Zn finger protein MucR as a novel H-NS-like protein that is critical for virulence in *Brucella* spp. We show that MucR directly represses virulence gene promoters in an H-NS-like manner through specific and direct binding to AT-rich DNA regions containing multiple TpA steps. Building on previous work, we show that oligomerization is required for proper MucR activity. Further, we demonstrate the stress-responsive regulator and SlyA-homolog, MdrA, acts as a direct counter-silencer to MucR through competition on virulence gene promoters. Recent ChIP-seq analysis

further identifies >500 MucR target sites within the *Brucella* genome and implicates key virulence activators as additional MucR counter-silencers, including the acid-responsive regulator, BvrR, the quorum-responsive regulator, VjbR, and the master cell-cycle regulator, CtrA. Consistent with the role of MucR as an H-NS-like protein, *hns* from *E. coli* is able to functionally complement *mucR* mutants in *Brucella* spp. Together these data support the role of MucR as a novel H-NS-like protein and highlight the importance of silencer/counter-silencer interactions in the pathogenesis of *Brucella* spp. and related bacteria.

GPP 8

Elucidating the conjoined regulation of the *Chkb-Cpt1b* locus in the development of the eutherian brown adipocyte phenotype

Jonathan Berkuta, Bhavin Patel, Dr. Fanrong Yao, Dr. Brian Shewchuk

Mentor: Shewchuk, Brian M

Obesity is an overabundance of adipose tissue mass caused by excess lipid supply, and is a rising epidemic in the United States associated with multiple co-morbidities. Brown adipocytes (BA) synthesize multiple small lipid droplets to increase triglyceride lipolysis, boosting endogenous mitochondrial fatty acid oxidation (FAO) and fueling thermogenesis. In addition, BAs express high amounts of the crucial thermogenic protein UCP1. This unique gene expression and high FAO capacity have implicated the BA phenotype as a possible therapy for obesity. Interestingly, brown adipose tissue (BAT) has only developed in eutherian (placental) mammals and is not seen in marsupials or prototherians, even though UCP1 is present across both ectothermic and endothermic clades. Carnitine palmitoyl transferase 1B (CPT1B) catalyzes the rate-limiting conversion of long chain fatty acids to acylcarnitine in the FAO process, while choline kinase B (CHKB) catalyzes the first step in phosphatidylcholine (PC) synthesis. Our lab has shown that the *Chkb* and *Cpt1b* genes are conjoined in mice, and that these genes are co-expressed in murine BAT and skeletal muscle through a single 5′ flanking region. Conversely, this conjunction was not observed in opossums, our selected marsupial model. As such, we hypothesize that the loss of functional intergenic sequences in the *Chkb-Cpt1b* locus led to the transcriptional conjoining of these genes in eutherians and contributed to the advent of the BA phenotype. We predict that, with the loss of the ancestral intergenic sequence, the 5′ flanking region of *Chkb* regulates transcription of both *Chkb* and *Cpt1b* in eutherians. Using CRISPR/Cas9 gene editing, we have modified the endogenous *Chkb-Cpt1b* locus in mouse cell lines to resolve how these genes are co-regulated and contribute to muscle and BA cell phenotypes. Understanding the importance of the conjoined *Chkb-Cpt1b* locus to the eutherian BA phenotype may shed light on the regulation of BAT function and thus provide new avenues for obesity therapies.

GPP 9

Sperm Information Games: Rethinking Sperm Physiology Through the Lens of the Reproductive Microenvironment

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Mentor: Schmidt, Cameron Alan

Mammalian sperm gain fertilization competence in the female reproductive tract through a series of biochemical changes and a requisite switch from linear progressive to hyperactive motility. Regulation of sperm energy transduction is poorly understood, despite being essential to fertilization. This knowledge gap confounds interpretation of interspecies variation and limits progress in optimizing sperm selection for assisted reproduction. Here, we develop a model of mouse sperm bioenergetics using metabolic phenotyping data, quantitative microscopy, and spectral flow cytometry. The results reveal an unexpected mechanism of motility regulation by microenvironmental pyruvate as well as rich sperm cell population dynamics that manifest via metabolically 'sensitive' sperm subpopulations. We then develop agent-based computational models to explore the emergent properties of phenotypic diversity in sperm subpopulations. We conclude that re-framing sperm physiology in the context of cell population dynamics and microenvironmental conditions is the key to building more accurate predictive models and developing innovative technologies for sperm selection during assisted reproduction.

GPP 10
Social regulation of the A11 Dopaminergic Region in Zebrafish (Danio rerio)

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Mentor: Issa, Fadi Aziz

Aggression facilities the formation and stabilization of social relationships. Despite its social benefits, persistent aggression is stressful psychologically and physiologically.

Aggressive animals are recognized as dominants and have priority to resources, while animals that display submissive behavior are recognized as subordinates. How social stress induces morphological plasticity of brain nuclei, involved in regulating motor circuits, is poorly understood. Here we investigated the effects of socially induced stress on the morphological plasticity of hypothalamic dopaminergic A11 nucleus, using adult male zebrafish. The A11 is an integration center of multimodal sensory social cues, and its dopaminergic neurons project caudally into the spinal cord to regulate the Mauthner mediated startle escape and swim behaviors. We hypothesized that the A11 is prone to socially induced plasticity that would influence the modulation of motor behaviors in a social status-dependent manner. We found the sensitivity of startle escape was significantly enhanced in submissive animals compared to dominants or communals (control); while swimming was significantly reduced in submissive animals compared to dominants. Histological analysis using*Tg[DAT:eGFP]* transgenic line with targeted eGFP expression in dopaminergic neurons showed no significant differences in the number of A11 cells after 7 days of social interactions. After 14 days, there was a significant increase in the number of A11 neurons in dominant animals compared to subordinates and control groups. These results suggests that chronic social stress correlates with A11 cell number differences and motor activity. Additionally, we stained brain tissue samples of all social groups with PSD-95 to assess whether socially induced aggression causes a change in axosomatic synaptic connections, correlating with differences in cell number. Results showed a significant increase in PSD-95 expression in subordinates compared to dominant animals. We predict that morphological plasticity in synaptic interconnectivity likely induces status-dependent functional differences of A11 cellular activity. Results from this project improves our understanding of how aggression induces morphological and likely functional plasticity of decision-making networks and highlights the importance of dopaminergic descending tracts in humans and how stress-induced plastic changes may lead to mental health disorders including depression and anxiety.

GPP 11

Biochemical and HDX Studies of the SNP Y649C in Human Platelet 12-Lipoxygenase Linked to a Bleeding Disorder

Rachel Lee Signorelli

Mentor: Offenbacher, Adam Richard

Human platelet 12-lipoxygenase (12-LOX) is an enzyme responsible for the formation of oxylipin products that play an important role in platelet aggregation (thrombosis). Single nucleotide polymorphisms (SNPs) of 12-LOX lead to mutant proteins that have been implicated in a number of human diseases. For example, a 12-LOX SNP, which generates a tyrosine-to-cysteine mutation at a buried site (Y649C), was previously

linked with reduced levels of 12S-HETE production in isolated platelets. The purpose of the presented work is to understand the structural and dynamical consequence of this protein mutation. Towards this goal, we performed hydrogen-deuterium exchange mass spectrometry (HDX-MS) and differential scanning calorimetry (DSC) on wild-type 12-LOX and compared it to the Y649C 12-LOX variant. The HDX-MS data revealed structural changes in the peptide mobility at the site of mutation. These results were complemented with the DSC data which revealed a significantly reduced enthalpy of unfolding for the Y649C mutation, suggesting a destabilization of the protein. This increased instability for the Y649C mutation also influenced the regional peptide flexibility at an arched helix that lines the substrate binding site, located more than 15 Å from the site of mutation. Our results are consistent with a dynamic 'allosteric-like' network model for the enhanced protein flexibility stemming from the tyrosine-to-cysteine mutation in 12-LOX. These data provide new structural insights into the impact of 12-LOX SNPs in platelet biology.

GPP 12

Multi-Technique Determination of Fibrin Fiber Diameter

Heather Ann Belcher

Mentor: Hudson, Nathan E

A fibrin fiber network provides the main structural component of blood clots. Fibrin monomers are created when a portion of the blood protein fibrinogen is cleaved by the enzyme thrombin. Fibrin monomers then bind together, forming protofibrils, which then grow longer and laterally aggregate until they form a 3-dimensional network. Altered fibrin structure is linked to several diseases, such as myocardial infarction, ischemic stroke, venous thromboembolism, diabetes, and COVID-19, so being able to accurately determine fiber structure and the effect varying conditions have on the structure is critical to further understanding these diseases. However, several different techniques are commonly utilized for studying fibrin structure, and comparing results obtained with different techniques can be challenging due to a lack of standardization.

This work investigates the diameter of fibrin fibers using scanning electron microscopy (SEM), super-resolution fluorescence microscopy, and turbidimetry (turbidity measurements over several wavelengths), with four commonly utilized turbidimetric approaches analyzed. This was done for a range of physiological concentrations (fibrinogen concentrations of 0.5, 1, 3, and 5 mg/mL and thrombin concentrations of 0.1, 1, and 5 NIH-U/mL) to determine how the diameter reported by the different methods varies with changing clot conditions.

We find that the diameter values obtained using SEM and super-resolution imaging agree within 10% for nearly all conditions tested, but that the agreement between the diameter values obtained using the different turbidimetric approaches are highly dependent on the approach used, experimental settings, and clot conditions. We propose a post hoc adjustment to the best overall turbidimetric approach which brings the diameter within 10% of those from SEM for nearly all investigated clot conditions.

We recommend 1 mg/mL fibrinogen and 0.1 NIH-U/mL thrombin become standard concentrations for experiments analyzing fibrin fiber structure with purified fibrinogen, as it results in less than a 3% difference in diameter values obtained using SEM, super-resolution imaging, and turbidimetry (with the proposed adjustment).

GPP 13

Defining mechanisms underlying tissue fragility in AEC

Maddison N. Salois

Mentor: Koch, Peter J

Approximately one in ten Americans are affected by a rare genetic disorder. Although the total number of affected individuals is high, each individual disorder is represented by only a small number of patients. Consequently, many disorders remain poorly understood and effective treatments are generally unavailable. Our laboratory studies how mutations in the transcription factor *TP63* lead to severe skin erosions in ectodermal dysplasias, specifically in ankyloblepharon ectodermal dysplasia and cleft lip/palate (AEC). These painful erosions subject patients to life-threatening infections and negatively impact their quality of life. To investigate the mechanisms contributing to the devastating skin fragility, we have developed an *in vitro* system to investigate the molecular effects of TP63 mutations in keratinocytes. To this end, we isolated skin fibroblasts from patient skin biopsies and reprogrammed these cells into induced pluripotent stem cells (iPSC). We generated three iPSC lines carrying different TP63-AEC mutations. Using CRISPR/Cas technology, we then corrected the disease-causing mutations, thereby creating pairs of patient and gene-corrected cells that differ only in the presence/absence of a TP63 mutation. Next, we differentiated these iPSC into keratinocytes (iPSC-K) using a method developed by our laboratory. These cells were used in RNAseq, qRT-PCR and Western blot analysis to determine abnormalities in gene and protein expression. Initial results indicate severe defects in cell-cell and cell-extracellular matrix (ECM) adhesion of AEC iPSC-K, which would be consistent with the observed skin fragility. These in vitro findings were further validated on AEC patient skin, confirming downregulation of several desmosomal and hemidesmosomal adhesion proteins. I hypothesize that the epidermal phenotype of AEC patients is caused by a combination of cell-cell and cell-ECM adhesion defects. Mechanistic studies

will address which of the deregulated adhesion proteins contribute to adhesion defects in patient iPSC-K. Additionally, I will use single cell RNA sequencing to identify gene regulation and signaling defects in mutant and gene-corrected iPSC-K cultures subjected to in vitro differentiation. We hope that a better understanding of the pathology of AEC skin fragility at the cellular level will eventually contribute to the development of therapies and improve patient quality of life.

GPP 14

Analysis of Different Types of Bracketing and Their Ability to Track Lung Tumor Motion

Wesley Andrew Belcher

Mentor: Jung, Jae Won

Lung cancer is the deadliest type of cancer. A treatment option for lung cancer is radiation. Radiation treatment for lung cancer is complicated by respiratory motion. During the breathing process a patient's lung tumor will move as a result of the breathing. In radiation therapy it is crucial to accurately have the radiation beam on the tumor throughout treatment. Otherwise, the radiation can damage the healthy lung tissue and could even cause the lung to quit functioning. There are multiple ways to compensate for the lung tumor motion. Fiducial marker directed lung tumor tracking is one such method and it does not require the patient to be capable of performing a breath hold. Fiducial marker tracking accuracy is reliant upon fiducial motion being similar to tumor motion. This study will show how fiducial bracketing affects the fiducial's accuracy in tracking tumor motion. The bracketing affect was checked for upper and lower lung tumors separately. The study included 27 patients consisting of 20 upper lung tumors and 7 lower lung tumors. The fiducials and tumor had their center of mass (COM) found in every phase of the breathing cycle. All possible centroids of different fiducial combinations were found to see which centroids were closest to the tumor's COM and which centroid kept the most consistent distance from the tumor's COM. After looking at the centroids of interest it was found that the tumor was tracked best when there was superior/inferior and or anterior/posterior bracketing. Upper lung patients had better tracking with anterior/posterior bracketing and lower lung patients had better tracking with superior/inferior bracketing.

GPP 15

The Effects and Mechanisms of Lactate and Protons on the Human Umbilical Vein Endothelial (HUVEC) and Murine Melanoma (B16F10) Cells' Migration, Adhesion, and Attachment.

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Mentor: Yang, Li

Rapidly growing cancer cells and tissues adapt to a lack of nutrients and energy supply through increasing rates of aerobic glycolysis (the Warburg effect). As a result, lactic acid is produced in large amounts and transported across the cell membrane through special symporters. Lactic acid is a strong acid and therefore will dissociate to lactate ions and protons at physiological pH 7.4. The two components of lactic acid have tumor-modulating effects, and lactate uptake in tumor cells occurs in a pH-dependent manner, besides, the important role as an oncometabolite in the metabolism of cancer cells. It was found that high lactate levels in the serum and the inability to normalize those levels have been strongly correlated with unfavorable outcomes in cancer patient care, which makes lactate no longer considered a waste product of glycolysis. The high levels of secreted protons promote acidosis in the tumoral microenvironment. The accumulation of lactate and protons in the extracellular region of the tumor cells is a hallmark of cancer. The reveal of the actual role of lactate and protons in carcinogenesis will support more accurate and effective therapeutic approaches for cancer. In this project, the effects of lactate and protons on endothelial and cancer cell migration behavior are studied by investigating the biological pathways and signaling transduction proteins related to the endothelial cells' migration and cancer cells' metastasis. The effects of different lactate and proton levels on cell migration for normal and transformed cells were investigated. Our preliminary results showed an increase in the cell length and the number of protrusions for both normal and transformed cells, under an acidic microenvironment. The cellular migration rate of both models was reduced when treated with high lactate concentrations under low pH treatment. Immunocytochemistry (ICC) was performed for the treated cells to study the possible changes that occurred on the location of the major signal transduction proteins of interest: P-FAK, P-Paxillin, and Actin. Preliminary results showed higher expression and relocation of P-FAK and P-Paxillin when treated with high levels of lactate and acidic pH, besides a high increase in the actin localization.

GPP 16

Confocal imaging and quantitative analysis of 3D morphology of human neutrophils

Lillie Dawn Huffman

Mentor: Hu, Xin-Hua

Neutrophils are one of the first responces of the human immune system agains infection. Once pathogens invade a human organ and circlating system, neutrophil

production is increased in responce to the pathogen induced infection with different degrees of maturity for neutrophils released into the circulating system. Mature neutrophils have different morphology charcterized by segmented nucleus that may have two to five lobes. Imature neutrophils (also known as band neutrophils) do not develop such segmentations of nucleus ath are typical in the mature ones. When doing a test of a complete blood count (CBC) in a clinic, the results only shows the number of neutrophils without any information on degree of maturity, which is an important marker for diagnosis of bacterial infections. To develop a quantitative approach for assay of neutrophil morphology on their degree of maturity, we have investigated 3D morphology of neutrophils extracted from human subjects by confocal imaging of about 150 neutrophils with different degree maturity. This will allow us to profile quantitatively the morphology of human neutrophils and correlate morphological features to teh degree of maturity of these cells. The granulocytes extracted from different peripheral blood samples were stained with the flourescent dyes for nucleus and mitochondria. by utilizing a laser scanning microscope (LSM 510), a s-stack is acuired on selected cells suspended in PBS solutions. Each acuired confocal image stack is imported into an in-house developed software. This software segments stainded organells of the imaged cell ine each image slice of a stack for 3D reconstruction. This process produces twenty-seven morphological parameters, such as cll volume, cell surface area, nucleus volum, and nucleus surface area. A p-tes is preformed on these parameters of different neutrophils to identify those that are different between mature and immature neutrophils of statistical significance. The results provide a foundation for our future research on development of new methond to rapid and quantitatiely assay human neutrophils of different maturity conditions for accurate diagnossis of bacterial infections against viral infections.

GPP 17

Oligomannose N-glycans Promote Neuroblastoma Progression

Adam Burch, Kristen Hall, Cody Hatchett, Ruth Schwalbe

Mentor: Schwalbe, Ruth

In the pediatric cancer neuroblastoma (NB), altered N-glycosylation has been shown to accompany aggressive tumor behaviors. Furthermore, the 5-year survival rate of high-risk NB remains under 50%, highlighting the need to better understand the molecular mechanisms that contribute to this deadly pediatric disease. Understanding which N-glycans contribute to aggressive NB tumor behaviors is essential. Historically β1,6 complex N-glycans catalyzed by N-acetylglucosaminyltransferase-V (GnT-V) have been thought to be the N-glycans responsible for aggressive cancer phenotypes; however, in NB the role of GnT-V is contested. To better study what N-glycans contribute to NB progression, three distinct N-glycosylation mutants were established in a rat NB_1

clonal cell line via CRISPR/Cas9 knockout of *Mgat1*, *Mgat2*, or *Mgat3*. Each glycosylation mutant had their N-glycan profiles examined via electron-spray ionization mass spectrometry, revealing both the most common N-glycan structures and N-glycan class (oligomannose, hybrid, or complex) associated with each cell line. Changes in proliferation, invasiveness, and cell-cell adhesion were then determined for each cell line to establish that oligomannose-type N-glycans drive NB progression through increased invasiveness in the clonal rat NB_1 cell line. We also examined two unmodified clonal human NB cell lines both being derived from SK-N-BE(2) cells: BE(2)-C and BE(2)-M17. We found that BE(2)-M17 was more invasive than BE(2)-C and that BE(2)-M17 expressed higher amounts of oligomannose N-glycans relative to BE(2)-C. This strongly suggests that high oligomannose N-glycan expression drives NB progression through increased invasiveness.

GPP 18

ATP synthase reversal supports oxidative metabolism in AML

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Mentor: Fisher-Wellman, Kelsey Howard

Early investigations of cancer cell respiration by Otto Warburg ultimately led to his hypothesis that the oxidative metabolism of cancer cells is irreversibly impaired. This insult to mitochondrial respiration was suggested to be the uncoupling of respiration from ATP synthesis. Since this early hypothesis was conceived, mitochondria-oriented cancer research has demonstrated that, relative to healthy cell counterparts, cancer cells frequently present with elevations in basal respiration. Because of this, strategies to target the cancerous mitochondrion have focused on global disruptions of OXPHOS without reconciliation for off-target organ system toxicity in energetic demand-driven organs. In addition to this, targeting OXPHOS in cancer is based on the assumption that elevations in basal respiration of cancer cells reflect an increased demand for ATP resynthesis to support the malignant phenotype. Using Acute Myeloid Leukemia as our model system, we demonstrate multiple lines of evidence that AML oxidative metabolism is fundamentally distinct from that of healthy hematopoietic cells. Despite elevations in basal and maximal respiration of leukemic cell populations that are consistent with previous reports, OXPHOS capacity and respiratory capacity were uncoupled in AML. Furthermore, assessment of mitochondrial membrane potential indicated that AML mitochondria support oxidative metabolism by reversing the ATP synthase reaction, as opposed to synthesizing ATP. Collectively, these findings directly refute ATP as a primary output of AML mitochondria and lend credence to the early hypothesis of Otto Warburg.

GPP 19

Castle Island Community Initiative: Increasing Public Awareness of and Engagement with Isolated Cultural and Environmental Resources in Washington, NC

Lindsay Myers Wentzel

Mentor: Raupp, Jason Thomas

Recent surveys on and around Castle Island (Washington, NC) by ECU's Program in Maritime Studies found extant archaeological remains of a wharf structure, a brick oyster kiln, and abandoned vessels. Once home to timber, boat building, and lime (calcium oxide) industries, the now uninhabited natural island experiences heavy winds that accumulate litter and expose its submerged cultural material. This paper covers the results of the Castle Island Community Initiative (CICI), a student-led project funded by ECU's Water Scholars Program in collaboration with the North Carolina Estuarium. Launched in spring of 2022, CICI began with a litter cleanup and cultural resources tour. In spring of 2023, CICI is expected to finish with an outdoor signage installation at the NC Estuarium showcasing both the natural and cultural histories of Castle Island. These educational and visual aids will help to disseminate ongoing ECU research while furthering the NC Estuarium mission of engaging the public on both historical and environmental influences of the Albemarle-Pamlico estuarine system. Through

community education and engagement, CICI aims to foster a greater public awareness of the isolated natural and cultural resources of Castle Island and the greater Washington waterfront.

GPP 20

MMIWG2: Rhetorical Strategies for Awareness, Change, and Reclamation

Rocky Elizabeth Patacsil

Mentor: Eble, Michelle F

The official colonialization of the North American continent brought numerous hardships to Native peoples, such as forced removal from Native homelands, incarceration at boarding schools designed to reshape Native Youths into Europeanized citizens, and obliteration of Native religious and language practices. Unfortunately, the practice of Native oppression, particularly that of Indigenous women, did not end with society's technical advancement with the Industrial Age. It did not become a black mark on history because it never became history. Although the boarding schools closed, Native Americans are no longer restricted to reservations, and efforts to restore Indigenous practices are resurging, the crisis of Missing and Murdered Indigenous Women has reached epidemic proportions. The Missing and Murdered Indigenous Women, Girls, and Two-Spirited (MMIWG2) advocacy group have worked for years to call attention to the issue and promote change. With the creation of the National Taskforce for Missing or Murdered Indigenous Peoples, Indigenous rights have begun to filter into the public's attention, however slowly, thanks in large part to the efforts of the MMIWG2 and other advocates. This project examines the rhetorical methods used by MMIWG2 to protest inequity, advocate for change, and prompt the public to acknowledge Indigenous struggles, rights, and culture.

GPP 21

Intersecting Rhetorical Velocity & Antiracism as Strategies for the Creation of University Crime Notifications under the Clery Act

Jason Lee Sugg

Mentor: Frost, Erin Anne

This article intersects rhetorical velocity and antiracism as strategies in the crafting and dissemination of timely warnings under the Clery Act. Timely warnings often take the form of crime notifications and are disseminated through a variety of localized and third-party technology platforms. Campus communities continue to struggle over the equitable use of suspect race descriptions that may reinforce stereotypes of

communities of color, and messages are often created by default police text-crafters driven by compliance and police discourse conventions, thus crossing aspects of police rhetorics and positionality. This article engages Ridolfo and DeVoss' (2009) notion of rhetorical velocity as a strategic approach to composing for rhetorical deliveryfor the strategic theorizing for how a text might be recomposed(Ridolfo & DeVoss, 2009, n.p.) by an audience, as well as why, how, and to what helpful or harmful rhetorical ends. Key takeaways are considerations for an antiracist approach to crafting Clery Act notifications and anticipating the rhetorical velocity of crime notifications and their impacts on communities of color.

GPP 22

A survey of a co-evolutionary review _strategy for writing center exit forms/session notes

Steven Andrew Amador

Mentor: Eble, Michelle F

In this presentation, I posit a survey that seeks to identify: 1) the prevalence of a simple adaptive strategy for completing writing center exit forms, and 2) the motives of those consultants in performing that intervention. The co-evolutionary strategy occurs at the end of a writing center appointment, and simply involves
the student/client assisting the consultant in completing the exit form. I say that the strategy is co-evolutionary because 1) it is not identified as a strategy on the instructional page of the online software, 2) writing center onboarding does not specifically address this method, and 3) I have yet to find instructions for these forms that mention student involvement in scholarship. Yet, at least two
East Carolina University Writing Center consultants reported using the strategy. As such, East Carolina University's Writing Center will be the primary site for research, but the possibility that other writing center consultants are using this strategy needs verification. Further, longer-term experimental designs will also be discussed that aim to quantify student/client perceptions. I highlight pros/cons from the viewpoint of the consultant and student/client. In sum, the experiment seeks to quantify the occurrence of this simple strategy and quantify similar motives for its use.

GPP 23

Public education of monitoring and maintaining local waterways through participation in the Earth Echo Water Challenge

Emma Teed

Mentor: Vance Chalcraft, Heather D

Citizen science projects create ways for the public, children and adults alike, to be exposed to new information, spark new interests, and change motivation regarding science. Participation in citizen science projects have been shown to increase content knowledge and self-efficacy for environmental action (i.e., belief that they can take action toward environmental problems) in adults. Involving children in citizen science has also been shown to benefit children by allowing them to feel like real scientists, improving content knowledge, and encouraging them to pursue a career in science. However, impacts on self-efficacy has not been explored as thoroughly in children.

This mixed-methods study was completed during a summer day camp at the North Carolina Museum of Natural Sciences at Contentnea Creek. Two hypotheses were explored: participating children will gain knowledge about water quality and will have an improved self-efficacy for environmental action. True/false questions (n=21) and guided reflection (n=19) results tentatively support the first hypothesis that participants had an increase in knowledge. Pre- and post-survey (n=20) results refute the second hypothesis but suggest that while participants did not have an increase in self-efficacy for environmental action, they entered the program with an already high self-efficacy for environmental action. Focus groups (n=20) supported the results of both hypotheses as well and added additional context about the children's beliefs and interests. Although limited by small sample size and lack of a relevant comparison group, this research suggests that citizen science may be a useful education tool for both formal and informal education.

Due to the results of this study, a Water Scholars grant from the Water Resources center was used to provide the North Carolina Museum of Natural Sciences at Contentnea Creek with Earth Echo Water Challenge monitor kits and other water monitoring equipment and train the Museum staff so the citizen science project can be continued with visitors and summer campers at their facility.

GPP 24

Does Entrepreneurship Education Impact Undergraduate Interest, Grit, Self-Efficacy, or Retention in Biology?

Elliot Weinthal

Mentor: Vance Chalcraft, Heather D

There is a retention problem within the life sciences, especially biology; roughly half of all incoming biology students will switch majors by their senior year. My research looks at this problem through the lens of the Social Cognitive Career Theory which shows that self-efficacy (the belief in one's abilities to accomplish a goal) is a major predictor of academic persistence. This study evaluated how an entrepreneurship learning experience designed for science majors impacts self-efficacy, interest in biology, grit (the

ability to withstand adversity), and ultimately retention in the major. I exposed approximately 400 students in a treatment group to online modules about entrepreneurship and 300 students in a comparison group to online modules reviewing financial literacy content. Participants were recruited from the Careers in Biology course as well as Introductory Biology I labs in Fall 2022. The intervention was a four-week asynchronous, online scientific entrepreneurship course that was deployed via an online learning management system. The topics covered were chosen based on entrepreneurship education literature and are inspiration and motivation, design thinking, intellectual property, and available resources. To ensure students were consuming the content, each module had a quiz that required a score of 75% or higher to move on to the next module. A survey was administered to students before and after the intervention using scales for interest, biological self-efficacy, retention, and grit; post-surveys were locked unless all quizzes were completed to ensure participation. After cleaning the survey data, I was left with a sample size of n = 139. Analyses show that the comparison group showed no significant differences in their pre/post scores whereas the treatment group showed a decrease in biological self-efficacy. When looking at demographics, female students scored higher on biological self-efficacy on the pre-survey but not on the post survey. However, females scored lower in grit on the post survey than males. The data also shows that students in the Honors College enter with higher grit than non-Honors College but after the semester the difference was not significant. This study will help determine how our students respond to short scientific entrepreneurship modules and courses themselves with respect to student interest, retention, grit, and biological self-efficacy as well as how it impacts certain demographics differently.

GPP 25

Domestic Immersion-Based Learning: Preparing Students for a Global Workforce

Bethany Leigh Martin

Mentor: Medina, Almitra and Levi Altstaedter, Laura

In ECU's mission statement, one of the institutional goals is preparing students with the knowledge, skills and values to succeed in a global, multicultural society(*University Mission*, 2023). Having taken lower-level foreign languages courses (1001-2004) at ECU in different languages, it appears that a higher usage of the foreign language by both professors and students in the classroom had an impact on the students' communicative abilities in the second language. I found that the language courses with smaller class sizes, such as French and German, equipped the students with more communicative skills early in the course sequence due to the dedicated efforts from both the students and professors to use the language of study as often as possible in the classroom. While there have been studies on domestic immersion-based learning in other, novel contexts

(Fukuda, 2014; Kelling & Bown, 2020; Thomas, 2004), there has not been any that focuses on students in a typical course during an average semester. For the present mixed-method study, domestic immersion is operationalized as a classroom where over half of the class is conducted in the target language. Results from pilot data suggest an emerging theme: a positive perceived impact of the instructor on students in a domestic immersion classroom. Therefore, a questionnaire will be used in the full-scale study based on the MUSIC (eMpowerment, Usefulness, Success, Interest, and Caring) Model of Motivation. This measures how instructors empower their students, demonstrate the usefulness of the subject matter, guide the students to feeling that they can succeed in the course, maintain students' interest in the subject, and create a classroom environment where the students feel cared for as individuals (Jones, 2023). Students in lower-level language courses from French, German, Japanese, Russian, and Spanish will be recruited to answer the questionnaire and participate in a semi-structured interview to determine participants' perceived impact of domestic immersion-based learning in the language classroom. The presentation will conclude will pedagogical implications.

GPP 26

Identifying and Applying Sound Design Principles for Multimodal Content Creation: Analyzing Professional Content Creators' Adobe Instructional Videos

Yvonne Kao

Mentor: Eble, Michelle F

Incorporating sounds in multimodal compositions is both important and easy to do. This field of study is also called *aurality*, and studying the rhetoric of sounds is called *aural rhetorics*. Instructional videos often use sounds—any sounds—to professionally communicate, such as educating non-expert audiences in how-to-do tasks. My research project analyzes several of these types of instructional videos, ones from a professional content creator community, Adobe, for principles of multimodal composition and professional communication, with an emphasis on sound usage.

By analyzing what we hear, we make meaning and communicate. It is also important to analyze how people utilize other types of sounds in conjunction with visual and textual elements. This interplay, with the goal of a well-balanced multimodal composition that communicates on a professional level, is where this research study is situated. My project investigates how these professionals integrate sounds into their works and how audiences might interpret the messages from these sounds. This is sound design,which I define as the rhetorical decisions that content creators make about how to use sounds to communicate their goals to their audiences. To inform this set of principles and decisions, I analyze how sounds work—or do not work—with the visual and textual

elements to create content in a specific setting. The implications of this analysis will inform a set of principles that could be used by content creators.

My primary question is this: How does the professional Adobe-based content creator community rhetorically use the sound design principles from my proposed model in creating multimodal instructional videos? Every component of sound design must be considered on some level, just as visual and textual designs must be crafted with care for composition efficacy. These sound design principles are derived from a mixture of physics-related, musical, and colloquial concepts that intersect across these disciplines and all pertain to sound: volume, speed, clarity, pitch, and modulation. This presentation will report on the results of this sound design analysis that have implications for rhetoric, TPC, multimodal composition, and pedagogy. As web compositions become more and more prevalent and popular, I feel that it is important to gain a better understanding of how different modes of communication, particularly aural aspects, function rhetorically in digital environments.

GPP 27

Using Unmanned Aircraft Systems For Construction Verification, Volume Calculation, and Field Inspection

Andres Leonardo Leonardo Acero Molina

Mentor: Huang, Yilei

The technology advancement in the construction industry has led to improved efficiency in many activities on the construction jobsite, including surveying, estimation, inspection, and verification. For example, construction professionals rely on accurate lengths, heights, areas, and volumes to create cost estimates and track the quantity of materials in construction projects. Traditionally, these measurements are obtained through manual methods with surveying equipment including levels, theodolites, total stations, and GPS. While these methods have been useful in the construction field for decades, the manual and repetitive processes will consume extensive time and labor efforts and can also result in questionable accuracy due to human errors. This research work aims to improve the efficiency of construction surveying and inspection activities by using Unmanned Aircraft Systems (UAS). The specific research objectives are to 1) identify the accuracy of linear dimensions of UAS measurements, 2) compare the results of different volume calculation methods between surveying methods and UAS, and 3) investigate the workflow of field inspections using UAS. A commercial UAS with a full-frame image camera and a customized UAS with a lidar sensor were used to capture aerial images and point clouds, respectively, and the

images and point clouds were then processed by various software to obtain linear dimensions and volumes of different buildings and structures. Finally, the linear dimensions from UAS were verified with the construction plans and the volumes were compared with the results from surveying methods to validate the accuracy of UAS measurements. The findings of this research work showed that with photogrammetric models and point clouds, UAS measurements can provide accurate linear, area, and volume measurements compared with traditional surveying methods, and the automated process can significantly improve the efficiency of surveying, estimation, inspection, and verification on the construction jobsite.

GPP 28

Computational Modeling of Arteriovenous Fistula Hemodynamics in Pulmonary Hypertension Patients

Kaitlin Southern (1), Fatehmeh Bahmani (2) Stephanie George (1), Veeranna Maddipati (2)

(1) Department of Engineering, East Carolina University

(2) Internal Medicine, Brody School of Medicine, East Carolina University

Mentor: George, Stephanie

Over 15% of U.S. adults suffer from chronic kidney disease, which over time can progress to end-stage renal disease (ESRD). ESRD is characterized by extremely impaired renal function that can lead to death if unaddressed. Care for these patients is typically managed by dialysis, with the surgical creation of an arteriovenous fistula (AVF). The most common of these is the radiocephalic fistula, created by anastomosing the end of the cephalic vein to the side of the radial artery. Even though fistula formation is a common and effective treatment it has been suggested as a risk factor for developing pulmonary hypertension (PH). The objective of this study is to develop subject-specific computational fluid dynamics (CFD) models of fistulas in patients with PH. By modeling fistula hemodynamics metrics, this study may offer insight to physicians about AVF monitoring, which may lead to early surgical interventions to prevent the development of PH.

Using previously collected magnetic resonance images from one patient, a three-dimensional model of the AVF was created using Materialise Mimics 15.0. The model was discretized in ANSYS Workbench, comprising of approximately 1.5 million elements. Boundary conditions included a patient specific velocity waveform at the inlet, relative pressure-based outlets (0 Pa), and a rigid non-slip wall assumption. A double precision, second order, transient pressure-based solver was used for CFD analysis. Simulation time duration was calculated by multiplying the R-R interval,

which is the time elapsed between two consecutive R waves of a QRS signal from an ECG, by three to achieve three full cardiac cycles. This concluded in 2691-time steps, with a single time step duration of 0.008772s.

At peak systole, results indicated relatively high velocity, 33.4 cm/s, down the proximal artery inlet, and low velocity, 5.32 cm/s along the distal artery outlet. Areas of physiologically low wall shear stress (< 1 Pa) were found along the anastomotic floor, the anastomosis heel (inner wall of the proximal vein), and the inner wall after curvature of the proximal vein. Overall, modeling fistula hemodynamics may elicit a link between fistulas and PH; thus, identifying key monitoring parameters. Improved monitoring will allow physicians to intervene (i.e., fistula banding); thereby, preventing the development of PH. This improvement would cause fewer incidences of PH and overall enhance the quality of life for those suffering with this condition.

GPP 29

Global Health Technology Project [Imaging the Source of Intelligence and Creativity]

Babatunde I Falohun

Mentor: Hudson, Nathan E

According to the World Health Organization's report on Public Health Challenges in the sector of Neurological Diseases, Neurological disorders constitute 12% of total deaths globally, with 85% of these being caused by cerebrovascular diseases (Neurological Disease: Public Health Challenges, 2006). The Center of Disease Control's National Center for Health Statistics reported that in 2017, the United States alone had a total national health expenditure which exceeded $3.5 trillion, more than any other large country(Center for Disease Control & Prevention, 2020). This situation tends to be worse in regions of the world classified as low income. Data from a published article on the burden of non-communicable diseases (NCDs) in sub-Saharan Africa indicated that all-age total Daily Adjusted Life Years (DALYs) due to NCDs increased by a whopping 67·0% between 1990 and 2017! (Global Burden of Diseases, Injuries, and Risk Factors Study-GBD) 2017).

We attempted to elucidate the significance of increased perfusion and regional gray matter volume within cerebral regions that are implicated in neurophysiological activity during activities involving high levels of cognitive functioning and creative expression, including the hippocampus, medial prefrontal cortex, posterior cingulate gyrus and angular gyrus. Image data was acquired using 1.5T magnetic resonance imaging scanners, ensuring that metrics for data acquisition were standardized, enabling three-dimensional extrapolation. Image data was analyzed in coronal, axial

and sagittal planes, focusing on anatomical regions implicated in the relevant neurophysiological conditions. The international outreach implemented by the project team enabled an assessment of imaging capacity at 3 institutions in West Africa, 2 in Ghana and a site in Nigeria. Of all three sites, none had functioning equipment to perform the imaging protocols required for comparative analysis of cohorts across institutions, evidence of systemic issues which contribute to the worsening chronic disease epidemiology in many low- and middle-income nations.

We discovered that the image resolution on a 1.5 T MRI system is adequate for analysis of the cerebral regions of interest to our study and the data could be effectively used for personalized diagnostic/bio-analytical services. We anticipate that image data which enables specialized analysis will be instrumental to the development and implementation of multimodal neurophysiological analysis.

GPP 30

Automatic Brain Tumor Classification

Ekaterina Vilkomir, Tara Gill, Jerrica Deloatch - Department of Computer Science

Mentor: Herndon, Nic

Our DNA gives instructions to our cells, and sometimes DNA mutates and instructs cells to duplicate abnormally, forming a tumor. A mass of abnormal brain cells is referred to as a brain tumor. Some brain tumors are benign (noncancerous), and others are malignant (cancerous). Early diagnosis of a brain tumor is crucial because brain tumors can be fatal, and brain cancer has a low survival rate. Early detection is also essential in non-fatal outcomes, as brain tumors can form in regions of the brain that regulate cognitive and motor functions, making rehabilitation a necessary part of recovery.

In addition, the ability to access medical specialists based on residential location can have a measurable impact on preventable hospitalizations and mortality rates for people with chronic conditions (Johnston et al., 2019). In moderately staffed areas, an increase in the number of patients has caused outdated practices to be expensive and inefficient.

To address the shortage of neurology specialists in certain regions, we propose a method that uses machine learning to automatically determine anomalies. Additionally, this method can support specialists in other areas and work to support their opinions in some cases. Our current model can distinguish between tumor and normal tissues. However, we want to add further classification abilities to the model which would

enable it to differentiate between specific common types of tumors such as gliomas, meningiomas, germinomas, and pituitary.

To teach the model how to classify brain MRI images our proposed method uses the following workflow: upload the MRI images, label them, check the picture extension, transform, and then identify the key features underlying the classification. For our analysis we use various classifiers to build different classification models. Specifically, we utilized the Mahotas Python library for image processing. Haralick features were used in feature creation for the training and testing sets. We plan to use the Keras library for creating our CNN model and its training. We hope that it will help to increase model accuracy. Right now, Neareast Neighbors classifier gives us 98% accuracy. However, when we speak about humans' life we want to have as much closer to 100 as possible. We believe this approach can be used in different areas of health care, not just neurology, and can positively impact patient morbidity and mortality.

GPP 31

Workflow Automation for Water Resource Modeling and Forecasting

Colby Lee Sawyer

Mentor: Popoviciu, Ciprian

Internet of Things (IoT) can be leveraged to enable an infinite spectrum of workflow automation efforts. In this project, I will demonstrate, using the IoT sensing platform developed by the Center for IoT Engineering and Innovation, the creation of a workflow automation schema to automatically ingest IoT sensor data and create custom informed decisions to interact with a network of distributed assets. This automation effort will include webhook orchestration, LoRa and LoRaWAN utilization to distribute downlink commands to inform sensor behavior, an algorithm with variable thresholds to raise alerts, and alerting patterns to distribute real-time notifications.

GPP 32

The Grotesque

Haley Lynn Mcelroy

Mentor: Tisnado, James R

The `grotesque' is often misconceived as a fancy word for ugly, atrocious, and obscene, a shallow definition. In actuality, the 'grotesque' is complex and elusive. For centuries, various theorists have debated the meaning of the grotesque. Phillip Thompson explains that in trying to understand the grotesque you must view it as a fundamentally

ambivalent thing, as a violent clash of opposites, as an appropriate expression of the problematic nature of existence. My work juxtaposes human anatomy and the grotesque. Each piece symbolizes a deformed thought that has festered and grown. Like many, I struggle with tumultuous thoughts filled with self-doubt, blame, and alienation. In my work I use visceral and grotesquevisuals as a way to question the boundaries created by society which compartmentalizes social and cultural standards. I am delving into the history behind the grotesque, examining the origins, characteristics and evolution through the centuries. With my research I hope to answer the questions- Why am I enamored with the grotesque and why do I want to use it as a vehicle to portray my festering emotions to my audience?

GPP 33

Portraiture: An Artistic Representation through Persons and Passions

Loraine Scalamoni

Mentor: Eagle, John Scott

Portraits are a long-standing genre in art dating back to ancient Egypt. Initially it was a way to record

someone's image, portraying their likeness for funeral rites. In the west, during the Middle Ages and the Renaissance, portraiture mainly served the needs of the church. However, a turning point in portraiture arose during the Renaissance and humanizing the portrait began, capturing the likeness of a person in some manner.

Today, the function and portrayal of a portrait is the choice of the artist. My exploration of portraiture is through the medium of paint, painting portraits of people whom I find interesting, and inspire me, both through their physical presentation and personality. Through my paintings I explore my subjects' interests and loves by use of the colors, representational objects, and motifs I choose suitable for that person. Additionally, I continue to explore alternative ways of capturing my subject through examination of applying paint, mark making, use of collage and playing with different perspectives. My objective is to create contemporary portraits with a nod to the past but firmly planted in the personality of the subject.

GPP 34

Documenting the Complexity of Tourette Syndrome: a Neurological Disorder of Control, Repetition and Loneliness.

Katelyn Brooke Stanley

Mentor: Wells, Angela Franks

Tourette syndrome is a nervous system disorder involving repetitive movements and/or sounds caused by dysfunctional neural circuits between the basal ganglia and other areas of the brain. It was discovered by Gilles de la Tourette in 1885 when he described nine patients who suffered from involuntary movements, echolalia, echopraxia, and coprolalia. The first description of Tourette syndrome was written in *Malleus Maleficarum* (1487) by catholic clergyman, Heinrich Kramer in which a priest is described as having uncontrollable movements and sounds. These symptoms are thought to be signs of demon possession and it is no surprise this book became widely used in witch hunting and was known as the witch-hunters bible. This misrepresentation continues today and has been misused in films such as characters blurting out obscenities and being portrayed as stupid, ditsy, etc. My work explores the visceral aspects of the body, the complexity of the syndrome, and the number of tics I experience. I document my tics to create a record and to learn more about the contributing factors that may or may not increase them. The goal of this work is to dismantle the harmful stereotypes surrounding Tourette syndrome and to show that those diagnosed with the syndrome are no different from anyone else.

GPP 35

Making Onggi Glaze in American Cirumstance

Joogab Kim

Mentor: Tisnado, James R

Onggi, a Korean traditional storage vessel, has been used to store Korean fermented foods for thousands of years. In my research, I have challenged myself to transition Korean onggi jars from traditional vessels to contemporary art. Then under the infulence American culture and ECU, I am now making onggi vessels with a distinct style. My current research is exploring how to make glazes for my onggi vessels. First, I attempted to make onggi glaze with a traditonal way that most Korean onggi artisans apply, so I experimented with the mixture of Greenville dirt and soybean stalks ash. Finally, I tried to make synthetic onggi glaze with commercially available raw materials equivalent to Korean onggi glaze using a trixacial tile test.

GPP 36

Dueling Identities: Exploring My Individual Identity within My Twinship

Haleigh Nicole Stanley

Mentor: Wells, Angela Franks

Being an identical twin, I struggle to find my individuality outside of my twinship. People often neglect to view me as a separate person. I feel conflicted about possessing aspects that pertain to me that are not within my twinship. I value the connection I share with my sister. At the same time, I want to be my own person. I explore these tensions by making photographs that use reflections, portraiture, and objects that symbolize aspects of our relationship. My research explores how twins are depicted and treated in society; how the challenges of being a twin are overlooked; and the struggles that twins face with their dueling identities.

GPP 37

Fuguelistic Inclinations

Michael Benjamin Gaines

Mentor: Wells, Angela Franks

As a 45 years old gay man, I am still on a quest to find my own place and identity within the LGBTQ community. Struggling with societal expectations of how I am supposed to act and present, I work a little harder every day to overcome them while keeping myself grounded in my familial roots and upbringing. Being blessed with four grandparents and a great-grandmother, a lot of wisdom and family knowledge was passed down to me. Several heirlooms have been given to me, as well, that help keep me connected to them, especially now that all but one have passed away. As I continue my exploration of identity, I have come to the realization that not all things passed down are tangible, that some heirlooms are genetic. This has forced me to come to terms with and acknowledge the less than savory aspects of family dynamics, things that I have avoided addressing for years as they would shatter the idealized image I have built in my mind of my own family. My work, as such, explores the fugue states and dualities of identity, relationships, sobriety, and substance abuse. My current research is centered around understanding self-identity within the family dynamic, coping with loss as it relates to substance abuse, as well as studying the the contemporary works of Jordan Gale, Marsha Guggenheim, and Duane Michals, as well as the historical works of Diane Arbus and Aaron Siskind.

GPP 38

Material Translations

Emily Booker

Mentor: Lazure, Timothy

Learning to shift our perception of memories can lessen the burden of past events and lead to a more empathetic perspective for future experiences. Memories serve as an internal framework through which we structure our understanding of ourselves and our past experiences. I am intrigued by the relationship between the experiencing self and the remembering self that occurs when we start to talk about memory. My research focuses on the philosophical and psychological process of how experiences become memories, the continued dialogue and translation between those two selves, and the weight of those memories we carry with us. I am working with a wide variety of materials—including metal, textiles, paper, and light—to represent the distortion that occurs through the natural translation between perceived reality and remembered experiences. The artists and philosophers referenced in my presentation will provide context for where my work fits into the conversation of those exploring similar ideas of memory, perception, and representing the intangible.

GPP 39

Doodles From the Noodle: The process of translating intuitive drawing into the third dimension

Charles Randolph Shotton

Mentor: Lazure, Timothy

My work explores my use of art as a method of combating the struggles presented by ADHD. My first illustrations existed only in the margins of my notes and on the back of my homework assignments, as an undergraduate in anthropology, I used the practice of intuitive doodling to occupy my hands and eyes so that I could retain the information that I was hearing. My work is both meditative and expressive, the designs that I use are small blips of what exists in my brain constantly.

Wearable jewelry has historically been a way to display something that the wearer finds valuable; to me these amorphous forms hold tremendous value which is why I have chosen to explore different techniques and methods to bring these illustrations onto three-dimensional, wearable objects.

GPP 40

Assembly Required: The Queering Principles of Collage and Science-Fiction

Anthony Naimo

Mentor: Hur, Mi-Sook

This document investigates the tradition of queering materials through collage by LGBTQIA+ artists and the queer history of science-fiction literature. This research pertains to my MFA thesis show called *Assembly Required*, a series about imagination, community, impermanence and reinvention. The process of queering strategically undercuts the stability of identity politics and the dispensation of power that shadows the assignment of categories and taxonomies over communities of marginalized peoples. Queering acts as a form of intellectual activism that challenges cultural presumptions and schematic binaries– often intersecting with conversations of gender and sexuality. Collage's method of appropriation is ripe for this queering manipulation of cultural values; taking fragments of marginalized materials and deconstructing dominant cultural norms to produce queer associations through radical reorder.

GPP 41

River Rat

Morgan Williams Zichettella

Mentor: Wells, Angela Franks

The marsh holds an entire world within its borders—with its own citizens, visitors, and rules. The sounds of the wildlife, the rhythm of the water, and the breeze through the tree branches are its voice. Time feels as if it's standing still when one feels completely immersed in this moment. *River Rat*, a series of salt print photographs, depicts a glimpse inside the hidden moments of a lively yet peaceful ecosystem. I use river water from the associated areas I photograph to print my images. The saltwater causes reactions with the silver that provides inconsistencies such as looking muddy, speckles, color distortions, odd stains, and streaks; some areas can get super dark, revealing the silver, and sometimes you can even see little salt residue crystals. Saltwater likes to do its own thing, and you never know what you might get. These reactions from collaborating with nature feel like magic and make each print unique and one of a kind. *River Rat* shares this sense of wild serenity, bringing the viewer into the secluded world of the marsh.

GPP 42

Beyond the Folds: Emergent Properties in Paper

John Cannon Rhodes-Pruitt

Mentor: Eagle, John Scott

In my thesis body of work I explore the relationship between visual art, information science, and geometry in an attempt to create a new visual language with which I

record aspects of myself; not unlike writing in a journal. Using cyanotype, origami, drawing, and digital techniques I co-opt the language of computers (binary) to represent aspects of myself in paper form, blending the analog and digital into a new way of communicating. The work is informed by my understanding of Constructor Theory, Information Theory, and Quantum Mechanics with which I draw thematic comparisons between the fundamental nature of who I am with the fundamental nature of the universe.

GPP 43

Ceramics, Glaze, and Plaster Molds

Nicholas Ryan Fowler

Mentor: Tisnado, James R

My creative work focuses on the intersection of medicine and capitalism, looking at snake oil and pseudoscientific medicine, creating visceral pieces that get across how people can be affected by it. Ceramics is the best medium for what I'm trying to accomplish because it's a medium that allows you to make dozens to hundreds of copies of the same piece, like a production pottery studio. This repeatability is great for getting swarms of things, which are inherently a little unsettling, eliciting the emotional reaction I want from the viewer. At the moment my focus is on technique and surface work, and I have placed a heavy interest in plaster molds and high-fire glaze processes. High-fire glazes are great for the colors I'm trying to achieve in my art, with earth tones emphasized and reds that are deep, rich, and visceral. I have progressively created thinner and more delicate pieces using slip casting and clay slabs in plaster molds. My goal with this research is to become more technically proficient with glaze firing and working as thin as possible, to make work that helps me illustrate problems with modern snake oil.

GPP 44

Nature, Heart, Life: A Study of the Life and Works of Alma Mahler

Jordan Virginia-Mae Cartrette

Mentor: Richardson, Mark Douglas

This thesis will examine the life and works of composer Alma Mahler and explore the historical and cultural conditions of her work. Surviving works will be harmonically and textually analyzed and compared to similar works of other prominent Viennese *fin-de-siécle* composers.

Alma Mahler, née Schindler, carries a long list of titles and almost as many surnames. Her life is the subject of countless books and a handful of movies, and her music carries all the depth and complexities of the *fin-de-siécle* style that bridged the gap between Romanticism and Modernism. An upper-middle class socialite in the heart of Vienna, it was expected she be musically literate, but any serious and professional pursuit of composing was considered unbecoming. Alma was born to a successful painter and was well-connected in the Viennese art and music scene from her youth. She had the privilege of studying the arts and found a passion for composing in her private studies with Josef Labor and Alexander von Zemlinsky.

This thesis aims to examine her life without bias and compare her works to her more well-remembered contemporaries, Schoenberg and Zemlinsky. This analysis will reveal that Alma was more than wife, mother, and socialite—it will show that, before anything, she was a skilled composer who navigated complex harmony and is deserving of a place in history along other Viennese *fin-de-siècle* composers.

Alma's surviving body of work is quite small, allowing for a thorough background on the entire repertoire. Publication details and the circumstances surrounded these compositions will be presented along with a broad analysis of each piece. A few of the lieder, such as *In Meines Vaters Garten*, *Laue Sommernacht*, and *Ansturm* will be subject to more in-depth harmonic, formal, and textual analysis. Each of these pieces is harmonically complex and a perfect example of the *fin-de-siècle* style, simultaneously pulling from Romantic traditions and forging ahead into Modernism, which will provide a basis for the argument that Alma's works deserve a place in the early twentieth century canon among those of more remembered and respected composers of the time.

GPP 45

A Shift in Process II: Non-Traditional Painting Applications with Integrated Technology

Christopher Michael Zidek

Mentor: Eagle, John Scott

In the 1960s all eyes were on the minimalists of New York, these artists were primarily focused on objectnesseven when those objects were store-bought and mass-produced. Working at the same time was a group of artists in Los Angeles that had a completely different take on the idea of minimalism. Inspired by their surroundings, they began using a broad array of groundbreaking and often, newly declassified materials and fabrication techniques. This movement was deemed the Finish Fetishor the Light, Space, and Surfacegenre for the use of highly polished surfaces of their work. The group's interest in the ephemeral experience of light and color over of the physicality of the

object blurred the line between painting and sculpture as well as the line between their exquisitely refined artworks and mechanically manufactured objects.

Much like the Light, Space, and Surface artists of the 60s, I embrace new technologies and materials in my current body of work. From using CNC routing tables to the newest automotive paints, and state-of-the-art high-density foam as a preferred substrate, these materials and applications help me create a more pristine product via a commitment to avoid a handmade appearance and a lack of gestural expression

GPP 46

Exploring the Potential of Educational Games in Graphic Design Education: Creating Engaging User Interfaces and User Experiences

Amal Abdelazeem Abdelsalam Abdalla

Mentor: Normoyle, Catherine Lucille

My passion lies in exploring the ways in which user interface, user experience, and digital game design can be leveraged to enhance the field of graphic design education. Visual art education has been facing numerous challenges, and my research aims to explore these struggles and find solutions to improve the learning experience for students. One of these challenges surfaced from a personal experience in Egypt when I discovered the visual arts schoolbooks were not printed due to budget constraints in 2005. This meant that students did not have access to a physical book for learning visual art, which contrasted with other topics where books were available.

To address this issue, my initial attempt was to redesign the old version of the art education schoolbook into an e-book, complete with a new cover design and interactive elements, such as an art gallery, pop-up messages, and a simple drag-and-drop game. This redesign presented an opportunity to explore the potential of educational games to serve graphic design education, which further piqued my interest in this topic.

Consequently, my current work focuses on educational game design to improve the graphic design learning process. Through my studies at ECU, I have created the user interface and user experience designs for an educational game application named Art Game. Another in progress project is called Visual Balanceas one of the most important principles of design. This project's aim is to enhance the learning of visual balance in graphic design through the creation of a gamified educational application.

By implementing an interactive and engaging approach, educational games can offer an effective and fun way to learn visual art and graphic design. This research emphasizes the importance of utilizing technological advancements to enhance the learning process and provides a promising solution to the ongoing struggles faced by visual art

education such as the negative societal perception of this field, resulting in a shortage of effective teaching aids for learners. The Art Game and Visual Balance app designs serve as a prototype for further exploration and development of educational games in art and design education.

GPP 47

Implementing Letterpress Printing in the Design of Information

Lee Turner

Mentor: Irwin, Megan Rebecca

Information design is the visual representation of quantitative values. Also referred to as data visualization, information design is a tool that can aid the human mind in comprehending large numbers, understanding sizable data sets, and apprehending changes over time. Additionally, information design can be a beautiful art form that transforms our perception of data. This creative research in data visualization seeks to demonstrate that information design can function to both visually communicate quantitative figures and alter how the audience views sets of numbers. In this work, two data sets will be represented through the process of letterpress printing. The first data set is a snapshot of all the books in the researcher's apartment on a specific date. The second data set is a playlist of songs shared by friends on social media compiled over the course of approximately one year. Topics addressed in this research will include overviews of information design and letterpress printing; accounts of how both data sets were collected and analyzed; descriptions of the letterpress printing processes employed; failures along the way; and final outcomes.

GPP 48

Exercise During Pregnancy Influences Offspring Health Biomarkers

Alex Claiborne PhD, Linda May PhD

Mentor: May, Linda Elizabeth

BACKGROUND: Exercise is recommended during pregnancy as it improves offspring health biomarkers such as body composition and may decrease the risk of cardiometabolic disease later in life. However, the influence of prenatal exercise dose on offspring biomarkers has not been studied.

PURPOSE: To assess the association of maternal exercise frequency, duration, and intensity on offspring body composition and blood chemistry.

METHODS: Pregnant women (n=30) were exercise trained (aerobic-AE, resistance-RE, or combination-CE) for ~24 weeks until delivery. After delivery, neonate birth weight and BMI were measured. One-month infant blood was collected and processed for lipids, glucose, and lactate. Infant weight and height were measured for calculation of BMI, and body fat % was estimated from 3 site skinfolds, taken in duplicate. Pearson correlations assessed relationships between prenatal exercise frequency, intensity, and type; neonate and infant body size and composition; and infant blood chemistry. The data was further analyzed, stratified by pre-pregnancy BMI (healthy weight, HW vs. Overweight/Obese, OW/OB) and exercise type.

RESULTS: Exercise frequency was positively correlated with birth BMI and infant HDL. When stratified by pre-pregnancy BMI, frequency correlated negatively with TC and LDL in HW. Exercise duration was related to reduced birth weight in OW/OB, and total exercise throughout pregnancy increased birth BMI. When stratified by exercise type, frequency of AE was positively correlated with birth BMI and infant HDL. RE volume was positively associated with infant BMI, with total exercise duration (weeks) positively correlated with infant lean body mass. Finally, CE volume was associated with reduced infant body fat % and skinfold sum, and positively associated with lean body mass.

CONCLUSION: Maternal exercise throughout pregnancy benefits infant health, especially in offspring of OW/OB participants. We show volume- and type-specific effects of exercise on offspring health, which promote discrete exercise regimens. The significance of these relationships should be further studied, as clinicians continue to encourage maternal exercise during pregnancy.

GPP 49

Beliefs About and Attitudes Towards Menstruation Among American Youths and Their Suggestions to Improve Early Menstrual Communication

Insha Pun

Mentor: Shearman, Sachiyo M

Menstruation is a crucial event for over half of the people in the world. Young people report being ignored, confused, stressed, embarrassed during their early menstrual conversation (EMC). This strained EMC impacts menstruators' health, social participation, and education. Similarly, young men find it difficult to relate to women and enforces sexist attitudes in them. The objectives of the study were to examine 1) American youth's experiences of EMC, 2) current belief and attitude towards menstruation (BATM) and 3) to seek suggestions to improve future menstrual education session in the schools.

A descriptive cross-sectional study design was used to fulfill these objectives. Self-administered online survey were distributed through Qualtrics. Participants' experience of EMC was measured using a 10-item semantic differential scale. BATM was assessed using a 45 items Likert scale, with five sub-topics namely secrecy, annoyance, prescription and proscription, pleasant and disability. The suggestions to improve future menstrual session was explored using five close and three open ended questions.

The current study surveyed 368 undergraduate students in the college of fine arts and communication, 153 identified as males, 214 as females. The mean age of the participants when they had their EMC was 11.9 years. On average, females had their EMC two years before males. Majority of the participants reported having their EMC with mother and a teacher. Males reported their EMC to be relatively more unrelatable and less frequent as compared to females. Both males and females reported being relatively confused during their EMC. Females were more likely to agree that menstruation is annoying than males. Males were more likely than females to agree that menstruation be kept a secret and endorsed certain dos and don'ts during menstruation. Those who discussed more negative topics in their EMC were more likely to endorse dos and don'ts during menstruation. However, participants who reported having EMC with a greater number of same age people agreed with less dos and don'ts during menstruation. Regarding the participant's suggestion for future menstrual education, majority of the participants preferred having all genders in the session. Regarding the topic, they would emphasize more on biology of menstruation and address myth, stigma around menstruation. Finally, majority would choose videos, documentaries, film clips to deliver future menstrual education session.

GPP 50

Utility of screening for Adverse Childhood Experiences (ACEs) in adult primary healthcare settings: A Systematic Review

Betul Kucukardali Cansever, Stephanie Ann Bridgland

Mentor: Lamson, Angela Lynn Smith

Background: There is sufficient evidence demonstrating a strong correlation between ACEs score and adult health problems, highlighting the need for improved ACEs detection, interpretation, and treatment in primary care settings for adults. We wanted to find out how the ACEs screeningis carried out with adult patients who are seen in primary care settings and which practices follow through with the screenings. **Methods:** For this systematic review, we searched PubMed, PsycINFO, and CINAHL from database inception up until September 30, 2022. We included studies without language and country restriction if: (1) an ACEs screening tool was used in a primary health care setting (e.g., internal medicine, family medicine, general practice,

gynecology, or Ob/GYN); (2) the study sample included participants aged 18 years and older; (3) the study was an original study with qualitative/quantitative/mixed methods; (4) the study was published in peer review journals, grey literature, or national reports; and (5) the original study was an unpublished but a part of the finished dissertation. Articles were excluded studies if they: (1) used secondary data (2) were not data-based (e.g., books, theoretical papers, reviews); (3) did not use original ACEs questionnaire; (4) only examine the impact of one ACE (e.g., divorce). **Data extraction and analysis:** Two independent reviewers extracted data and assessed for risk of bias using the Mixed Methods Appraisal Tool. Results were synthesized qualitatively. **Results:** After removing duplicates, initial searches identified 535 articles, of which 60 were included in the final review. Findings regarding who employed the ACEs screening, how it was distributed (email, mail, or in-site), whether the implementer received any training or information before the screening, the reason for the screening (research or quality improvement purposes), intention to include non-native spoken patient participation, intention to include underserved/represented population, availability of follow-up intervention or resources, provider comfortability, and patient satisfaction were evaluated and discussed thoroughly. **Conclusion:** Despite growing knowledge about the long-term effects of ACEs, a limited number of primary care settings report screening for ACEs globally, and even fewer provide supportive resources or referrals beyond detecting patients' ACEs scores. Future studies should employ study designs and implement interventions tailored to the setting.

GPP 51

Effect Of Load Carriage on Patellofemoral Joint Stress in Physically Active Young Females

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Mentor: Willson, John David

Purpose: Patellofemoral joint (PFJ) pain is common among military recruits. Female military personnel are especially prone to PFJ injury, with twice as much risk as males. Participation in activities that involve repetitive elevated PFJ stress (PFJS) like prolonged walking with load carriage, may contribute to PFJ injury. The purpose of this study was two-fold. First, we compared PFJS in females during walking with and without load carriage. Second, we explored participant physical and performance characteristics that predicted PFJS change with load carriage to inform future PFJ injury prevention or treatment efforts for females at risk of high PFJ stress during military-relevant training tasks.

Subjects: 22 females (22.3 yr, 1.65 m, 58.6 kg) with a physical activity rating of 7.4/10.

Materials and Method: 3D motion capture recorded lower extremity kinematics (200 Hz) and ground reaction forces (2000 Hz) during walking at 1.5 m/s with and without load carriage (22.7 kg). Estimated quadriceps, hamstring, and gastrocnemius muscle forces during 5 left limb stance phases from the motion capture data were input to a sex-specific PFJ model to calculate peak PFJS in each condition. Differences between peak PFJS during walking and load carriage were evaluated for statistical significance using a paired t-test (α=.05). Univariate associations between participant physical characteristics (height, mass, body fat %, BMI, and tibia length), physical performance (vertical jump height, calf endurance, power, and work (heel rise test), 2 mile run time, and step length), and change in PFJS with load carriage were evaluated using Pearson correlation at p-value < 0.15 and were then entered into a backwards elimination multiple linear regression analysis to identify the most useful predictors of PFJS change during load carriage.

Clinical Relevance: Walking with load carriage increases PFJS proportional to the load added. This exposes the PFJ to disproportionately high mechanical loads and may justify increased tissue adaptation time between exposures. Low plantarflexor power may increase quadriceps demands during load carriage and could be considered an important modifiable characteristic that may benefit PFJ injury prevention and treatment efforts.

GPP 52

Management of a Type A Aortic Dissection in a Pregnant Patient

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Mentor: Cai, Sunny

Aortic dissection is a rare and life-threatening event in which a tear in the intima of the aorta allows circulating blood to enter in between the layers of the vessel, often extending the defect in the process. The most frequently employed system for evaluating aortic dissections is the Stanford system, which designates a dissection involving the ascending aorta as Type A and one involving only the descending aorta as Type B. Although the high mortality rates associated with aortic dissections make fastidious diagnosis and intervention critical, workup may occasionally be delayed or complicated by atypical presentations and challenging comorbidities. Here we present a case of aortic dissection in a third-trimester pregnant patient, along with the unique

challenges encountered in her management. Our patient was a 37-year-old G8P5 African-American female at 31 weeks gestation who presented emergently to an outside hospital with abdominal pain radiating to the throat, right arm numbness, diarrhea, nausea, and emesis. Cardiovascular workup was unremarkable and the patient was admitted with a diagnosis of gastroenteritis with concern for sepsis. Two days later the patient was found to have unequal blood pressures in her upper extremities prompting the decision to attain a CT-Angiogram, which revealed a Type A aortic dissection inclusive of both the thoracic and abdominal aorta. The patient was emergently transferred to our institution where a multidisciplinary team of obstetrics, cardiac surgery, and anesthesiology decided for the patient to undergo cesarean section that evening under general anesthesia and with transesophageal echocardiography. The cesarean section proceeded uneventfully, and 3 days later the patient underwent aortic dissection repair. She was extubated on dissection postoperative day 1, chest tubes were removed on postoperative day 6, and she was discharged home on postoperative day 12. In conclusion, we determined this patientÕs atypical presentation, her stage in pregnancy, and the severity of her dissection all presented unique challenges to her management. While her miraculous outcome was due in large part to the heroic efforts of her treatment team, we also emphasize the importance of risk factor assessment and broadened differentials to clinicians in the future.

GPP 53

Quality assessment and predictors of success in velopharyngeal MRI – a multisite study

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Mentor: Perry, Jamie L

Introduction: Magnetic resonance imaging (MRI) can provide direct visualization of velopharyngeal muscle anatomy and function unlike any other imaging modality. While used extensively in research, there is growing interest in the clinical application of velopharyngeal MRI (VP MRI) for patients with velopharyngeal insufficiency (VPI). Sufficient velopharyngeal closure (i.e., the velum creating a seal with the posterior pharyngeal wall) is necessary for effective speech and swallowing. VPI is the inadequate soft palate sealing to the upper pharynx. The transition to the use of MRI in clinical care comes with a steep learning curve, and hospitals indicated that they needed more support in VP MRI.

Aims: (1) To describe the quality assurance protocol for multi-site velopharyngeal MRI data collection, and (2) to identify predictors of scan success across sites performing velopharyngeal MRI in patients with VPI.

Methods: Ten hospitals were trained on collecting VP MRIs in this study. Quality assurance forms are completed by instrumental data coordinating center (ECU) to report factors that impact MRI anatomical analysis and classify the scan as a passor fail. These factors described in the forms include motion, head coverage, susceptibility artifacts, and wrapping. In addition, completion and labeling of all scans in protocol and additional feedback was reported in the forms. Use of resources was confirmed through interviews with hospital team members.

Results: Sites that had a refresher session had significantly more first scans pass than other sites. When an SLP was present for each MRI, scan success was greater. Sites using child life resources had better scan pass rates overall. Sites that used the live hotline during the scan had a pass rate of 67% (vs the average 61%). Sites that used available resources and training material had much better scan pass rates than sites that did not. Additionally, sites that had consistent staff had a higher success rate for their first scan (85% first scan pass rate vs 0% for sites with rotating staff), although their overall pass rates were almost equal. Sites with previous MRI experience had almost double scan pass rates than other sites.

Conclusions: Sites collecting VP MRI data had better success rates when implementing use of consistent staff, resources provided by instrumental data coordinating center, and presence of SLP for collecting speech sample and cueing.

GPP 54

Association of Leadership, Performance, and Efficacy in ROTC Cadets

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Transformational leadership is when leaders inspire, motivate, influence, and stimulate followers to build a connection and common belief towards goals. Military leaders that engage in transformational leadership encompass behaviors that can build their followers' confidence and cohesiveness to reach their full performance potential individually and collectively. In addition to exhibiting transformational behaviors, effective military leaders instill confidence in their followers. Confidence comes from several sources including evaluations of oneself (i.e., self-efficacy; SE), leaders (i.e., other efficacy; OE), and the whole group (i.e., collective efficacy; CE). Leadership styles can

also impact ROTC cadets' abilities to meet challenges and perform tactical tasks necessary. Unfortunately, very little evidence exists to support if ROTC cadets exhibit transformational behaviors and how these behaviors relate to their confidence and performance. Regarding cadets' field training experiences, confidence is mentioned as one of the most needed psychological skills to succeed. Currently, there is little empirical evidence of how military leaders instill confidence in their followers, especially in an ROTC setting. The study's purpose was to (1) examine the relationship between transformational leadership behaviors and performance in ROTC cadets; and (2) examine whether efficacy mediates the relationship between transformational leadership and performance in ROTC cadets. We hypothesize (1) transformational leadership behaviors will have a positive relationship with performance; and (2) SE, OE, and CE will mediate the relationship between transformational leadership and performance. Within the Army ROTC program (n = 150), 67 participants completed the transformational leadership and confidence measures. Historical data of the cadet's Army Combat Fitness Test that includes the maximum deadlift, standing power throw, hand release push-up-arm extension, sprint-drag-carry, plank, and two-mile run was used to measure performance. To test hypotheses, direct and indirect effects among transformational leadership, efficacy, and performance will be analyzed alongside means, standard deviations, and correlation. In conclusion, we hope to identify what leadership behaviors in ROTC can help enhance cadet's confidence and performance.

GPP 55

Natural Disasters and Mental Health

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Mentor: Saeed, Syed A

Natural disasters are large-scale adverse events resulting from natural processes of the earth, often associated with death, trauma, and destruction of property. They threaten harm or death to a large group of people; cause disruption of services and social networks and a communal loss of resources; and involve identifiable mental and physical health outcomes, among those affected. While majority of individuals who experience a traumatic event due to natural disasters do not develop psychopathology, natural disasters can threaten our psychological well-being in many ways and they can result in both short and long-term psychological distress and thus create a significant burden of mental health conditions on individuals and the community affected by them. In this paper we provide a narrative review that focuses on the mental health effects of natural disasters. We discuss effective, evidence-based interventions that can help enhance the sense of safety, hope, and optimism, as well as serve to promote social connectedness for those who are impacted. We describe how these interventions, developed by keeping in mind the cultural context and the needs of the community, can

be provided pre, peri and post-disaster period to improve the adverse mental health effects of the disaster.

GPP 56

Nanbar Health; Empowering Patients, Supporting Providers, and Discovering Connections to Transform Healthcare

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Nanbar Health aims to reimagine the ways we treat illness and support wellness by integrating all silos of healthcare into a single network centered around the patient.

Nanbar Health's innovative software platform begins with our patient-facing mobile application, which is designed to empower patients to be able to communicate the complexity of their disease experience with their providers. The Nanbar mobile application also pairs with several FDA approved wearables, including Apple Watch and FitBit, to collect biometric information such as heart rate, step count, and oxygen saturation, which is then integrated into the unique Nanbar Health dashboard. In the dashboard the data can be to evaluated or combined with information from electronic health records to provide a comprehensive, longitudinal understanding of a wide range of multi-dimensional biopsychosocial factors affecting a patient's disease experience. Furthermore, our complex symptom network tool (INSIGHTS) analyzes this information to produce a visual representation of the most salient factors for each

individual patient and how they are interrelated. Our advanced analytics platform and novel machine learning algorithms support the capacity to make predictions about what will come next for patients. Finally, Nanbar Health's application hosts a variety of physician-reviewed education materials for patients, and takes submitted data and provides live-time updated visuals for patients to better understand their own health. Nanbar Health's comprehensive software suite therefore allows clinicians to better understand their patients and provide more targeted, personalized treatment based on their unique situation, while simultaneously reducing the existing burden on the healthcare system.

Nanbar Health has been used in a variety of patient populations, including chronic pain, sickle cell disease, oncology, orthopedic surgery, palliative care, and psychiatry. Our technologies have been used to explore predictions of pain scores using biometric data, real-time improvements in treatment plans for mental health, and open conversation between a care team and a young child with cancer who previously struggled with communicating their disease burden. Nanbar Health's next steps include working with Amsterdam University Medical Hospital, Cooper Health, University of North Carolina at Chapel Hill, and furthering our impact here at East Carolina University.

GPP 57

The Negotiation is the Game: How TRPGs influence player agency through document design

Kasen Christensen

Mentor: Eble, Michelle F

Game design is a negotiation of agency between designer and player. Without agency, players can feel trapped and unfulfilled. Too much agency and players can feel untethered. This article focuses on Mörk Borg, a 2019 Swedish tabletop role playing game (TRPG), to examine how rules lightTRPGs negotiate agency between designer and player (or players) when there are intentionally few game mechanisms that control player agency. In this design philosophy, game writers use a wide array of document design elements, including both aesthetic elements as well as more traditional technical communication tools, to influence player agency. While it is true that all TRPGS use these elements to influence gameplay, rules lightgames uniquely show of the effects of aesthetics and document design choices.

GPP 58

Consubstantiality In The Legal Profession

Michael Gordon Byrd

Mentor: Eble, Michelle F

The Rules of Professional Conduct, composed by the American Bar Association, is a terministic screen for those in the legal profession to seea unified reality of what it means to be a lawyer. The symbolic inducement within the Rules draws each individual lawyer together for a greater good. This common bridge creates an identification with one another in the legal profession. This presentation is expounds upon the consubstantiation (of one substance) of lawyers by the text of the Rules of Professional Conduct. Using Kenneth Burke's ideas of identification and consubstantiation, I analyze how the Ruleswork to create on substance for lawyers to identify with. This work is a part of a larger project which analyzes lawyers' Professional Rhetoric, with an aim at detailing the necessary elements in the Rhetoric of Professionalism, or how professionals command ethos in their area of expertise.

GPP 59

Optics of Implication: Rhetorical Performance in Zoom Quarterly Earnings Webinar

Sarah Bess McCullouch

Mentor: Eble, Michelle F

Quarterly earnings conference calls provide select portions of written earnings reports to audiences of shareholders, stakeholders, and industry analysts. The calls include prepared statements by executives, providing impressions of past events, current positions, and forward-looking statements, with subsequent questioning of executives by analysts. Some stakeholders have asked for changes in quarterly earnings calls and certain companies have piloted changes in how the calls are conducted and presented. Technological innovations have made these changes simple to implement, yet corporations have been slow to adopt enhanced visual presentations for these calls. Zoom Video Communications, Inc. (Zoom) began using its own webinar product for presentations in 2019. Zoom's use of the video webinar presentation to conduct earnings calls has enabled audiences of interested parties to glean insights into the firm's earnings, positions, and leadership. Zoom's executives in turn have demonstrated strategic moves in the deployment of its product as a persuasive mechanism used to direct attention and influence audiences. This study considers the

Zoom fiscal year Q1 2022 earnings webinar and approaches the intersection of business communication and visual rhetoric within the merging media and tech spaces.

GPP 60

The *Return of* what? Coherence Issues in ECU's *Return of Pirate Nation* Covid Resources

Nicole Elizabeth Allen

Mentor: Kain, Donna Jean

The covid-19 pandemic further highlighted the critical importantance of effective communication of public health information. During the first two years of the pandemic, East Carolina University (ECU) created and implemented an informational dashboard, *Return of Pirate Nation*, to communicate covid-related information and requirements specific to ECU students, faculty and staff. To explore the coherence of ECU's covid reporting, guidelines, and resource webpages, I analyzed the path of entry and the Covid Dashboardusing Gunther Kress' analytical framework of multimodal discourse analysis (MMDA). Analysis revealed that there were critical issues with the *Return's* initial point-of-access, clarity of vital information and resources aimed at reducing the spread of disease, as well as challenges in the design of the graphical reporting on the covid dashboard. The implications of the *Return* webpages not having a coherent point of entry, clear indications to find covid testing locations, nor the requirements for weekly testing of unvaccinated students living on-campus during 2020-2021 may have further endagered the ECU community and potentially contributed to the spread of covid on ECU's campus. Though not currently in use, should ECU or other colleges create online content or reporting dashabords for communicating public health information, greater attention must be given to the coherance of its design, the affects and interactions of multimodal elements on meaning-making, as well as ease of access to and comprehension of its information so that its indended audiences can use the information and help in lessening the potential for human harm.

GPP 61

Speech Directed toward Older Adults

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Mentor: Rothermich, Kathrin

Background: Speakers are known to accommodate their audience, and these adjustments vary from a normalspeech register systematically to be shorter, slower, and simpler (Cockrell, 2020). When accommodation occurs in the context of intergenerational communication, inappropriate adjustments could diminish the confidence and independence of the older adult (Ryan et al., 1995).

Objective: This scoping review explores speech accommodation directed toward older adults, specifically (1) how speech is modified to accommodate older adults by younger adults, (2) how older adults perceive this unique speech register, positively or negatively, (3) the established experimental methods used to monitor this phenomenon, and (4) areas for future research. This review outlines the linguistic form of speech accommodation for older adults and subsequently reveals further avenues for testing communication practices, social behavior, and experience in this demographic.

Inclusion criteria: This scoping review includes experimental studies of linguistic and communicative phenomena among healthy, aging adults.

Methods: A comprehensive literature search was performed in October 2022 in Medline (PubMed), Scopus (Elsevier), CINAHL (EBSCOhost), PsycINFO (EBSCOhost), Linguistics and Language Behaviour Abstracts (ProQuest) and SOCINDEX (ProQuest). This yielded 5315 titles and abstracts to screen. Results were limited to English language articles and uploaded into Covidence and examined by two independent reviewers. Screening will be reported in PRISMA-ScR flow diagram. Data from the selected articles will be extracted using a tool developed by the authors.

Planned studies: The findings from this scoping review will form the basis for experimental investigation into intergenerational speech accommodation. We plan to analyze dyadic communication between younger and older speakers of English in an interactive task-based environment. We will gauge how measures of stress levels, linguistic features, and individual differences correlate with the younger and older adults' experiences of speech accommodation.

Conclusions: This scoping review will reveal the gaps in the literature around speech accommodation for older adults. Further research in this area will support strategies for improving the relational experience of aging adults in daily contact with their caregivers, family, and friends.

GPP 62

Impact of Buyout Programs on Land Use Patterns in the Special Flood Hazard Area of Pitt County, North Carolina.

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Mentor: Mukherji, Anuradha

Buyout programs in the US are non-structural approaches to facilitate a managed retreat for flood mitigation. The buyout program is a voluntary action by property owners that involves selling their properties after a disaster (such as Hurricane Floyd) to the government and relocating outside the flood hazard risk area. This study investigates two questions; what are the land use trends on the buyout parcels in Pitt County between 2000-2021; what are the challenges of the buyout program?

This study adopted a mixed-method approach, including geospatial data acquisition and a semi-structured interview with key informants. The acquired datasets were analyzed using descriptive statistics, geographically weighted regression (GWR), descriptive coding, and thematic analysis.

This study identified 418 buyout parcels in the study area between 2000-2021. Almost 97% (404) of the parcels are in the special flood hazard area (SFHA). The 418 parcels have been converted into different land uses, including parks (15), trails (7), wetlands (94), and open spaces (291). The GWR results show that the buyout parcels only explain 5.76% of the land value in the SFHA. Further consideration of other explanatory variables, such as parcel size, proximity to school, rescue location, etc., increased the adjusted R^2 from 0.0576 to 0.522, which means that the combination of these variables explains 52.2% of the land value in the SFHA. This study identified the buyout timeframe and the cost of maintenance of the buyout parcels as challenges to the county and the adjoining property owners. This study recommends increasing funding streams to maintain or convert the buyout parcels to the Federal Emergency Management Agency's recommendations, such as parks, bike/hike trails, etc.

Keywords: Buyouts, Land Use Planning.

GPP 63

The future of wastewater in coastal areas: linking socio-economic and natural systems using Agent-based modeling

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Mentor: Moysey, Stephen

Water depletion and contamination are, according to experts, among the main environmental problems humankind face in the 21st century (Brown & Flavin, 1999; Rosegrant, Cai, & Cline, 2003). America's infrastructure is old and failing, leading to increasing amounts of pollution, especially in coastal areas like Eastern North Carolina (ENC). While the decisions on the overall investment in infrastructure are made on the federal level, the actual spending is mostly responsibility of counties and cities. This management focus within jurisdictional boundaries creates large regional differences in infrastructure, and therefore exposure to pollution. One potential solution to this management dilemma is scaling up to the watershed level (Bareford et al., 2021).

Of particular interest in ENC is wastewater treatment (WWT) infrastructure, which is not only important for human health and the health of aquatic ecosystems, but also a relevant factor in conserving scarce resources such as water, energy, and the enabling of nutrient recycling (Su et al., 2019). Whereas in urbanized areas of the state wastewater collection is organized centrally through a sewer system, the rapidly developing and sprawling areas of ENC predominantly rely on decentralized systems such as septic systems for wastewater treatment. These treatment systems are either specific to a house or cover several homes as a community system, which constitutes the perfect case to look into individual pro-environmental decision making on multiple levels of governance.

The proposed research is using an evidence-based Agent-based model (ABM) starting at a Role-Playing Game (RPG) to relate the choices of individual homeowners, developers, and local politicians to nutrient loading caused by insufficient wastewater treatment systems in the Tar-Pamlico watershed in ENC. This approach is improving the understanding of a watershed on an integrated systems-level, connecting the human dimension, individual decisions and how collective action emerges from the interaction of individuals, with the environmental system, the watershed, and the predictable and stochastic events that influence the path and transport of nutrients. Using the Watershed Game, a board game developed by Minnesota Sea Grant, this project is involving stakeholders from the beginning, working on building trust and collaboration between the researchers and the participants.

GPP 64

Utilizing the Calm Before the Storm: An Exploration of Disaster Mitigation in Princeville, North Carolina

Alexandra Paige Stevenson

Mentor: Grace-McCaskey, Cynthia A

Climate change increases flooding events globally, with affluent populations having more access to recovery resources. However, marginalized communities within these populations do not have access to the same resources. Literature regarding the recovery of Princeville, North Carolina (NC), from Hurricane Floyd in 1999 and Hurricane Matthew in 2016, states disaster management fails to address residents' needs and concerns vis-à-vis flooding. I provide an overview of the compounding hazards residents face and use a political ecology lens to analyze data collected with participant observation and semi-structured interviews to describe residents' concerns. I also explore the extent to which mitigation strategies account for such concerns.

GPP 65

Preserving the Apex: A Shark Conservation Campaign

Katelyn Francis

Mentor: Johnson, Erika Katherine

As the ocean's top apex predator, sharks indicate ocean and reef health (The Importance of Sharks, 2022). Sharks also maintain the species below them in the food web and ensure species diversity. I will be conducting research (IRB approval pending) utilizing a survey to gain a further understanding of my audience's perspective on sharks, share information regarding the importance of sharks in the ecosystem and what citizens can do to improve shark population density, and measure the differences in opinions about sharks from before compared to after reviewing the informational website. My research will be grounded in the Uncertainty Reduction Theory with the aim of mitigating the uncertainty surrounding sharks among my target audience.

My research questions include:

RQ1: What percentage of eastern North Carolinians understand the importance of sharks in our ecosystems?

RQ2: What kind of reputation do sharks have from the perspective of citizens of eastern North Carolina?

RQ3: Is a website useful in reducing uncertainty and changing perceptions about sharks among residents in Eastern North Carolina?

RQ4: What can citizens of eastern North Carolina do to make our oceans healthier and, in turn, improve shark population density?

My target audience will consist of citizens of eastern North Carolina and their legislators. I plan on utilizing a website buildout and social media campaign to spread

awareness and potentially design stickers and other merchandise to raise money for shark conservation. A survey will be curated and distributed to the target audience to get a general understanding of the number of people aware of the declining shark populations, how much they know about it, and what reputation sharks have among people. My goal is to gauge my audience's understanding of sharks through reframing and possibly change their perspective of sharks.

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GPP 66

Farm Animal-Assisted Therapy for Individuals with Autism Spectrum Disorder: Parent and Caregiver Perspectives

Mackenzie Paige Dolecheck

Mentor: Autry, Cari Elaine

Autism Spectrum Disorder (ASD) is a developmental disorder that affects an individual's ability to communicate, create social relationships, and regulate sensory input and repetitive behaviors. A commonly used intervention in ASD treatment is animal assisted therapy (AAT). AAT interventions focus on the use of animals in adjunct to achieve goals and outcomes. Farm AAT is defined as the use of farm animals such as cows, sheep, goats, horses, and pigs in AAT interventions. There is a lack of evidence on the use of farm animals and their benefits within the scope of AAT. As such, there is a lack of evidence-based practices and protocols for therapists to provide safe and effective treatment when utilizing farm AAT. The purpose of this study is to provide evidence of the possible benefits of farm AAT for individuals with ASD from the perspective of those who observe, are aware of, and who may understand the client's behavior the most within and outside of farm AAT: the parents and caregivers. The study design uses a phenomenological qualitative approach. Data collection using a semi-structured interview, that was conducted over the phone with parents who participated in family session programs at the study location. The study location was a ranch that utilizes farm animals in a 13-week therapy program. Interview transcripts were coded and analyzed using NVivo 12 software. Five (N=5) participants were selected that matched the inclusion criteria for this study. The findings from this study concluded that there were increases in social behaviors that included social interaction, communication, and social connections. Along with an increase in regulation of behaviors such as safety awareness and nervous system regulation. Lastly, the findings showed there was an increase in a sense of normalcy for the children and a reported increase in self-

confidence. The findings from this study will provide a foundation for future research related to farm AAT such as evidenced-based curriculums and practices. The data will provide therapists and parents with an understanding of the potential benefits that are gained from participation in farm AAT interventions.

GPP 67

Tradeoffs between phenology and geography constraints in response to environmental changes in the Eastern Pacific

Katherine E. Dale[1], Lorenzo Ciannelli[2], Jerome Fiechter[3], Mercedes Pozo Buil[3], Rubén Esteban García Gómez[4], Paty Jiménez-Rosenberg[4], Gerardo Aceves Medina[4], Andrew R. Thompson[5], John G. Field[6], Toby D. Auth[7], R. Ian Perry[8], Lauren Rodgers[9], Rebecca A. Howard[2], Rebecca G. Asch[1]

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Mentor: Asch, Rebecca G

In response to changing ocean conditions, marine fishes may shift where they are (geography) and/or when they are present or when climatically-sensitive behaviors take place (phenology). Understanding the distribution and seasonal timing of larval fish occurrence is especially important, as the larval period is particularly vulnerable to high mortality rates; in a changing ocean, these effects can become even more stark. Here, we examine how fish from different life history strategies balance the tradeoff between shifting geography and phenology. A unique aspect of this work is that it allows for range-wide modeling even though no one survey covers the range of many of the target species. We have assembled larval fish data from seven long-term ichthyoplankton sampling programs covering the region between Baja California Sur, Mexico and the Gulf of Alaska. We tested as environmental covariates salinity, sea surface temperature, and sea surface height from a 10-km resolution configuration of the Regional Ocean Modeling System (ROMS) for the North American West Coast, and distance from shore. We modeled presence-absence and catch anomaly data using using a non-linear model that accounts for temporal and spatial autocorrelation. We present

patterns from 1995-2019 for wide-ranging fish species from three life history strategies (groundfish, coastal pelagics, and mesopelagics).

GPP 68

Monitoring breeding Black Rails in North Carolina Game Lands to evaluate the effects of prescribed burns on occupancy

Bailey A Kephart

Mentor: McRae, Susan B

The Eastern subspecies of the Black Rail *(Laterallus jamaicensis jamaicensis)* is one of the rarest marsh birds in North America. Increased habitat fragmentation has resulted in rapid population declines and it is now listed as 'threatened' by the USFWS. Rarely observed, the Eastern Black Rail's ecology and behavior are poorly understood. In this study, I will determine how prescribed burns alter Black Rail breeding habitat as well as how the habitat is used pre- and post-fire management. In addition, I will document circadian activity patterns of breeding Black Rails over the course of the breeding season. This study will primarily focus on marsh habitat within Goose Creek and Salter's Creek Game Lands, both state-managed using prescribed burns. In the 2022 breeding season, I performed standardized callback surveys to infer the presence or absence of birds in burned and unburned sites. Data loggers were also deployed within these sites to continuously record water depth fluctuations. I quantified the local vegetation structure and composition at each survey point, using coarse- and fine-scale protocols adapted to characterize the microhabitat of these sparrow-sized, ground-dwelling birds. Cryptic and secretive, Black Rails are notoriously difficult to observe. To increase detection probability, I deployed Autonomous Recording Units (ARUs) to record their vocalizations passively and motion-activated trail cameras to capture visual aspects of breeding activity. Analyses of ARU data are underway. However, one of the cameras captured the first evidence of Black Rails breeding in North Carolina in 135 years. Going forward, I will attempt to identify environmental predictors of Black Rail occupancy as well as how those predictors relate to burn management. My results will help inform decisions, such as the frequency and timing of burns, to better manage habitat for the Eastern Black Rail across the Atlantic coastal plain.

GPP 69

Modeling the Impact of Container Geometry on the Uniformity of Dose in Irradiation Calibration

Marcus Snedeker

Mentor: DeWitt, Regina

Luminescence dosimetry measures the dose absorbed by minerals. This measurement needs a known dose from a calibrated laboratory source as reference. To calibrate the laboratory source, samples need to be sent to an external reference source for irradiation with a precise known dose. These samples are sent in containers in which they remain for the entire duration of irradiation. The containers will affect the magnitude and uniformity of radiation within the sample, which will in turn affect calibration precision. The parameters that influence the result are container material, wall thickness, and size. The goal of my research is to quantify the impact that these parameters have on dose precision and to determine which container results in the highest uniformity and dose. To achieve this goal, I simulate the irradiation of a variety of samples in containers of differing material, size, and thickness via DosiVox. DosiVox is a GEANT4-based Monte Carlo simulator which is used to simulate the irradiation of different materials in a variety of geometries. In this presentation, I will analyze the results of these simulations and discuss the implications they have for the calibration of the external irradiation of samples being studied by ECU researchers.

GPP 70

Using environmental DNA (eDNA) to monitor river herring movement within the lower Roanoke River basin

Chase G Spicer (East Carolina University), Cammy Bailey (East Carolina University), Will Langley (East Carolina University), Sara Roozbehi(East Carolina University), Aaron J. McCall (The Nature
Conservancy), Patrick Harris (East Carolina University), Brian Boutin (The Nature Conservancy),
Julie DeMeester (The Nature Conservancy), Roger A. Rulifson (East Carolina University) , Erin K.
Field (East Carolina University)

Mentor: Field, Erin Kirby

Blueback Herring and Alewife are two threatened species of Alosa that utilize the coastal rivers and estuaries of Eastern North Carolina to spawn. In North Carolina watersheds, river herring were once highly sought after by commercial and recreational fisheries, but since the mid-to-late 20th-century populations have been on the decline with no signs of recovery. A technique to accurately monitor river herring spawning populations and juveniles both quickly and noninvasively would greatly assist in assessing the impact of population recovery efforts while
monitoring fish movements. In this study eDNA from two species of river herring, Blueback Herring *A. aestivalis* and Alewife *A. pseudoharengus* were quantified using qPCR. Water samples were taken weekly along the Lower Roanoke River and its tributaries from February through November 2022. Data will better our understanding

of the effects of water flows on adult river herring and juveniles' movement within the Lower Roanoke River basin. Since eDNA can be successfully detected and amplified within the river basin, eDNA sampling was used as a technique for monitoring river herring movements between Edwards Ferry and Plymouth, North Carolina for more than 40 weeks in 2022. Our results concluded that we were successfully able to detect both adult and juvenile river herring, sampling site locations located near each other showed similar trends in eDNA counts throughout the 2022 sampling season, and we confirmed that eDNA detected in late summer and early fall could be attributed to juvenile river herring through the use of nighttime electrofishing sampling.

GPP 71

Can a native mud crab exploit low salinity refugia to escape an invasive body snatching parasite?

Haley Dawn Hagemeier, Presenting

Carter Stancil, East Carolina University

Gracie Strobel, University of Michigan

Carolyn K. Tepolt, Woods Hole Oceanographic Institution

Amy E. Fowler, George Mason University

April M.H. Blakeslee, East Carolina University

Mentor: Blakeslee, April Monica Houghton

Investigating organismal response to invasions is increasingly important given human-mediated global change. Estuarine organisms face numerous biotic and abiotic factors that influence their ability to respond to invaders like parasites. When confronted with parasitic invaders, hosts can either develop resistance or expand distributions beyond the limits of the invader's tolerance. One such invader of US Atlantic estuaries is the Rhizocephalan *Loxothylacus panopaei*, which infects native panopeid crabs including *Eurypanopeus depressus* (*ED*). Given that successful development of *L. panopaei* larvae is dependent on salinities >10 PSU, *ED* may have a parasite refuge in lower salinity waters. Over a three-week exposure period, we tested low salinity tolerance in adult *ED* by examining mortality and righting response after exposure to treatments (n=7) from fresh to moderate salinities (0–10 PSU) in *ED* sourced from three sites in the US East Coast. We found higher mortality and slower righting response in the fresh/near-fresh salinities, but high survival in salinities between 3-10 PSU where field surveys do not detect the crab. Our study helps determine the low salinity

tolerance range of *ED*, allowing us to resolve whether salinity is a key barrier to the species' ability to exploit low salinity parasite refugia in Atlantic estuaries.

GPP 72

Effects of Productivity on Grassland Community Structures Across Spatial and Temporal Scales

Jasper Leavitt, David Chalcraft

Mentor: Chalcraft, David R

Species diversity in ecological systems is thought to vary with the amount of net primary productivity in the system, often measured as the increase in biomass across a community. This relationship has been shown to vary with spatial scale. When exploring these patterns, research often focuses on how the number of species varies, with less emphasis being placed on the abundance and identities of species present due to changes in productivity. These missing factors can be crucial in understanding the dynamics of communities by giving us information about habitat suitability and key players. This is especially important when considering plant communities, where habitats are often described based on the most abundant species on the landscape.

We used a long-term dataset from the Jornada Long-Term Ecological Research Station in New Mexico, USA to assess how the relative abundance of plant species varied with net primary productivity at two different spatial scales. First, we assessed how multivariate descriptors of species diversity that incorporate relative abundance and identities of species varied with net primary production at the local (1-square meter plots) and regional (1-hectare sites) scale. We will next compare the distributions of individual species along the productivity gradient. Using these species distributions, we can determine the frequency of species replacing one another in communities along the productivity gradient.

We found that productivity is more often related to diversity at the local scale than the regional scale. With these results, we were able to determine using a subset of our data that higher productivity environments have higher rates of species replacing one another on the landscape, as well as more frequent species co-occurrences. This work will allow us to better understand how environmental conditions can alter biodiversity across spatial scales and will help predict how large-scale change can impact local communities.

GPP 73

Team Science in Undergraduate Research

Clark Isaac Andersen

Dr. Joi P. Walker

Mentor: Walker, Joi Phelps

Undergraduate research experiences have shown to have positive effects for students, faculty advisors, and the programs which host them. In Chemistry, students who participate in course-based undergraduate research experiences (CUREs) are given the opportunity to perform novel research in a lab and to learn the skills that lab scientists use as part of their work. Little is known, however, about how CUREs teach and implement the principles of Team Science to the students who participate. The Organic Chemistry CUREs at ECU are emphasizing Team Science as a part of its lab learning. Students complete a survey before and after participating in the CURE to assess gains in the knowledge of how teams work, the skills gained from emphasizing teams, and the attitudes students have of working in teams.

Student artifacts are collected to assess how Team Science is being used in the CURE lab. These artifacts assess the students' skills and attitudes in communicating how to work in their team, how to plan their research to ensure everyone participates equally, and how to write about their research and the role teamwork played in it.

GPP 74

Copper Binding in FtrB from *Brucella sp.*

Kai Alexander Hart

Sambuddha Banerjee

Alexa N Kerkan

Mentor: Banerjee, Sambuddha

Iron transport in *Brucella sp.* is done through a four-component periplasmic copper-dependent ferrous iron transporter, FtrABCD. In this system, all parts are required for bacterial survival. The current mechanistic model asserts that, after iron enters the periplasm, FtrA captures Fe^{2+} and delivers it to FtrC, which oxidizes the iron, translocating it into the cytoplasm with FtrD acting as an electron sink. FtrB is thought to helps FtrA move Fe^{2+}. Previous work shows that FtrA, a type 1 cuperdoxin, strongly sequesters copper and can oxidize ferrous iron; however, recent work shows that FtrB can also bind copper without the typical type-1 Cu^{2+} binding site (HHC); though, it is thought that FtrB's only histidine (H121) plays a role. The copper-bonding residues and the molecular geometry of bound copper is presently unknown. Electron paramagnetic

resonance (EPR) spectroscopy on recombinant wild-type FtrB in the presence of Cu^{2+} indicate copper being bound in an EPR silent form, while UV-Visible spectroscopy shows distinct binding between histodine's imidazole group and copper. Based on these experiments, it is predicted that copper is bound in an EPR silent form and is bound by H121 with the potential for other binding residues.

GPP 75

Resolving Human Fibrinogen's In-Solution Structure with Cryogenic Electron Microscopy

Nicholas Carter Kirby

Mentor: Hudson, Nathan E

Fibrinogen and its activated form fibrin serve as the structural components of blood clots and help to incorporate red blood cells, macrophages, and fibroblasts to the wound-site. Fibrinogen's conversion involves cleavage of fibrinopeptides A and B by thrombin, producing insoluble fibrin. This process involves the exposure of knobs 'A/B' which bind holes 'a/b' of adjacent fibrin molecules, respectively. Studies focused on the intricacies of fibrinogen's structural components will help further understand the processes of fibrin polymerization as well as highlight the more dynamic nature of this glycoprotein. Current conventional structural determination methods (nuclear magnetic resonance or x-ray crystallography) are limited in their determination of conformationally dynamic proteins, like fibrinogen, due to a requirement of crystallization, which introduces bias towards certain conformations. Cryogenic electron microscopy however, serves as a valuable tool in elucidating the possible native structure(s) of dynamic proteins as molecules are flash frozen at random orientations in solution, allowing for more natural state imaging.

Our lab flash froze fibrinogen samples mixed with a high-affinity knob 'A' mimic peptide to bind fibrinogen's D region (contains hole 'a') and restrict its mobility to obtain high-resolution structures. In conjunction with CryoSPARC, a single particle analysis software, we sought to obtain highly resolved molecular volumes of fibrinogen from many two-dimensional images. The addition of peptide was shown to stimulate some thrombin-independent fiber-like formation of the fibrinogen molecules, leading to the development of complexes with no currently known crystal structures. Focusing on the distal D region of fibrinogen, CryoSPARC was used to automatically pick ~10 million individual particles, which were then split into classes of alike two-dimensional structures. Multiple rounds of 2D classification gave a selection of ~130,000 particle picks of highly defined D regions. These 2D classes were then used to create a high-resolution volume of fibrinogen's D region at 3.66 Å after collective homogeneous and non-uniform refinement methods. This work seeks to better understand fibrinogen's D

region structure to provide a physiologically-relevant model for more effective development of fibrinogen therapeutics.

GPP 76

Inferences Over Fields

Charles Wingate Crumpler

Mentor: Robinson, Zachary

This paper develops a four-valued logic over the field $\F_4$. The field $\F_4$ is constructed and imbued with a lattice structure. Logical connectives are then defined over $\F_4$. Extentions of the standard definitions of logical notions (e.g. validity and proof) are made to accomodate the four-valued setting. In so doing, two candidate definitions for validity, namely that of only moving higher on the lattice or not moving lower, are compared. Finally, it is proved that the four-valued logic over $\F_4$ is both Sound and Complete.

GPP 77

Comparing parton scattering cross section for QGP from the AMY formalism and AMPT model

Noah M. MacKay

Mentor: Lin, Ziwei

Under extremely high temperatures and densities, quarks and gluons are deconfined as quasi-free partons in a plasma state of matter. An essential parameter for certain properties of this plasma is the cross section σ, which is obtained by the square of the parton scattering amplitude. There are several important parton two-body scatterings in the plasma, such as gluon-gluon, quark-quark, quark-antiquark, and quark-gluon. A multi-phase transport (AMPT) model [1] uses the gluon-gluon amplitude to obtain an AMPT cross section. This study aims to explicitly utilize all relevant parton scattering amplitudes (provided in Ref. [2]) to obtain the cross section for the plasma. This will then be compared to the AMPT cross section, including the total cross section and the total transport cross section versus the plasma temperature.

GPP 78

Assessing Parton Transport with an Exact Solution of the Relativistic Boltzmann Equation

Todd Mendenhall

Mentor: Lin, Ziwei

The relativistic Boltzmann equation (RBE) describes the dynamics of many-body systems like the quark-gluon plasma that is produced during high energy heavy ion collisions. Solutions of the RBE give the time evolution of the single-particle distribution function *f(x,p,t)*. While exact analytical solutions of the RBE are difficult to find in general, one has recently been found for massless particles under two-body scatterings in an expanding spacetime for a given initial condition [1]. The parton transport model ZPC numerically solves the RBE by performing parton collisions according to a total scattering cross section. Parton subdivision transforms the system into one with a small opacity and diminishes the effect of causality violation that is caused by the geometric interpretation of the cross section. An improved collision scheme accurately reproduces the subdivision results without the computational cost [2]. Here we implement the initial condition of the exact analytical solution and check the accuracy of ZPC by comparing its numerical evolution of *f(x,p,t)* with the exact solution.

1. D. Bazow, G. S. Denicol, U. Heinz, M. Martinez, and J. Noronha, Phys. Rev. Lett. 116, 022301 (2016)

2. X.-L. Zhao, G.-L. Ma, Y.-G. Ma, and Z.-W. Lin, Phys. Rev. C 102, 024904 (2020)

Graduate Student and Postdoctoral Scholar Poster Presentations (In-Person) Abstracts

Ballrooms

GP 1

Probing melanoma CD8$^+$ T-cell mitochondrial dynamics and exhaustion: A possible way forward to improve patient therapy outcomes

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Mentor: Fisher-Wellman, Kelsey Howard

Melanoma ranks high among the aggressive and detrimental forms of skin cancer, with increasing cases and mortality. Although various immune checkpoint inhibitors (ICI) continue to transform melanoma therapy, but a subset of patients fail to respond. Significant efforts are underway to understand the mechanism underlying this refractory in some melanoma patients. Among the various immune populations, CD8 T cells play an essential role in ICI therapies, making them an important target to augment immunotherapy. Herein, CD8-positive tumor-infiltrating lymphocytes (CD8$^+$ TILs) were generated from tumors excised from melanoma patients. The melanoma CD8$^+$ TILs were subjected to mitochondrial phenotyping in a high-resolution respirometry and flow cytometry after staining with ICI antibodies. Our data showed an upregulation of complex 1 respiration in the melanoma CD8$^+$ TILs compared with fresh human CD8$^+$. This was evaluated as the NADH oxygen consumption rate (JO_2) ratio to the complex II substrate (succinate) JO_2. The observed upregulation could signify a change in function. Furthermore, immunophenotyping of the CD8$^+$ TILs revealed that they expressed PD-1, LAG-3, CTLA-4 and Tim-3, suggesting an exhausted phenotype. So far, we believe our findings will provide useful information in mitochondrial bioenergetics that could aid ICI efficacy.

GP 2

Estrogen restores the cardiac function in ovariectomized rats: Role of circadian clock Per2-regulated heart-specific miRNAs and redox enzymes

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Mentor: Abdel-Rahman, Abdel-Rahman

Background: Estrogen (E_2) protects women against cardiovascular diseases before menopause by regulating various biological processes. Most of the E_2-specific biological effects, studied in female reproductive organs, vary on a circadian rhythm basis that is related to the expression of circadian clock genes. However, it remains unknown if a similar circadian pattern exists in the female heart in a manner that explains, at least partly, the cardioprotective effect of E_2.

Objective: The aim of the present study was to determine if restoration of the cardiac circadian rhythm protein Per2-regulated miRNA and redox homeostasis explains the cardioprotection conferred by E_2 replacement in E_2-deficient females.

Methods: OVX was performed 2 weeks before starting E_2 or placebo treatment for 2 weeks before tissue collection for ex vivo biochemical measurements. In parallel studies, mean arterial pressure (MAP) was measured using radiotelemetry.

Results: Diurnal variations revealed E_2-dependent lower body weights during the light phase and lower MAP during light and dark phases throughout the observation period. Hearts of E_2-treated OVX rats exhibited: (1) higher Per2 and cardioprotective miRNAs (miR1, 133a, 208a, and 499) expressions and mALDH2, and catalase activities; (2) lower cardio-detrimental miRNAs (miR652), carbonyl, MDA and HO-1 levels. The reciprocal Per2/HO-1 relationship was more evident during the daytime and correlated with E_2-mediated upregulation of the measured protective heart-specific miRs.

Conclusion: E_2-dependent restoration of Per2-miRNA homeostasis mitigated cardiac oxidative stress and restored healthy cardiac function in OVX rats.

Supported by NIH grant 2R01 AA14441-15

GP 3

Effects of perfluorooctane sulfonate (PFOS) and perfluorooctanic acid (PFOA) exposure on erectile function in Sprague-Dawley rats: A Pilot Study

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Mentor: Hannan, Johanna

Per/polyfluoroalkyl substances (PFAS) are used in industrial and consumer products and have been deemed environmental and health contaminants. Most common PFAS chemicals, perfluorooctane sulfonate (PFOS) and perfluorooctanic acid (PFOA), are used in firefighting foam, nonstick bakeware, and fire resistant materials. The impact of PFAS on erectile physiology is unknown. The aim of this pilot study is to determine the effect of PFOS and PFOA on erectile function. We hypothesize PFOS and PFOA will cause detrimental effects and decrease erectile function. Adult male Sprague-Dawley rats were divided into 3 groups (n=4/group): 1) Control; 2) PFOS (10mg/kg/day); and 3) PFOA (10mg/kg/day). PFOS/PFOA were dissolved in 0.05% Tween20 and administered in drinking water for 28 days. Controls received 0.05% Tween20 in drinking water. Following 28 days PFOS/PFOA exposure, rats were placed on regular drinking water for 2 weeks. Body weights were collected weekly and terminal organ weights of liver, testes, spleen, heart, lungs, brain, seminal vesicles, kidneys, bladder, and thymus were recorded and normalized to body weight. Prior to PFAS exposure and every 2 weeks after, apomorphine-induced behavioral erections and yawns were measured. Body weight was significantly decreased in PFOS rats at 28, 35 and 42 days (D28: 414.3g; D35: 432.2g; D42: 445.4g) compared to controls (D28: 509.0g; D35: 528.1g; D42: 543.8g). PFOA exposure did not change body weight. Liver and testes weights were significantly higher in PFOS rats compared to PFOA and control rats ($p<0.0001$). Additionally, PFOS rats had significantly lower spleen/body weight ratios compared to control and PFOA rats ($p<0.001$). No other organ weights were different. Apomorphine-induced erections in PFOS rats were lower at 2 weeks and absent at 4 and 6 weeks ($p<0.001$). PFOA and control rats had similar numbers of erections throughout the 6 week period. The number of yawns were also decreased in PFOS rats at 4 and 6 weeks. Erectile response will be confirmed with direct measurement of nerve-stimulated intracavernosal pressure and mean arterial pressure. PFOS exposure decreased body weight, increased liver and testes size, and decreased spleen weights. Erectile function was severely decreased after 4 weeks of PFOS exposure. PFOA exposure did not cause

systemic organ changes or impact erectile function. Ongoing studies will repeat these exposure parameters in more animals to confirm whether PFOS is impacting erectile function.

GP 4

Developing an animal model of chronic pain to predict biomarker profiles of morphine responsiveness

Authors: Dylan Marshall[1], Felicia Branch[2], Mandee Schaub[1], Kori Brewer[2], Stefan Clemens[1]

Affiliations: 1 Department of Physiology, 2 Department of Emergency Medicine, Brody School of Medicine, East Carolina University

Mentor: Clemens, Stefan

The current standard to manage moderate to severe pain in the clinic is through the prescription of opioid medications. Opioids, however, provide pain relief pain in only about one out of three individuals. When non-responsive individuals take these medications, they are not receiving an analgesic effect, while being exposed to unnecessary risks resulting from the potential side effects of the drug. As a first step towards developing potential biomarkers that may predict opioid responsiveness, we here used an animal model of chronic pain to probe for morphine responsiveness following an injury. Young adult (8–12 weeks) female Long-Evans rats underwent ligation surgery of the left sciatic nerve (SNL) to induce a chronic neuropathic pain condition. Prior to and post SNL, pain testing was performed (Hargreaves method) to record thermal pain reflex latencies. In addition, we collected blood samples pre- and post-SNL for subsequent analysis using mass spectrometry. Following SNL, 21 out of 24 animals showed a significant reduction in reflex latencies on the side of the injury across time points post-injury ($p<0.05$), while only 2 out of 24 animals showed significant reductions in reflex latencies on the control side ($p<0.05$). After 10 days of post-SNL testing, animals were randomly assigned to receive subcutaneous injections of morphine (2 mg/kg) or saline control 30 minutes prior to Hargreaves testing. Morphine increased reflex latencies in 5 of 22 animals compared to the saline control, but had no significant effect on reflex latencies in the remaining 17 animals. These data indicate that the SNL injury model leads to a differential morphine response profile (opioid responders vs. opioid non-responders), with a larger cohort of the animals not responding to the opioid, similar to what has been observed in the clinic. We are currently analyzing the blood samples of the animals to identify metabolomic profiles in opioid responders and opioid non-responders.

GP 5

Magnetic Control of NanoEL via Magneto-Mechanical Actuation

Mohammad Kanber, Obum Umerah, Sydney Grose, Lew Reynolds, and Juan Beltran-Huarac

Mentor: Beltran-Huarac, Juan

Cancer treatment is one of the major health problems that burdens society. According to the latest publication of the American Cancer Society, the cancer mortality rate has reached 32% in 2022. Therapeutic targeting is considered the gold standard in cancer treatment. However, when tumor grows beyond a critical size, its vascular system differentiates abnormally and erratically, creating heterogeneous endothelial barrier that further restricts drug deliveries into tumors. One way to overcome this problem is to induce endothelial leakiness using nanoparticles (NanoEL), so therapeutic drugs can be successfully delivered. While several methods exist, none has been established as a valid clinical approach. Most of concerning complication is uncontrolled NanoEL prompts subsequent tumor migration and the appearance of new metastatic sites. In this research, we use a new non-invasive approach to remotely control NanoEL by implementing PEGylated superparamagnetic iron oxide nanoparticles (PEG SPIONs) actuated by non-heating super low-frequency magnetic fields. As proof of concept, we developed a 2D cell culture model based on human umbilical vein endothelial cells (HUVEC). Our findings indicate that the controlled mechanical agitation induced over the PEG SPIONs by magnetic torques can disrupt the VE-cadherin junctions in a controlled manner and enable the passage of therapeutic drugs. This approach has the potential to avert cancer migration. This approach provides a remotely controlled drug delivery method harnessing the physics and biology of endothelial adherens junctions. This approach can open up new avenues for targeted drug delivery into anatomic regions within the body for a broad range of disease interventions.

GP 6

BAFF neutralization impairs the regression of insulin resistance in diabetic mice by modulating the innate immune response

Melissa Lempicki[1], Jake Gray[2], Bradley Whitaker[1], Coleen McNamara[3], Akshaya Meher[1]

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Mentor: Meher, Akshaya Kumar

Adults with type 2 diabetes have a two-to-three-fold increased risk of cardiovascular diseases. B cell activating factor (BAFF), a tumor necrosis factor superfamily member, is implicated both in diabetes and cardiovascular diseases, and hence a therapeutic target of interest. High levels of BAFF are known to promote autoantibody synthesis and autoimmune diseases. We examined if BAFF neutralization with an anti-BAFF antibody improves glucose intolerance in a model of regression of insulin resistance in diabetic mice. Male C57BL/6J mice were fed a high-fat diet (HFD) for 12 weeks and segregated into two groups based on their glucose intolerance determined by a glucose tolerance test. Each group was simultaneously switched from HFD to a normal chow diet and received injections of anti-BAFF or an isotype control antibody every 2nd week for a total of 6 weeks. As expected, body weights decreased in both groups parallel with the increase in insulin sensitivity. Unexpectedly, the BAFF-neutralized mice had impaired regression of insulin resistance compared to the control mice. Extensive cellular phenotyping of immune cells indicated systemic depletion of only the B2 cells and lower levels of circulating autoantibodies in the BAFF-neutralized mice. Gonadal white adipose tissue (gWAT) was the primary source of BAFF, and no differences in the M1 and M2 macrophages, eosinophils, natural killer cells, helper T cells, and cytotoxic T cell populations were found. RNA sequencing analysis of stromal vascular fraction from gWAT revealed impaired B cell receptor signaling, immunoglobulin production, complement activation, and phagocytosis pathways in the BAFF-neutralized mice. In this line, (i) an increased number of dead adipocytes, (ii) decreased levels of IgG2b and IgM, (iii) increased citrullinated histone H3, neutrophils, and DNA extracellular traps were found in the gWAT of BAFF-neutralized mice. These results suggest attenuated humoral response and a dominant and harmful role of innate response in the gWAT following BAFF neutralization in late-stage obesity. Since anti-BAFF biologics are approved for the treatment of lupus patients, our results highlight the need for further studies on the role of BAFF in late-stage obesity and insulin resistance.

GP 7

MucR represses *Brucella* genes encoding polar adhesins

Connor Brett Cribb; Ian Barton; R. Martin Roop II

Mentor: Roop, Roy M

Brucella spp. are zoonotic facultative intracellular pathogens that have substantial economic and public health impacts due to the diseases they cause in food animals and humans. The bacteria belong to the α2-proteobacteria whose class contains several important plant and human pathogens. Members of this class have evolved similar genetic strategies to infect and survive in their hosts and regulate the genes required for this process. One conserved regulator of these genes is the prokaryotic Zn finger protein MucR.

Recent studies have shown that MucR is a novel type of H-NS-like gene silencer. H-NS and the H-NS-like proteins bind to low consensus AT rich regions in the promoters of genes and their capacity to oligomerize, form filaments and bend and bridge DNA make them effective transcriptional repressors. One of the important functions of H-NS and H-NS-like proteins is to prevent the unnecessary expression of virulence genes until they are required during the infectious process, at which time antagonistic transcriptional activators responding to host-specific environmental cues overcome H-NS and H-NS-like repression of these genes.

MucR is an essential virulence determinant in *Brucella*. Microarray analysis, electrophoretic mobility shift assays and ChIP-seq analysis have identified several important virulence genes that appear to be direct targets of MucR silencing in *B. abortus* 2308. Notable among these are the genes encoding the polar autotransporter adhesins BtaE, BmaC, BtaF and BigB. These adhesins aid in the attachment to mammalian cells and have been linked to virulence.

After confirming these genes as direct targets of MucR repression, we will utilize biochemical and genetic approaches to determine precisely how MucR regulates the expression of these genes and identify the 'counter-silencers' that work in concert with MucR to ensure the proper temporal patterns of expression of these adhesins during the infectious lifecycle. We will also employ cell culture and mouse models to directly test the hypothesis that MucR's capacity to prevent the gratuitous expression of the one or more of the genes encoding the polar adhesins plays a critical role in its function as a virulence determinant.

GP 8

Characterization of cardiovascular function, metabolic status and erectile function in rat model of cardiometabolic syndrome

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Mentor: Hannan, Johanna

Introduction/Objectives: Cardiometabolic syndrome is a widespread health issue and common cause of erectile dysfunction (ED), yet the molecular basis of ED in cardiometabolic syndrome needs to be elucidated. Our aim is to characterize the cardiovascular and erectile function, and metabolic status in the obese ZSF-1 rat. This hybrid rat is a cross between a Zucker diabetic fatty female and a spontaneously hypertensive heart failure male rat.

Methods: We used male lean and obese ZSF-1 rats (n=8/group). We measured body weight weekly, and performed MRI and glucose tolerance tests at 10, 20, 30 weeks. At 30 weeks, we assessed erectile function using ICP/MAP and vascular stiffness was measured via laser doppler pulse wave velocity (PWV). Additionally, tissue bath experiments measured acetylcholine (Ach)-mediated vasodilation, vasodilation to sodium nitroprusside (SNP), and contraction to phenylephrine (PE) in thoracic and abdominal aortas. Aorta and penile segments were collected for histological analyses.

Results: On average, obese rats were 60% larger (230g) than controls and had significantly impaired glucose tolerance at all time points ($p<0.05$). At 30 weeks, obese ZSF-1 rats had significantly reduced ICP/MAP compared to controls indicating the development of erectile dysfunction ($p<0.05$). Obese rats were significantly more hypertensive compared to lean rats (MAP: 140.2 mmHg vs 99.6mmHg, $p<0.05$). Lean and obese rats had no difference in vascular stiffness indicated by PWV. In our tissue bath experiments, ACh-mediated vasodilation was significantly decreased in the thoracic aorta of obese rats ($p<0.05$) while the abdominal aorta was unchanged. SNP-mediated vasodilation was similar between groups in both thoracic and abdominal aortas. At high concentrations, PE-mediated vasoconstriction was significantly increased in the thoracic and abdominal aortas of obese rats ($p<0.05$).

Conclusions: To our knowledge, this is the first report on the erectile function in the ZSF-1 rat model of cardiometabolic syndrome. We believe that the ZSF-1 rat is useful for studying erectile dysfunction as they gradually develop metabolic disease and erectile dysfunction over time similar to the human disease. Further characterization of the penile smooth muscle physiology, and penile and aortic histology will follow.

Funding Source(s): DiaComp Pilot and Feasibility Grant Charles River Animal Model Evaluation Program

GP 9

No Evidence of Erectile Dysfunction, Nerve Injury or Change in SDF-1 Signaling 2 Weeks Following Prostatic Radiation

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Mentor: Hannan, Johanna

Background or Problem Statement: Prostatic radiation therapy (RT), a leading therapy for prostate cancer, leaves 50% of men with erectile dysfunction (ED). Currently, there are no effective drugs for the prevention or recovery of RT-induced ED. Preliminary studies show stromal cell-derived factor-1 (SDF-1) recombinant protein penile injections improve erectile function in rats with bilateral cavernous nerve injury. Although not fully understood, RT causes pathophysiological changes similar to the injury mechanism observed in rats with cavernous nerve crush injury-induced ED. This study aims to characterize changes in the gene expression of nerve injury or SDF-1 signaling markers in the major pelvic ganglia and erectile function at 2 and 9 weeks post-RT.

Hypothesis: We predict prostatic RT will not cause ED or increase SDF-1 expression at 2 weeks post-RT but will cause ED and increase SDF-1 expression at 9 weeks post-RT.

Methods: Male rats (10 weeks old) were exposed to 0 Gy or 25 Gy prostatic single-dose radiation. At 2 weeks or 9 weeks post-RT, erectile function was evaluated by behavioral apomorphine assay. Rats are injected subcutaneously with apomorphine (80ug/kg), and erections and yawns are monitored over 30 minute testing period. RNA was isolated from rat major pelvic ganglia (MPG), and quantitative real-time polymerase chain reaction was done to assess the expression of genes related to nerve injury and repair (ATF3, GAP43, CASP3, GFAP), autonomic nerve markers (TUBB3, NOS1, TH), and SDF-1 signaling pathway (SDF-1, CXCR4, VEGFa). Penile tissues will be fixed, sectioned, and stained with Masson trichrome staining to assess smooth muscle content and fibrosis.

Results: At 2 weeks post-RT, there was no erectile dysfunction--erectile stimulation with apomorphine was unchanged. Additionally, all gene expression of nerve injury markers, autonomic nerve profiles, and SDF-1 signaling pathway were unchanged at 2 weeks post-RT.

Conclusion: Evidence of ED and neuronal injury are absent at 2 weeks post-RT, suggesting a prolonged progression in ED development. Our next step is to evaluate erectile function and SDF-1 signaling at 9 weeks post-RT. If changes in SDF-1 signaling are evident when RT-induced ED is present, we will explore the SDF-1 as a therapeutic option to recover erectile function.

GP 10

What is the myocardial implication in RAAS-regulated hypertension? A closer look at the NKA, NCX and Ca^{2+} reuptake machinery in the left ventricular myocytes

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Mentor: Aileru, Azeez

Introduction: Renin Angiotensin-Aldosterone System (RAAS), a hormonal system that regulates fluid retention, sodium-potassium, volume homeostasis and blood pressure. **Objective:** The present study characterizes circulation of RAAS in (mRen2)27 transgenic model of hypertension, to understand the machinery for cardiac excitation-contraction coupling and arrhythmias in RAAS-regulated high blood pressure. **Methods:** Analysis of cardiomyocytes showed imbalance in the expression of RAAS receptors (AT_1R, AT_2R and MAS), Na^+/K^+ ATPase (NKA) pump, Na^+/Ca^{2+} exchanger (NCX) system and alteration of intracellular Ca^{2+}. **Results:** Protein expression for AT_1R, AT_2R and Ang1-7-mediated-MAS receptors were significantly reduced in the cardiomyocytes of (mRen2)27. The relevant roles of NKA and NCX in Na^+ homeostasis was hypothesized that an increase in NKA isoforms (a1 & a2) would suggest a surge in the NCX exchanger to maintain Na^+ influx in cardiomyocytes. The protein expression of the NKA isoforms in the left ventricular myocytes suggests a two-fold increase in (mRen2)27. Further, RT-PCR showed that there is a decrease in mRNA profile for sarco/endoplasmic reticulum Ca^{2+}-ATPase (SERCA Atp2a-2), suggesting a decrease in the slow twitch of Ca^{2+} reuptake in sarcoplasmic reticulum which results in an increased intracellular Ca^{2+} and cardiac excitation-contraction coupling in the hypertensive rodents. **Conclusion:** The data suggests that the optimum role of NKA, NCX and SERCA, in handling of Na^+ and Ca^{2+} in ventricular myocytes, is different in RAAS-induced hypertension.

GP 11

Effects of interprofessional mass casualty incident simulation on role perception and communication between medical, physician assistant, and nursing students

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Mentor: Fletcher, James C

Background: Throughout the didactic portion of health professional schools, students have little opportunity to directly practice their role as a member of the larger healthcare team, and students frequently report lacking confidence in applying themselves in their future roles. We aimed to evaluate the utility of a voluntary, half-day, interprofessional Mass Casualty Incident (MCI) simulation on RN, PA, and MD students' perceived confidence in their role and understanding of the role of others members of the healthcare team.

Methods: This descriptive survey study consisted of surveys evaluating perceived confidence of roles within the healthcare team, knowledge of healthcare team dynamics and communication, and perceived benefit of interprofessional simulation training, administered around an interprofessional MCI simulation. 15 MD students, 9 PA students, and 9 RN students from East Carolina University (ECU) participated in the simulation and were asked to complete a pre-event and post-event survey consisting of 10 Likert scale questions and qualitative, short-answer feedback.

Results: Of the participants, 12 MD, 8 RN, and 5 PA students participated in the pre-survey while 7 MD, 1 RN, and 6 PA students participated in the post-survey. Two-tail T-tests were used to analyze responses comparing pre to post surveys. When asked about the healthcare team, participants reported a significantly higher understanding of their role (p-0.038), confidence functioning within their role (p-0.034), perceived confidence communicating with other members (p-0.001), and ability to identify reasons for communication breakdowns (p-0.005). Additionally, participants reported having greater knowledge of MCI skills (p-0.0005) and increased confidence implementing MCI skills (p-0.004). There was no significant difference found in understanding the roles of other members of the healthcare team (p=0.0552), or comfortableness working with others as part of the healthcare team (p-0.101). Additionally, themes in the free response questions reported new insight of others on the healthcare team.

Conclusion: Surveyed MD, PA, and RN students reported a simulated MCI improved knowledge of individual roles and ability to communicate with others on the healthcare team. We hope future studies will work to evaluate if these perceived improvements translate to clinical practice.

GP 12

Physical Activity During Pregnancy Increases Mitochondrial Efficiency In Myotubes And Offspring Myogenic Mesenchymal Stem Cells

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Mentor: Broskey, Nicholas Thomas

PURPOSE: Transgenerational studies in rodents indicate physical activity during pregnancy improves skeletal muscle mitochondrial energetics in both mother and offspring. Due to the invasive and longitudinal nature of these studies, it is unclear if

these results can be translated to humans. To circumvent these limitations, we conducted a high-throughput screen on our mitochondrial diagnostics platform to assess the effect of maternal physical activity on bioenergetic efficiency in skeletal muscle myotubes and myogenically differentiating progenitor cells from the mother and offspring, respectively.

METHODS: This study recruited physically active (PA, n=10) and sedentary (S, n=9) pregnant women (≤21 weeks of gestation). Women were matched for age (30±2.8 years), race (95% White), and pregravid BMI (23.5±2.9 kg/m2). VO_2peak and ^{31}P-MRS, an assessment of *in vivo* mitochondrial ATP generation, were measured in the second and third trimester. A *vastus lateralis* biopsy was taken to culture primary skeletal muscle cells (SkMC). Upon delivery, fetal MSCs were isolated from umbilical-cord Wharton's jelly and underwent 21 days of myogenesis. Maternal myotube and MSC mitochondrial bioenergetics were assessed using high-resolution respirometry. OXPHOS efficiency (P:O ratio) was directly quantified by simultaneous measures of rate of oxygen consumption (*J*O2) and ATP synthesis (*J*ATP).

RESULTS: Women in PA had a higher VO_2peak (26.0±1.4 ml/kg/min versus 17.6±1.5 ml/kg/min; p=.002) in trimester 2 but not trimester 3. There was no difference between groups for *in vivo* maximal ATP production (p=.20) at either time point. PA women had higher SkMC P:O than S when respiration was supported by mixed substrates (p=.04). MSCs from PA had higher P:O than S when respiration was driven by Complex I substrates pyruvate/malate (p=.03). No significant correlation existed between SkMC and MSC P:O (p=.80); however, a higher VO_2peak during pregnancy was associated with increased P:O in MSCs when respiration was driven by Complex I supporting substrates (r=0.61, p=.04).

CONCLUSIONS: PA women during pregnancy have improved SkMC mitochondrial efficiency. Myogenically differentiated MSCs from infants born to PA mothers showed higher P:O than S largely in carbohydrate-linked oxidation rather than lipid oxidation suggesting these infants may be more efficient when oxidizing glucose.

GP 13

The role of myoferlin and S100A4 in migration of Human T-cell Leukemia Virus type-1 infected T-cells

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Mentor: Lemasson, Isabelle

Human T-cell Leukemia Virus type-1 (HTLV-1) is classified as a complex retrovirus that primarily infects CD4+ T-cells *in vivo*. Effective viral transmission occurs within this cell population upon establishment of direct cell-to-cell contacts. It is currently

estimated that 5-10 million people are infected by this virus. Although most HTLV-1 infected individuals remain asymptomatic, 5-10% develop adult T-cell leukemia/lymphoma (ATLL) or an inflammatory syndrome such as HTLV-1-associated myelopathy/tropical spastic paraparesis (HAM/TSP). Lymphocytic infiltration into various organs such as central nervous system, skin, and visceral organs is commonly observed in HTLV-1-associated pathogenesis. The exact molecular events that regulate lymphocytic migration remains unclear. According to current literature, the viral *tax* and the viral gene *hbz* are thought to be critical in viral replication, persistence, and pathogenesis. Recently, our laboratory demonstrated that the protein encoded by the *hbz* gene, HTLV-1 basic leucine factor (HBZ) induces expression of myoferlin (MyoF) in HTLV-1-infected T-cells. MyoF is a membrane-associated cellular protein that has variety of cellular functions. Current evidence indicates that myoferlin is involved in the proliferation, invasion, and migration of cancer cells. We found that shRNA-mediated knockdown or pharmacological inhibition of MyoF in HTLV-1-infected cells impairs adhesion to endothelial target cells. Adhesion of leukocytes to the endothelial surface is the critical step of T-cell migration. We also observed that knockdown of MyoF in HTLV-1 infected T-cells led them to acquire an overall less migratory morphology. Through RNA-seq analysis comparing MyoF-knockdown and control knockdown (shRNA targeting GFP) of HTLV-1-infected T-cells, we found that *S100A4* transcripts were significantly reduced in MyoF knockdown cells. The S100A4 protein is reported to function in motility and invasion by regulating actomyosin assemblies. Based on our data, we hypothesize that MyoF knockdown in HTLV-1-infected T-cells causes the cell to develop a less migratory morphology due to the loss of S100A4 expression. Progress in addressing this hypothesis is presented.

GP 14

Collagen-derived matricryptin reduces cardiac inflammation post-MI via regulation of inflammatory response

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One in every four myocardial infarction (MI) patients progress to heart failure (HF). Following MI, maladaptive compensatory cardiac responses exacerbate HF; such responses include uncontrolled inflammation. Post-MI macrophages are phagocytic and secrete high levels of inflammatory mediators, such as matrix metalloproteinases (MMPs. Since excessive or prolonged tissue breakdown by MMPs leads to adverse remodeling, the controlled recruitment of inflammatory cells is crucial for optimal

healing. Clinical trials that aimed to prevent maladaptive left ventricular (LV) remodeling by inhibiting MMPs were only partially successful. Mostly, the lack of selectivity in inhibitors (high MMP homology) and the critical functions of MMPs in the healing process impaired success of those trials.

To address these limitations, we propose to use a MMP competitive substrate to reduce, without inhibiting, MMP cleavage of endogenous substrates. Recently, we identified a collagen matricryptin (p1159) that gradually forms post-MI and is a substrate for MMP-9. Matricryptins are bioactive peptides produced during extracellular matrix (ECM) proteolysis and can control cell survival and function. MMP-9 levels directly correlate with MI patient mortality and morbidity. Accordingly, we hypothesize that by increasing levels of p1159 post-MI, we will reduce maladaptive remodeling by limiting MMP-9 proteolysis of cardiac substrates.

A permanent occlusion (PO) model of MI was used for the study. Animals received p1159 (14 µg/day/kg)or vehicle solution by osmotic mini-pump. To determine treatment effects on different cell types through the inflammation continuum, mice were euthanized at 3-day post-MI (D3) to quantify neutrophils, monocytes, and macrophages, and at 5-day post MI (D5) to measure mostly macrophage populations. This was accomplished through a flow cytometry cell sorter. Macrophages were defined as CD45+ Ly6G- CD11b+ Ly6C- F4/80+, monocytes as CD45+ Ly6G- CD11b+ Ly6C+ F4/80, and neutrophils as CD45+ Ly6G+ CD11b+. After cell sorting, RNA and protein were isolated from the purified populations to measure inflammatory cyto/chemokine expression.

Compared to vehicle control, neutrophil infiltration was increased in the p1159 treated group at D3, but no changes were observed in macrophages. Our findings suggest that matricryptin p1159 therapy changes the early inflammatory response. These are preliminary results, group numbers are being increased to validate these findings.

GP 15

Sensitization of Malignant Breast Epithelial cells to Proton Radiation by Gold Nanoparticles

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Mentor: Shinpaugh, Jefferson

Exploration into the enhancement of cancer treatment has garnered interest for more than 50 years. These enhancements all share the same goal: a method to spare healthy surrounding tissue while enhancing killing of cancerous tissue. We report in this work on our resent results using metallic nano-particles as radio-sensitizers in the treatment of malignant breast (MCF7) epithelial cells. Specifically, polyethylene glycol (PEG)-coated gold nanoparticles (GNPs) are studied as potential radiosensitizers in MCF7 cells irradiated by energetic protons. The cells are irradiated in the ion beam facility at East Carolina University using the 2-MV tandem Pelletron accelerator and micro-beamline, which has been adapted to irradiate a monolayer of cells with doses ranging up to 30 Gy. The cells are plated and cultured on standard flat bottom 96-well plates 48 hrs prior to irradiation. Twenty-four hours prior to irradiation, the cells are incubated in the presence of the PEG-coated GNPs at a concentration of 5nM, 15nM, 34nM, and 45nM, allowing integration of the GNPs to the monolayer of cells. Cells are treated with the GNPs for 24 hrs prior to irradiation, and cell viability is subsequently measured using the PrestoBlue metabolic assay. Twenty-four hours post irradiation metabolic activity as well as cell growth are monitored via PrestoBlue and Colonigenic Assasys respectively. Survival curves for the malignant breast cells will be presented.

GP 16

How *ettA* and *lepA* mutations impact *Acinetobacter baumannii* strains with *csrA* deletions

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Acinetobacter baumannii is a Gram-negative bacterial pathogen well known for causing nosocomial infections. It has been classified as an urgent threat by the U.S. Centers for Disease Control and Prevention. This is because of the high rates of multi-drug resistance in many *A. baumannii* strains. We found that the *csrA* gene is essential for *A. baumannii* to grow within a host and that deletion of *csrA* results in growth inhibition in complex media or media containing amino acids. To try to understand the basis for this growth inhibition, we isolated D*csrA* suppressor mutants that regained the ability to grow on complex media and analyzed them by whole-genome sequencing. These analyses identified suppressor mutations in *lepA* and *ettA*, two genes which each encode proteins involved in translational regulation. We hypothesized that LepA and EttA act to inhibit growth in *A. baumannii* when CsrA is inactivated. To explore the role of *lepA* and *ettA* in growth inhibition D*lepA* and D*ettA* deletion mutants were made in the wild type and D*csrA* strains (double mutants) and strains carrying

the *lepA* and *ettA* mutations found in the suppressor mutants (*lepAT638A* and *ettAE470V)*. Analysis of growth for each genotype was performed on lysogeny broth (LB) and chemically defined growth media (MOPS-A) with and without the addition of casamino acids. Additionally, lysates were analyzed by SDS-PAGE to compare the protein expression of suppressor mutants for *lepA* and *ettA* with the wild type and D*csrA*strains. Growth on solid media showed improved growth of the suppressor mutants on LB compared to D*lepA*D*csrA* and D*ettA*D*csrA* double mutants. This was confirmed by growth curves which showed faster growth rates in MOPS-A with amino acids for suppressor mutants as compared to the same double mutants. The growth curves also showed a lower growth rate for D*lepA* compared to the wild type strain in MOPS-A without amino acids. SDS-PAGE analysis showed different protein expression patterns for the *ettA* suppressor mutants compared to the other genotypes. We concluded that the rescued growth in the suppressors is the result of a partial change in the structure of the proteins LepA and EttA rather than the result of these proteins being inactivated. We also propose that the point mutation in *ettA* results in altered translation of some proteins in *A. baumannii*.

GP 17

Ethanol-induced right ventricular hypertrophy and pulmonary hypertension: The Role of pro-inflammatory signaling

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Supported by NIH grant R01 AA14441-15

Mentor: Abdel-Rahman, Abdel-Rahman

The substantial increase in Worldwide ethanol consumption since the Covid-19 pandemic re-emphasized the need to expand the extensive preclinical research, on the effects of ethanol on left heart function, to the rather ignored right ventricular (RV) structure and function. Therefore, the aim of this preclinical study was to investigate the effects of moderate ethanol consumption on RV and pulmonary structure and function, and to elucidate the implicated mechanisms. Two groups of Sprague-Dawley male rats (n=7-8 each) received daily freshly prepared balanced liquid diet containing 5% ethanol (w/v) or pair-fed with isocaloric liquid diet for 8 weeks. The resulting average blood ethanol concentration (39.8 $\pm$ 1.9 mg/dL) resembled moderate drinking. Parasternal short-axis of the pulmonary artery in pulsed-wave Doppler mode showed a decrease in pulmonary artery acceleration time/ejection time in ethanol-fed rats. This finding suggests elevated pulmonary vascular resistance, a hallmark of pulmonary hypertension. Further, transthoracic echocardiography in long-axis orientation showed a significant increase in the RV internal diameter/left ventricular

internal diameter during diastole (RVID-d/LVID-d), indicative of RV dilation in chronic ethanol-treated rats. While echocardiographic RV free wall thickness (RVFW) was not observed in vivo, post-mortem Fulton's index (RV/LV+septum) was significantly higher in ethanol-fed rats suggesting ethanol induced RV hypertrophy. Ex vivo biochemical analyses showed upregulation of the vasoconstrictor/contractility modulator/pro-inflammatory protein endothelin-1 (ET-1) within the RV and lungs of ethanol-fed rats. Furthermore, the ET-1 stimulated cytokine IL-6 was increased by ethanol consumption, supporting a mechanistic role for the ET-1-IL-6 pro-inflammatory pathway. Collectively, this study yields new insight into ethanol-evoked RV hypertrophy and pulmonary remodeling via the upregulation of the ET-1-IL-6 pathway.

GP 18

Determination of the Elastostatic Force Exerted in the Prostate from Image Registration

Aaron Bain, Shiva Bhandari

Mentor: Jung, Jae Won

Image registration is a powerful tool in healthcare and treatment planning within the scope of oncology. It provides the potential for a deep understanding of the anatomical and physiological characteristics of each patient. A particular region of interest is the prostate, where organ motion from the bladder and rectum cause deformation thereof. Using time-dependent MRI images of the prostate, a deformation vector field can be made with respect to the organ motion. A reference image of the prostate is used and compared with an image at a later time to calculate the deformation. Using the deformation and image data of the prostate, an equation can be derived to calculate the force, and from which the elasticity. A vector field for the elasticity can therefore be generated and overlayed over the MRI images. The motivation is to give healthcare workers a picture of the elasticity of the tissue. Possible future implications of this research may extend to treatment planning within the world of oncology, using the elasticity to determine more precisely what types of tissues are represented within images.

GP 19

Investigating the role of Covid-19 in blood clotting

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Mentor: Anderson, Eric Shawn

SARS-CoV-2 is the virus responsible for a global pandemic due to its infectivity and severe symptoms. In addition to the typical respiratory symptoms, infection with COVID-19 has been shown to promote micro-clots within the blood vessels, and these clots are predicted to contribute to a number of the uniquely COVID-associated symptoms. Clot formation is a natural response to cellular damage within the vascular system, and is facilitated by the release of a series of fiber-like structures known as Von Willebrand Factor (VWF). To prevent unnecessary clots from forming during vascular inflammation, an enzyme called ADAMTS-13 (A disintegrin and metalloproteinase with a thrombospondin type 1 motif, member 13) prevents the accumulation of VWF, in the absence of serious cell damage.

Objective: The goal of our research is to determine if the SARS CoV-2 3CL protease, used in viral replication, promotes clotting during infection by targeting ADAMTS-13.

Methods: The amino acid sequence of human ADAMTS-13 was evaluated for potential cut sites using published cleavage data from the SARS 3CL protease. Western blotting was used to directly evaluate interactions between ADAMTS-13 and purified COVID-19 3C protease.

Results: *In silico* data identified 3 potential 3C protease cleavage sites in the ADAMTS-13 amino acid sequence. Western blotting confirmed cleavage of ADAMTS-13 in the presence of the SARS-CoV-2 3CL protease.

Conclusions: Our current data demonstrate that a viral protein capable of cleaving ADAMTS-13 may be responsible for the reduced levels of ADAMTS-13 noted in COVID-19 patients that is linked to increased clot formation during infection. Additionally, this interaction may provide insights into the rebound symptoms observed with the anti-COVID drug Paxlovid, a 3CL protease inhibitor, and may provide clues to the nature of symptoms associated with long COVID.

GP 20

Central axis and off-axis heterogeneity correction factors for three commercially available I-125 seeds models for COMS eye plaques

Mehran Nik Akhtar, Jae W. Jung, Yongsook Lee, Yongbock Kim

Mentor: Jung, Jae Won

The heterogeneity component of eye plaques can contribute clinically significant dose differences compare to dose calculation using all water environment TG 43 approach. The purpose of this study is to determine heterogeneity correction factors along the

central axis and off-axis for three commercially available I-125 seeds models for Collaborative Ocular Melanoma Study (COMS) eye plaques. Using EGSnrc Monte Carlo (MC) code, COMS plaques were modeled at the center of a water phantom. Two MC simulations (HOMO and HETERO) were performed for each plaque size (10 mm - 22 mm in diameter, 2 mm increments). HOMO was simulated under TG-43 conditions with seed configurations in water and no inter-seed interactions, plaque backing or insert. A prescribed dose of 85Gy was normalized at a depth of 5mm. HETERO was simulated with plaques containing the same seeds fully modelled. Correction factors along the central axis from 0 mm to 22 mm were determined by taking a ratio of HETERO to HOMO. For off-axis, the coordinates for optic disc, macula, and lens are determined. Under two simulation conditions (HOMO and HETERO), dose for optic disc, macula and lens was calculated as a function distance from tumor margin to optic disc (DT) and to macula (MT) for various basal dimensions (BD or BM). Heterogeneity correction factors for optic disc, macular and lens were determined as a function of DT or MT for BD or BM by taking a ratio of HETERO to HOMO. Simulations were repeated for three I-125 seed models (IAI-125A, 2301 and I25.S16). Central axis heterogeneity correction factors increase slightly and then decrease as increasing depth for all seven plaques, ranging between 0.79 and 0.92 for all three seed models. Average (maximum) absolute difference in correction factors among three seed models is < 0.035 for all sizes of plaques. Heterogeneity correction factors for optic disc ranged from 0.871 to 0.754 for IAI-125A, from 0.884 to 0.763 for Best 2301, and from 0.886 to 0.765 for Bebig I25.S16. Correction factors for macula ranged from 0.871 to 0.755 for IAI-125A, from 0.883 to 0.766 for Best 2301, and from 0.886 to 0.770 for Bebig I25.S16. The variation in correction factors for lens was small, ranging from 0.831 to 0.805 for IAI-125A, from 0.841 to 0.805 for Best 2301, and from 0.836 to 0.821 for Bebig I25.S16.

GP 21

The effects of protons and lactate due to increased glycolysis on the expression of the inflammatory and stress genes of human umbilical vein endothelial cells

Kylie D. Cashwell, Li V. Yang

Mentor: Yang, Li

An acidic tumor microenvironment is mainly due to a preference for glycolysis as the main energy source for cancer cells even with the presence of oxygen, called the Warburg effect. This leads to an increase in lactic acid, which disassociates into protons and lactate. Previous studies show the protons acidify the microenvironment which activates the proton-sensing receptor GPR4 found on vascular endothelial cells. As a result, there is an increased expression of stress and inflammatory genes. The role of lactate in the microenvironment is not as clearly understood. GPR4 is a potential drug target for inflammatory and acidosis-related diseases, and its impact on other gene

expressions can also be targeted for disease treatment. One of the downstream effects of GPR4 activations is an increased expression of the stress-response transcription factor ATF3. The purpose of this study is to examine how protons and lactate, as byproducts of glycolysis, influence stress and inflammatory genes in endothelial cells and what role ATF3 plays in inflammation in the GPR4 pathway. In acidic media of pH 6.4 where GPR4 is activated, HUVEC (human umbilical vein endothelial cells) had higher expression of various stress and inflammatory genes in comparison to media with a pH of 8.4 or the physiological pH of 7.4. With the addition of lactate, these genes' expression is reduced compared to without lactate in the matching acidic pH in media. When comparing vector control HUVEC and ATF3 overexpressing HUVEC, the expression of these inflammatory genes is suppressed by the ATF3 expression. The results suggest that protons and lactate, two metabolites derived from lactic acid, have differential effects on the expression of inflammatory and stress genes in endothelial cells. Whereas protons and the acidification of the microenvironment activate GPR4 and increase stress and inflammatory responses, lactate's role could be to alleviate some of these responses. Even though GPR4 is proinflammatory, the results show ATF3 as a negative regulator for inflammation, suggesting other pathways may function as positive regulators for inflammation in response to the acidic microenvironment.

GP 22

Modelling of Light scattering by microspheres and biological cells

Ismail Ibrahim

Mentor: Hu, Xin-Hua

The goal of this project is to simulate light scattering by single biological cells which allows understanding of the relation between cell morphology and diffraction patterns formed by the elastic scattering of coherent light. Using existing numerical modeling tools of light scattering, one can identify the features of diffraction images acquired from single cells to the types of cells for various clinical applications such as cancer diagnosis and blood cell analysis. For example, one may combine the diffraction imaging method with flow cytometry to rapidly recognize and count malignant cells in effusion samples taken from patients with abnormal buildup of fluid in their pleura. In the first phase of my dissertation research, we have applied an open-source code called Amsterdam discrete dipole approximation (ADDA) for modeling light scattering by small particles on the size scales of biological cells.

ADDA divides a small particle into an array of voxels with sizes usually much smaller than the wavelength of light. The light-particle interaction is modelled by

approximating each voxel as an electric dipole to calculate spatial distribution of scattered light emitted by the dipoles. Since ADDA is an approximate solution ion to the accurate ones of wave equations, it is important to understand the effect of simulation parameters on accuracies of the simulation results by ADDA. We have investigated these effects by comparing the output data form ADDA to the accurate solution given by the Mie theory. Among various simulation parameters, the one affecting accuracy is the dipole per unit length (dpl). Employment of higher dpl values reduces errors in ADDA but causes the program to consume more memory since larger number of voxels must be used. For example, we found that ADDA simulation of light scattering by a homogeneous sphere with a diameter of a 10μm and a complex refractive index of 1.60 +0i requires a memory size of 1098.8 MB with a dpl setting of 15. In the future, we want to run the same parameters but with a dpl setting of 30 to compare the memory usage and accuracy. The same sphere was inputted into a Mie theory code without the dpl setting since this is unnecessary. Both sets of data were normalized and graphed to show the difference and the result was that ADDA is a very good approximation. The next steps are to build the optical model of the cell using result of ADDA and a technique called ray tracing.

GP 23

The Radiosensitization Effect of PEG-coated Gold Nanoparticles in Prostate Carcinoma Cells with Proton Irradiation

Tristan Gaddis, Nichole Libby, Mahboubeh Nabavinia, Juan Beltran-Huarac, Michael Dingfelder, and Jefferson Shinpaugh

Mentor: Shinpaugh, Jefferson

One of the main goals of cancer radiation therapy is to reduce the dose to healthy tissues while maximizing the dose to malignant tissue. A special class of materials known as radiosensitizers" has emerged that can help achieve this goal by increasing the response of cells and tissues to radiation. High-Z metallic nanoparticles, such as gold nanoparticles (GNPs), have been studied as radiosensitizers. The application of these nanoparticles to cancerous cells has been shown to result in an increase in DNA damage from secondary electron emission when irradiated indicating an increased reaction to the radiation. An important parameter of GNPs that has been shown in effect their biocompatibility is the applied surface coating. Polyethylene-glycol (PEG), in particular, has been shown to be an advantageous coating for gold nanoparticles by increasing biocompatibility as well as increasing to the production of low energy electrons.

This research explores the use of PEG-coated GNPs as radiosensitizers in prostate carcinoma cells (22Rv1). The cells are cultured and plated in 96-well plates in the ECU Cell Culture Laboratory. Once the cells reach 80% confluency, the PEG-coated GNPs of concentrations varying from 0-45 nM are added to the cells 24 hours before irradiation to allow for optimum cellular uptake. After the 24-hour waiting period, the cells with fresh growth media are transferred to the ECU Accelerator Laboratory which houses a 2 MV Tandem Pelletron Accelerator with an attached microbeam line where the cells are irradiated with a 3-MeV proton beam. The exposure times of the irradiation to the cells correlates to a range of doses. The viability of the cells is determined by means of a PrestoBlue assay. These results are used to construct survival curves of the cells with the varying concentrations of PEG-coated GNPs along with their controls to illustrate the radiosensitization effect.

By enhancing the sensitivity of the cells to radiation with these PEG-coated GNPs, the overall dose applied to patients undergoing radiation therapy could be lowered while still effectively treating the cancer. This reduction of dose would spare surround healthy tissue resulting in fewer side effects for patients.

GP 24

Association between congenital heart disease and trauma surgery outcomes

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Mentor: Tumin, Dmitry

Congenital heart disease (CHD) is one the most common birth defects, with a prevalence of 8-10 cases per 1000 live births in the US. CHD has been recognized as a risk factor in poor perioperative and postoperative outcomes in non cardiac surgery. These risks have not been studied in trauma surgery. We used a multicenter trauma registry to test the hypothesis that documented presence of CHD would be

independently associated with postoperative mortality and complications. Data were acquired from the 2010-2019 American College of Surgeons' Trauma Quality Programs Participant Use File (TQP PUF). This study included patients of all ages with at least one non-trauma International Classification of Diseases (ICD-10) code to capture comorbidity. The primary outcome was overall mortality rate after surgical intervention, with other outcomes including overall hospital length of stay and hospital complications. The primary independent variable was documentation of an ICD code for CHD, and 215 CHD cases were matched 1:1 to non-CHD controls using propensity score matching. Outcomes were analyzed using fixed-effects regression controlling for any covariates remaining imbalanced after the matching procedure. Compared to patients with other comorbidities, patients with CHD were less likely to be discharged home to self care (OR = 0.44, 95% CI = 0.23 to 0.86, p = 0.016) and tended to have prolonged hospital length of stay (OR = 1.10, 95% CI = 1.02 to 1.18, p= 0.012) . Extended postoperative LOS has been associated with possible ICU admission, increased risk of infection, and associated respiratory and cardiac complications. These results support the need to routinely document CHD comorbidities in trauma admissions that could eventually lead to surgical intervention, and prepare for trauma patients with possible comorbid CHD.

GP 25

HAMSTRING LENGTH EFFECTS ON GROUND REACTION FORCE IN PITCHERS

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Mentor: Durland, Alexander Nathaniel

Purpose
This study will attempt to determine if there are correlations between supine, active hamstring angle of the stride leg in baseball pitchers, and peak vertical and braking ground reaction forces produced when throwing a pitch at game speed.

Methods
Participants will be between the ages of 14 and 30, currently playing competitive baseball and must not have any current injuries hindering the ability to pitch at a game-like intensity off a pitching mound. Participants will have their stride leg hamstring

angle measured actively in the supine position with motion capture trackers. Participants then will go through a whole body, active warmup and can throw as many warmup throws as desired. Participants will then throw 5-15 pitches at game intensity to a catcher. When throwing off the mound, force plates will measure peak vertical and braking ground reaction forces.

Results
Results are pending as the study is ongoing.

Conclusion
Conclusion is pending as the study is ongoing.

Clinical Relevance
Studies have shown that stride leg ground reaction forces predict throwing velocity (McNally et. al. Stride Leg Ground Reaction Forces Predict Throwing Velocity in Adult Recreational Baseball Pitchers 2015) and influence kinetic motions further up the body to trunk and upper extremities (Howenstein et. al. Peak Horiztonal Ground Reaction Forces and Impulses Correlate With Segmental Energy Flow In Youth Baseball Pitchers, 2020). The act of throwing a pitch produces very large ground reaction forces that the pitcher must control in a knee extended moment, requiring hamstring flexibility (Guido et. al. Lower Extremity Ground Reaction Forces In Collegiate Baseball Pitchers). It is not evident if hamstring angle is related to the production of peak vertical and braking ground reaction forces. Since throwing a ball at higher velocities is desired in baseball, finding a relationship could provide medical professionals, physical therapists, strength coaches and baseball coaches education on hamstring flexibility and a pitcher's ability to produce optimal force while pitching.

GP 26

Impact of Insecticide Exposure Method on Susceptibility/Resistance in Mosquitoes

Crystal Elizabeth Dailey, Stephanie Richards, Sinan Sousan

Mentor: Sousan, Sinan

Mosquitoes can develop resistance to insecticide active ingredients (AI) over time when exposed to sublethal doses. This is a public health risk as insecticides applied by mosquito control programs are one method for preventing mosquito-borne diseases. Mosquito exposure to insecticides during ultra-low volume (ULV) application occurs via direct liquid contact (formulated product [FP]), while barrier applications expose mosquitoes to dried residual FP. The Centers for Disease Control and Prevention (CDC) bottle bioassay (based on contact with dried residual insecticide AI) may not directly

relate to operational interventions for ULV applications. The current pilot study will assess how topical/direct versus residual insecticide exposure impacts mosquito susceptibility/resistance. A wind tunnel-like apparatus will be designed and developed for testing resistance to formulated products and AIs. Initial wind tunnel testing will be conducted on 1 *Aedes albopictus* and 1 *Culex* spp. lab colony for at least one formulated product used in North Carolina (e.g., Biomist; active ingredient permethrin). Testing is also planned for at least 1 North Carolina *Aedes albopictus* and 1 *Culex* spp. field population. Female mosquitoes (4-5 d old) will be aspirated from a colony cage and anesthetized with cold. Mosquitoes will either be: 1) treated topically with 1 µL of each AI (stocks made in acetone), 2) transferred to bottles containing residual AI as used in CDC bottle bioassays, or 3) transferred to 6 in diameter mosquito cages and exposed to insecticides via wind tunnel (8 µg/mL permethrin for topical and residual treatments). Control groups will be treated with acetone instead of AIs (following topical and residual application methods). Immediately after topical exposure and 10-15 min after residual exposure, each group will be transferred to separate 0.5 L cardboard cages (10 mosquitoes/cage; 2-3 replicate cages/group). Mosquitoes will be provided 20% sucrose and placed in a 28°C incubator with 14 h light:10 h dark. Mortality will be monitored/recorded for all groups 1 h, 2 h, and 24 h post-exposure. Fisher's Exact tests ($P < 0.05$) will be used to determine differences between groups.

GP 27

Discovering Motivation to engage social work graduate students: A Student Leadership Advisory Board

Sheila Gay, JoAnna Latham, Jessica Llamas, Zaye Massey, & Meghan Marie Stello

Mentor: Reinsmith-Jones, Kelley K

Participation in Master of Social Work (MSW) graduate program student groups has waned nationally, as most concentrate only on community service much like their undergraduate program counterpart. As a call to action for reigniting the interest among social work graduate students to become involved in prevalent issues, our MSW course project group proposed a *social work student advisory leadership board.* We partnered with the East Carolina MSW program to identify program areas where students can become more involved in academia issues. This effort also assists the program with meeting Council on Social Work Education (CSWE) compliance standards by involving students in program decision making and environmental or diversity, equity, and inclusion matters. After polling other universities about existing student leadership advisory boards, we created a Microsoft Form survey that asked

ECU MSW students to provide their feedback on constructing a student leadership advisory board. It was offered that the board could contribute towards several issues including: (1) collaboration of all MSW students choosing to participate in work groups designed to address key issues related to graduate social work education, as well as relevant department, college, and university policies; (2) unity between online and face-to-face students; and (3) representation at key department and college meetings where student voice is invited and needed. From the MSW Student Opinion survey we created, 46 of 47 students believed that the MSW Program would benefit from a student advisory leadership board. We found that integrating a student leadership advisory board would be beneficial for ECU's MSW program, as well as for the students, providing access to a platform for their voices--ideas and feedback--to be heard. It would be central to student engagement and success to strengthen student involvement and ability to articulate concerns to the administration regarding their education. Reviewing the survey data, the positive responses display how students are interested in developing this advisory board to feel valued and serve as an educational and social function for each cohort.

GP 28

Seeking Sista Blackademics for Support: The labor of being a Black woman doctoral student at a Primarily White Institution

Codi Renee Blackmon
Anie Patterson Partin

Mentor: Eble, Michelle F

Education has power for social mobility not just for individual Black women but for the Black community as a whole (Tillman, 2012). Yet, with the declining value of tenure and the departure of valued underrepresented academics during the "Big Quit"" or "Great Resignation"" (Dolezal, 2022), new and emerging Black scholars and women of color face a precarious position. While institutions recruit Black scholars in pursuit of diversity, equity, and inclusion, it is uncertain if they will receive support once they arrive.

Previous research has demonstrated that Black women instructors face unique challenges in the American higher education system due to the intersections of race and

gender (West & Bertrand Jones, 2018; Smith, 2016; Henry & Glenn, 2009; Patitu & Hinton, 2003). Through social justice and Black feminist theory (West, 2021), this presentation by Black women doctoral students in the field of rhetoric, writing, and professional communication includes narratives of their experiences at a PWI, highlighting the importance of Black female mentorship and emotional support, as well as the creation of spaces for Black women to reduce the labor imposed on each individual. Black women-centered spaces provide a source of specialized knowledge derived from shared experiences and can serve as a supportive space for Black women to process experiences of oppression and validate their experiences. Addressing these obstacles and establishing connections with people in professional counterspaces can aid Black women in bearing the emotional and mental labor needed to navigate the field successfully and continue creating space for Black women in academia to connect, share, and succeed in their field.

GP 29

Enhancing Tuberculosis Treatment Adherence by Tailoring Education to the Patient

Daniela K Ingram

Mentor: Dillon, Margaret Ann

Tuberculosis (TB) is one of the deadliest infectious disease agents worldwide, with an estimated 1.3 million deaths in 2020. The bacteria called Mycobacterium tuberculosis is transmitted via respiratory droplets such as coughing, singing, and laughing. Even in the United States, TB is still present. Even as TB cases fall in industrialized nations, treatment is imperative to cure the person and reduce transmission to others. Completion rates are defined as completion of treatment within 12 months when 12 months or less are indicated, such as when a patient has uncomplicated pulmonary or extra-pulmonary TB. High completion rates are desired since it reduces the chances of relapse and creates drug-resistant cases from incomplete or delayed treatment. Relapse is TB disease within 12 months after completion of previous treatment. Drug-resistant TB comes in several forms, from multi-drug-resistant (MDR-TB) to extensively drug-resistant TB (XDR-TB). The level of drug resistance depends on which medication the TB is resistant to.

Adherence is an important part of completing treatment on time. Adherence is defined as taking the pills when required, the route as prescribed, and the correct quantity. Non-adherence is one of the main factors in poor treatment outcomes. Several studies show that consistent education throughout treatment is beneficial to the patient. It is imperative that education is started early and continued throughout the treatment process.

When looking at the implication of inadequate treatment, including non-adherence and incompletion, physical, social, or psychological barriers must be identified and removed. Some identified barriers are the lack of appropriate instructions, understanding of the disease, the process, the importance of treatment, and how it is prescribed. TB treatment has not changed in decades. It remains long and arduous, with numerous barriers to completion. It is not uncommon to have patients who do not complete treatment, do not adhere to proper medication administration, or are lost to follow-up.

Every patient is a unique individual. Healthcare providers must keep in mind the different needs and access to information patients have; the available education should not be generic. Quite the opposite, patient instructions should be tailored to the patient and personalized.

GP 30

EXPLORING HEAD START TEACHERS' PERCEPTIONS OF SCIENCE IN PRESCHOOL EDUCATION

Taylor Marie Brown

Mentor: Hegde, Archana

This study investigates how Head Start teachers view science incorporation in early childhood classrooms, including their use of science resources and personal reflections. One can assess the efficacy of our current programs and investigate the possible need for further support by understanding the experiences of Head Start teachers through a study that is inclusive of the state of North Carolina. While it is clear that prepared teachers help students achieve greater academic success, it is critical that teachers receive the most support in order to attain preparedness in critical topics. Due to this domain being found as one of the least successful subjects among low-income students, science is the subject of interest for this study. Derived from existing literature, this study aimed to answer this fundamental research question: What experiences do Head Start educators have with preschool science education, and how does this affect their prevalence of incorporating preschool science curriculum? Additionally, these questions will also be explored: (1) What are the current experiences of Head Start teachers with opportunities for science-related professional development? (2) What types of barriers or challenges exist when introducing science in a preschool classroom? (3) Based on the experiences of teachers, what types of professional development opportunities could be useful? Thus, utilizing a phenomenological qualitative research design, this study aims to examine Head Start preschool teachers lived experiences with science education through the implementation of guided interviews. Specifically looking at their current experiences with science teaching, opportunities for

professional development, and their perceived need for support while introducing science in their preschool classrooms. This study aims to collect Head Start educators' perspectives through one-on-one interviews, analyze the responses, recognize common experiences, and develop a representative narrative of the population's responses and experiences.

GP 31

Teaching Social Justice in a Post-MAGA World: Writing Past The Stop WOKE Act

Amanda Patterson Partin

Mentor: Eble, Michelle F

Scholars in higher education have openly recognized that social justice in the classroom is a worthy endeavor as universities increasingly express a commitment to addressing social justice issues (Agboka, 2022; Cox 2018; Haas,2012). However, the push toward antiracist-informed pedagogy has been slowed by public and political opposition. This presentation will discuss the social justice turn in higher education and the public opposition to that turn, focusing primarily on the Stop WOKE Act. In this poster presentation, I discuss the particular effect this legislation may have in the studies of Technical and Professional Communication (TPC), rhetoric, and composition, and suggest strategies for creating a course syllabus that continues social justice work in light of political and social opposition. Ideally, this poster session will be generative for instructors as we collectively think through ways to foster equity in our classrooms and empower students with the agency to carry those principles forward.In March 2022, the Florida state senate passed House Bill 7, also known as the Stop WOKE Act. The bill suggests that a person should not be instructed that he or she must feel guilt, anguish, or other forms of psychological distress for actions, in which he or she played no part, committed in the past by other members of the same race or sex" (flsenate.gov). One of the targets of this legislation is the integration of Critical Race Theory (CRT) in classrooms, primarily in the humanities and social sciences. By interpreting the elements of the Stop Woke Act, I demonstrate the academic field's diverging trajectory of pedagogical practices with the simultaneously emerging political opposition (Kynard, 2018). I provide open practical suggestions for using the syllabus as a starting point for beginning to navigate through the shroud of opposition toward a more inclusive and culturally responsive classroom and world. Instructors can use the syllabus as an entry point to clearly define social justice, interrogate power structures within the classroom, and introduce students to strategies for countering dominant narratives of oppression.I suggest that the root of the problem is a misinterpretation of the aims of social justice pedagogy. This misinterpretation is willful. There is a history of opposition to change in every step of history.

GP 32

Title: Factors Behind Intrinsic Motivation for Mathematics: A Cross-Sectional Study of 4th and 5th-grade students

Dawn D Fletcher

Mentor: Gregory, Kristen Howell

Many factors affected upper elementary students' intrinsic motivation for learning and math performance. Some of these factors included how students felt about math, the setting at the school they attend, and the methods teachers used to deliver instruction. This study investigated factors that contributed to the lack of intrinsic motivation in 4th and 5th-grade students in math at a Title I school in rural eastern North Carolina. The data allowed educators and administrators to better understand the reasons why students like or dislike math and the relationship between mindset and performance. The methodology used was mixed methods, as a survey with both open-ended and closed questions, investigated students' intrinsic motivation toward mathematics and the factors that contributed. The quantitative and qualitative data gathered were from 147 fourth and fifth-grade students, 12 math teachers, and an instructional math coach. Additionally, 20 students and five teachers had follow-up interviews based on their survey answers. The findings from this mixed methods study benefited administrators and teachers as it allowed them to have a clearer understanding of why students lack intrinsic motivation in 4th and 5th-grade math and helped them find ways to strengthen the willingness of students to engage and internally want to succeed in the classroom and beyond.

GP 33

Impact of Fluency Homework on Math Achievement

Kalysha Mccarthy

Mentor: Gregory, Kristen Howell

Multiplication fact fluency is an issue among many students beginning in third grade. Third grade students are expected to memorize their multiplication facts within the first semester of the year in order to be successful in the second half of third grade. Teachers in Eastern North Carolina follow the North Carolina State Standards. These standards and the set pacing guide do not allow teachers and students to focus on rote memorization of multiplication facts.

With the primary focus for teaching multiplication being on strategies for solving multiplication, there is no time to focus on the memorization of facts. A possible solution to this problem is giving purposeful homework. Does homework in math fact fluency impact third-grade students when they begin learning more advanced math concepts?

The purpose of this qualitative study is to determine if fact fluency homework has an impact on student achievement. Third-grade students in a title-one school within Eastern, North Carolina, participated in fact fluency homework for approximately three weeks. In order to know if fluency homework helped these students, they will take a pre and post assessment. Their data will be compared to another third-grade class that did not participate in homework. The results of this study will assist teachers in determining if homework is needed to help close learning gaps. More importantly it will help students progress through other math standards with less struggle.

GP 34

Student Perceptions of Science Instructional Strategies and Vocabulary Acquisition

Tabitha Dawn Mozingo

Mentor: Gregory, Kristen Howell

Many elementary students enter school with a healthy social vocabulary, but are lacking in academic vocabulary. With such an emphasis on student performance in reading and math due to high-stakes testing, science curriculum can often be overlooked in the elementary grades in lieu of providing more instructional time for reading and math. While these subjects do hold high importance, student knowledge of science curriculum and vocabulary at the elementary level deserves a closer look as it can greatly impact overall student performance.

This study is based on the topic of science curriculum and focuses on the problem of students' lack of science academic vocabulary. The purpose is to explore a variety of instructional strategies that promote acquisition of science academic vocabulary for fourth grade students at a rural, Title One elementary school in North Carolina. The research question being investigated is: What do students perceive as highly effective instructional strategies to teach science academic vocabulary for fourth grade students at a rural, Title One elementary school? This study uses a qualitative methodology and action research design. Data are collected using a researcher observation journal and a student survey where participants identify their most and least preferred instructional strategies used to learn science academic vocabulary.

It is anticipated that by studying this particular group of students and determining how teachers can more consistently teach science academic vocabulary using instructional

strategies preferable to students, it will help educators positively alter their own pedagogy when it comes to teaching science academic vocabulary. Students would also benefit from these adjustments in instruction, likely leading to higher academic achievement. Also, school academic and instructional coaches would be better able to assist all teachers by having more resources to provide them for teaching science academic vocabulary.

GP 35

Assessing Reading Motivation in Fourth Grade Students

Jessica Rose Dolan

Mentor: Gregory, Kristen Howell

In recent years there has been a large increase in the amount of students who are not motivated to read independently. Utilizing data from this study I haev identified ways to improve reading motivation among fourth grade students at a Title-1 school. This research focuses specifically on students who are reading below grade level in fourth grade at title one school. The purpose of this research is to be able to identify whether intrinsic or extrinsic motivation yields better results of motivating these students to read. We do this by giving students a pre and post survey to help them assess their own motivation to read. We will also be looking at their iReady scores to identify any changes in their reading level as their motivation level changes. This study will benefit not only the teachers in title one schools, who are struggling with how to motivate their students to read, but also benefit the students by helping them find the motivation to read on their own. Through this study we will be able to answer the question: How can teachers improve the motivation levels in fourth grade students who are reading below grade level in title one schools?

GP 36

Title: Teacher Perceptions on Teaching International Students

Abigail Elisabeth Prosser

Mentor: Gregory, Kristen Howell

Abstract:

When international students enter American schools, they either have learning gaps or are far ahead of grade level. This study investigated the following research question:

What strategies do teachers implement to teach international students? This research took place at a rural elementary school in North Carolina. The purpose of this qualitative study was to explore different ways teachers can better serve international students in a rural, Title One, elementary school. This research used a narrative research design. Data is collected from a small group of teacher who have had experience with international students using an interview method. The interview questions revolved around the academic levels of international students, the social/emotional behavior of these studnets, and strategies to help differenciate instruction. Learning about what and how international students learn can help teachers differenciate instruction to either fill in their gaps or challenge international students to show growth.

GP 37

Effectiveness of Homework

Deonte Lamont Cavender

Mentor: Gregory, Kristen Howell

The case investigated was the effectiveness of homework in an elementary school setting and takes the efficacy of fifth grade students in rural, Title One school in eastern North Carolina into consideration. Qualitative and quantitative data was collected during this case study making this mixed methods study. Students who participate in this study were asked to complete a survey voicing their opinions of homework and their overall confidence in how well they can complete their assignments in school. Participants also completed homework for a set amount of time while data is being collected and their performance in school was evaluated by tests and grades. Findings from this study allow educators to better understand the effectiveness of homework in an elementary school setting.

GP 38

Teachers' Stance on Foundational Reading Skills

Amanda Taylor Monroe

Mentor: Gregory, Kristen Howell

Many studies over the years have focused on reading instructional practices recommended for use in the classroom, but few have solicited the beliefs of experts—

teachers. This study examines teachers' beliefs on reading instruction, specifically when it comes to the importance of and best practices to teach foundational skills to students in grades K-2.To do so, this study uses a mixed methods approach when collecting data from teachers with a cross-section survey, allowing me to measure the current attitudes of and practices used by teachers.

To begin this study, qualifying teachers are invited to participate in a digital survey through Qualtrics. The survey questions use a questionnaire format to deliver quantitative questions using a Likert Scale, yes or no response, and multiple choice, as well as qualitative open-ended questions that allow teachers to provide written responses. These questions cover teacher beliefs on what practices they use, the value of varying skills or practices, and which are most successful, as well as background information on their education, training, and experience. Data collected from qualitative questions are analyzed using open coding to create categories that pull from evidence to support each category. Additionally, quantitative questions are analyzed using descriptive statistics, which allows me to describe responses to each question and determine overall trends.

The results of this study serve multiple purposes. For one, teachers are given a voice and can provide insight into their beliefs and experiences with best practices. Secondly, this can help guide decisions about curriculum choices and help determine what types of professional development are being offered based on teachers' needs. It is important to see if teacher beliefs align with the current curriculum since it has been found that teachers' beliefs and understanding of the content can affect its implementation in the classroom. In the end, this data will help ensure we are supporting and creating more knowledgeable educators and that students are gaining the most from their foundational readinginstruction in the elementary school setting to make them successful readers.

GP 39

Deicing of bridges by heating rebars and heat transfer effect

Pablo Andrés Nunez Hernandez

Dr. Faete Filho

Dr. Amin Kamal Akhnoukh

Mentor: Filho, Faete

Deicing of bridges is a crucial issue in areas with harsh winter weather conditions, as ice and snow accumulation on bridges can lead to hazardous driving conditions and increased maintenance costs. The traditional method of deicing bridges is the use of

salts, which can be corrosive to the bridge structure and the surrounding environment. In this research, the focus is on exploring a new method of deicing bridges using heat transfer. The study aims to determine the effectiveness and efficiency of heating the steel bars of bridges to remove ice and snow.

The research will consist of numerical simulations to accurately model the heat transfer in the steel bars. The numerical simulations will help to predict the temperature distribution in the steel bars under different heating scenarios, and to understand the heat transfer mechanism. The results of this research will provide insights into the feasibility and potential benefits of using heat transfer as a method for deicing bridges.

The findings of this study will be of great significance for the field of bridge engineering, providing valuable information for decision-makers to make informed choices about the best methods for deicing bridges in the future. The research will contribute to the development of more sustainable and environmentally-friendly methods of deicing bridges, reducing the negative impact of deicing salts on the environment, and improving the safety of bridge users.

In conclusion, this research project will provide guidelines on the potential of using heat transfer to deice bridges and will provide valuable information for the design and maintenance of bridges in areas with harsh winter weather conditions. The results will be beneficial for bridge engineers, decision-makers, and the public, as they will contribute to the development of safer, more sustainable, and more efficient methods for deicing bridges.

GP 40

Computational fluid dynamics simulation of pulmonary hypertension in sickle cell disease patients, a viscosity model study

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Mentor: George, Stephanie

Sickle cell disease (SCD) is a genetic blood disorder caused by an amino acid substitution in the beta globin chain of the hemoglobin. Pulmonary hypertension, one of the complications caused by sickle cell disease has a prevalence of 10% in patients with sickle cell disease and sickle cell disease patients with pulmonary hypertension are at

higher risk of morbidity compared to patients who do not have pulmonary hypertension.

Due to increased hemolysis, whole blood viscosity in sickle cell disease patients is lower compared to normal. We have used computational fluid dynamics to examine the effect of altered blood viscosity in sickle cell disease patients. Of the four subjects' data included in this study, one (Subject 1) did not have pulmonary hypertension, a control subject, and the other three subjects (2,3,4) had pulmonary hypertension. Subjects 1 and 2 had sickle cell disease, the others did not. In these simulations normal and SCD blood viscosities were taken to be 3.5 and 1.87 cP respectively. Simulations with normal and SCD blood viscosities were carried out for SCD subjects and the results show 29% decrease in maximum wall shear stress at peak systole of 3rd cycle when lower blood viscosity of 1.87 cP was used for subject 1 compared to normal viscosity of 3.5 cP. Results from simulations of blood flow for subjects 3 and 4 return close values of maximum wall shear stress for constant viscosity of 3.5 cP and Carreau viscosity models. Also our results confirm lower values of WSS reported in PH subjects.

GP 41

Optimizing HVAC Design for Pharmaceutical Requirements with Computational Fluid Dynamics

Lijun Liu

Mentor: Huang, Yilei

As one of the new technologies in the construction industry, Building Information Modeling (BIM) has been widely used in the past decade to improve the quality of HVAC design and engineering. Although these new technologies have brought significant impacts in the HVAC industry, most of them have not been applied in specialty projects, such as the design of pharmaceutical clean rooms. Their design process requires particular consideration for indoor air quality and thermal conditions, which depend on detailed analyses from interdisciplinary design collaboration. The conventional design process of pharmaceutical clean rooms is typically CAD-based, which can rarely generate simulation models of temperature distribution to verify the effectiveness of HVAC systems. Such design process is likely to cause errors in the operation stage, which will fail the design requirements. To address the design challenges in specialty projects, this paper presents a BIM-based approach to optimize HVAC design with Computational Fluid Dynamics (CFD). By utilizing CFD to simulate the dynamic conditions of airflow in clean rooms, the effectiveness of HVAC systems can be verified. A case study of a typical clean room design is presented to demonstrate the workflow of the approach and validate its functionalities. The results of the case study have shown that CFD can successfully simulate the design intentions of indoor

air quality in BIM models and suggest optimized HVAC systems for clean room design. The findings of this paper contribute to the body of knowledge on overcoming the limitations of the traditional CAD-based HVAC design process and provide valuable insights on optimizing HVAC design with BIM and CFD technologies.

GP 42

Cancer subtype detection using tensor decompositions and artificial neural networks

Farnoosh Koleini

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Mentor: Nassehzadeh-Tabrizi, Moha

Biomarkers are biological molecules that are indicative of normal or abnormal processes, such as disease states or responses to treatments. When combined with clinical data, the resulting information can be used for earlier detection of diseases and the development of personalized therapies. Moreover, new developments in ''omics'' technology provide researchers the chance to look for disease biomarkers at the system level. A Tremendous amount of work has gone into discovering disease-associated biomolecules by analyzing data obtained from different ''omics'' experiments (genomics, transcriptomics, metabolomics). However, due to the complexity of biological systems and the poor integration of various forms of ''omics'' data, integrative analysis of multi-omics data is a difficult undertaking. Integrated analysis using tensor decompositions of data from many sources has recently demonstrated the ability to improve knowledge discovery. The process of biomarker discovery and characterization allows for more sophisticated approaches to integrating purely statistical and expert knowledge-based approaches, and tensor decompositions provide a great opportunity to aid in the interpretation of such interactions and the identification of reliable biomarkers. In this project, we want to use our recent developed method on the colon cancer dataset to do cancer subtype classification. Our aim is to detect specific disease biomarkers in this dataset. We recently developed a powerful method, combining ANOVA simultaneous component analysis (ASCA) and Tucker3 models to explain high-dimensional data. In this strategy, we use ASCA and Tucker3 modeling to analyze a multivariate dataset with an underlying experimental design. By comparing the spaces spanned by different model components we showed how the two methods can be used for confirmatory analysis and provide complementary information. We demonstrated the novel use of ASCA to analyze the residuals of Tucker3 models to find the optimal model. Also, important variables for clustering were identified by inspection of loading confidence intervals. At this point, we are trying to implement this developed method on a multi-omics dataset. Multilayer perceptron (MLP), a fully connected class of forward artificial neural network, is

implementing to improve detecting cancer subtype specific features and hopefully achieving the higher cancer subtype classification accuracy.

GP 43

Undergraduate Medical Education Enhancement Using HoloLens

Cody Michael Johnson, Edward F Gonzales

Mentor: Wu, Rui

Throughout higher education, and especially in medical education environments, the norm for learning has been using textbooks and microscope slides. Over time, students and teachers have looked to new styles of learning that will allow said students to have a form of interaction with the topics that the classes are based on due to the monotony of the norm. This routine has led to student burnout and disengagement in classrooms, which can lead to lower grades and less retention of material [1]. To tackle this issue, we propose to use AR technology to improve medical education. Students can learn medical knowledge without the use of a book or slides and have a more interactive experience with what they are learning about using an AR device, i.e., HoloLens 2. This project was carried out to investigate the relationship between information retention within medical students when using AR as a learning supplement as opposed to traditional supplemental material. The proposed project will engage first year medical students enrolled at the Brody School of Medicine using focus groups and interviews with the target audience. We created 2 case studies contained within the AR headsets which covered the gastrointestinal system concepts along with quizzes paired for each study. We also created quizzes for students to test the retention of the subject matter that was learned through the application. Through the focus groups, we learned that students had indeed found our supplementary work helped them retain information as it was a new environment for them to learn in. They also suggested different ways the application could be improved to fit their needs, which we have added to what we are working on for future versions.

1Rondon, S., Sassi, F.C. & Furquim de Andrade, C.R. Computer game-based and traditional learning method: a comparison regarding students' knowledge retention. BMC Med Educ 13, 30 (2013). https://doi.org/10.1186/1472-6920-13-30

GP 44

A Convergent Validity Study: Listening in Spatialized Noise-Sentences (LiSN-S) test and the BKB-SIN test

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Mentor: Vermiglio, Andrew J

Background: The BKB-SIN (Bamford-Kowal-Bench Sentences in Noise) and LiSN-S (Listening in Spatialized Noise Sentences) are used to evaluate SRN (Speech Recognition in Noise) ability. James et al. (2022) reported a moderately strong, significant relationship between the LiSN-S and BKB-SIN results for listeners with normal pure-tone thresholds. Conversely, Vermiglio et al. (2021) reported no significant convergent validity of the LiSN-S vs. the HINT (Hearing in Noise Test) SRN test results. It was hypothesized there would be a significant relationship between the LiSN-S and BKB-SIN thresholds. It was also hypothesized there would be no relationship between SRN test results vs. pure-tone averages (PTA; Middelweerd et al.,1990).

Purpose: The primary purpose of the study was to compare the LiSN-S and BKB-SIN results to determine if the two SRN tests measure the same construct (convergent validity) and to investigate the relationship between PTA vs. SRN thresholds.

Method: Native English speakers participated in this study (n=25). All participants had normal pure-tone thresholds (≤ 25 dB HL, 0.25–8.0 kHz). The LiSN-S Different Voices 0° condition was used to evaluate binaural speech perception in two-talker babble. The noise was presented at a fixed level of 55 dB SPL. The level of speech varied adaptively based on performance. For the BKB-SIN test, the sentences were presented with a four-talker babble and scored in total words correct at a series of signal-to-noise ratios. All stimuli were delivered under headphones at 0° azimuth. For both tests, participants

were instructed to repeat as much of the sentence as possible and results were reported as thresholds in dB SNR.

Results A Spearman rho correlation was used to investigate relationships between variables. A statistically significant, yet weak relationship, was found between the BKB-SIN vs. LiSN-S results (r=0.31, *p*=0.03). No significant relationships were found between PTA vs. BKB-SIN and LiSN-S thresholds.

Conclusions: There was a weak relationship found between the BKB-SIN and LiSN-S thresholds (poor convergent validity). The results indicate the BKB-SIN results cannot be predicted from the LiSN-S results and vice versa. The weak relationships between PTA and SRN test results demonstrate that SRN difficulties cannot be predicted from pure-tone averages, consistent with Vermiglio et al. (2021).

GP 45

The Effect of Target Speaker Sex on Monosyllabic Word Recognition in Quiet Ability

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Mentor: Vermiglio, Andrew J

Background: In clinical audiology word recognition scores are used to assess the degree of hearing handicap, compare hearing aid performance, and determine site of lesion (Gelfand, 1997; Silman and Silverman, 1997). Two popular monosyllabic word recognition tests are the Northwestern University Auditory Test No. 6, (NU-6; Tillman

& Carhart, 1966) and the Maryland-CNC (Causey et al., 1984). The recordings of the NU-6 words use a female speaker and Maryland CNC words use a male speaker. Bradlow et al. (1996) found subjects had better intelligibility of key words in sentences for female target speakers than male speakers in the quiet condition. It is unknown if this effect of speaker sex would be found for monosyllabic words in quiet.

Purpose: The primary purpose of the present study was to investigate the effect of speaker sex on monosyllabic word recognition scores in quiet. The secondary purpose was to determine the convergent validity (correlation) of these two tests (e.g., Vermiglio et al., 2021).

Method: Forty native English speakers aged 19 to 28 years (mean=21.15, SD=2.39) with normal pure-tone thresholds (≤ 25 dB HL, 0.25–8.0 kHz) participated in this study. All but two participants were female. One 50-word NU-6 list and one 50-word Maryland-CNC list were used to evaluate binaural word recognition in quiet. The words were binaurally presented at 65 dBA under supra-aural headphones. Word recognition scores were reported as the percent correctly repeated words.

Results: A matched-pairs t-test revealed a significantly better performance for the NU-6 words with a female target speaker than the Maryland-CNC with a male target speaker ($p=0.0409$). This indicates an effect of target speaker sex on word recognition in quiet ability. The Spearman rho correlation found a very weak and non-statistically significant relationship between the test results ($r=0.1135$, $p=0.4856$), indicating poor convergent validity for these word tests.

Conclusion: The present study revealed better performance when using female talkers than male talker. A very weak and non-statistically significant relationship was found between CNC and NU-6 scores, this indicates poor convergent validity and that these tests are not interchangeable for clinical use.

GP 46

Mesenchymal stem cell insulin sensitivity is associated with adiposity in early infancy

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Mentor: May, Linda Elizabeth

Maternal obesity increases the risk of offspring adiposity and the development of insulin resistance (IR). Impaired skeletal muscle insulin action significantly contributes to systemic IR. In rodent models, gestational exercise improves skeletal muscle insulin sensitivity (Si) and decreases offspring adiposity; however, confirmation of these findings in humans is limited. The use of umbilical cord-derived mesenchymal stem cells (MSCs) has been recognized as a model for the investigation of metabolic programming of the human offspring. This model capitalizes on the multilineage potential and ability to differentiate MSCs into various lineages of mesenchymal tissue including skeletal muscle while preserving the donor's phenotype. The aim of this study was to elucidate the effects of ME on infant Si and adiposity. Females between the age of 18 and 40, <16 weeks' gestation were randomized to either 150 minutes of moderate-intensity aerobic, resistance (RE), or combination exercise per week, or to a non-exercising control (CTRL). At delivery, MSCs were isolated from the umbilical cords, myogenically differentiated, and Si and fatty acid oxidation rates (FAO) were measured using radiolabeled substrates. Infant body fat percentage (BF%), and fat-free mass were calculated using standard equations at 1 and 6 months of age. Unpaired t-tests and one-way ANCOVAs were used to determine statistical significance between groups. Pearson's correlations were used to determine if there is any statistical relationship between different variables. MSCs from infants of all exercisers had significantly ($p=0.02$) higher glycogen synthesis rates, indicative of greater Si. The increase in Si was driven by RE group which had higher ($p=0.02$) Si compared to CTRL group, without significant differences between other groups. MSC Si was inversely associated with infant BF% at 1 ($r= -0.38$, $p=0.02$) and 6 ($r= -0.65$, $p<0.01$) months of age. After median stratification based on Si, infants with the high Si group trended towards lower BF% ($p=0.07$) at 1 month and had significantly ($p<0.01$) lower BF% at 6 months of age compared to the low Si group. MSCs in the high Si group had higher ($p=0.035$) FAO; however, this was not associated with Si or infant adiposity. These data suggest that ME-induced improvements in offspring adiposity are at least in part influenced by the improvements in infant insulin sensitivity, independent of the differences in fatty acid metabolism.

GP 47

Hertford County: A Review of Contributions Related to Infant Mortality and Potential Solutions

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Mentor: DeVille, Kenneth

Hertford County is a county located in the Northeastern part of North Carolina. With a population of 21,278, Hertford County is considered a rural community with a predominantly African-American population consisting of 56.68%. Like many other counties in North Carolina, Hertford County faces a continuing problem in health care including access to care, notable uninsured populations, substance abuse, a low-socioeconomic population, and more. Moreover, Hertford County experiences an abnormally high infant mortality rate that exceeds that of surrounding counties and that of the state of North Carolina. These factors contribute to the overall population health of Hertford County and plays an important role in monitoring infant mortality throughout the county.

The burden of amending these issues and the underlying causes behind them, specifically infant mortality, fall on the health system of Hertford County which consists of ECU Health Roanoke Chowan Hospital, Carolina Pediatrics, Ahoskie Pediatrics, North Carolina Pregnancy Resource Center, and educational facilities. A comprehensive review of data collected from the North Carolina Department of Health and Human Services census was analyzed to assess major contributing factors that may explain the staggering infant mortality rate of Hertford County.

The results showed that low-socioeconomic families and uninsured families were at higher risk of infant mortality, a trend consistent with those throughout the state of North Carolina. Hertford County was also noted to possess infant mortality rates that are consistently higher than the state. These results suggest a potential resource gap between educating prenatal and postpartum women on steps to avoid infant mortality.

GP 48

Maternal Physical Activity Enhances Mitochondrial Bioenergetics in Offspring Fetal Mesenchymal Stem Cells

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Mentor: Broskey, Nicholas Thomas

Preclinical studies have shown that physical activity during pregnancy improves the metabolic health of mother and offspring, in part, via parallel improvements in mitochondrial bioenergetics across several tissues. Recent data from our labs indicate umbilical cord derived mesenchymal stem cells (MSCs) capture the programmed effects elicited by changes in maternal health. Thus, we utilized our high-throughput mitochondrial diagnostics platform to investigate the impact of maternal physical activity on mitochondrial bioenergetics in fetal MSCs. Ten physically active (PA, 30±2 yrs, pre-gravid BMI 23.09±3.71 kg/m^2) and nine sedentary (S, 30±4 yrs, pre-gravid BMI 24.0±1.78 kg/m^2) pregnant women completed two study visits from the second to third trimester. Participants completed VO_2 peak testing, as well as ^{31}P-MRS to evaluate *in vivo* mitochondrial capacity. Upon delivery, MSCs were cultured from Wharton's Jelly and all experiments were conducted in the undifferentiated state. Mitochondrial OXPHOS efficiency (P/O ratio) was directly quantified by simultaneous measures of rate of oxygen consumption (JO_2) and ATP synthesis (JATP), the creatine kinase clamp was used to measure OXPHOS kinetics across a physiologic range of energetic demands and OXPHOS power output was empirically derived. Data normality was determined with a Shapiro-Wilk test. Analyses were conducted using one-way ANOVAs and Spearman's ρ. The P/O ratio in MSCs was significantly higher from babies born to PA women compared to S (p=0.03). MSCs from PA maintained significantly increased JO_2 across a physiologic range of energetic demands (p≤0.05) compared to S, and demonstrated significantly higher FCCP-stimulated maximal respiration (p≤0.05). OXPHOS power output was significantly increased at each energetic demand among MSCs from PA compared to S (p<0.05). MSC P/O ratio was negatively correlated with maternal ^{31}P-MRS measures of PCr Tau (p=0.03, r=-.54), and positively correlated with ATPmax (p=0.03, r=.54). MSC JO_2 at each clamped energetic demand was correlated with maternal VO_2 peak at trimester two and three (both p<0.05, r =0.53). MSCs of offspring born to PA women during pregnancy exhibited improved mitochondrial efficiency, which was associated with maternal *in vivo* mitochondrial efficiency. Considering MSCs largely represent the mesodermal stem cell niche, these novel findings may have implications not only for fetal development, but for the long-term health of the tissues they derive.

GP 49

Risk of COVID-19 infections Among People with Asthma: A Scoping Review

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Mentor: Kearney, Gregory Dale

Background: From 2019 to 2022, the COVID-19 pandemic resulted in approximately 676,504,785 cases and 6,773,773 deaths in 229 countries, areas, and territories worldwide. COVID-19 is primarily transmitted through respiratory droplets, contact and air. Asthma is a chronic respiratory condition that affects the airways and lungs, causing the airways to become inflamed and narrow, and is the most common chronic disease among children worldwide. Furthermore, over 80% of asthma-related deaths occur among lower to middle-income countries. Asthma affects people of all ages, with more than 339 million people living with the illness globally. Certain conditions have been associated with risk of developing asthma, including allergies, obesity, and respiratory infections, but little is known about the potential link between asthma and COVID-19.

Objective: In this study, we conducted a scoping review of the literature to determine if asthmatic patients were at higher risk of contracting COVID-19 than non-asthmatics.

Methods: A comprehensive literature search was conducted using keywords: COVID-19, Asthma, Asthmatic Patients, Respiratory infections, and Corona Virus, and search engine databases: PubMed, Google scholar, IDSA, WHO and American Journal of Respiratory and Critical Care Medicine.

Results: Among the 63 identified, 55 articles were screened, 15 articles met the inclusion criteria and included in this study.

Conclusions: Our findings suggest that asthma is not an independent risk factor for severe COVID-19 illness. In studies where poor outcomes were found among COVID-19 patients diagnosed with asthma, the use of inhaled corticosteroids was identified as the primary risk factor driving poor outcomes.

Recommendations: Future studies into asthmatic individuals and COVID-19 disease should be to understand the potential role of high dose corticosteroids in severe-COVID-19 disease risk among asthmatic patients.

GP 50

Title: Video fluoroscopic Detection Sensitivity of Swallowing Landmarks following Radiotherapy for Head and Neck Cancer

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Mentor: Larsen, Deirdre Helen Suzanne

Background: A primary component of instrumental swallowing evaluations is identifying physiological abnormalities that result in functional changes to the safety and efficiency of swallowing. Edema and fibrosis are known radiotherapy (RT) toxicities expected to contribute to post-RT swallowing difficulty (i.e., dysphagia). Quantitative measures of video fluoroscopic swallow studies (VFSS) may offer a sensitive analysis of progressive physiological abnormalities, ultimately identifying markers of functional changes. Clinically, VFSS can detect landmarks of the soft tissue. However, there may be poor sensitivity of VFSS (two-dimensional imaging) to capture three-dimensional changes. Prior research found only one of three markers of edema to significantly change in HNC subjects from pre- to four weeks post-RT. Few measures of the swallowing organs and the short time since treatment limit these findings tumor response may confound the measures. Therefore, further research is needed to determine if alternate measurements may be better detected on VFSS in patients immediately and long post-treatment.

Methods: Fifteen HNC subjects attended pre- and <6 weeks post-treatment with a subgroup (n = 7) returning to the clinic with dysphagia complaints 2 months to 3 years post-RT. All subjects were compared pre- and post-treatment within group as well as to 30 age-matched subjects with functional (n = 15) or normal (n = 15) swallowing. Edema was captured by measuring the posterior pharyngeal wall (PPW) at rest, pharyngeal area, vallecular space, epiglottic thickness, PPW at maximum constriction, and laryngeal area. A random selection of 10% of the data will be re-rated by the same rater and repeated by a second blind rater for intra- and inter-rater reliability results, respectively, using intraclass correlation coefficients. Appropriate nonparametric tests will be conducted.

Results: Results will highlight the feasibility of quantitative measures obtained from VFSS as indications of edema in post-RT treatment. Based on these results, implications for future considerations will be outlined.

Conclusions: Ongoing investigation of specific quantitative measures may further illuminate salient features of swallowing in HNC.

GP 51

Addressing Nosocomial Infections Caused by Antibiotic Resistant Bacteria using Surface-functionalized Nanoparticles

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Mentor: Pokhrel, Lok R

Nosocomial infection is an emergent public health problem as current antibiotics are becoming obsolete due to bacterial pathogens becoming increasingly resistance toward the antibiotics. According to the CDC, an estimated 1 in 31 hospital patients have nosocomial infections per day, causing approximately 75,000 deaths per year in the United States. Rising nosocomial infections are also documented in low-income and developing economies. Nosocomial Infections are caused by antibiotic resistant (AR) and multidrug-resistant organisms (MDROs), including E. coli, and associated with significant mortality and morbidity, and economic burden to hospitals and patients. Herein, we tested the inhibitory efficacy and the mode of action (MoA) of amino-functionalized silver nanoparticles (NH2ÐAgNPs) against the two model AR bacterial isolates, ampicillin-resistant E. coli and kanamycin-resistant E. coli. Kirby-Bauer disc diffusion test and Luria-Bertani growth assay were performed, samples were incubated at 37¡C for 48 h, and halo diameter and growth were recorded. Electron microscopy was used to determine potential cell wall damage and changes in fimbriae expression as the MoA. Our results showed at ³10 µg/mL, NH2ÐAgNPs significantly inhibited both bacterial growth, suggesting potent bactericidal activity of NH2ÐAgNPs. In addition, adherent fimbriae expression was inhibited with ³10 µg/mL NH2ÐAgNPs. The MOA of NH2ÐAgNPs was determined as cell wall damage via electrostatic interactions and inhibition of fimbriae expression. Ampicillin and kanamycin were nontoxic to respective bacteria up to 160 µg/mL, confirming resistance of the bacteria to the antibiotics tested. These findings suggest that NH2ÐAgNPs may serve as a potent bactericidal agent to address rising nosocomial infections associated with AR bacteria and promoting public health and safety.

GP 52

Multi-Source Exposure Assessment of Lead on Minority Populations and Homes in Pitt County, North Carolina

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Dr. Lok Pokhrel

Dr. Gregory Kearney

Mentor: Pokhrel, Lok R

Background: Lead based piping (LBP) used for drinking water at homes has been banned since 1986, but the ban did not require a replacement of LBP leaving millions of minority populations and public housing residents exposed to lead through contaminated drinking water. Upon erosion, LBP releases lead into drinking water, affecting multiple organ systems and primarily the nervous system, and can be fatal upon acute high-dose exposure. Minority populations, specifically children, are at risk of plumbism or lead poisoning upon low-dose repeated exposure from drinking water and lead-based paint that are predominantly found in older homes. While there is no safe level of lead but CDC uses a blood lead reference value (BLRV) of 3.5 mg/dL to identify children that might be exposed to high lead and may need treatment.

Research Objective: In this study, we aimed at identifying multiple exposure sources of lead within different areas of homes and correlate with blood lead levels (BLLs) while identifying at-risk minority populations living in homes with high lead levels.

Methods: We used multiple lead databases to identify elevated lead levels throughout homes in counties across North Carolina, with a focus on Pitt County, and geo-mapped the homes with high lead levels with averages from household data from the NCDHHS database using Screen and ArcGIS.

Results: Our results show that minority populations had elevated BLLs and occupy older homes with high levels of lead throughout the homes, including areas in the kitchen, bedroom, and common entry. GIS mapping the homes within Pitt County, North Carolina, revealed hotspots of elevated lead levels within the county. Additional analyses are currently underway to determine potential association between homes with elevated lead levels and minority populations.

Recommendations: More research is needed to determine if minority populations are disproportionately exposed to elevated lead levels through drinking water and paint.

Key Terms: Lead, children, minority populations, blood lead levels, lead based piping

GP 53

National Assessment of Fatality Reports Among Landscaping and Tree Trimming Workers

Anna Doub, Dr. Greg Kearney, and Nancy Romano

Mentor: Kearney, Gregory Dale

Introduction

In 1982, the CDC, National Institute for Occupational Safety and Health (NIOSH) established the Fatality Assessment and Control Evaluation (FACE) program to investigate occupational deaths among workers across all industries. Each FACE report includes vital information about how each fatality occurred, the contributing factors and recommendations for safety and prevention. Reports involving the deaths among workers in the landscaping and tree trimming occupations have not been thoroughly examined. The aims of this study are to, 1) create an electronic database of FACE reports among landscapers and tree trimmers, and 2) create a profile characterizing deaths of workers in these occupations.

Methods

FACE investigation reports involving landscaping and tree trimmers deaths occurring between 1982 to 2022 were reviewed. A new FACE electronic database was created in MS Excel using major variables including, demographics of the decedent employer, use of PPE, safety training and recommendations in the reports. Variables were coded. Data analysis was performed using SPSS v24.

Results

A total of 94 FACE reports were identified. The primary cause of death and other variables from FACE reports are described using queries in the new database.

Conclusion

The new electronic database can rapidly access information on worker fatalities while replacing previous paper-based reports. This database will allow researchers, policy makers and public health officials to gain knowledge about the specific circumstances that surround worker deaths and to formulate prevention strategies

Practical Application

Researchers, policy makers and public health officials can use this database in efforts to establish targeted public health campaigns and preventive interventions.

GP 54

Does Daily Use of Prolonged Speech Patterns Benefit People Who Stutter

Nathalia Kalena Cannon

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Mentor: Briley, Patrick Minton

Prolonged speech patterns are regarded as the standard of care for behavioral stuttering interventions. Treatments utilizing prolonged speech patterns typically begin with prolonged syllables of longer durations, transitioning to prolonged syllables of shorter durations as the client advances in treatment. One outcome of interventions utilizing prolonged speech patterns is a period of carry-over fluency or lucky fluency" experienced by the speaker. However, this type of speech that is characterized by increased control and little effort ends eventually deteriorates (Perkins, 1983). While it is unclear what factors are responsible for this relapse, studies have indicated that treatment and time away from treatment are both factors capable of influencing neural activation patterns. With this context in mind, Briley et al. (2016) hypothesized that the breakdown of carry-over fluency (i.e., relapse) is the result of graduating from extremely prolonged speech patterns in the therapeutic process and continued use of prolonged speech patterns establish and nurture carry-over fluency. The purpose of this study is to determine if long-term use of extreme prolongations is capable of reducing the negative influence of stuttering. This is time-series design will explore the outcomes of speech control as a result of daily, solitary implementation of extreme prolongations by people who stutter for the duration of 1 year. Outcomes that will be assessed pretreatment, at month intervals, and post-treatment include the Overall Assessment of the Speaker's Experience of Stuttering, the Stuttering Anticipation Scale, self-reported control assessed through a 5-point Likert scale, and percentage of stuttered syllables across speaking contexts. The research question is, can increased control of speech be gained, with decreased effort, by way of daily, solitary practice with extremely prolonged speech patterns?

GP 55

Exploring the Relationship Between Praxis & Handwriting Legibility in Elementary Students

Larymi Beck and Kathryn Hill

Mentor: Donica, Denise

Background: Research shows that praxis and sensory processing are contributing factors to handwriting legibility in elementary school students. However, little research has demonstrated performance-based measures of praxis and its relationship to handwriting legibility. In this study, we examined performance-based praxis skills of 3rd and 4th grade students with and without handwriting difficulties.

Methods: Praxis and handwriting legibility were examined in 33 3rd and 4th grade students at a local elementary school using five praxis tests from the Evaluation in Ayres Sensory Integration and the Handwriting Legibility Scale. Participants were categorized into two groups based on their handwriting legibility scores: students with handwriting difficulty (n=6) and students without handwriting difficulty (n=27).

Results: Using a Mann-Whitney U test, there is a statistically significant difference in 3 of the 5 praxis tests *(praxis positions, sequences, and oculomotor praxis)* when comparing students with and without handwriting difficulties.

Conclusion: Overall, preliminary data supports a relationship between praxis and handwriting legibility which may inform occupational therapy interventions for students handwriting difficulties.

GP 56

Decontamination of food packaging plastics with novel nano-antimicrobial and cool light.

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Mentor: Pokhrel, Lok R

Foodborne illness is a critical public health concern, with a global burden estimated at 600 million cases and 420,000 deaths, annually. A common pathogen, *Escherichia coli,* is responsible for a large majority of the foodborne outbreaks and was estimated to cost the US over 15.5 billion dollars alone in 2013. Current gold standard in food/ packaging decontamination is washing the produce with disinfectants such as chlorine/dioxide, ozone, peroxyacetic acid, or alcohol; however, these agents have their inherent limitations and as such foodborne illnesses continue to rise, globally, highlighting an imminent need for effective, safer, and sustainable disinfectants. Herein, we report on the novel nano-based antimicrobial agent that effectively sanitizes common plastic food packaging materials, including soft plastic wrap and hard plastic food containers, at two low concentrations (40 and 80 μg/mL) in combination with white (cool) light (approx. 1900 Lux) and is safe to humans. We synthesized 5 nm size highly positive amino-functionalized silver nanoparticles (NH_2–AgNPs) in combination with white light exposure and tested its bactericidal efficacy against the ampicillin-resistant *E. coli* dh5a as a model foodborne pathogen. The bacteria were applied on these packaging surfaces (10^5-10^6/mL), and spray treated with NH_2–AgNPs as a function of exposure time (30 and 60 mins.). Colony count enumeration followed by transmission

electron microscopy confirmed that NH_2–AgNPs was bactericidal, via cell wall damage, disinfecting both types of packaging materials within 60 mins. At 30 mins exposure, bacterial growth decreased compared to the control, however some growth was evident. Cool light seems to have antagonistic effects on NH_2–AgNPs toxicity. The NH_2–AgNPs did not show oxidative stress response in human lung epithelial and dermal fibroblast cells, suggesting human exposure to these nanoparticles may not pose risk. These pilot results suggest that our novel NH_2–AgNPs may serve as a safer and effective disinfecting agent for food/packaging industry, potentially improving food practice safety standards and averting global foodborne illnesses and deaths.

GP 57

The Influence of Orthodontic Appliances on MRI of the Velopharynx

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Mentor: Perry, Jamie L

Background: The purpose of this study is to evaluate the influence of common pediatric orthodontic appliances on velopharyngeal MRI. Magnetic resonance imaging (MRI) is becoming increasingly valuable among cleft palate craniofacial teams in patients with velopharyngeal insufficiency (VPI). One complication to the growing use of MRI among the cleft population is the presence of orthodontic appliances, which may result in image distortions and non-interpretability of MR images. This is particularly a challenge because individuals with cleft anatomy have a higher incidence of dental anomalies compared to the non-cleft population (Bohn, 1963; Jordan et al., 1966; Schroeder & Green, 1975; Ribeiro et al., 2003; Marzouk et al., 2020). Currently, it is not known which orthodontic appliances and materials interfere with the ability to visualize the velopharyngeal (VP) structures during an MRI. The purpose of this study is to evaluate the influence of common pediatric orthodontic appliances on VP MRI. Insights from this study will be useful in determining which patients undergoing orthodontic treatment are candidates for VP MRI.

Methods/Description: Nineteen participants (6 females, 13 males) ages 11-18, undergoing orthodontic treatment, were recruited. All participants were scanned in a 1.5-Tesla Siemens MRI machine in supine position, capturing 3D and 2D images at rest and during sustained phonation. Two raters experienced in performing MRI evaluations of the velopharynx examined the MRI for distortion in 8 anatomical sites of interest.

Results: Analysis with data collected thus far suggest that a single-shot technique using Half-Fourier Acquisition Single-shot Turbo spin echo (HASTE) results in less distortion compared with a multi-shot imaging technique using a fast spin-echo (FSE).

Conclusion: The presence of orthodontic appliances does not hinder visualization of all velopharyngeal structures during an MRI. The results of this study will be useful in determining which patients undergoing orthodontic treatment are candidates for VP MRI.

GP 58

THE IMPACT OF BLOOD FLOW RESTRICTIONS ON STRENGTH AND COORDINATION OF A YOUNG ADULT WITH QUADRIPLEGIC CEREBRAL PALSY

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Mentor: Johnson, Sarah Elizabeth

The objective of this case study is to improve function of both lower extremities on a 19-year-old female with spastic quadriplegic cerebral palsy. The subject experiences deficits in all four limbs, but more significant deficits seen in the left sided extremities affecting strength and coordination. Procedures she has undergone due to her medical history include Dorsal Rhizotomy and lower extremity tendon lengthening. The subject participated in physical therapy once a week for therapeutic exercise and activity, neuromuscular re-education, and gait training utilizing Lite Gait. Since graduating high school, she has experienced a decrease in ambulation and endurance. Her 6-minute walk test, measuring gait distance and speed, has decreased. The subject has a goal of reaching 1000 feet in the 6-minute walk test (6MWT), which was attained still in high school.

An ongoing study, entitled HABIT, at ECU, uses remote limb ischemic conditioning (RLIC) to improve function of the affected upper extremity in children with hemiplegic cerebral palsy. Essentially, this study is using blood flow restriction and repeated bimanual activity to enhance neuromuscular connection to the brain, making the task more easily performed with the affected limb. The same concept of RLIC is also used in another ongoing study at ECU by Dr. Surkar, pairing RLIC with strength training to the lower extremities to improve muscle strength and walking performance in children with cerebral palsy. We determined that implementing this concept on our subject's lower extremities may yield desired gait and endurance outcomes. Although she is an adult with goals of improving strength, endurance, and coordination in the lower extremities, the same RLIC protocol would be implemented. The subject continued to be seen once a week for physical therapy. RLIC to her left lower extremity was

performed 3 times a week for 4 weeks, followed by increased exercise and walking at home. Her 6MWT improved to 919ft after 4 weeks of consistent RLIC in October 2022. She then discontinued RLIC but continued walking at home for 6 minutes at least 3 times a week since November 2022. Her 6MWT was retested in December and she maintained her gains walking 965 ft. Improvement in 6MWT demonstrated the effectiveness of using RLIC along with lower extremity strengthening to improve muscle strength endurance during gait for short term and long-term benefits.

GP 59

Reducing Patient Harm: Identifying Risk Factors Associated with Development of Pressure Injuries in a Pediatric Cardiac ICU

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Mentor: Linder, Julie Michelle

Introduction: Patients who are among vulnerable populations such as neonates and the critically ill are at increased risk for pressure injuries (Munoz et al., 2022). There has been a total of 33 pressure injuries identified in the Pediatric Cardiac ICU (PCICU) at a large academic medical center between 2019-2022. The purpose of this project is to identify commonalities for patients at high risk for a pressure injury within the PCICU and develop criteria that will automatically consult the Wound and Ostomy Care CNS to preform skin assessments on these patients.

Methods: A chart review was performed on all the pediatric patients who had an identified pressure injury between the years of 2019 and 2022 within the PCICU. The categories for evaluation of commonalities were age, race, presence of neuromuscular blockades, presence of vasoactive drugs, nutritional status, and days between a surgical or procedural event and the pressure injury being identified.

Results: Results for the chart review included that most of the patients who had a pressure injury were 0-2 months of age. 70% of the patients had vasoactive drugs infusing within three days of identifying the pressure injury. 82% of patients were not on full enteral nutrition, and 55% of the patients had a surgery or a procedure within 10 days of the pressure injury.

Conclusion: The PCICU in populated with both surgical patients and neonates born with a congenital heart defect. Surgical patients that are exposed to prolonged anesthesia are at increased risk for developing a pressure injury (Kulik et. al., 2018). Epinephrine, which is used often in the PCICU, and is a potent vasoactive drug, can decrease tissue perfusion and can be associated with deep tissue injury (Alderden et al., 2021). Pressure injury development has been associated with both inadequate nutrition

as well as undernutrition. (Munoz et al., 2022). It is thus recommended that the Pediatric Wound and Ostomy Care CNS be consulted and follow patients ages 0-2 months, not currently on full enteral nutrition, currently have infusing vasoactive drugs, and are within 10 days of a surgery or procedure. Limitations include this being based on chart review results from one PCICU.

GP 60

Characterizing Nationally Available Gelatin-Based Products using IDDSI Testing Methods

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Background: Dysphagia, or difficulty swallowing, can lead to clinician-led diet modifications to make the swallowing process safer. The International Dysphagia Diet Standardization Initiative (IDDSI) Framework promotes consistent description and labeling of food texture and drink thickness used in diet modifications to streamline determination of overall dietary recommendations as well as monitoring of particular products meeting these recommendations. Unfortunately, modified diets are often less accepted by dysphagic individuals and less nutritionally dense, which can lead to insufficient nutritional and fluid intake. As a result, dehydration can be frequent and accelerated, placing these individuals at increased risk of mortality. Gelatin-based desserts are a popular method to control liquid consumption for individuals with dysphagia in all living settings. However, due to the unique texture characteristics of United States gelatin-based products, there is a need to test and determine their appropriate IDDSI level. This study aims to determine the IDDSI level of nationally available gelatin-based products. It is hypothesized the unique characteristics of gelatin-based products will not be reflected in current IDDSI testing methods.

Methods: IDDSI levels will be determined using the IDDSI testing methods for two pre-made brands (Jell-O and Snack Pack) and two ready-to-make brands (Jell-O and Royal) based on varying formulations (regular and sugar-free; flavor one and flavor two). Blind testing will be conducted by three raters at two university-based labs (East Carolina University; University of Montevallo). Repeated testing will occur

immediately after the product is removed from refrigeration as well as 15 minutes and one-hour post-refrigeration to simulate sitting on a counter or food tray. Interrater and intra-rater reliability will be conducted. The frequency of IDDSI-level assignments will be reported using descriptive and non-parametric analysis. If appropriate, the temporal relationships between IDDSI level and the gelatin-based products will be assessed using correlation coefficients.

Results: Results will highlight the relationship between current IDDSI levels testing methods and gelatin-based dessert products. Based on these results, implications for IDDSI testing considerations will be outlined.

Conclusions: Ongoing investigation of specific food products may further illuminate IDDSI testing validity and implementation procedures.

GP 61

The Effect of Male vs Female Voices in Speech Recognition in Noise

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Mentor: Vermiglio, Andrew J

Background: Speech recognition in noise (SRN) testing measures how well a person understands speech in everyday conditions. The effect of speaker sex (male, female) on SRN has been reported. Bazilinskyy and Winter (2017) measured ease of hearing male or female voices when used as warning voices in cars in background noise. They found female voices were easier to understand and surmised it was due to the features in the voices. Nixon et al. (1998) investigated if female speech would be more intelligible than male speech in military aircraft voice communication systems by testing male and female speech among the noise from four military aircraft cockpits. When levels of the cockpit noises were higher (115 dB [SPL]) female speech was unintelligible while males were heard. This might be due to female speech being higher in frequency, lower in power and more susceptible to masking made by some military aircraft. The effect of speaker sex is unknown for the AzBio SRN test.

Purpose: The goal of the present study was to investigate the effect of speaker sex (male, female) on AzBio SRN performances.

Method: Fifty-one young, native English speakers participated in the study. All had normal pure-tone thresholds (< 25 dB HL, 0.25-6.0 kHz). SRN ability was measured using the AzBio speech perception in noise test. The AzBio sentences were recorded using 2 female and 2 male talkers. Each list consists of 20 sentences, with 5 sentences spoken from each of the 4 talkers. The sentences were presented in three conditions; quiet and two different maskers (10-talker babble and steady-state noise). Testing was administered binaurally under supra-aural headphones in a sound-treated booth. All stimuli were presented at 65 dBA (0 dB SNR). All sentence lists and test conditions were randomized.

Results: A matched pairs t-test was used to investigate the effect of speaker sex (male, female) for each listening condition. For the quiet condition, no effect of speaker sex was found (p>0.39). Statistically better performances were found for sentences with female talkers than male talkers for both masker conditions (p<0.0001).

Conclusion: While there was no effect for speaker sex for the quiet condition, a statistically significant effect of speaker sex was observed for the steady-state noise and 10-talker babble masker conditions where female voices resulted in higher scores than sentences voiced by a male talker.

GP 62

Non-destructive Indicators of Trematode Parasite Infection in Littorinidae Snail Hosts

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Mentor: Blakeslee, April Monica Houghton

Biological invasions are often investigated shortly after introduction, but the ecological legacy of older invasions is also significant, particularly for parasites. Non-destructive ways to determine infection status are useful for parasite experiments because by not harming the snails, these hosts can then be used to study the impacts of infection. This

study compared two non-destructive methods of assessing infection status in marine snails. The first was cercarial shedding, which involves taking snails out of water to dry out and them resubmerging them, which cues the emergence of the larval state of the parasite (called cercariae) from the snail. The second method was a foot color assessment procedure in which the variation in color of the snail's foot was used to predict infection. Non-native *Littorina littorea* (*LL*) snails were collected alongside native *L. saxatilis* (*LS*) and *L. obtusata* (*LO*) in 2021 from Appledore Island, Maine. Their foot colors were assigned values using a color-gradient chart ranging from white (0) to dark orange (5) for *LL*, and 0-2 for *LS* and *LO.* After inducing cercarial shedding, snails were checked every two hours for cercariae, and if detected, cercariae were identified to trematode species and counted. All snails were dissected at experiment end. From dissection data, 36% *LL* (n=136), 13% *LS* (n=256), and 27% *LO* (n=124) were infected. Of these, 92% of infected *LL* released cercariae compared to 50% *LS* and 67% *LO*. Additionally, 88% of infected *LL* with foot colors 4-5 were infected, compared to 28% *LS* and 69% *LO* with foot color 2. These findings justify using non-destructive indicators of infection in littorinidae snails, which can further parasite work on these hosts in native and non-native populations globally.

GP 63

PALEOENVIRONMENTAL CHANGES RELATED TO RAPID SEA-LEVEL RISE DURING THE LATE PLEISTOCENE IN THE LOWER NEUSE RIVER BASIN, NORTH CAROLINA

Jessica King, David Mallinson, Steve Culver

Mentor: Mallinson, David J

The coastal plain of eastern North Carolina evolved through the rapid relative sea-level changes of the late Pleistocene during Marine Isotope Stage 5 (MIS 5; 130 to 71 ka) and Marine Isotope Stage 3 (MIS 3; 55 to 29 ka). The sea-level highstands of MIS 5 are marked by the Suffolk Shoreline (120 km inland from the modern ocean shoreline); associated transgressive and highstand deposits occur east of the shoreline. MIS 3 highstand deposits are less extensive and occur north of the Neuse River Estuary study area. Lithofacies and geophysical data indicate that transgressions during MIS5 and MIS3 may be comparable to projected future sea-level rise and associated transgressions over multi-decadal to centennial scales. To better understand the temporal and spatial variation of sea-level fluctuations, and the corresponding evolution of the coastal system, nine cores, placed in a geophysical context, from near the southern end of the Suffolk Shoreline (Pamlico and Beaufort County, NC) are being analyzed using micropaleontology (foraminifera) and sedimentology to reconstruct the paleoenvironments. The chronological framework, determined using optically stimulated luminescence dating, provides age estimates of 139.9 (± 9.3) ka to 85.7 (± 5.3)

ka. During this time, foraminiferal assemblages (including
Buccella frigida, Nonionella atlantica, Rosalina sp.) indicate an open shelf environment with normal salinity waters existed in the study area.

GP 64

Recent Biochemical Advances in the Isolation of Cryptochrome 4

Samuel Wyatt Guy

Mentor: Offenbacher, Adam Richard

Every year, migratory birds use earth's geomagnetic field to navigate thousands of miles to return to breeding grounds, find food, and escape predation, mostly during the night. However, the mechanism by which this 'magnetoreception' process takes place is not fully understood. Recent advances in biochemical research have implicated a blue-light sensitive flavoprotein, cryptochrome 4 (CRY4), as a potential magnetoreceptor. Found in the retina of the birds' eyes and upregulated during seasonal migration, CRY4 possesses a DNA photolyase homology domain, equipped with a carboxy-terminal tail (CTT). In addition, it harbors an oxidized flavin adenine dinucleotide (FAD_{ox}) chromophore, which upon exposure to blue-UV light participate in rapid electron transfer (ET) reactions with a chain of four tryptophan (Trp) amino acids. The resulting electron spins on the flavin anion radical and Trp cation radicals are considered to be 'coherent' – a quantum phenomenon. Protonation of the FAD-radical results in release of the CTT producing the signaling state of CRY4. An open question in this field is how the conformational change of the CTT (classical property) is related to the quantum properties (electron spin coherence). I will present recent biochemical advances in the isolation of CRY4 from bacterial cultures and preliminary spectroscopic studies. The goal of this project is to determine the link between these two disparate properties and the molecular basis for how these processes are modulated.

GP 65

Review of pQCD Derivations of Shear Viscosity of the Quark-Gluon Plasma

Okey Ohanaka

Mentor: Lin, Ziwei

We review earlier works on transport coefficients from high-temperature perturbative quantum chromodynamics (pQCD) for the purpose of reproducing their results. Specifically we aim to reproduce the derivation of shear viscosity in quark-gluon plasma in the research done by Arnold, Moore, and Yaffe.

Those works consider both 2<>2 parton scatterings and 1<>2 processes. In this first step, we plan to reproduce the shear viscosity for 2<>2 scatterings.

GP 66

Pyrogenic organic matter in sediments from Lake Bosumtwi as a proxy for Holocene climate in northern Africa

Michael Paul Zigah

Mentor: Mitra, Siddhartha

This study is an investigation into the Holocene paleoclimatic history of northern Africa, deconvolved using organic carbon (OC), black carbon (BC), and other chemical markers of pyrolysis in a sediment core from Lake Bosumtwi, Ghana, West Africa. The hypothesis tested with this research is that North Atlantic climate inf influenced historical wildfire occurrence in northern Africa throughout the Holocene. Downcore sedimentary OC and BC abundance were compared to records of regional precipitation. 13COC and 13CBC were quantified to understand the type of biomass burned. Sedimentary BC ranged from 0.72% to 34.60%. Similarly, OC was 0.11% to 14.3%. Stable isotope values of 13COC and 13CBC range from -19.00‰ to -29.06‰ and ~-28.35‰, respectively. Collectively, the data suggest that a shift in vegetation/change in environment occurred in the west African region from a mix of C4 –C3 plants in the early Holocene to a C3 dominant system in the late Holocene. This investigation can help better understand coastal precipitation and draught patterns in response to climate change in Western Africa.

GP 67

Status of a mid-Atlantic population of a threatened freshwater marsh bird: land management is a key predictor of occupancy

Carol Gause

Mentor: McRae, Susan B

King rail (*Rallus_elegans*) populations have experienced severe declines throughout their range over the past half a century. It is becoming increasingly urgent to better understand the habitat requirements of these secretive rails. During the 2022 summer breeding season, I completed regional surveys of a mid-Atlantic population of king rails in marshes within and surrounding Mackay Island National Wildlife Refuge (NWR) where a breeding population has been intensively studied over the past ~12 years. I replicated regional surveys completed between 2009-2010 that covered the northern extent of the intracoastal waterway of North Carolina and the tidewater area of

Virginia. In addition to these, I surveyed sites in surrounding areas. Survey sites consisted of areas that are managed using prescribed fire and herbicide applications in parts of Mackay Island NWR and Back Bay NWR in addition to unmanaged public access areas. Using responses to call-broadcast surveys, data from vegetation surveys, and land management history as predictors, I constructed models to identify factors that best predict king rail occupancy and detection rate. I found that land management positively impacts king rail presence. Additional associations were identified with specific vegetation types: king rail presence was positively related to the percentage of a survey plot consisting of *Juncus roemerianus*, *Typha* sp., and invasive *Phragmites australis*. I then used these four site covariates to estimate the density of king rails in surveyed habitat. Coastal refuges have traditionally focused their management activities on overwintering waterfowl, but there is increasing interest in managing natural and impounded marshes for threatened rails. This research impacts management decisions for regional wildlife refuges, as well as state-owned and private lands. Moreover, it provides current information about king rail occupancy in freshwater and oligohaline wetlands surrounding a critical breeding population.

GP 68

Dosimetry calibration for low-energy protons produced in the ECU accelerator

Homeira Faridnejad

Mentor: DeWitt, Regina

Large radiation doses are used to kill tumor cells. Proton or ion beams, produced with an accelerator, have been accepted as excellent methods for cancer treatment. The beams deliver most of their energy in a narrow volume in the body. Further studies are necessary to improve the method. Experiments in the ECU accelerator lab are ongoing to study the biological effectiveness of proton beams in killing cancer cells. To evaluate the results correctly, it is crucial to know the exact radiation dose that was delivered to the cells.

The goal of this dissertation is to test and develop methods to measure accurately the radiation dose delivered during cell experiments in the ECU accelerator lab. Methods for ion-dose measurement that will be tested include Gafchromic radiotherapy films, and an ion chamber (IC). An ion chamber measures the small charge produced by protons passing through the chamber. Gafchromic films change their color as a function of absorbed dose. The methods will first be tested with ion doses of known magnitude. We will also test different ion energies and ion currents. Once the methods have been calibrated, they will be used to evaluate unknown radiation fields and doses. In the final step, the measured data will be compared with dose values calculated via Monte

Carlo methods. In my presentation, I will give an outline of the project and I will describe the methods we will test for dose measurements.

GP 69

PAH Contamination Variability in the Lower Tar River N.C. From a Legacy Hazardous Waste Site as a Function of Hydrological Conditions

Daniel Joel Reed, Department of Chemistry

Mentor: Mitra, Siddhartha

Polycyclic aromatic hydrocarbons (PAHs) are trace organic contaminants that can enter the environment through both natural and anthropogenic means. Of these compounds 16 are currently listed as high priority contaminants by the EPA. One potential anthropogenic source of PAHs is via fuel seeps. Town Creek, a tributary of the Tar River in eastern North Carolina (NC) is currently being affected by a legacy fuel seep in the Greenville, NC area. The seep was originally caused by leaking underground oil storage tanks. Surface water quality in Town Creek was adversely affected by the fuel seep in the 1980s, to the extent that the creek was designated as a state hazardous waste site. Although the tanks have been removed and the seep remediated, residual petroleum contamination continues to be discharged into the creek. This research aims to determine how the seep, despite remediation, affects PAH contamination and water quality in the Tar River as a function of discharge.

Biweekly trends in dissolved and particulate phase PAHs and other ancillary environmental variables will be discussed in relation to Tar River gauge height in Greenville, NC. Thus far, dissolved organic carbon (DOC), has varied from 2.1 - 37 mg/L across all the sites sampled both upstream and downstream of the legacy seep. Interestingly, DOC at the legacy seep site is typically lower than at the other sites. Collectively, this research can shed light on post-remediation hydrocarbon seep contamination in fluvial systems.

GP 70

Dry matter digestibility and stable carbon and nitrogen isotope analysis of captive northern galagos (*Otolemur garnettii)* fed experimental frugivorous and invertebrate diets

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Mentor: Loudon, James Ernest

Northern galagos (*Otolemur garnettii*) are small, nocturnal, acrobatic primates that are difficult to observe in free-ranging settings. To better understand the feeding ecology of *O. garnettii*, we provided a captive colony of eleven galagos (five females and six males) with experimental frugivorous" and invertebrate" diets that simulated the seasonal dietary shifts that this species faces in the wild. We analyzed the stable carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) values of the foods in the frugivorous" and invertebrate" diets and note both diets included primate biscuits to ensure the nutritional stability of each galago. The frugivorous" diet also included blackberries, raspberries, and tamarind, while the invertebrate" diet included crickets, mealworms, night crawlers, and red worms. The stable isotope values of these foods were compared to the fecal $\delta^{13}C$ and $\delta^{15}N$ values collected from each galago. We accounted for the contribution of each food in the diets to interpret the galagos' δ13C and δ15N fecal values. When averaged, across all foods within the diet, the galago's invertebrate" diet was significantly lower in ^{13}C ($P<0.05$) and higher in ^{15}N ($P<.001$) and their $\delta^{15}N$ fecal values were significantly higher ($P<0.01$) when they were consuming this diet. Digestibility trials revealed the galagos were more efficient at digesting the invertebrate" diet (DMD = 76.6±7.0%) compared to the frugivorous" diet (DMD = 72.0±5.1%), which may mean invertebrate" foods are more readily incorporated into their tissues. Therefore, structural differences in these substrates may be why the dietary offsets between foods and feces are better aligned with the frugivorous" diet.

GP 71

CONSTRAINTS ON EMPLACEMENT HISTORY OF SUBVOLCANIC MAGMA SYSTEMS FROM THERMAL MODELING, HENRY MOUNTAINS UTAH

Collin Earls

Mentor: Horsman, Eric

Recent approximations have 9% of the world's population living near an active volcano within recorded history. Volcanism at Earth's surface is driven by changes in underlying magma plumbing systems. We describe in-progress research designed to provide constraints on the growth history of these subvolcanic magma systems. We use Oligocene igneous intrusions now exposed in the Henry Mountains of southeastern Utah as a model for subvolcanic magma systems. Previous work demonstrates that the

igneous intrusions of the Henry Mountains have a laccolith geometry and were constructed through injection of multiple magma pulses, but the number and volume of the pulses is poorly constrained. The detailed 3-d geometry of the laccoliths is well known. Additionally, published geochronologic and host rock thermochronology data provide constraints respectively on the total duration of magmatism and the thermal history of sedimentary host rock adjacent to the intrusions. We use thermal modeling of these laccolith systems to better understand their igneous emplacement history. The modeling allows us to explore a range of factors related to igneous emplacement history that influence thermal history, including magma pulse sizes, number of pulses, timing between pulses, stacking order of magma sheets (e.g., over-accretion versus under-accretion), etc. Our goal is to explore the possible combinations of these factors that produce thermal histories compatible with existing data such as host rock thermochronology data, field observations of igneous textures, etc. Our results will provide insight into how shallow magma systems grow and evolve.

GP 72

Prevalence and Transmission of Black Gill Disease in Penaeid Shrimp in the Pamlico Sound

Chloe Elizabeth Gabriel

Mentor: Blakeslee, April Monica Houghton

Warming coastal temperatures have altered disease dynamics in many ecologically and commercially valuable species. In the southeastern USA, this is exemplified by Black Gill Disease (BGD), a host pathogenic response to the presence of a parasitic ciliate *Hyalophysa lynni* (*HL*). BGD is reported in multiple crustacean species but is best known for its severe impacts on penaeid shrimp, which support a ~$22 million fishery in North Carolina. *HL* is purportedly native to the Gulf of Mexico, but a warming climate has allowed it to expand its range northwards along the Atlantic coast, prompting the need for research into its impacts on local ecosystems. Visual observations by NC agency (NCDMF) surveys suggest ~19% infection prevalence, but our preliminary visual data estimates higher prevalence with peak values of ~26% when examining specimens under a microscope. However, visual-based assessments underestimate true prevalence by missing early stage and asymptomatic infections. Thus, we are using PCR-based methodologies to detect *HL* presence across symptomatic and asymptomatic individuals of penaeid shrimp and possible reservoir species (grass shrimp). Our work will improve the efficacy of ongoing monitoring of BGD and will have important implications for commercial shrimp fisheries in the southeast. Broadly, we hope to enhance knowledge of climate change impacts on host-parasite ecology in estuaries. We ultimately aim to use our genetic, parasitological,

ecological, and environmental data to build a disease transmission model for BGD in the southeast.

GP 73

Deciphering potential toxicity of Alumina (Al_2O_3) nanoparticles in *Camelina sativa*.

Bishwa Raj Pokharel

Mentor: Zhang, Baohong

Nano-enabled products offer significant benefits over conventional chemical counterparts; however, there is limited understanding on the potential toxicity and risk of nanomaterials used in agriculture as nanofertilizers and nanopesticides. In this study, we tested the effects of different concentrations (0, 0.001, 0.01, 0.1 and 1%) aluminum oxide nanoparticles (Al_2O_3NPs) against *Camelina sativa*. Seeds (n=25 per treatment) were incubated with desired concentration of Al_2O_3NPs on phytagel and allowed to grow for 2 weeks in germination media. Germination rate, biomass, root length, number of secondary roots, leaf width and number of leaves were recorded, and dose-response curves were developed. Our results showed that seed germination was highest with 0.01% Al_2O_3NPs by day-4, but by day-14, the control samples had the highest germination rate while 1% Al_2O_3NPs treated samples had significant inhibition in germination. 0.001% Al_2O_3NPs treated samples had the highest fresh shoot biomass, while 0.1% Al_2O_3NPs treated samples showed the highest fresh root biomass. Further, results showed that Al_2O_3NPs induce elongation of primary roots within 2 weeks. Compared to control, Al_2O_3NPs treated plants had significantly reduced number of secondary roots, number of leaf and leaf width, demonstrating a linear dose-response compared to control plants. These findings suggest that Al_2O_3NPs may have potential to induce germination rate and increase biomass at 0.1% concentration beyond which negative effects would occur.

GP 74

Laser and X-Ray Source Characterization for Optically Stimulated Luminescence

Christopher Garcia

Mentor: DeWitt, Regina

Optically Stimulated Luminescence (OSL) is a method used to determine the amount of natural radiation a rock or sediment sample has stored over time. This stored radiation is reset when the sample is exposed to light (i.e. optically stimulated). The sample will release the stored energy in the form of luminescence and this OSL signal is a direct measure of the stored energy. Current OSL instruments use light sources that expose

the entire sample to light, and the luminescence intensity is recorded, making it impossible to retain any spatial information.

An instrument developed in our lab uses a different approach: A narrow laser beam is scanned over the rock surface and luminescence is recorded for every point (pixel) separately. The image is then created by combining the pixels. Four different lasers can be selected. A 50kV X-Ray source is used to determine the relationship between the given radiation dose and the measured luminescence signal. The goal of the work presented here is to characterize the output of the X-Ray source and lasers.

Experiments were carried out to determine the dose rate of the X-Ray source for three different materials: sandstone, quartzite, and quartz sediment. The four lasers were characterized by their penetration depth in different materials and their resolution (pixel size). These experiments will be described and the results will be discussed in this poster.

GP 75

Characterization of the floral development mutant, *Polytypic ear1*

Kimberly R. Rispress, Anastasia Amoiroglou

Mentor: Thompson, Beth

Maize produces two inflorescences, the tassel and ear, which are critical for both plant reproduction and agriculture. The classical mutant, Polytypic ear1 (Pt1), affects multiple aspects of inflorescence development, including floral development.
Interestingly, Pt1 appears to have roles in promoting and repressing meristem activity. Inflorescence primordia in Pt1/+ individuals often have fasciated inflorescence meristems and other meristems (i.e. spikelet pair, spikelet and floral meristems) are indeterminate, consistent with increased meristem activity. However, spikelet pair meristems often arrest in Pt1/+ inflorescences. In some genetic backgrounds, Pt1/Pt1 inflorescences almost completely lack lateral primordia, suggesting reduced meristem activity. To search for the causative gene in Pt1 mutants, we used a positional cloning approach to map Pt1 to a 5.3 Mbp region (6.8 cM) on chromosome 6, followed by RNA-seq to compare transcripts in Pt1/+ and normal ear primordia. From the 111 expressed genes in the Pt1-mapping interval, we identified 112 SNPs predicted to have a high or moderate effect on protein function. All 112 SNPs were also present in the HapMap and therefore unlikely to cause the Pt1 phenotype. We also identified nine genes in the Pt1-mapping interval that are differentially expressed in Pt1/+ and normal primordia. Pt1 is a semi-dominant mutant and thus likely a gain-of-function mutation. Therefore, Pt1 is more likely to be caused by one of the three upregulated genes. Our top candidate gene, ethylene receptor homolog3 (ETR3),

encodes a putative ethylene receptor and shows allele-specific expression in Pt1. Ethylene receptors negatively regulate ethylene signaling, and in Arabidopsis, dominant mutations confer ethylene insensitivity. Overexpression of ethylene receptors may also confer a similar ethylene insensitive phenotype. To test the hypothesis that Pt1 is caused by etr3 overexpression, we are evaluating ethylene sensitivity of Pt1 mutants and examining etr3 transcript accumulation in Pt1 and normal plants using RNA in situ hybridization. The characterization of Pt1 mutants will give insight into the mechanisms that underlie normal inflorescence development.

GP 76

Athlete Mental Health and Peer Relationships

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Mentor: Habeeb, Christine

Teammates represent a unique, powerful, peer-oriented relationship that cannot be replaced by coaches, athletic trainers, administrators, or mental health professionals. For student-athletes experiencing mental health issues, teammates serve as a primary source of informal help in sport (Bird et al., 2018; Habeeb et al., 2021). In fact, up to 62% of athletes that believe they need professional support do not seek formal help (Drew & Matthews, 2019). However, very little is known about the role of teammates in the help-seeking process. The purpose of this study was to understand the specific characteristics of teammates who athletes commonly seek help from. Twenty-one Division I student-athletes (14 females, 7 males) participated in six focus groups lead by a former student-athlete with qualitative training. The semi-structured interview questions were tailored to identify both why or why not an athlete would seek help from a teammate and characteristics of teammates most and least likely to be asked for help. Thematic analysis revealed that
teammates' *Relatedness*, *Behavioral Characteristics,* and *Personality Characteristics* were factors associated with teammate help-seeking. *Relatedness* represented athletes feeling understood by one another. Athletes reported shared experiences and obligations as student-athletes, perceived stigma, and barriers athletes face when seeking help for mental health problems lead to feeling related to
teammates. *Behavioral Characteristics* involved actions by teammates that lead to being more comfortable to seek out a teammate for help. These behaviors included being proactive, reciprocating, and being receptive. Finally, *Personality Characteristics* displayed by a teammate including trustworthiness and authenticity were reported as qualities that would encourage an athlete to open up to a teammate. This study provides an improved understanding of teammate behaviors and interactions. The knowledge accrued in this study allows coaches and sport administrators to foster a culture that encourages peer help-seeking behaviors, ultimately leading to improved student-athlete well-being.

GP 77

An Eighteenth-Century Archaeology of Socioeconomics at Historic Bath, NC

Chloe Suzanne Scattergood

Mentor: Ewen, Charles R

Studying the consumer choices of early North Carolinians can indicate much about their lives and status. Archaeological excavations of two eighteenth-century warehouses in Historic Bath can tell us about merchants and their clientele. The material from these warehouses suggests notable wealth disparity, not unlike today, in North Carolina's first established town.

GP 78

Food swamps have stronger impacts on geographic disparities in obesity and diabetes than food deserts in North Carolina: Census tract-level analysis using GIS

Connolly David Baxter

Mentor: Park, Yoo Min

Analysis of food environments has varying results on the impact of food deserts, low-income areas with low access to healthy food, on the health outcomes of obesity and diabetes. However, food swamps, areas with a relatively high density of unhealthy food options compared to healthy food, might be a better predictor of these chronic diseases than food deserts. This study aims to identify locations of food deserts in North Carolina at the census tract level using GIS methods, including network analysis and food swamps using the modified Retail Food Environment Index and measurements of low income. It also aims to analyze the statistical significance of food deserts and food swamps on the chronic diseases of obesity and diabetes through ordinary least squares and spatial regression models. This study found that food deserts were located in eastern and western North Carolina, and food swamps were clustered in eastern North Carolina. The statistical analyses demonstrated the more substantial impact on chronic disease from food swamps compared to food deserts and that there is spatial clustering of high levels of obesity and diabetes, making spatial regression more robust than ordinary least squares. This study contributes to public health policy by illustrating the significance of food swamps on health outcomes, so policymakers can target areas where food initiatives would have the most significant impact. Also, identifying eastern North Carolina as containing both food deserts and food swamps illustrates the need for state and local governments to increase their efforts to mitigate food insecurity in the region.

GP 79

Self-Exclusion: A look at polices by state based on legalized forms of gambling

Hannah Elizabeth Thornton

Alyssa N. Wilson, PhD

Summer Hamideh

Mentor: Malkin, Michelle L

Self-exclusion is an umbrella term for a policy created by state regulators and/or individual gambling establishments intended to help prevent individuals who seek to limit access to gambling and/or self-identify as problem gamblers (people addicted to

gambling) from entering a gambling establishment, purchasing a gambling opportunity, and/or accessing gambling opportunities through technology. Self-exclusion is voluntary and enacted by the individual. If a person on a self-exclusion list is caught entering the establishment or purchasing a gambling opportunity, they may forfeit winnings and/or may be charged with trespassing (depending on policies) which is meant to deter individuals on the self-exclusion list.

Policies vary by state and/or establishment, with no clear research to date on effectiveness and best practices. This research project aims to provide a better understanding of what self-exclusion opportunities are available throughout the United States with reference to legalized gambling opportunities within each state. This is the first known research that considers the relationship between which forms of gambling are legal in each state and self-exclusion policies.

The first step in this research was gathering the state-by-state types of legalized gambling (e.g., card/poker rooms, commercial casinos, bingo halls, etc.) Next, research established a database on whether each type of legalized gambling by state included a self-exclusion opportunity. Where self-exclusion did exist, the name of the program, procedure, and length of the exclusion were gathered. This data was triangulated with multiple researchers comparing results to ensure accuracy. Analysis was then conducted to see similarities/differences among states and types of legalized gambling, the relationship between legalization of gambling and self-exclusion policies, and the frequency of specific types of policies.

Initial findings demonstrate a relationship between the growth of legalized forms of gambling and self-exclusion policies intended to help those who may suffer harm because of their gambling and that self-exclusion policies vary widely depending on state, gambling provider, and type of legalized gambling. Findings provide an opportunity for regulators, gambling treatment providers, and others to consider best-practices for creating a more universal self-exclusion opportunity for those who seek this road-block from potentially suffering from gambling-related harms.

GP 80

Examining the Effects of Child Perception of Family Functioning on Psychological Wellbeing

Haiden Hice

Mentor: Komoski, Mary Catherine

Objectives: The data for this analysis was collected as part of a larger research study conducted in April 2021 about parenting. The main goal of the current research study is to examine the relationship between the child's perception of family relationships and

the child's mental well-being during the Covid-19 pandemic. The second objective of this study is to review demographic variables to see if they had a mediating effect on the child's perception of family relationships and their mental well-being.

Sample: The survey was given via Google Forms. The survey was primarily distributed via flyers in Laredo, Texas. In order to reach a wider audience, the survey was also published in parent Facebook groups. The questionnaire was available in both Spanish and English, but only 3 participants chose to use the Spanish option, so these participants' data were not included in the final data analysis. The sample includes 79 parents; of those parents, 56 had their child complete a survey as well. The majority of the sample self-identified as Hispanic.

Methods: Participants answered demographic questions (e.g., gender, race, education level, etc.) and questions related to their family relationships, and their mental health (anxiety and depression). The survey questions were from pre-existing scales. Depression and Anxiety were both assessed using the PROMIS Pediatric Item Bank, Version 2 (Quinn et al., 2014). Family relationships were from the PROMIS® Pediatric Family Relationships Measures (Bevans et al., 2017)

Anticipated Results: This study seeks to understand family dynamics during the pandemic. The pandemic had a significant impact on the family structure and family functioning. We hypothesize that more negative perceptions of family relationships will have an adverse effect on the child's mental well-being.

GP 81

Training ECU Writing Center Consultants in Suicide and Crisis Intervention Assessment and Response

Joshua A Wade, Amai Hagans, Brandon Higson, James Adam May

Mentor: Reinsmith-Jones, Kelley K

For some time, college and university students' mental health has been a concern for academic administrators, mental health professionals, and instructors. Those concerns have only been exacerbated by the recent COVID-19 pandemic and the political and social turmoil generated by hate speech, racial violence, and a tendency towards tribalism in the United States over the last five years. While much focus has been on

students in general, particularly with regard to quantitative reports of the number of college-age suicides or referrals for students to university mental health and counseling offices, little research has focused on university writing centers (UWCs) as potential locations for screening and support for students who may be thinking of self-harming or having suicidal ideations. University writing centers are designed to create safe spaces where students may share their thoughts and feelings through their written words with writing consultants. This safe, accepting environment also positions UWCs, though unintentionally, as places where students can also express other concerns or anxieties. However, writing center consultants, themselves often fellow students, are not trained in how to handle these issues. The intervention developed for this research presentation explains how UWCs operate as communities and how crisis intervention training provides UWC consultants with needed tools to engage, stabilize, and refer fellow students in crisis to appropriate mental health services. The result is an intervention that, in multiple ways, serves the larger university system at ECU and has implications for institutions of higher learning across the country.

GP 82

Emotional Labor in the Writing Center: A Pilot Study

Elizabeth Marie Gagne'

Mentor: Caswell, Nicole Irene

Emotional labor, which Kristi Murray Costello cites Susan H. Mastracci et al., define as is a "'rang[es] from authentic expression of the worker's emotional state to requiring workers to don masks and display an emotion that they do not actually feel,"(para. 5). These various emotions and having to navigate through them, more so the falsehood of performance is what makes up emotional labor. Within the writing center, emotional labor can determine how effective a session will be. Gemma Hartly is quoted in Julie Beck's (2018) The Concept Creep of 'Emotional Labor'" stating emotional labor, as I define it, is emotion management and life management combined" (para. 4). However, Hartly's definition is a repurposed interpretation of Arlie Hochschilds' definition which referred to the work of managing one's own emotions that was required by certain professions" (para. 5). For the purpose of this pilot study emotional management leads to emotional labor. Furthermore, individuals may consciously alter their emotional expressions to align them with the expectations of the surrounding context (Beal et al., 2013). This regulating effort is generally called EM [emotional management] but, if carried out within the work domain, then it can be associated to emotional labor2 (Hochschild, 1979; Kluemper et al., 2013)" (Carminati, 2). Emotional management determines how an individual will manage the emotions they experience, but emotional labor is how they conceal and present a falsehood of how they really feel to others and their surrounding environment. In the writing center emotional

management and emotional labor coincide with how consultants present themselves to their clients. The hypothesis generated for this study was: Are there interventions in place for consultants who are not able to effectively perform their duties during a session with a client because of emotional labor? This hypothesis is centered around trying to understand the exact emotions writing center consultants exhibit in the writing center to help determine the types of interventions that need to be set in place to help consultants, and possibly clients, deal with emotional labor.

GP 83

Data Analysis and Vizualization: Trials and Tribulations of a Graduate Student

Crystal Lee Bowers

Mentor: Elliott, Daniel Wayne

Being a graduate student brings with it a lot of stress and struggle, but when you throw in not being a traditional student, things get complicated. The high level of expectation and demand that every graduate student encounters varies depending upon their capability to adapt and overcome. Given all of the external worldly events that have occurred paired with not being a traditional graduate student, I will be exploring how my graduate experience has transpired visually. By collecting data about my personal experiences both mentally and physically as a graduate student, I will analyze and then visually adapt that data to captivate the viewer while also informing them about these topics.

Graduate Student Posters (Online) Abstracts

MCSC Room 237, 10:00-4:00

1 10:00-10:55

Exploring the Role of Complex I in Colorectal Cancer

Mclane Matthew Montgomery

Mentor: Fisher-Wellman, Kelsey Howard

In the United States, colorectal cancer is the 3rd most frequently diagnosed cancer and ranks second in cancer-related deaths. A key hallmark of colorectal cancer (CRC) pathology is the high prevalence of mitochondrial DNA (mtDNA) mutations. In fact, mtDNA mutations are among the most frequent genomic alterations across cancers. Lack of effective pharmacotherapies has left invasive surgery as the only curative treatment, highlighting the need for novel interventions to combat CRC. These mutations in the mitochondrial genome remain a uniquely unexplored aspect of CRC tumors. CRC tumors undergo positive selection for mutations in mtDNA, suggesting CRC disease progression relies on disruption of normal mitochondrial metabolism. We propose that decreased mitochondrial efficiency will disrupt cellular metabolic homeostasis, leading to a compensatory increase in extracellular nutrient uptake that will ultimately support tumor growth. Utilizing an in-house multi-omics platform including proteomics, mtDNA sequencing and bioenergetic flux analysis, our lab recently found that 12 out of 12 clinical CRC tumors exhibited partial loss-of-function in respiratory complex I. Interestingly, patrial impairment of complex I function had no impact on tumor respiratory capacity. Instead, respiratory competence in CRC tumors was completely maintained at the expense of ATP synthesis. Thus, reduced complex I function and decreased ATP synthesis are critical hallmarks of clinical CRC that combine to lower the efficiency of mitochondrial energy production. Importantly, we recapitulated the disruptions in complex I seen in clinical CRC tumors using a genetic mouse model of complex I deficiency and saw increased CRC tumor burden. These exciting preliminary results drive our central hypothesis that inefficient mitochondrial metabolism resulting from forced complex I disruption will accelerate tumor growth in CRC. This work will further our understanding of mitochondria in CRC by providing a mechanistic link between mitochondrial inefficiency and CRC, paving the way for novel CRC-specific mitochondrial interventions.

2 10:00-10:55

North Carolina Read to Achieve Legislation: Is it Successful for Third Graders in a Title I School?

Tracy Lee Gilbert

Mentor: Gregory, Kristen Howell

Are 3rd graders in a Title I school successful in meeting the requirements of Read to Achieve? The Read to Achieve Legislation, set forth by the state of North Carolina, requires third graders to read and comprehend on grade level by the end of the school year. The purpose of this research is to determine whether the requirements of the legislature are being met by students, and is it a successful component in determining whether students can read and comprehend on grade level by the end of the third grade. This mixed methods study used a survey to collect data from third and fourth grade teachers in a Title I elementary school on the number of students successfully completed a pathway to meet Read to Achieve requirements, the effectiveness of the legislation, and how it affected students and teachers. The findings benefit teachers in knowing which pathway had the most success and can also be used for further studies in the effectiveness of the legislature.

3 10:00-10:55

Early Childhood Phonemic and Phonological Strategies in Kindergarten Students

Stephanie Moody

Mentor: Gregory, Kristen Howell

Early childhood literacy is a key issue being addressed in elementary schools across the United States especially, Title 1 funded schools. It is imperative that students are developing the proper literacy skills needed to be successful throughout their educational career. Many kindergarten students lack the ability to process simple phonemic and phonological awareness strategies needed to enhance their reading. Based on the current need for kindergarten students, I proposed the research question, "What are the most effective literacy strategies for kindergarten teachers to use in a Title One elementary school?" The earlier students can achieve these grade level expectations in kindergarten for both phonemic and phonological awareness, the better outcome for passing third and fourth grade end of year testing. This study focuses on key strategies that are important for kindergarten students. Data is analyzed through a quantitative analysis repeated measures t-Test. Using an experimental research design, students take both a pre-test and post-test on orthographic mapping, sound chaining, and DIBELS testing measures. The results of this study after implementation and interventions using these strategies shows their importance for academic achievement in kindergarten students. The findings from this study will help to close achievement gaps in reading for elementary school students.

4 10:00-10:55

Understand the predicting factors of achievement gaps in upper elementary students at Title One schools

Jodian Monique Barker

Mentor: Gregory, Kristen Howell

The purpose of this study is to understand the factors that predict achievement gaps in upper elementary students at Title One schools. This research will answer the question, "What do teachers think are the predicting factors for student's achievement gaps at Title One schools?" Achievement gaps in education refers to differences in academic performance between groups of students which are reflected in grades, standardized test scores, course selection, dropout rates, college graduation rates, and more (Ansell, 2011). A qualitative research methodology will be employed and a case study will be used for the research design. The population of this study will include educators who have experience at a Title One elementary school in North Carolina. A survey will be used to collect data that will be coded identifying different themes. The results will help by proving useful data and solutions for this issue that can be helpful to schools and educators in driving their instructions, curriculum choices, and interventions.

5 10:00-10:55

Student Attitude of Social-Emotional Learning

Sarah Elizabeth Seymour

Mentor: Lee, Tammy D

During 2020, schools introduced SEL to help students cope with the Covid-19 pandemic life-changing events. Social-Emotional development was in peril prior to the pandemic, after this time it will take systematic, intentional, and intensive efforts to get social-emotional learning back on track (Rosanbalm, 2021). Students from a rural high school in North Carolina will participate in this study to determine the student attitude of how useful social-emotional lessons are in their lives. The purpose of this research is to understand the overall student attitude of SEL so schools can make decisions about the incorporation of SEL programs at the secondary school level. Schools will need SEL to become ingrained within the mindset of the educators and culture of the school. SEL should be a prioritized area of instruction and intervention, based on student-specific strengths and needs (Rosanbalm, 2021). The information gained in this study will add to a scarce research about students' perception of SEL (Tan et al. 2018).

6 10:00-10:55

Improving Students' Self-Determination Using Engaging Instructional Strategies

Ashleigh Claire Fleming

Mentor: Gregory, Kristen Howell

The decline in student motivation has been an issue our education system has been struggling with for years. Furthermore, since the closures of school in 2020, the need for this research is even higher than ever. For this proposal, I have explored different instructional strategies that will improve students' self-determination. The purpose and question surrounding this this qualitative study was to determine instructional strategies that promote self-determination for 3-6th grade students in North Carolina. The methodology used for this study was a mixed method style. More specifically, for my methodology I conducted survey given to multiple educators through social media across North Carolina. This survey was open to any educator who has taught in grades 3-6th. This was done to help my research in being able to gather multiple perspectives regarding the information needed for my research. The analysis for this type of data was done through grouping alike survey answers as well as analyzing open response questions. For my data analysis, I included specific information about any frequency or percentages of missing data regarding survey questions as well as numerical descriptions. It is anticipated that this study will allow understanding about what current practices educators are preforming in their classrooms to increase motivation. From the collection of the current educators, I anticipate that I will find similarities and differences in what research suggest will increase motivation. As a result of my findings, I think that it would have a huge impact on the way our education system understandings student motivation as well as setting a foundation to include more instructional tools to help increase student motivation.

7 10:00-10:55

What are the science education programs and outreach programs that are provided by informal science centers in Central Eastern NC?

Courtney Leigh Olvey

Mentor: Lee, Tammy D

This study will be conducted to analyze current informal science centers that can be found in Central Eastern North Carolina. The purpose of the study is to determine the focus of each science center and the outreach programs that they offer. Information will

be obtained through internet research of the informal science centers' websites and through an exploration of their social media accounts. The results of this study will be presented through a poster using graphs, venn diagrams, and charts to display the information in an organized way. This poster will be a way for teachers, administrators, and other educators to easily find an informal science center that will meet the requirements of their classroom using standards, age group, and focus as a guide. Another piece that will come of this research is parts that are missing in Central Eastern NC informal science centers. They can use this information to improve their own informal science centers to fit the needs of schools in Central Eastern NC. This research will transform teachers, administrators, science centers, and informal science in Central Eastern NC.

8 10:00-10:55

Math Curriculum Implementation and Student Proficiency

Elaine Elizabeth Waters

Mentor: Gregory, Kristen Howell

Math educators are always looking for innovative approaches to teaching the subject's curriculum, but they often have a hard time determining whether or not those approaches are effective. Teachers want their student to learn but also understand the content that is being taught. This was the main reasoning behind the research. The research is taken place where the teachers in the school are in their first year implementing the new curriculum. The problem that teachers faced is that there is a lack data to support if the curriculum is beneficial for 7th grade students in a title 1 middle school, which proposed the research question: What is the relationship between student achievement on curriculum-based class assessments and iReady progress monitoring? The quantitative data will have a correlational design. This will be based on the scores of the two variables, the class assessments and iReady progress monitoring lessons based on the topic of probability. Once all the data had been collected, an inferential analysis will compare the two data sources. Through the findings and results of the research will benefit the teachers, instructional coaches and district curriculum using the curriculum and review the findings to see if the curriculum is helping students with proficiency and if it is effective in the classroom.

9 10:00-10:55

Open Court Curriculum

Olivia Nichole Haley

Mentor: Gregory, Kristen Howell

Open Court Phonics Curriculum is seen in many schools and districts today. These schools and districts are now incorporating this curriculum into their everyday schedules for phonics and ELA instruction. Open Court Curriculum is a scripted curriculum given to teachers that includes phonics and ELA instruction along with individual student activities to go along with whole group lessons. The purpose of this research is to focus on the curriculum and determine if it allows enough differentiation for students who need differentiated instruction in order to succeed and obtain on grade level scores in the classroom setting. This study takes place in a Title One school in an urban community in South Carolina. To determine the effectiveness of this curriculum, data collected consists of pre and post-test data of up to 67 first students. It is anticipated that the research and data will show the effectiveness of the curriculum and how all students are able to understand the curriculum. This will be based on personal assessment scores from the beginning of the school year to the middle fo the school year after using the phonics curriculum on a daily basis. This research topic is beneficial for school districts who are planning to implement the curriculum into their local schools.

10 10:00-10:55

Investigating Achievement Gaps with Student Led Mathematic Instruction

Hunter Avery Mcneeley

Mentor: Gregory, Kristen Howell

The elementary mathematic achievement gap has increased due to the pandemic and the implementation of instructional strategies that do not meet the need of all students. The purpose of my research was to discover the effectiveness of student-led math talk in closing achievement gaps. The research question that I was focused on answering was can student-led math talk amongst 4th grade students help close achievement gaps. I collected several data sources from 4th grade students at a Title One school in an urban community. The research methodology I used was mixed methods because I collected both qualitative and quantitative data from students using a district created common formative assessment on equivalent fractions and comparing fractions. Students also completed a survey with short answer responses to describe their experience with student-led math instruction. The research design that aligned with my research problem is action research. The goal of my research is to encourage other educators, future and present, to implement math instruction with student-led learning and discourse. The findings from this research will allow educators to reflect on their teaching practice to see how they can incorporate more student-led learning in their classrooms.

11 10:00-10:55

Learning Outcomes of a Peer-Explored Inquiry Method Using Virtual Simulation Laboratory Experiences

Candice June Lavra Fleming

Mentor: Lee, Tammy D

This action research will analyze the use of Gizmos (ExploreLearning, 2023) as a laboratory experience while implementing a peer-explored approach to inquiry learning. During an atmosphere unit, a team of 84 sixth-graders will be used to gather data in the form of preliminary/post assessments, recorded dialog during peer-explored inquiry and written explanations from Student Exploration Sheets (SES). These activities will happen while exploring the Virginia Department of Education Standard of Learning 6.7e (2018), weather related phenomenon, using the dynamic visualization software Gizmos. The facilitator of research will have multiple perspectives when monitoring student progress that are both semi-structured class observation and network-based platforms. Established platforms give insight to monitoring student screens or tracking student records like assessment scores. By analyzing data in terms of qualitative indicators of the peer-explore inquiry method, teachers will be able to apply the results of this research to their own classrooms when considering various methods to incorporate dynamic visualization laboratory experiences.

12 11:00-11:55

The novel function of PUF-9 RNA-binding protein in C. elegans Parkinson model

Mariah Elizabeth Jones

Savannah Lipski

M.H. Lee

Mentor: Lee, Myon Hee

Neurodegeneration refers to a significant loss of functional neurons, which is present in neurodegenerative diseases such as Alzheimer's (AD) and Parkinson's disease (PD). Despite considerable progress in our understanding of neurodegeneration, how to integrate this information to gain fundamental insights into the molecular mechanism is still severely lacking.

The long-term research objectives are to identify key regulators of neurodegeneration using the nematode *C. elegans* as a model organism. Although the *C. elegans* is an invertebrate, they contain a well-studied nervous system. Its nervous system has

extensively been characterized and found to be similar, in structure and function, to mammals. Their nervous system has been completely mapped, laying out the various neurons and their interactions within the animal. Specifically, PD is a neurodegenerative disease that is the result of dopaminergic neuron cell death. In addition to this loss of DA neurons, there is an accumulation of Lewy bodies. Lewy bodies are classified as clumps of protein such as aggresomes. Lewy bodies are a common phenotype in neurodegenerative disorders in humans. In PD, α-Synuclein (α-Syn) has been identified as the primary protein that Lewy bodies are comprised of. α-Syn proteins are mainly expressed in the brain at presynaptic terminals, but it is not naturally expressed in the *C. elegans.* Notably, overexpression of alpha-synuclein (a-Syn) in *C. elegans* dopaminergic neurons mimics key symptoms of PD patients, including neurodegeneration and abnormal behaviors. Using this model animal, we have identified PUF-9 RNA-binding protein as a potential regulator of PD. PUF-9 protein is a conserved post-transcriptional regulator, but its role in neurodegeneration has not yet been reported.

Using multiple approaches, we found that *puf-9(ok1136)* mutation significantly delays a-Syn-induced neurodegeneration during aging. Expression analysis using CRISPR/Cas9-*puf-9::gfp* worms reveals that PUF-9 is highly expressed in the intestine and hypodermis, but not highly expressed in dopaminergic neurons. These preliminary findings led us to test the hypothesis that PUF-9 may induce PD phenotype non-cell autonomously. Our ongoing genetic experiments will elucidate the novel function of PUF-9 in a-Syn-induced neurodegeneration. Since PUF-9 is highly conserved in most eukaryotes, a similar mechanism may control neurodegeneration (e.g., PD) in other organisms, including humans.

14 11:00-11:55

Teachers' Perception on CKLA: Knowledge (Listening and Learning) Strand

Fernanda Pivetta Gerringer

Mentor: Gregory, Kristen Howell

The current curriculum for English Language Arts in some districts in the country is Core Knowledge Language Arts, or CKLA. Core Knowledge Language Arts has two main strands: Skills and Knowledge (Listening and Learning). The purpose for this study is to explore elementary teachers' perception of the read aloud portions of the CKLA Knowledge (L&L) strand. The research method I used to conduct this study is qualitative. My intent is to capture teachers' perspectives and experiences when using this curriculum as the core instruction in elementary schools. My research question for this study is: What are elementary teachers' perceptions of the CKLA read-alouds? By using survey design, I seek to gather information on real classroom experiences,

thoughts, feedbacks, and input from the lens of educators who have a real understanding of the strengths and weaknesses of the curriculum. The survey questions are tailored to investigate how teachers perceive the framework, the resources, the topics, and the reads-alouds of CKLA-Knowledge (Listening and Learning) strand. I submitted the survey to participants via an online platform called Facebook. Facebook has innumerous private groups, one of this groups is specifically for CKLA teachers, coaches, and other educators who utilize or mentor users of this curriculum. I used this group to reach as many educators as possible. My findings intend to help administrators and reading coaches to find best practices when utilizing the same or similar curricula that may integrate other subject contents in their English Language Arts lessons such as Science and Social Studies.

13 11:00-11:55

Investigating how Student Motivation can Impact and Benefit Middle School, Special Education Students in the Classroom

Kara Wilkerson

Mentor: Gregory, Kristen Howell

In this study, I questioned how middle school aged, special education students can become motivated in the classroom. Several special education, middle school students struggle with self-motivation within a school environment, which is why the issue needs to be addressed. With this being said, I researched how middle school aged, special education students can become motivated in the classroom? The study consisted of one student, in a rural, Title I middle school. The classroom covered in the study involves 19 regular education students and four special education students, with a total of 23 students. During my mixed methods research, I conducted a case study where the purpose is to find beneficial strategies to help the participant become motivated. The qualitative and quantitative data, gained from student surveys, a tally behavior tracker, daily behavior data sheet, BOY/EOY benchmark scores, and student work samples, presented data results from strategies used to promote student motivation. The case study topic of student motivation is beneficial to special education middle school students. The findings are anticipated to impact the field of education by sharing ways students can be motivated in their academic abilities.

15 11:00-11:55

Second grade students' view on how humans impact the life cycle of sea turtles

Morgan Alyssa Salge

Mentor: Lee, Tammy D

This study will consist of students learning a second-grade standard (2.L.1 Understand animal life cycles) through ocean literacy. The unit is designed to follow ocean literacy principle 6: How humans impact the ocean. The students will be learning how humans affect the life cycle of sea turtles in both positive and negative ways. Learning the standard this way will allow the students to make a personal and meaningful connection to the content. Studying their views both before and after the unit will reveal the change in perspectives they have on the topic. The students' views will be collected through pre and post-tests. The expected outcome of this study is for students views to change from a negative view on how humans affect the life cycle of sea turtles, to a positive one. Students are expected to gain a wide variety of views on how humans impact sea turtles at all stages in life.

16 11:00-11:55

The effect studying abroad has on a science teachers' implementation of multicultural instruction into their classroom

Kayla Alex O'Brien

Mentor: Lee, Tammy D

My study is on the effect studying abroad has on a science teachers' implementation of multiculturalism instruction into their classroom. Studying abroad is an influential program (Shively & Misco, 2015). Studying abroad allows teachers to understand the worlds diversity and embrace different cultures and differences as well as open up many opportunities (Altun, M. 2017). Since our country is continuing to become so diverse, it is very important to teach multiculturalism in today's classrooms (Rozman, 2016). Teachers need to embrace diversity and create a classroom environment focusing on equality (Davis, G, et.al, 2022). Research says that studying abroad has impacted teachers positively in many ways (Shively & Misco, 2015). Research also shows that there are plenty of ways for multiculturalism to be integrated into the classroom (How to Provide a Multicultural Education, 2022). Even though research says that studying abroad has impacted teachers positively in many ways and says that there are plenty of ways for multiculturalism to be integrated into the classroom, there isn't any research on the impact that studying abroad has on science teacher's implementation of multiculturalism instruction into their classroom. This is what my study will address. This research will help find out if studying abroad allows teachers to embrace and appreciate different cultures more, as well as create a more diverse and inclusive classroom environment. The expected outcomes should be positive. Teachers should be implementing multiculturalism into their classroom by building stronger relationships with students, celebrating different cultures, fostering inclusion, and including diverse literature in their classroom (How to Provide a Multicultural Education, 2022).

17 11:00-11:55

Inclusion Benefits for Self-Contained Elementary Students

Casey P Herman

Mentor: Gregory, Kristen Howell

Students with special needs have a right to an education to provide them with the most appropriate setting and learning environment. Many people are involved with special needs students, including teachers, administrators, typically developing peers and students. This paper will discuss the information provided by regular and special education teachers, staff, parents, or caregivers of students, and administrators at a charter school with a growing exceptional children's population. Perspective is an essential aspect of inclusion, and this research will provide benefits and perspectives of inclusive classrooms. The research question identified is "What inclusion activities are most effective in helping students with special needs develop social-emotional skills?" A qualitative research method using a case study and thematic analysis will be used to show the findings of the research conducted. The findings have the potential to aid schools, and regular and special education teachers alike in creating more inclusive classrooms that benefit special education students.

18 11:00-11:55

Teacher Perception on the Impact of Retention on Student Achievement

Vanessa M Jeanty

Mentor: Gregory, Kristen Howell

Retention is a practice that, when used, requires a student to repeat an academic year to improve a child's academic performance. Retention and its use has increased over the last 25 years, with millions of students retained every year. The topic of this study was teacher perception on the impact retention has on student achievement. The purpose was to determine teacher standing on retention and if there is a belief that retention is an effective practice that benefits students. The study analyzed the research question: What are teacher's perception of grade retention? The research design was quantitative. This study examined numerical data collected by a likert scale survey completed by educators. The data were analyzed through descriptive statistics. The results of this study will impact decisions making processes on how to best support students. With more information on retention and a determination of its effectiveness through the lens of educators, it can aid in making more informed decisions.

19 11:00-11:55

Implementing Barthel Index of Activities of Daily Living into Standard Nursing Assessment on the Medical-Surgical Unit to Help Reduce Falls

Rebecca Dunn

Mentor: Linder, Julie Michelle

Falls are monitored in all healthcare organizations. Falls carry a high burden to the hospital and the patient. Falls are a preventable events, yet they still occur. Falls can lead to injury and increased length of stay as well as increased costs associated and resources needed due to any injury sustained. Falls also can affect hospital reimbursment through Medicare/Medicaid and costs thousands of dollars. Patients are assessed with different scales on their "fall risk". An associated score is then accompanied by specific interventions to help prevent falls. One major intervention to help prevent falls, along with the falls risk assessment, is to assess every patient for their ability to complete activities of daily living.

Activities of daily living (ADL) are basic skills that people do daily to function. These include eating, dressing, bathing, toileting, and ambulating. Being able to independently perform ADLs can be an indicator of the patient's ability to manage their care post discharge. The major reason for assessing ADLs in the hospital is to determine the need for additional resources during admission. Many patients have adapted their activities at home to their own needs and do not recognize functional decline. While in the hospital, they experience environmental changes as well as health issues--both contributing to the incidence of falls. Examples include poor motor function, medication changes, age, and sensory impairements. The risk for falling is high at all points of the hospital stay. The importance of assessing ADLs in reference to falls is that it can predict a higher chance of falls for the patient.

The Barthel Index is a standardized assessment tool for ADLs and results in a numerical scale to determine a person's independence or dependence with performing ADLs. The aim of this evidence-based practice project is to determine if using the Barthel Index tool will help with decreasing falls in a Medical-Surgical unit during hospitalization. The current tool is a subjective interview and does not give a nominal score. The goal of using the Barthel Index in practice is to use interventions to assist with ADLs, which will prevent falls. Data is being collected on falls occurences on the units and sorted based on demographics, diagnosis, and activity prior to the fall. The data collection is ongoing as the tool is being incorporated into the electronic charting for nursing use and then pre/post data will be compared.

20 11:00-11:55

Classroom Management: Effective Support for Beginning Teachers in the Kindergarten & First Grade Classroom

Ashley Bass Sullivan

Mentor: Gregory, Kristen Howell

The focal point of this study is to dive deeper into classroom management, specifically the lack of classroom management support for beginning teachers. Data was collected from 4 beginning teachers in a rural Title 1 elementary school in eastern North Carolina. The overall purpose of this study was to identify the level and types of classroom management support needed to effectively assist beginning teachers in their Kindergarten and First Grade classrooms. The study aimed to address the following research question: How can instructional coaches effectively support Kindergarten and First Grade beginning teachers with classroom management? The data in this study was collected using qualitative ethnographic design. A narrative discussion was composed by examining and reporting the shared findings of the research group. Quotes and generalizations were made by identifying patterns that were derived from the teacher participant interviews, classroom field note observations and classroom management observations of the 4 participating beginning teachers.

Coaches and mentors in the elementary school setting will benefit from the findings of this study and can utilize the information from the study to better serve the beginning teachers in their school. They will develop an understanding of how to support Kindergarten and First Grade beginning teachers with classroom management. Coaches can implement meaningful feedback strategies and solid classroom management practices that are named in this research as a result of the study. Principals will also benefit from the findings because it will allow them to understand the intentional levels of support that must be in place to assist beginning teachers with effective classroom management strategies. Additionally, beginning teachers that are on the receiving end of the implementation will benefit from having the direct support needed to make necessary adjustments in their classroom management practices to best serve, support, and instruct the students in which they teach.

21 11:00-11:55

The Impact of Environmental Injustice Education on High School Students' Attitudes and Behaviors Related to Climate Change

Kristine Lynn Doster

Mentor: Lee, Tammy D

This research study evaluates the effectiveness of a Climate Change Inequities Course on high school students' climatic mindsets and behaviors. Recognizing environmental inequities may increase student concern for situations outside of their own, highlighting the concept as fundamental to creating a future, more unified society willing to combat

climate change together. In this study, 20 high school students enrolled in an honor-level Earth and Environmental class were surveyed before taking a 5-day, teacher-led Climate Inequities Course. Thirty days after the course, students were resurveyed to note any changes in their attitudes toward climate change and their commitment to making more pro-climatic decisions. The findings will show a positive correlation between students' philosophy of mind and action and going beyond the standard course of study to expose students to the reality of climate inequities, why they exist, mitigation opportunities, and their power as young people.

22 11:00-11:55

Third Grade Students Virtual Plant Models

How does the use of SeeSaw impact Third Graders knowledge of creating a plant

structure model for flowering and non-flowering plants?

Hannah Falk

Mentor: Lee, Tammy D

Seesaw is a digital learning tool used to allow student to virtual show their learning and understanding of topics. Using Model-Based inquiry, students will be exploring digital software by creating virtual models by drawing and labeling flowering, and non-flowering plant strucutures.

23 2:00-2:55

Spectrophotometric study of turbid samples and artery phantoms for modeling of photoplethysmography process

Zachary David Jones

Mentor: Hu, Xin-Hua

We have improved an existing multiparameter spectrophotometry (MPS) system for acquisition of three light signals of diffuse reflectance $R_d(\lambda)$, diffuse transmittance $T_d(\lambda)$ and forward transmittance $T_f(\lambda)$ for wavelength λ between 460 nm and 1000 nm in steps of 20nm. This experimental system is paired with a GPU-based in-house developed single photon tracking Monte Carlo simulation (iMC) to acquire calculated signals $R_{dc}(\lambda)$, $T_{dc}(\lambda)$ and $T_{fc}(\lambda)$ to determine optical parameters μ_a, μ_s, and g of a turbid sample. The experimental system and iMC pairing have been validated by measurement of standard turbid phantom materials of intralipid solutions and bovine milk for determination of the optical parameters based on the radiative transport (RT) theory.

These optical parameters have been determined using a recently developed inverse algorithm based on Particle Swarm Optimization (PSO) framework. We are currently extending this system to investigate the photoplethysmography (PPG) process using human artery phantoms and a modified iMC code to accommodate a host medium region and embedded artery tube region, as well as surface conformation changes. Preliminary measurements have been obtained using these phantoms with artificial and human blood as the tube medium. With these results, we plan to develop a PPG model on the rigorous radiative transfer theory to clearly understand the light-tissue interaction underlying PPG signals and extract artery parameters from the spectral dependence of optical parameters.

24 2:00-2:55

Teachers' Perception on Class Size

Kayla Marie Wood

Mentor: Gregory, Kristen Howell

Class size refers to the number of students in a class. This can be the number of students taught by an individual teacher or the ratio of students to teachers in a school system. The positive and negative effects of reduced class size have been of discussion for many years. Although teachers are not debating the positive effects of reduced class size, research does not highlight teachers' perceptions on the topic. Specifically, the perceptions of teachers in a rural primary school with a majority of students being economically disadvantaged. The purpose of the research study is to understand teachers' perceptions on class size through the research question: How do kindergarten through second grade teachers describe the effects of class size at a rural North Carolina public school? A mixed methods research design procedure was used to collect and analyze both quantitative and qualitative research in order to better understand teachers' perceptions on class size. Data collected through a researcher created survey provides information that impacts the field of education. The results of this study will help to enhance the debate on optimal class size and inform administration and teachers of areas needed for professional development. Class size effects budgets, employment, and available resources.

25 2:00-2:55

Impact of Virtual Models in 5th Grade Students Conceptual Understanding of The Greenhouse Effect

Sarah Sanchez

Mentor: Lee, Tammy D

This study focuses on the impact of virtual models on the conceptual understanding of the greenhouse effect of 5th grade students. In this study, students will use three different virtual models to learn about the greenhouse effect. Models help students make predictions, engage in class and group discussions, and more plainly see things that may be abstract. Models help students bridge scientific theory and reality. Student knowledge will be measured before learning through a pre-test and measured after learning with a post-test. The scores of each test will be analyzed and compared to measure student growth after using the virtual models. Data will be analyzed and represented using descriptive statistics. The data will be used to determine if the virtual models were effective in helping the 5th grade students understand the greenhouse effect.

26 2:00-2:55

Effect of Serious Educational Games on Physical Science Student Knowledge

Jarrett Davidson Godwin

Mentor: Lee, Tammy D

Serious Educational Games (often referred to as SEGs) are a collection of classroom teaching tools that have shaped the way students learn in science education. The process behind an SEG, is to immerse students in a game-style culture where the core of the game is filled with curricular related content. In order to evaluate how SEGs impact students' knowledge, research will be conducted with a group of high school Physical Science students. The question being asked through this research is how effective are SEGs in teaching Physical Science concepts to students? A pre-assessment and post-assessment will be implemented along with the actual SEG of choice as part of collecting data to analyze for this research study. Based on prior research conducted, the effects of student knowledge have displayed positive results after implementing an SEG into a curriculum lesson/unit. In this research study, similar growth results are expected with the implementation of an SEG into a Physical Science curriculum unit.

27 2:00-2:55

The Relationship Between Scores on 3 Different Kindergarten ELA Assessments

Jessica Leigh Williams

Mentor: Gregory, Kristen Howell

Due to the shift to the Science of Reading, many schools are fully implementing this new ELA curriculum called Core Knowledge Language Arts (CKLA). Although the CKLA curriculum is aligned with the Science of Reading and has assessments within

each unit, students' literacy achievement is primarily determined based on their scores on the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) assessments, which is created and mandated by the state. The purpose of this quantitative study is to analyze the relationships between students' scores on the CKLA assessments and MOY DIBELS assessments in a Title 1 elementary school located in the Mid-Atlantic United States. The specific question this has led me to investigate is: What is the relationship between kindergarten students' scores on the different ELA assessments given in the middle of the year? Kindergarten students' data across 6 different classrooms is collected and analyzed. A correlational analysis design is used to determine the relationship between student scores across various ELA assessment tools. The findings of this study will impact the field of education by providing administrators and school board members with data that shows how the CKLA curriculum relates to student achievement in literacy. It can provide information to kindergarten and first grade teachers to better understand the relationship between the different assessment tools and student performance on them.

28 2:00-2:55

Integration of Movement in Physics Teaching for 1st Grade Students

Danielle Nicole Marsicano

Mentor: Lee, Tammy D

In this study, a first-grade class of students will be exploring the physics concepts of force and motion through the creation of a dance. Students will be challenged with the task of creating a 30 second dance using two to three objects of their choice with the ideas of push, pull, motion and direction in mind. In this qualitative study, participants will be assessed through a drawing created representing different physics concepts present in their dance. Student's drawings will be coded and analyzed to determine understanding of specific physics concepts is present with the integration of the arts. Researchers in education have been putting an emphasis on their interests in different learning styles, related to instructional methods (Lopez, Schroeder, 2008). Combining two passions, dance and science, the study conducted is based on thoughts about different science concepts that could be better taught and understood by students with the integration of different art forms.

29 2:00-2:55

Analyzing Student Task Values For Activities in an Earth History/Evolution 8th Grade Science Unit

Shayna Renee Hines

Mentor: Lee, Tammy D

The purpose of this study is to find out the types of activities that students in 8th grade science assign a higher task value (as described as student interest, importance, and utility) in an Earth History/Evolution Unit. This quantitative study will gather data from 8th grade students in Onslow County, North Carolina using a Linkert- Style survey. Students will rate three activities for four different topics (fossils, geologic times scale, evolution and taxonomy) throughout the four-week unit. Having students assess the task value of different instructional activities would include their interest in the activity, their perceived importance of the activity and how useful the activity is. Expected outcomes include trends across different subgroups in the population. Students with disabilities can have difficulties with reading and low confidence with these activities, so they may rate activities which require them to read lower than other styles of learning. Higher level students may rate lecture or activities where they can engage in discussion to be higher due to these students typically asking more questions and wanting to be able to interact with others. This knowledge could help educators plan and prepare lessons to engage and motivate students to become more invested in the content and subject.

30 2:00-2:55

The Effectiveness of School to Home Relationships: Family Perceptions of English Language Learners

Lindsey Christine Main

Mentor: Gregory, Kristen Howell

Relationships between schools and the families they serve can be mutually beneficial. There are barriers which can negatively influence the relationship between schools and families of English Language Learners (ELLs). A direct resource which schools can use to identify these barriers within their walls are the families themselves. The purpose of this quantitative study was to explore the perceptions of home to school connections with the families of ELLs. The following research question was investigated: How do families of ELLs perceive the effectiveness of home to school connections at a rural, Title 1, primary school? This study operated under a cross-sectional survey design. The survey consisted of a mixture of background, attitude, closed-ended questions, and utilized Likert scales. Parents or guardians of ELL students were used as participants. Data analysis methods included an initial descriptive analysis of the data, followed by using mathematical statistical measures. Results were examined for validity and reliability. The results of this study will impact the field by providing information for school administrators and School Improvement Teams to adjust the ways in which connections are made with ELL

families. Classroom teachers would also gain insight into ways that they could reach out and adjust their practice to meet the needs of ELL students.

31 2:00-2:55

Strategies to Motivate Struggling Readers

Connie D Oliver

Mentor: Gregory, Kristen Howell

This qualitative research paper explored strategies to motivate struggling readers. What are some strategies that will motivate struggling EC students at an alternative school? was addressed in this research study. Students were seen during normal, everyday reading assignments in the classroom. Various reading strategies were used during instruction and student assignments. Data of engagement was recorded on an observation form. Data was analyzed through open coding. This research paper concluded with recommendations for educators on how to effectively implement practical and effective strategies for the classroom to improve reading motivation and engagement among struggling readers. The results of this research study are beneficial to the field of education for teachers who are faced with finding ways to motivate or engage their students who struggle with reading.

32 2:00-2:55

Teacher Motivation and AP Courses

Cassandra Maralica Flemming

Mentor: Lee, Tammy D

Currently, there is a global teacher shortage, and the COVID-19 pandemic is still having an impact on educational institutions all over the world. Following these circumstances, some teachers have made the decision to leave the industry, while many continue, particularly those who teach AP courses. This research study will attempt to identify what are the motivational factors for teachers to teach AP courses. College Board, offers students the chance to take and receive credit for college-level subjects while still enrolled in high school and they moderate these classes. Very little research has been conducted on AP or College Board and teacher motivation. Within this phenomenological study, using teacher-completed surveys and structured interviews, the findings distinguished the intrinsic, extrinsic, and environmental factors that influenced the varying levels of motivation while teaching AP courses. These implications would help educational leaders strengthen AP programs and identify additional supports for teachers.

33 2:00-2:55

Parent Participation in Middle School Education

Julia Dean Gilmore

Mentor: Gregory, Kristen Howell

During the middle school years of education, parent participation tends to decrease, and parent participation changes from in-person to more at-home involvement. At-home involvement comes in various forms. Parenting is a lifelong journey and students in middle school continue to need their parents to be very active in their lives. Parent participation is necessary because it shows the students that the parents are one hundred percent invested in all aspects of the student's life and that the parents desire to help the student succeed in life. Parent participation can also help with student motivation and decrease student behavior issues. This research addressed; How does parent participation or nonparticipation affect their child's education? This qualitative research included a cross-sectional survey of teachers and administrators at a Title 1 middle school. The cross-sectional survey had seventeen statements that will be responded to from strongly agree to disagree strongly. There were also seven open-ended comment questions. This was an anonymous survey. The data has been stored in a secure area. These findings identify why parent participation decreases and changes and how the school can encourage more parents to be active in their child's education. The survey addressed various ways that parents can participate in their child's education. The school will benefit from the findings because the school will be able to help increase and encourage parent participation in middle school. The students will benefit from the findings when their parents are more involved in their education.

34 3:00-3:50

'Where's Jim Cantore?': Using Humor & Affective Ecologies for Crisis Communication

Ashleigh Hill Taylor

Mentor: Eble, Michelle F

As the old saying goes, "laughter is the best medicine." During and after natural disasters, survivors often lean on humor as a coping mechanism and for healing (Cherry et al., 2018). In a digital setting, humor can inspire community building and increase resilience (Meza et al., 2018). Using the framework of affective ecologies, this presentation examines how humor is used for information sharing and community building in the Facebook group "Where's Jim Cantore?" It will

identify which posts and methods of delivery (image, video, or text) have the most impact through impressions, shares, and comments.

35 3:00-3:50

Rooted

Kristen Lanier Baucom

Mentor: Tisnado, James R

I am developing a body of work that illustrates the beauty of a transient upbringing through the use of personally symbolic imagery from both the natural and the man-made world. I will be visually representing the states that I have lived in, as well as the experiences and memories derived from each particular location. I am researching ways in which I can incorporate images of the nuclear power plants that are indicative of my father's career. Since his profession afforded me the opportunity to be immersed in so many parts of this country, I feel that intertwining components of these plants within the landscapes they exist in will be a meaningful, yet also challenging approach for me to address through my artmaking. I will also illustrate some of the homes I lived in and the concept of a family tree. In doing so, I hope to convey that while I don't have roots in the traditional sense, I am deeply connected to the places I have been and the people I have shared these spaces with, therefore leaving me to feel rooted nevertheless.

36 3:00-3:50

From the Inside: Educators Perspective on Academic Curriculum and Child Development

Kristin Danielle Schneider

Mentor: Gregory, Kristen Howell

The academic demands of public school continue to increase, and the solution has become a "one size fits all" approach with the implementation of boxed academic curriculum. For students in rural areas across America, especially Title 1 schools, this may not be the best approach and could possibly be detrimental to their future academic success. There is an abundance of literature to support the implementation of these curriculums but there was little to be found on the opinion of educators inside the classrooms. This mixed methods study utilized a cross sectional survey to gain the opinion and feedback of educators within kindergarten classrooms. This approach allowed me to collect qualitative and quantitative data for interpretation. The mixed methods approach allowed me to collect data and information that was then analyzed to produce statistical results while also allowing me access to personal opinions and

quotes related to educators' opinions on academic curriculum and child development. The data was collected with the intention to provide stakeholders with varying perspectives before implementation of boxed academic curriculum by answering the following question:
How do educators in rural American Title 1 schools feel academic based curriculums affect holistic child development of kindergarten students within their classrooms?

37 3:00-3:50

The impact of CER argumentation instruction on student abilities to support a claim with evidence

Krystal Krill

Mentor: Lee, Tammy D

Claims, Evidence, and Reasoning (CER) is an instructional technique that allows students to explain phenomena around them (Kennedy & Folkes, 2018, p. 43). Claims are statements or ideas made from an investigation or scientific concept; the evidence is data collected to support their claim; and reasoning is explaining why the evidence supports their claim (Alegado & Lewis, 2018, p. 72). The use of argumentation guides students in convincing others of the validity of a claim and assists in making informed decisions throughout life. The focus of the research is on the learning progressions of a specific scientific argumentation instructional strategy (CER). Whenever students answer a question, it's important that they can support their answers with evidence, however, most are unable to. When a class is divided on the correct response, it is also important that students can analyze responses and reasoning and further support or defend their thinking. Students should be able to think for themselves, find the appropriate evidence, and establish a rational reason to support their claim. This will not only help in the classroom but in the world as well.

38 3:00-3:50

Where are We?

Tamla Boone

Mentor: Tisnado, James R

While visiting one of the most prestigious museums in the world, I found the marble sculptures mesmerizing, gold wreaths breathtaking and foreign gods intriguing. Each floor had representations from all over the world, exposing various histories and ages through art. It was disheartening to observe a continued lack of displays portraying Afrocentric culture. There were no brown people displayed in the museum, which was

unbelievable. This museum, in the middle of the arts capitol of the world was only a ship's cast away from Africa. I determined the curators must have had some exposure to Africa's beauty. Yet, there were no braids, broad noses, or full lips on any of the sculptures, figurines, or etchings. Where were the pieces that told the history of these people? This lack of diversity in this and many other museums was inspirational and encouraged me to seek, create and distribute such art.

My artwork has become an intertwined pathway with quilt patterns. They offer covert messages that directed African Americans to safe havens during the 1800's. I reproduce these codes on barns, wood, paper, tiles, and recently ceramic quilt chest. This visual narrative involves education and awareness of the Transatlantic Slave Movement and how it impacted America, Africans, Art, and Culture. I continue to research and learn more about these secret codes and I wonder how they are relative today? Do we need more education about this time and the impact in still has on the art world.

39 3:00-3:50

THE IMPACT OF ARGUMENTATION ON THE ACHIEVEMENT LEVELS OF 7TH GRADERS' KNOWLEDGE AND ATTITUDES TOWARDS GENETICS

Mitchelle Simone McLeod

Mentor: Lee, Tammy D

Research supports argumentation at the heart of the science classroom as a tool to increase engagement and the critical thinking skills of students, teachers must provide ample opportunity for students to practice and improve their scientific reasoning skills even if it means a shift in the pedagogy of the teacher. This study extends previous studies to examine the impact of argumentation on the knowledge and attitudes of African American Male students in middle school while studying genetics. The study will use multiple methods including journaling, interviews and surveys to assess students' attitudes while using pre and post test scores to analyze their knowledge gains. The expected results are that argumentation will help to increase engagement by providing students with a voice. It is expected that Post test scores will increase or remain unchanged and students will display more interest in learning when argumentation is used as the primary teaching strategy.

40 3:00-3:50

Analysis of Fibrin Fiber Growth

Aravind Elangovan

Mentor: Hudson, Nathan E

Fibrin fiber networks form the structural component of blood clots. Fibrinogen, protein found in blood plasma, polymerizes in the presence of thrombin into a network of fibrin fibers. The early stages of fibrin polymerization and the final structure of the fibrin network are mostly known. The intermediate phase, on the other hand, is not fully understood. Many studies have investigated the polymerization process, but it was found to be challenging to obtain high resolution images of fibrin polymerization due to fiber mobility. The goal of this project is to measure the growth of fibrin fibers in the intermediate phase. Fibrin growth was recorded via light sheet microscopy. Using the Imaris software, the longitudinal growth and the change in fluorescence intensity of the fiber can be measured. Preliminary results will be presented. The long-term goals of this project are to connect the mechanisms of blood clot formation to diseases. By understanding how the structure is formed, it is possible to trace backwards and identify how diseases affect the polymerization process.

41 3:00-3:50

Effectiveness of nutrition education in a cardiac rehabilitation (CR) program and barriers to diet adherence

Mary Frances Donnelly, Department of Nutrition Science, East Carolina University, Greenville 27858, North Carolina, United States

Dr. Oyinlola T. Babatunde, Department of Nutrition Science, East Carolina University, Greenville 27858, North Carolina, United States

Mentor: Babatunde, Oyinlola Toyin

Nearly one in four cardiovascular-related deaths could be prevented by improving lifestyle behaviors, reducing risk factors, and addressing socioeconomics. Modifiable risk factors (e.g. nutrition, exercise) are integral parts of cardiac rehabilitation (CR) and improving cardiovascular health (CVH). Currently, there are gaps in research assessing quality CR nutrition education programs. The purpose of this study is to assess effectiveness of one CR nutrition education program at improving diet quality, preventing hospital readmissions, and evaluating patient-reported barriers to diet adherence.

This retrospective, one-group pre-post analysis included participants from one outpatient, hospital-based CR program in Eastern North Carolina. The nutrition component offered 14 sessions (12 group and 2 one-on-one) with a Registered Dietitian (RD). The RD measured participants diet quality at baseline, discharge, and 2-year follow-up using the Diet Habit Survey (DHS). A total of 30 participants completed the study (73.3% male, 26.7% female, mean 66.36 years old). DHS scores significantly

improved baseline to discharge ($p < 0.05$) and maintained discharge to follow-up. Participants readmitted 30-90 days post-CR completion (13.33%) had lower average DHS scores comparatively with greatest variance found at discharge (124.23 versus 155.30, $p = 0.056$). Reported barriers to diet adherence included fried foods (10%), motivation (16.67%), family (16.67%), access to food (6.67%), and other health conditions (20%). Participants reporting "no barriers(n=11) had higher average DHS scores (154.97 versus 140.52, $p=0.61$).

Findings from this study and the literature indicate RD-lead CR nutrition education can be effective to increase diet quality. Participant-reported barriers to diet adherence may also have been impacted by geographical region, health literacy, and self-efficacy. Despite the effectiveness of this program, expanded nutrition sessions may enhance participants' self-efficacy and motivation for diet adherence. It is recommended that CR programs increase nutrition sessions offered and include interactive activities (cooking demonstrations, grocery tours) for greater improvements in diet quality and CVH.

42 3:00-3:50

The Impact of Recess on Students' Academic Performance

Meredith Louise Valentine

Mentor: Gregory, Kristen Howell

In elementary schools, recess has traditionally been a regular activity; however, to increase instructional time and student achievement, recess time is currently being reduced or eliminated in many schools. During recess, students can constructively channel their excess energy. Due to increased educational requirements, recess time has decreased, resulting in ongoing discussions about the academic effects of recess. Thus, the purpose of this qualitative study is to understand how recess affects the academic performance of seven- and eight-year-old students in a Title One elementary school in rural Eastern North Carolina. This research will help answer the question of: How do elementary school classroom teachers and administrators describe the impact of recess on students' academic performance? Participants in this study are four second-grade teachers, a principal, and an assistant principal. These participants have been interviewed to help determine how recess affects students' academic performance. The following methods have been used to analyze this research: Data transcription, hand analysis, preliminary exploratory, data coding, and theme identification. This research will assist administrators, school boards, and policymakers in understanding how recess affects students' academic performance. The intended outcome of this study is to increase recess time for students.

43 3:00-3:50

Geometry Analysis of Oscillating Surge Wave Energy Converter Flaps

Jason Takeo McMorris

Mentor: Filho, Faete

Having a reliable supply of fresh water is a problem that impacts nations around the world. Saltwater desalination is one of the best methods for fulfilling this need, but it is an energy-intensive process that is expensive to maintain. Sustainable desalination using renewable energy will lower the cost of running a desalination system, making it a viable source of fresh water with minimized external energy inputs. Hydrodynamic power from ocean waves has significant energy potential, but commercial utilization is low. Wave energy can be utilized to increase the efficiency of seawater desalination using a wave energy converter (WEC) combined with a pressure accumulator to convert the wave motion into pressure energy.

In this presentation, I present an analysis of scaled down flap-type oscillating surge wave energy converter (OSWEC) geometries and their effects on the performance of a renewable energy powered desalination plant. The maximum power output of the WEC under consistent wave conditions and optimized power take-off (PTO) damping and stiffness is the main metric used to assess desalination performance. Various geometries have been proposed, including a standard rectangular flap, an elliptical flap, a flap with varying thickness, a flap composed of multiple cylinders, and a flap made up of cylinders with different diameters. Each geometry was subjected to a boundary element method analysis software to determine its hydrodynamic response to specific variable values. WEC-Sim, an open-source simulation tool, was used to simulate the WEC and compute the power outputs of each flap variant under different PTO conditions. This study employed scaled down wave conditions at Jennette's Pier in Nag's Head, North Carolina. The experimental results reveal which flap geometry and variable configuration yields the highest power output.