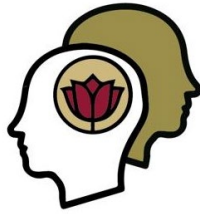




**2024**  
**SPRING**  
**UNDERGRADUATE**  
**RESEARCH**  
**FORUM**

**CELEBRATION OF ACHIEVEMENTS IN UNDERGRADUATE RESEARCH**

 **ELON UNIVERSITY**



**SURF**

Spring Undergraduate  
Research Forum

# Spring Undergraduate Research Forum

**Welcome to SURF 2024**

**The 31<sup>st</sup> Annual Celebration of Achievements  
in Undergraduate Research at Elon University**

The Spring Undergraduate Research Forum (SURF) is a time each year when we suspend our other campus activities to celebrate the academically centered creative endeavors and research efforts of Elon's students. SURF 2024 has **321** presentations, including **167** poster presentations, and **152** oral presentations and **2** performances in **35** sessions. Among them, **72** presentations are self-identified as projects related to diversity, equity, and inclusion (DEI) and marked with a <sup>(1)</sup>, **43** presentations are self-identified as relating to sustainability and marked with a <sup>(2)</sup>, and **85** presentations are self-identified as data intensive and marked with a <sup>(3)</sup>. This year's SURF features two interdisciplinary symposiums named "Identity, Politics, and Place, in a Globalizing World" and "American Studies". Six poster presentations are also being given by students from Williams High School, in Burlington, NC, who were mentored by Elon faculty.

Each SURF abstract was reviewed by two Elon faculty members with disciplinary expertise. SURF brings to light our students' wonderful academic and creative pursuits. We invite you to join and support the student presenters and performers as they share the joy of exploration and discovery that are the hallmarks of an intellectual community. At Elon, Undergraduate Research & Creative Endeavors include activities undertaken by undergraduate students with significant faculty mentoring that:

- Lead to new scholarly insights and/or the creation of new works;
- Add to the discipline; and
- Involve critical analysis of the process and/or outcome of the activities.

Quality undergraduate research and creative activity result in products that have the potential for peer-reviewed dissemination in the form of presentations, publications, exhibitions, or performances. At Elon, undergraduate research and creative activity take place in the classroom in course-embedded research classes and outside of the classroom in faculty-mentored one-on-one or in small group models.

## **2023-2024 Undergraduate Research Program Advisory Committee**

Dr. Casey Avaunt  
Dr. Katie Baker  
Dr. Kelsey Bitting  
Dr. Manoj Chari  
Dr. Cynthia Fair  
Dr. Barbara Gaither

Dr. Megan Isaac  
Dr. Jenny Jiang  
Dr. Samuele Pardini  
Dr. Paula Rosinski  
Dr. Hwayeon Ryu  
Dr. Sabrina Thurman

Dr. Rissa Trachman  
Dr. Cora Wigger  
Dr. Eric Hall (Director)  
Dr. Jen Hamel (Associate Director)  
Dr. CJ Fleming (Associate Director)

## Undergraduate Research Student Association (URSA)



The Undergraduate Research Student Association is an organization on campus that acts as the student-run counterpart to Elon's Undergraduate Research Program. They help undergraduate students get involved with research as well as act as a cohort for upperclassmen already doing research. URSA is looking for new members as well as people to fill leadership positions next semester. Please visit us at our table at the front of Alumni Gym during the morning and afternoon poster sessions!

To contact URSA:

Please join us on PhoenixConnect

Sophie Miller, President of URSA: [smiller63@elon.edu](mailto:smiller63@elon.edu)

## Special Thanks

Planning a large event like SURF requires a team. We would like to thank the many people who helped make this event possible:

- Faculty mentors are an integral part of this process. Thank you to the wonderful mentors who supported students in their scholarship and creative endeavors.
- Thank you to the reviewers who provided constructive feedback on student abstracts.
- We would also like to extend the appreciation in advance to all the moderators who will ensure that the oral presentation sessions are run smoothly and on time, as well as to all the faculty members who will help assess the poster presentations.
- We would like to thank Dr. Julia Bleakney from the Writing Center for her poster workshops that helped students prepare for SURF.
- Many people from Event and Space Management and Information Technology, particularly Robert Johnson, Alexa Lowey, and Sean Walker who provided all kinds of fantastic support to help with the setup of this event.
- Our program assistant, Emily Moser, and the Powell 108 student workers, Jin Kobes, Rachel Mullenix, Ceara O'Neal, and Henry Searle, who have worked hard on the preparation for SURF Day.

## Campus Map

To find the presentation locations, please [click this link](#) to access campus map.

## PROGRAM LISTING BY SESSION AND TIME

(Click the page number for presentation information. All listed times are Eastern.)

<b>Poster Session I</b> (8:30am – 9:40am) <b>Alumni Gym</b>	<a href="#">7</a>
<b>Poster Session II</b> (4:20pm – 5:30pm) <b>Alumni Gym</b>	<a href="#">13</a>
<b>Oral Presentation Session I</b> (10:00am – 12:00pm)	
<b>McKinnon Hall D: Education &amp; Wellness and Performing Arts</b>	<a href="#">19</a>
<b>McKinnon Hall E+F: Chemistry and Biochemistry</b>	<a href="#">19</a>
<b>Lakeside Meeting Room 212+213: Human Service Studies, Anthropology, and Sociology</b>	<a href="#">19</a>
<b>Lakeside Meeting Room 214: Mathematics and Statistics</b>	<a href="#">20</a>
<b>Moseley 215: Classical Studies</b>	<a href="#">20</a>
<b>Koury Business Center 101 (LaRose Theatre): Biology</b>	<a href="#">21</a>
<b>Sankey Hall 308: Sport Management</b>	<a href="#">21</a>
<b>LaRose Student Commons 200: Exercise Science and Dance Science</b>	<a href="#">21</a>
<b>Belk Pavilion 208: Computer Science</b>	<a href="#">22</a>
<b>Center for the Arts Yeager Recital Hall: Communication Design, Strategic Communications, and Cinema &amp; Television Arts</b>	<a href="#">22</a>
<b>Koenigsberger Learning Center 127: Carret Essay Contest</b>	<a href="#">23</a>
<b>Oral Presentation Session II</b> (12:20pm – 2:00pm)	
<b>McKinnon Hall D: Environmental Studies</b>	<a href="#">24</a>
<b>McKinnon Hall E+F: Psychology</b>	<a href="#">24</a>
<b>Lakeside Meeting Room 212+213: Symposium: American Studies</b>	<a href="#">24</a>
<b>Lakeside Meeting Room 214: Engineering and Physics</b>	<a href="#">25</a>
<b>Moseley 215: Classical Studies and World Languages &amp; Cultures</b>	<a href="#">25</a>
<b>Koury Business Center 101 (LaRose Theatre): Biology</b>	<a href="#">25</a>
<b>Sankey Hall 308: Economics</b>	<a href="#">26</a>
<b>LaRose Student Commons 200: Public Health and Exercise Science</b>	<a href="#">26</a>
<b>Belk Pavilion 208: Art, Art History, and Museum Studies</b>	<a href="#">26</a>
<b>Lindner 102: Biology, Environmental Studies, and Statistics</b>	<a href="#">27</a>
<b>Studio D, Arts West: Music</b>	<a href="#">27</a>
<b>Oral Presentation Session III</b> (2:20pm – 4:00pm)	
<b>McKinnon Hall D: History and Political Science &amp; Policy Studies</b>	<a href="#">28</a>
<b>McKinnon Hall E+F: Symposium: Identity, Politics, Place in a Globalizing World</b>	<a href="#">28</a>

<b>Lakeside Meeting Room 212+213:</b> English	<a href="#">28</a>
<b>Lakeside Meeting Room 214:</b> World Languages & Cultures	<a href="#">29</a>
<b>Moseley 215:</b> Religious Studies	<a href="#">29</a>
<b>Koury Business Center 101 (LaRose Theatre):</b> Biology	<a href="#">29</a>
<b>Sankey Hall 308:</b> Economics	<a href="#">30</a>
<b>LaRose Student Commons 200:</b> Education & Wellness	<a href="#">30</a>
<b>Belk Pavilion 208:</b> Accounting, Finance, and International Business	<a href="#">30</a>
<b>Lindner 102:</b> Psychology	<a href="#">31</a>
<b>Center for the Arts 117 (Studio A):</b> Dance Performance & Choreography	<a href="#">31</a>
<b>Studio D, Arts West:</b> Music	<a href="#">31</a>
<b>SURF Reception</b> (4:20pm – 5:30pm) <b>Alumni Gym Concourse</b>	
<b>Lecture-Demonstration-Performance</b> (6:00pm) <b>Roberts Studio Theatre, Scott Studios:</b> Dance Science	<a href="#">31</a>

## ABSTRACTS BY DEPARTMENT/PROGRAM

(Click the page number for abstracts.)

Accounting	<a href="#">39</a>	Journalism	<a href="#">142</a>
Art	<a href="#">39</a>	Management & Entrepreneurship	<a href="#">143</a>
Biology	<a href="#">40</a>	Marketing & International Business	<a href="#">145</a>
Chemistry	<a href="#">56</a>	Mathematics & Statistics	<a href="#">148</a>
Cinema & Television Arts	<a href="#">64</a>	Media Analytics	<a href="#">158</a>
Communication Design	<a href="#">67</a>	Music	<a href="#">158</a>
Computer Science	<a href="#">67</a>	Performing Arts	<a href="#">160</a>
Economics	<a href="#">72</a>	Physics	<a href="#">165</a>
Education & Wellness	<a href="#">77</a>	Political Science & Policy Studies	<a href="#">166</a>
Engineering	<a href="#">94</a>	Psychology	<a href="#">170</a>
English	<a href="#">105</a>	Public Health Studies	<a href="#">186</a>
Environmental Studies	<a href="#">113</a>	Religious Studies	<a href="#">191</a>
Exercise Science	<a href="#">121</a>	Sociology & Anthropology	<a href="#">193</a>
Finance	<a href="#">131</a>	Sport Management	<a href="#">196</a>
History & Geography	<a href="#">132</a>	Strategic Communications	<a href="#">206</a>
Human Service Studies	<a href="#">136</a>	World Languages & Cultures	<a href="#">208</a>

## Poster Session I (8:30am – 9:40am) Alumni Gym

#	Presentation Information	
1	<b>Alexa Jacobo, Hellen Portillo Franco, Ivy Robinson, &amp; Kiefer Winter</b> (Williams High School) Comparing College Class Experiences and Preferences	Prof. Larry Cantwell & Dr. Ryne VanKrevelen
2	<b>Grace Gabrielli, Gracie Hartle, Walker Hicks, Kenna Talhelm, &amp; Scout Winter</b> (Williams High School) Investigating Factors That Impact College Satisfaction Among Graduates	Prof. Larry Cantwell & Dr. Ryne VanKrevelen
3	<b>Naje Gray, Abigail Choi, Chelsea Melendez Liapa, &amp; Thomas Fasan</b> (Williams High School) How Elon Students Balance Social Life With Other Factors	Prof. Larry Cantwell & Dr. Ryne VanKrevelen
4	<b>Avery LaPlante, Sofia Anaya Becerra, Jaden Wilson, Olivia Sharpe, &amp; Ella Vaught</b> (Williams High School) Investigating Factors Related to Stress in College Students	Prof. Larry Cantwell & Dr. Ryne VanKrevelen
5	<b>Zainab Elzibair, Lelia Wilson, Lauren Turner, Bisan Abu Khalaf, &amp; Inaaya Siddiqui</b> (Williams High School) Stress and Mental Health of High School Students Through the COVID-19 Pandemic	Prof. Larry Cantwell & Dr. Ryne VanKrevelen
6	<b>Samantha J. Fish</b> Exploratory Data Analysis for Teaching Statistics for Social Justice	Dr. Heather Barker
7	<b>Eliana C. Olivier</b> Toxic Incarceration: Environmental Injustice in Immigrant Detention Centers <sup>1,2,3</sup>	Dr. Leyla Savloff
8	<b>Charlotte P. Harte</b> Exploring Elementary Educators' Perceptions of Mindfulness-Based Practices in the Classroom	Dr. Stephen Byrd
9	<b>Grace M. Sherriff</b> Exploring Preservice Teachers Perceptions of Linguistic Identity <sup>1</sup>	Dr. Jennifer Eidum
10	<b>Natalie J. Christian</b> The Impacts of Technology on the Lives of Students With Down Syndrome Inside and Outside of School Contexts <sup>1</sup>	Dr. Stephen Byrd
11	<b>Gabby R. Conover</b> Examining the Impact of the Blood Brain Barrier and the Gut-Brain-Axis on Brain Development in Zebrafish	Dr. Jen Uno
12	<b>Eliza J. Witt</b> The Impact of Adaptive Dance Movement Classes <sup>1</sup>	Prof. Lauren Kearns
13	<b>Catherine E. Oliver</b> Investigation of the Role of the TNF- $\alpha$ Pathway in Cell Survival of Triple Negative Breast Cancer (TNBC) Cells	Dr. Tonya L. Train

14	<b>Bronson Meyers &amp; Pedro Raban Arbunies</b> Mounting Pressure: A Textual Analysis of State Legal Regulations on College Sport Gambling	Dr. Khirey Walker
15	<b>Allie Ryder</b> Analyzing Program Materials and Data in Responsive Classroom <sup>1</sup>	Dr. Lisa Buchanan
16	<b>Lauren Bratton</b> Fluctuation of American Politics: A Concern for Foreign Policy	Prof. Tom Kerr
17	<b>Ben Zipay</b> The Facility Arms Race: How It Affects the Success and Integrity in College Athletics The Effect of Economic Downturns on Alcoholism	Dr. Khirey Walker
18	<b>Jackson C. Spaeth</b> Intercropping as a Method to Reduce the Concentration of Toxic Metals in Edible Crops <sup>2</sup>	Dr. Dan Wright
19	<b>Zachary M. Diamond</b> Investigating the Impact of Soil Amendments on Carbon Holding Capacity, Cation Exchange Capacity, and Overall Soil Health and Plant Growth in Turf Grass Systems <sup>2</sup>	Dr. Kelsey Bitting
20	<b>Kenny Mallory Jr.</b> "Handle With Care": A Qualitative Analysis of Recreational Youth Baseball Coaching and Mentorship	Dr. Khirey Walker
21	<b>Mark Dobson</b> The Importance of Baseline Concussion Testing in Neurodiverse Collegiate Student-Athletes <sup>3</sup>	Dr. Eric Hall & Dr. Caroline Ketcham
22	<b>Sadie Guffey</b> The Case for Teaching Math Outside: A Cross-case Analysis of Fifth Grade Teachers	Dr. Katherine Baker
23	<b>Claudia Macari</b> Chase the Rhythm: Music's Effects on Player Motivation in Video Games	Dr. Todd Coleman & Dr. Cora Palfy
24	<b>Anthony A. Bamford</b> "At What Cost?": An Analysis of NCAA Reclassification Between Division II and Division I Member Institutions	Dr. Khirey Walker
25	<b>Rachel A. Solomon &amp; Jessica Adner</b> Heavy Metal Contamination in Consumer Products	Dr. Dan Wright
26	<b>Tyler McKellar, Harshith Ramesh, &amp; MK Anyimah</b> Developing and Constructing a Prototype ROV: VS-1	Dr. Jonathan Su
27	<b>Ellie L. Cotton</b> The Representation of Black Children in Scholastic Book Club Books <sup>1,3</sup>	Dr. Lisa Buchanan
28	<b>Jacob S. Karty</b> Quantifying Cyanobacteria Using Holographic Lensfree Imaging and Object Detection	Dr. Jonathan Su
29	<b>Sarah E. Edwards</b> Languishing in the Classroom: The Role of Instructional Design and Students' Personality Traits <sup>3</sup>	Dr. Erika Lopina
30	<b>Moris E. Menjivar Alfaro</b> Ion Pumping Technology in Miniature Mass Spectrometry	Dr. Scott Wolter



31	<b>Sydney C. Rose</b> Students' Experience of Languishing and Technology Use in the Classroom: Does Personality Make a Difference? <sup>3</sup>	Dr. Erika Lopina
32	<b>Mara J. Waskiewicz</b> Freedom of Religion Versus Freedom From Religion: The Differing Impacts of French Secularism Policies	Prof. April Post
33	<b>Emma C. Grossberg &amp; Alex L. Simon</b> Weight Matters: Exploring Body Composition's Impact on Inflammation <sup>3</sup>	Dr. Svetlana Nepocatych
34	<b>Moris Menjivar Alfaro, Nicholas Muller, Benjamin Trainum, &amp; Lamar Williams</b> Building a Human Machine Interface (HMI) System for an FSAE Racecar	Dr. Will Plier
35	<b>Cade D. Missimer</b> Physical Education According to Physical Education Students	Dr. Carol A. Smith
36	<b>Julia Herman</b> How Do Embedded Consultants (And Their Professors) Make a Difference to Students? The Perceived Benefits to Students of Having an Embedded Consultant in a Disciplinary Course. <sup>3</sup>	Dr. Julia Bleakney
37	<b>Nate R. Krohmer &amp; Ryan D. Gibbons</b> My Experience as a Field Research Assistant: Describing and Measuring Soil Carbon and Related Soil Characteristics at Elon Forest <sup>2</sup>	Dr. Kelsey Bitting
38	<b>Sidra Kennedy</b> Learning Outside the Classroom: A Look at Potential Barriers to Co-Curricular Activities in Public High Schools	Dr. Bud Warner
39	<b>Jake Dyer, Skyler Reed, Sarah Gaynor, Braeden Miller, &amp; Emerson Wesson</b> Addressing Stormwater Management Concerns at Christmount Christian Assembly <sup>2,3</sup>	Dr. Bethany Brinkman & Dr. Jonathan Su
40	<b>Rush Lacoste, Kevin R. Burkett, Arianna Skolnick, Gloria Kaso, &amp; Allee Seering</b> Paving the Way to Sustainable Stormwater Management: Analysis of Road Pavement Effects on Water Quality <sup>2,3</sup>	Dr. Jonathan Su
41	<b>Parker R. Fairfield</b> A Mixed Methods Exploration of the Relationship Between Fathers' Physical Play and Infant Motor Skill Development	Dr. Sabrina Thurman
42	<b>Ethan J. Singer</b> Using Losses to Gameplan for Wins: Applying a Machine Learning Model to Historical Game Data to Improve Team Performance <sup>3</sup>	Dr. Alex Traugutt
43	<b>Edward J. Markowski &amp; Ella A. Parlavecchio</b> Using Resistance Training To Evaluate Improvements In Depressive Symptoms In College Students	Dr. Eric Hall
44	<b>Collette Lynch</b> Teacher Candidates and the Science of Reading in Practicum Placements	Dr. Mary Knight-McKenna
45	<b>Ryan Kolaitis</b>	Dr. Justin Clar

	Release of Nanoparticle Coatings Additives From Common Surfaces via Simulated Dermal Contact	
46	<b>Grace Dieleman</b> Supporting the Supporters: An Analysis of Division I Athletic Trainers and Their Pursuit of Fulfillment	Dr. Khirey Walker
47	<b>Carissa Pallander</b> Witches and Authority: Gendered Institutions of Power in Young Adult Fantasy	Dr. Megan Issac
48	<b>Michael Smith</b> Why is Methylamine a Stronger Base than Ammonia <sup>3</sup>	Dr. Joel Karty
49	<b>Aniya Scott</b> Recruitment Strategies for the Black community in the Pittsboro, NC Water Crisis <sup>1</sup>	Dr. Jessica Merricks
50	<b>Gillian Perilstein</b> Investigating the Sensitization of Pancreatic Cancer Cells by IFN- $\gamma$	Dr. Yuko Miyamoto
51	<b>Lauren Jablon</b> Exploring the Landscape of Generative AI in Academic Writing: A Collaborative Inquiry at Elon's Writing Center <sup>3</sup>	Dr. Jessie Moore
52	<b>Stephanie Abbazia, Mandy Heffernan, Abby Smith, Ava Louis, &amp; Mariel Colao</b> Advantages of Outdoor Learning for Young Children <sup>2</sup>	Dr. Maureen Vandermaas-Peeler
53	<b>Hannah Enck</b> Comparing Measurements of Sleep Obtained Through Self-Report or Wearable Devices <sup>3</sup>	Dr. Mark Weaver
54	<b>Grant T. Doherty</b> New Digital Apprenticeships of Observation	Dr. Scott Morrison & Dr. Jeffrey Carpenter
55	<b>Ben A. Rosenthal</b> Perceptions of Authenticity and Trustworthiness in TikTok Influencer Diet Advice <sup>3</sup>	Dr. Ilyssa Salomon & Dr. Katrina Jongman-Sereno
56	<b>Samantha P. Pensiero</b> Exposure to Weight Loss Content on TikTok and Antifat Attitudes <sup>3</sup>	Dr. Ilyssa Salomon
57	<b>Lauren Cicale, Timothy Henderson, Grady Cooke, &amp; Zoë Scherpier</b> Development and Optimization of a High-Density Polyethylene (HDPE) Recycling Machine: Design for Sustainable Plastic Waste Management <sup>2,3</sup>	Dr. Jonathan Su
58	<b>Blake Healey</b> Faust and Legal Philosophy in the Age of Goethe	Dr. Kristin Lange
59	<b>Rachael E. Davis</b> Creating Online Social Presence: E-Commerce and the Purchasing of Private Goods <sup>3</sup>	Dr. Smaraki Mohanty
60	<b>Maggie Penman</b> Mental Health Risk and Help-Seeking Behavior in College Athletes in Relation to Athletic Identity and Stigmatization <sup>3</sup>	Dr. CJ Fleming
61	<b>Megan Pavlick</b> Holocaust Education: How Does North Carolina Compare?	Dr. Andrea Sinn
62	<b>Sophie G. Kronenberger</b>	Dr. Christopher Leupold

	Assessing the LBDQ50's Fit With College Students <sup>3</sup>	
63	<b>Ryan P. McKenna</b> Pick Me Girls and Scarlet Women: Female Intrasexual Competition and Sexual Overperception <sup>1,3</sup>	Dr. Jordann Brandner
64	<b>Jackson Fender</b> The Lightbulb Tunicate: A Study of Climate Change, Invasion Ecology and Risk Assessment <sup>2,3</sup>	Dr. Michael Kingston & Dr. Amanda Chunco
65	<b>Amelia Myers</b> A Content Analysis of Religion in Children's Literature <sup>1,3</sup>	Dr. Lisa Buchanan
66	<b>William S. Thalhimer</b> The Adaptability of Digital Identities: Guidance for Improving Ones Online Presence	Dr. Jessie Moore
67	<b>Leah M. Schwarz</b> El Clima Estudiantil en Elon: Latinx Students in Higher Education <sup>1</sup>	Dr. Leyla Savloff
68	<b>Aaron J. Simansky</b> Risk Assessment in Pre-Trial Release Decisions: A Comparison Between Judges and Algorithms	Prof. Damion Blake
69	<b>Declan A. McGeady</b> Comedians and Cancel Culture: Actions Speak Louder Than Words	Prof. Harlen Makemson
70	<b>Ainsley O'Quinn</b> Teacher and Administrator Perceptions of Restorative Practices in Schools Restorative Practices <sup>1</sup>	Dr. Katie King
71	<b>Wilson A. Holcombe</b> Effects of a Remote Tai Chi Intervention on Measures of Cognitive Functioning in Older Adults <sup>3</sup>	Dr. Aaron Piepmeier
72	<b>Akani Bey</b> Land Use Change and Carbon Storage at Cane Creek Mountains Natural Area <sup>2</sup>	Dr. David Vandermast
73	<b>Katelyn R. Litvan</b> Environmental Activism on Instagram: Exploring the Effects of Advocate Type and Image Type <sup>2,3</sup>	Dr. Qian Xu
74	<b>Sarah F. Clarke</b> Mixed Signals: Studying the Multimodal Signaling of the Cone-Headed Katydid ( <i>Neoconocephalus triops</i> ) <sup>3</sup>	Dr. Jen Hamel
75	<b>Lindsey Steinkamp</b> The Primary Causes of Compassion Fatigue in Special Educators	Dr. Stephen Byrd
76	<b>Sophie M. Padalecki</b> Beyond the Binary: Gender Inclusivity in Research <sup>1</sup>	Prof. Monica Burney
77	<b>Lainey English</b> Use of Alternative Pain Management Strategies in a Randomized Trial of Pain <sup>3</sup>	Dr. Mark Weaver
78	<b>Alex R. Anderson</b> Preferred Support Systems for Individuals With Severe Mental Illnesses	Dr. CJ Fleming
79	<b>Avery L. Johns, Vivian C. Krause, Bruce Vagt, &amp; Seth Wolter</b>	Dr. Will Plier

	Creating a Commercial PFAS Water Filter Using BN NanoBarbs <sup>2</sup>	
80	<b>Shannon N. Kutcher</b>	Dr. Vanessa Drew-Branch Homegoing: Death and Dying in the Urban North and Rural South <sup>1,3</sup>
81	<b>Margaret Hayes</b>	Dr. Ilyssa Salomon The Role of Educators: Increasing Awareness of Social Media's Impact on Adolescent Development <sup>1</sup>
82	<b>Alexandra J. Borda</b>	Dr. Daniel Haygood Love, Revenge, Ambition, and Scorn: A Content Analysis of the Portrayal of Women in Telenovelas and American Soap Operas <sup>1</sup>
83	<b>Lily Helm, Jack O'Donnell, &amp; Emmeline Roberts</b>	Dr. Jonathan Su & Dr. Blake Hament Robotic Arm Attachment for Unitree Go1 Pro: Safe Collection and Disposal of Hypodermic Needles <sup>2</sup>

**Note:** The projects self-identified as relating to diversity, equity, and inclusion (DEI) are marked with a (1), those self-identified as relating to sustainability are marked with a (2), and those self-identified as data intensive are marked with a (3).

## Poster Session II (4:20pm – 5:30pm) Alumni Gym

#	Presentation Information	
1	<b>Sydney Gilbert</b>	Dr. Cynthia Fair The Inclusivity of Transgender and Gender Non-Conforming Students in North Carolina Universities' Online Sexual Assault Resources <sup>1,3</sup>
2	<b>Sophia del Priore</b>	Dr. Eric Bauer Prevalence of Freezing Behavior in Zebrafish
3	<b>Ava Girardi</b>	Dr. Daniel Haygood Hashtag Havoc: Unmasking Young Women's Reactions to Health, Fitness, Food, and Disordered Eating Content on TikTok
4	<b>Emma E. Simpson</b>	Dr. Katrina Jongman-Sereno Intellectual Humility and Investigative Behaviors in Relation to Overclaiming of Knowledge
5	<b>Emily Murrill</b>	Dr. Jessie L. Moore Editorial Assistant or Editor-in-Chief? Exploring the Role of AI in Professional Editing
6	<b>Juliette P. Cryder</b>	Dr. Cara Lucia Female Collegiate Athletes' Perceptions of Empowerment: Addressing Equitable Practice in College Athletics
7	<b>Katie M. Lowe</b>	Dr. Caroline Ketcham, Dr. Titch Madzima, & Dr. Eric Hall Relationship Between Stress, Recovery Measures, Hormone Levels, and Performance in Female Collegiate Athletes
8	<b>Mandi Jaffe</b>	Dr. Evan Small Mapping the Outdoors: Evaluating Accessibility Through Print Trail Map Design <sup>1</sup>
9	<b>Caroline Borio</b>	Dr. Megan Issac Gender and Murder in Jacobean Revenge Tragedy
10	<b>Samuel Martin</b>	Dr. Evan Small Examination of Community Facebook Comments During ABSS Mold Crisis
11	<b>Julia Johnson</b>	Dr. Christopher Leupold The Bright Side and the Right Side: Optimism and Moral Self-Image as Antecedents of Organizational Citizenship Behavior
12	<b>Zhuohao Tan</b>	Dr. Scott Spurlock Improving Early Diagnosis of Pancreatic Cancer With Synthetic Data <sup>3</sup>
13	<b>Rylee McKinney</b>	Prof. Elizabeth Bailey The Relationship Between Perceived Academic Competence and Physical Competence in Children
14	<b>Kaitlyn S. Leazer</b>	Dr. Stephen Byrd Family Perspectives on Information, Compassion Fatigue, and Disability: Through Christian and Non-Christian Frameworks <sup>1</sup>
15	<b>Morgan L. Williams</b>	Dr. Kelsey Bitting Gaming for the Future: Using Games to Explain Heatwaves and Health <sup>1,2</sup>

16	<b>Shane Dwyer</b> Aggregation of Alpha - Synuclein in the Brain	Dr. Kathryn Matera
17	<b>Sophie M. Padalecki</b> Condom Use Resistance: Perceptions and Experiences	Prof. Amanda Tapler
18	<b>Sydney Barlow</b> "Now She's Totally Fine. She's Thriving. She's Doing Great:" A Qualitative Longitudinal Study of Resilience in Internationally Adopted Children With Perinatally-Acquired HIV	Dr. Cynthia Fair
19	<b>Christina R. Berry</b> Cinnamaldehyde Effects on Social Behavior in Zebrafish	Dr. Eric Bauer
20	<b>Giavonna D. Gaw</b> Impact of Liming on Denitrifying Genes in Soil Microbial Communities	Dr. Antonio Izzo
21	<b>J'lynn Poplin</b> Child Custody for Non-Traditional Families <sup>1</sup>	Prof. Monica Burney
22	<b>Lucas Wells</b> The Evolution of Assessment in Secondary Social Studies Education	Dr. Mark Enfield
23	<b>Morgan Ptaszek, Stacey Walton, &amp; Oliver Tulsa</b> Differences in Joint Angles During Obstacle Clearance in Immersive Environments <sup>3</sup>	Dr. Srikant Vallabhajosula, Dr. Alys Giordano, & Dr. Pratheep Paranthaman
24	<b>Jessica M. Baker</b> Dancing Queen and the Idolization of a Teen: How Fifty Years Of Lyrics, Media, and Culture Have Influenced the Way Society Views Young Women <sup>1,3</sup>	Prof. Brian Walsh
25	<b>Jacob Stanley</b> Diving into Data: A Cross-Regional Analysis of a Global Citizen Science Marine Debris Dataset <sup>2,3</sup>	Dr. Nicholas Bussberg & Dr. Manoj Chari
26	<b>Ryan Pleasants</b> Examining College Football Success and Money Donated to Football Bowl Subdivision Athletic Departments	Dr. Khirey Walker
27	<b>Matthew J. McCourt</b> Threat Versus Non-Threat Substances: Developing a Classification Methodology Using Principal Component Analysis of XRD Spectra	Dr. Scott Wolter
28	<b>Matthew A. Patterson</b> The Relationship Between Sleep and Cognitive Function in College Students	Dr. Eric Hall
29	<b>Marguerite H. Bevier</b> Does Social Support Buffer the Relationship Between Concussion History and Depression?	Dr. Madison C. Chandler
30	<b>Mackenzie DeMania</b> Variations in Perception of Sexual Assault by Sexual Orientation <sup>1</sup>	Dr. CJ Fleming
31	<b>Mandi Lichtenstein</b> Evaluating Transcriptomic Differences Between Hepatitis B virus (HBV) and Hepatocellular Carcinoma (HCC) <sup>3</sup>	Dr. Andrea Perreault
32	<b>Morgan McGlynn</b> Climate Change Policy Development: A Multiple Streams Analysis of The Inflation Reduction Act 2022 <sup>2,3</sup>	Dr. Aaron Sparks

33	<b>Sofia Lacayo</b> Yoga for Relief: Using Yoga as an Immediate Intervention for Menstrual Pain <sup>3</sup>	Dr. Aaron Piepmeier
34	<b>Josephine C. McWhorter</b> The Influence of Posttraumatic Stress on Veterans: Assessing Exercise Adherence Following Clinical Intervention	Dr. Eric Hall
35	<b>Mia Vernasco</b> Examining Awareness of Trauma-Informed Education for Children Experiencing Familial Long-Term Illness <sup>1</sup>	Dr. Katie Baker
36	<b>Sydney P. Byers</b> Gender Dynamics in Pharmaceutical Sales: Evaluating the Sales Effectiveness of Women Compared to Men	Dr. George Talbert
37	<b>Claire Lancaster</b> Decolonizing English in Academia: Exploring the Impact of White Hegemony on Language Usage and Perception <sup>1</sup>	Dr. Jessie Moore
38	<b>Grace M. London</b> Multifunctional Nanocomposites for Water Treatment <sup>2,3</sup>	Dr. Justin Clar
39	<b>Sarah P. Dawkins</b> An Economic Impact Analysis of College Conference Championships: A Review of the Literature	Dr. Khirey Walker
40	<b>Julianna Fazzino</b> Investigating Potential Short-Term Sedative Effects of Cinnamaldehyde Exposure on Zebrafish ( <i>Danio rerio</i> )	Dr. Eric Bauer
41	<b>Lauren Jablon</b> Navigating Historic Moments Abroad: Insights From the 2023 Presidential Election in Buenos Aires, Argentina <sup>1</sup>	Prof. April Post
42	<b>Noah H. Dyson</b> Young, Black, & Grieved: The Grief Process of Receiving a Mental Illness Diagnosis <sup>1</sup>	Dr. Vanessa Drew-Branch
43	<b>Rachel R. Mullenix</b> Sociocultural Influences on Digital Parenting Mediation Attitudes <sup>1,3</sup>	Dr. Jess Navarro
44	<b>Henry J. Searle</b> What Cues Do People Use to Perceive Authenticity in Others?	Dr. Katrina Jongman-Sereno
45	<b>Catherine Rita Carroll</b> The Effects of Quarantine and Pre-Schooling on Early Elementary Students' Social and Cognitive Development	Dr. Heidi Hollingsworth
46	<b>Teddy Morgan</b> The Winter Experience: An Assessment of Merging "The Game" & "The Winter Classic"	Dr. Khirey Walker
47	<b>Henna Reid</b> Pilates Intervention for University Dance Team Members <sup>3</sup>	Prof. Lauren Kearns & Dr. Caroline Ketcham
48	<b>Danielle DaSilva</b> Mathematical Approaches of Modeling Obesity Trends <sup>3</sup>	Dr. Karen Yokley
49	<b>Stephanie Abbazia &amp; Mandy Heffernan</b>	Dr. Maureen Vandermaas-Peeler

	"This Green Tomato Does Not Look Ready to Pick!": Children's Learning and Engagement in Gardening and Cooking <sup>2</sup>	
50	<b>Seth Holter &amp; Lauren Hill</b>	Dr. Scott Wolter & Dr. Will Puer Passive Nitrogen and Phosphorus Filtration in Stormwater using Layered Double Hydroxides <sup>2</sup>
51	<b>Ella Kinman</b>	Dr. Prudence Layne Evaluating the Relationship of Personal Assistants and Loneliness Within the Disabled Community <sup>1,3</sup>
52	<b>Chase R. Siewert</b>	Dr. Eric Hall Prediction of Anxiety and Depression Using Pre-Concussion Screening in Collegiate Athletes <sup>3</sup>
53	<b>Emily J. Elowitch</b>	Dr. Aaron Trocki The Effects of Multimodal Writing in a Calculus I Course
54	<b>Sonith Riem, Ayesh Awad, Lauren A. Hanchar, &amp; Matthew J. McCourt</b>	Dr. Will Puer, Prof. John Ring, Matthew Banks, & Dr. Jonathan Su Designing a System that Removes PFAs in Water Using Boron Nitride <sup>2,3</sup>
55	<b>Grace Dieleman</b>	Dr. Manoj Chari How Non-Profit Associations Can Increase Membership and Revenue: A Case Study With the American Baseball Coaches Association <sup>3</sup>
56	<b>Max W. Shilling &amp; Nicholas Berry</b>	Dr. Joel Karty Why Is the Ethyl Cation More Stable than the Methyl Cation? Contributions by Inductive Effects, Hyperconjugation, and Internal Solvation
57	<b>Paige Kenyon</b>	Dr. Kelsey Bitting & Prof. Jacob Rutz Examining the Correlation of Fungal to Bacterial Ratios With Soil Carbon in Agricultural Ecosystems That Differ in Management Practices <sup>2,3</sup>
58	<b>Elizabeth R. DiGrande</b>	Dr. Katrina Jongman-Sereno It's Not You, it's My Attachment Style: How Attachment Styles Relate to Perceptions of Authenticity in Romantic Partners
59	<b>Jasmyn Brown</b>	Dr. Vanessa Drew-Branch Brilliantly Black: Success and Resiliency in PWI's <sup>1</sup>
60	<b>Henry Agyemang, Samantha DiRenzo, Gabe Nicholas, &amp; Mary Hermes</b>	Dr. Jonathan Su, Dr. Will Puer, & Prof. John Ring Efficient Food Waste Compaction in Industrial Kitchens <sup>2</sup>
61	<b>Sarah N. Tyner</b>	Dr. Judy Folmar Child-Centered Play Therapy in the Community: Surveying Students and Alumni on How a Play Therapy Course Impacts Their Work and Lives
62	<b>Quinn Shannon</b>	Dr. George Talbert The Influence of Perceived Clothing Style on Men's Mental Well-Being: An Evidence-Based Management Approach
63	<b>Sarah Gaynor, Devin Guilbeau, Kanokwan Ngamwong, &amp; Dalton Thompson</b>	Dr. Will Puer Compactor for Food Waste Composting <sup>2</sup>
64	<b>Lauren Beuerle</b>	Dr. Karen Yokley



	Mathematical Modeling of COVID-19 Transmission With Focus on Asymptomatic Carriers and Vaccination Schedules <sup>3</sup>	
65	<b>Eleanor Kahl</b> Conditional Love: Parentification and its Outcomes in YA Literature vs. Literary Fiction	Dr. Megan Isaac
66	<b>Kevin R. Burkett, Kate B. Becksvoort, &amp; Braeden A. Miller</b> Designing and Assessing the Impacts of Accessible Food Trays for Visually Impaired Students at Governor Morehead School	Dr. Sirena Hargrove-Leak
67	<b>Katherine E. Conover</b> Aggregation Effects of Amyloid Beta (1-42) and Insulin	Dr. Kathryn Mansfield Matera
68	<b>Andy Walter</b> "The Metlakatla Controversy": The Complicated History of William Duncan, Missionary to the Tsimshians, 1857-1918	Dr. Andrew Monteith
69	<b>Robert H. Goecker</b> The Role of Environment in Mediating the Psychological Benefits of Physical Activity	Dr. Jen Uno
70	<b>Nathaniel E. Brawley-Magee</b> Have Any Studies Shown That the SPIN Selling Framework Directly Increases Sales Effectiveness More So Than Other Selling Strategies for Maritime Products?	Dr. George Talbert
71	<b>Nicholas A. Muller</b> LiDAR for Safety: Affordable Collision Avoidance Systems	Dr. Jonathan Su
72	<b>Ayanna Bearden</b> Star Formation Rates in AGN Galaxies: Impact of Separation and Physical Traits <sup>3</sup>	Dr. Yashashree Jadhav
73	<b>Emilia M. Cappellett</b> Positioning the Future of the North Carolina Sports Hall of Fame	Dr. Young Do Kim & Dr. Cara Lucia
74	<b>Zoie M. Browder</b> Place and Class in Young Adult Appalachian Literature	Dr. Megan Isaac
75	<b>Molly P. Packwood</b> Medication Nonadherence Among Syrian Refugees in Germany: Interviews With Community Pharmacists <sup>1</sup>	Dr. Molly Green
76	<b>Kaela P. Bernard</b> Alternative Influencer Appeals: "De-Influencing" <sup>3</sup>	Dr. Lana Waschka
77	<b>Emma Puleo, Ivan Nguyen, &amp; Olivia DiGiovanni</b> Synthesis and Characterization of Polypyridyl-Carbonyl Complexes of Cobalt, Rhodium and Iridium <sup>3</sup>	Dr. Karl D. Sienarth
78	<b>Lauren Kennedy &amp; Marika Kassaris</b> Quenching Behavior of Explosives on Organic Luminescences in Non-Hazardous Solvents <sup>3</sup>	Dr. Karl D. Sienarth
79	<b>Brooke Gehrke, Lauren Hill, Sidney Lowe, Rane Parr, &amp; Sammy Tucker</b> Mitigating Waterlogged Area at South Graham Municipal Park Through Best Management Practices <sup>2</sup>	Dr. Will Puer & Prof. John Ring
80	<b>Madeline Volchko</b>	Dr. Ryan Mattfeld

	Navigational Device for People With Visual Impairments	
81	<b>Mollie E. Lund</b> Exploring Rhetorical Strategies in Misinformative News Media on Social Media Platforms	Dr. Jessie L. Moore
82	<b>Beth Resch</b> The Inclusion of Special Education Students in Music Classrooms	Dr. Stephen Byrd
83	<b>Olivia E. Kogan</b> Creating an Inclusive Cabin: Experiences of Jewish Camp Counselors in Supporting DEI Efforts and Camper Wellbeing <sup>1</sup>	Dr. Jessica Navarro
84	<b>Nadia Aho, Sasha Hyde, Spencer Spry &amp; Blessed Eshun</b> Sledding Made Simple: Designing a Lightweight, Compact Sled for Kids	Dr. Jonathan Su

**Note:** The projects self-identified as relating to diversity, equity, and inclusion (DEI) are marked with a (1), those self-identified as relating to sustainability are marked with a (2), and those self-identified as data intensive are marked with a (3).

## Oral Presentation Session I (10:00am – 12:00pm)

<b>McKinnon Hall D: Education &amp; Wellness and Performing Arts</b> (Moderator: Dr. Scott Morrison)	
10:00am	<b>Alice Rickards</b> Dr. Scott Morrison Perspectives on Walking Curriculum From Educators, Caregivers, and First Graders: A Two-Part Qualitative Study <sup>1,2</sup>
10:20am	<b>Ivy J. Pennekamp</b> Dr. Katie Baker The Perceptions and Awareness of Trauma-Informed Education in Religiously Affiliated Schools
10:40am	<b>Jordan C. Smith</b> Dr. Evan Small "I Would've Never Had the Courage": An Exploration of Lived Experiences at LGBTQ+-Affirming Summer Camps <sup>1</sup>
11:00am	<b>Faith E. Minor</b> Dr. Scott Morrison Experiences and Perspectives of Queer and Trans Pre-Service Teachers <sup>1</sup>
11:20am	<b>Matthew W. Bobzien</b> Dr. Susanne Shawyer Telling Queer Stories With Site Based Theatre <sup>1</sup>
11:40am	<b>Mallorie C. Sievert</b> Prof. Kim Shively & Dr. Lynn Huber The City-Women: A Play about Queerness in Catholicism <sup>1</sup>

<b>McKinnon Hall E+F: Chemistry and Biochemistry</b> (Moderator: Dr. Victoria Moore)	
10:00am	<b>Chris D'Inzeo</b> Dr. Victoria Moore Investigating Chemoresistance Mechanisms and Collateral Responses in Pancreatic Ductal Adenocarcinoma
10:20am	<b>Stephanie R. Land</b> Dr. Kathryn Mansfield Matera Effects of Fused Ring Inhibitor Structures on Aromatase Activity: Treatment Alternatives for Estrogen Receptor-Positive Breast Cancer <sup>3</sup>
10:40am	<b>Amaya Sheffield</b> Dr. Justin Clar Utilizing Boron Nitride Nanomaterials for Remediation of Per- and Polyfluoroalkyl Substances (PFAS)
11:00am	<b>Genesis L. Tolbert</b> Dr. Justin Clar Examination of Trace Metal Content in Sparklers and Effect on Lungs Utilizing Synthetic Lung Fluid <sup>2</sup>
11:20am	<b>Aoife C. Judge</b> Dr. Victoria Moore Resisting Resistance: Developing Gemcitabine Resistance in HL-60 Cells to Uncover Collateral Sensitivities in Acute Promyelocytic Leukemia
11:40am	<b>Megan Liebig</b> Dr. Kathryn Mansfield Matera Exploring the Moieties of VER-155008: Targeting Hsp70 Inhibition for Breast Cancer Therapy

<b>Lakeside Meeting Room 212+213: Human Service Studies, Anthropology, and Sociology</b> (Moderator: Dr. Tom Arcaro)	
10:00am	<b>Delyla V. Makki</b> Prof. Sandra Reid

	Poaching: Experiences in Motherhood of Justice Involved Black Women <sup>1</sup>	
10:20am	<b>Mackenzie B. Wright</b> Child-Centered Play Therapy in the Community	Dr. Judy Folmar
10:40am	<b>Ethan Lane-Blake</b> Erased: The Hidden Stories of Queer People in the Civil Rights Movement <sup>1</sup>	Dr. Vanessa Drew-Branch & Prof. Sandra Reid
11:00am	<b>Renee Driver</b> LGBTQ+ Safe Spaces: Queer Community on Tumblr <sup>1</sup>	Dr. Devin Proctor
11:20am	<b>Erin M. Rohde</b> Taking Up Space in the Workforce: Queer in the Postgraduate World <sup>1</sup>	Dr. Leyla Savloff
10:40am	<b>Hayley J. Hawkins</b> Exploring the Utility of Critical Models: Perceptions of Critical Theory and Introducing Critical Hydra Theory <sup>1</sup>	Dr. Tom Arcaro

### Lakeside Meeting Room 214: Mathematics & Statistics (Moderator: Dr. Todd Lee)

10:00am	<b>Sol Addison &amp; Lila Snodgrass</b> Danceability! Directed by Braid Index	Dr. Nancy Scherich
10:20am	<b>Ayesh Awad, Rony Dahdal, Mary Hermes, &amp; Carissa Potter</b> Mathematical Modeling of Immune Response to SARS-CoV-2	Dr. Hwayeon Ryu
10:40am	<b>Jillian M. Thomas</b> Numerical Simulation of Jellyfish Swimming	Dr. Karen Yokley
11:00am	<b>Schuyler Cady</b> Statistical Modelling of Alaskan Coral Biodiversity Trends <sup>2,3</sup>	Dr. Nicholas Bussberg
11:20am	<b>Walt B. Pierce</b> Coal Mining in West Virginia: A Digital Data Story <sup>2,3</sup>	Dr. Heather Barker
11:40am	<b>Eli Bier</b> Quantifying Gerrymandering: Utilizing Algorithmic Redistricting to Create a Quantitative Metric for Gerrymandering in North Carolina	Dr. Todd Lee

### Moseley 215: Classical Studies (Moderator: Dr. Kristina Meinking)

10:00am	<b>Ava N. Crawford</b> Decoding Aesthetic Descriptions of Cynthia in Propertius' Elegies	Dr. Kristina Meinking
10:20am	<b>Marissa J. Duffield</b> Vestal Virgins, Women of the Imperial Household, and Augustan Propaganda	Dr. Tedd Wimperis
10:40am	<b>Chapin C. Epps</b> Julius Caesar's Portrayal of the Celtic Peoples in Book Six of the Commentarii de Bello Gallico: An Analysis of Roman Imperial Propaganda	Dr. Kristina Meinking
11:00am	<b>Hammond Sherouse</b> Narrative Inauthenticity in Books II & III of Vergil's Aeneid as Support for an Anti-Augustan Reading of the Poem	Dr. Rosemary Haskell

<b>Koury Business Center 101 (LaRose Theatre): Biology</b> (Moderator: Dr. Eryn Bernardy)		
10:00am	<b>Max Taylor</b> Development of a Novel Protocol Measuring Antibody Binding by Bacterial Pathogens	Dr. Eryn Bernardy
10:20am	<b>Rachel C. Mingus</b> Investigating the Anti-Cholinesterase Properties of <i>Crassocphalum crepidiodes</i> in Larval Zebrafish ( <i>Danio rerio</i> )	Dr. Linda Niedziela
10:40am	<b>Jennifer N. DeLustro</b> Evaluating Cell-Specific Differences in Breast Cancer Subtypes Through Integrative Genomics <sup>3</sup>	Dr. Andrea Perreault
11:00am	<b>Brooke L. Beall</b> Comparing Genotype and Phenotype of Antibiotic Resistance Profiles of <i>Staphylococcus aureus</i> Isolates From Cystic Fibrosis Patients	Dr. Eryn Bernardy
11:20am	<b>Rachel Hunt</b> DNA Analysis of Fungal Succession in Truffle Orchard Chronosequence	Dr. Antonio Izzo
11:40am	<b>Lauren Copenhaver</b> Investigating the Effects of Estrogen Concentrations and Chemotherapeutics on Pancreatic Tumor Growth	Dr. Yuko Miyamoto

<b>Sankey Hall 308: Sport Management</b> (Moderator: Dr. Mark Cryan)		
10:00am	<b>Celsey V. McMahon</b> #Coachruinedthesportilovecheck: TikTok Exposing the Detriments of the Coach-Athlete Relationship	Dr. Shaina M. Dabbs
10:20am	<b>Heath H. Foster</b> Perception vs. Reality: How Fantasy Experts, Scouts, and College Students Value NFL Players <sup>3</sup>	Dr. David Bockino
10:40am	<b>Lena Gunn</b> Promotions and Themes: An Empirical Analysis of Attendance Factors in the National Women's Soccer League <sup>3</sup>	Dr. Alex Traugutt
11:00am	<b>Sammy P. Fisher, Will R. Haynes, &amp; Cierra R. Hopson</b> Crafting a Winning Fan Community: A Sport Marketing Case Study of Tampa Bay Sun Football Club	Dr. Young Do Kim & Dr. Tony Weaver
11:20am	<b>Evan Wu, Tristan Hiestand, Tobias Coker, Alex Wigder, &amp; George Lyche</b> Foul Balls: Who Do They Benefit?; Evaluating the Impact of Foul Balls & if They Benefit the Pitcher or Hitter	Dr. Mark Cryan & Dr. Ryne VanKrevelen
11:40am	<b>Elliot Rezek</b> Viewer Affinity for Live Sports Broadcast Innovations <sup>3</sup>	Dr. David Bockino

<b>LaRose Student Commons 200: Exercise Science and Dance Science</b> (Moderator: Dr. Svetlana Nepocatych )		
10:00am	<b>Julia L. Burpeau &amp; Mark Weaver</b>	Dr. Svetlana Nepocatych

	Lean Mass as the Mediator: The Link between Insulin and Bone Health in High School Seniors
10:20am	<b>Roxy Geballe</b> Dr. Matt Wittstein Investigating the Physical and Psychological Effects of Learning Piano in Arthritis and Attention Deficit Hyperactivity Disorder Populations <sup>3</sup>
10:40am	<b>Josephine C. McWhorter</b> Dr. Eric Hall Addressing Stigmatization of Mental Health in the U.S. Military and Assessing the Correlation of PTSD Severity to Exercise Attrition in the Warrior Wellness Study
11:00am	<b>Carolyn E. Oliver &amp; Elle A. Nash</b> Dr. Svetlana Nepocatych From High School to College: Investigating Sugar's Influence on Body Composition and Insulin Resistance
11:20am	<b>Kaitlyn Sumner, Mark Weaver, &amp; Hannah Enck</b> Dr. Svetlana Nepocatych Exploring Misalignment of Sleep-Wake Rhythm and Its Impact on Stress in High School Seniors
11:40am	<b>Emma T. Stenger</b> Prof. Renay Aumiller Embodying Textures: How Somatic Imagery Effects Psycho-Physical Dynamics in Dance Performance

### Belk Pavilion 208: Computer Science (Moderator: Dr. Pratheep Kumar Paranthaman)

10:00am	<b>Gerald Fuller &amp; Nikesh Bajaj</b> Dr. Pratheep Kumar Paranthaman Translating Computer Game Mechanics to Mixed Reality
10:20am	<b>Spencer W. Graham &amp; Nikesh Bajaj</b> Dr. Pratheep Kumar Paranthaman Assessing the Effects of Various Gaming Platforms on Players' Affective States and Workload through Electroencephalogram
10:40am	<b>Clayton McLamb</b> Dr. Scott Spurlock Addressing Class Imbalance in Machine Learning Using Variational Autoencoders <sup>3</sup>
11:00am	<b>Alexander Wilson</b> Dr. Pratheep Kumar Paranthaman Extracting EEG Artifacts From VR Game Mechanics <sup>3</sup>
11:20am	<b>Henry Agyemang</b> Dr. Pratheep Kumar Paranthaman SolAR: Immersive Learning through an Augmented Reality Application
11:40am	<b>John R. Pittman</b> Dr. Shannon Duvall Symptom Tracking Gamified: Exploring the Impact of Gamification Principles in a Mobile App for Symptom and Wellness Tracking

### Center for the Arts Yeager Recital Hall: Communication Design, Strategic Communications, and Cinema & Television Arts (Moderator: Prof. Kai Swanson)

10:00am	<b>Matthew T. Newberry</b> Prof. Rebecca Bagley Antes del sol (Before the Sun): Bridging Acculturation Gaps in Hispanic and Latin American Immigrant Families With a Dual-Language Board Game <sup>1</sup>
10:20am	<b>Jacob D. Kisamore</b> Dr. Kenn Gaither Golfing in the Gulf – Saudi Arabia's Strategic Use of LIV Golf as a Sportswashing Tactic

10:40am	<b>Miles B. Vance</b> Frames of Death: The Rhetorical Goals of Official Social Media Posts in the Russo-Ukrainian War	Dr. Daniel Haygood
11:00am	<b>Stella R. Bloom</b> Examining the Portrayal of the Queer Coming-of-Age Experience in Contemporary Film <sup>1</sup>	Prof. Sowjanya Kudva
11:20am	<b>Ryan Campbell</b> Recreating the American Prometheus: How Christopher Nolan's Oppenheimer Intertwined Film Theory and Framing Theory	Dr. Barbara Miller Gaither
11:40am	<b>Jesse S. Riback</b> Generational Perspectives in Comedy Writing	Prof. Kai Swanson

### Koenigsberger Learning Center 127: Carret Essay Contest

(Moderator: Dr. Cassie Kircher)

10:00am	<b>Maya Simmons</b> The Sound of Sally	Prof. Shaina Jones & Dr. Cassie Kircher
10:20am	<b>Kenna Dubraski</b> Book Banning: A Modern A&S Act?	Dr. Erin Pearson
10:40am	<b>Claire Lancaster</b> 1798 Phaedrus: Jefferson and Adams Discuss the Alien and Sedition Acts	
11:00am	<b>Lola Moore</b> Looking West	

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## Oral Presentation Session II (12:20 pm - 2:00 pm)

<b>McKinnon Hall D: Environmental Studies</b> (Moderator: Dr. Kelsey Bitting)	
12:20pm	<b>Ryan D. Gibbons &amp; Nate R. Krohmer</b> Dr. Kelsey Bitting & Dr. Ryan Kirk Soil Carbon Sequestration in Elon Forest: Role of Past Land Use, Forest Age, and Landscape and Soil Characteristics <sup>2</sup>
12:40pm	<b>Megan Green</b> Dr. David Vandermast Mathematical Model of Obesity Trends in the United States
1:20pm	<b>Madison Z. Johnson</b> Dr. Amanda Chunco Exploring the Relationship Between Faculty Grading Practices as it Relates to STEM Student Identities <sup>1</sup>
1:40pm	<b>Emma G. Zelkind</b> Dr. David Vandermast CO2 Emission of Different Forms of Agriculture <sup>2</sup>
<b>McKinnon Hall E+F: Psychology</b> (Moderator: Dr. William Schreiber)	
12:20pm	<b>Vibha Maheswaran</b> Dr. Stephen Byrd An Analysis of Effective Self-Regulation Interventions for Elementary School Students With Attention-Deficit/Hyperactivity Disorder (ADHD): A Literature Review <sup>1</sup>
12:40pm	<b>Lindy H. Feintuch &amp; Eva J. Hunter</b> Dr. Amy Overman Eye-Tracking Insights Into Autistic Traits: An Investigation of Self-Referential Encoding <sup>1,3</sup>
1:00pm	<b>Grace Caluri, Jeppe Overgaard Jordoson, &amp; Sophia Solan</b> Dr. Meredith Allison Judicial Instructions on Alibis: Impact on Mock Jury Decision-Making <sup>3</sup>
1:20pm	<b>Diana E. Rand</b> Dr. William Schreiber Evaluating Personality Characteristics in the Behavior of Harvester Ants
<b>Lakeside Meeting Room 212+213: Symposium: American Studies</b> (Moderator: Dr. Erin Pearson)	
12:20pm	<b>Ashley B. Burnett</b> Dr. Kathleen Crosby Creation and Curation: The Narratives of Festival Culture
12:40pm	<b>Cole Picca</b> Dr. Andrew Monteith "The Greatest Generation": Historical Memory of World War II Soldiers in American Popular Culture
1:00pm	<b>George Krupkin</b> Dr. Waseem Bin-Kasim & Dr. Amanda Kleintop Disease Knows No Line: Community Hospital and Medical Segregation in Evanston, Illinois
1:20pm	<b>Katherine Graham McCormick</b> Dr. Baris Kesgin The Woman Who Almost Broke the Glass Ceiling: A Comprehensive Analysis of Hillary Rodham Clinton's Political Belief System



<b>Lakeside Meeting Room 214: Engineering and Physics</b> (Moderator: Dr. Blake Hament)		
12:20pm	<b>Amalie J. Keefe</b> Artificial Intelligence (AI) Voice Module for Service Robot Dog (RSD) <sup>1</sup>	Dr. Blake Hament
12:40pm	<b>Vivian C. Krause</b> Factoring Out Racial Bias: Developing a Dual Sensor System for Pulse Oximetry <sup>1</sup>	Dr. Jonathan Su
1:00pm	<b>Rony Dahdal &amp; Jacob Karty</b> Individual Plant Farming using 3D Point Cloud Data: Robot Arm Data Collection and PointNet <sup>3</sup>	Dr. Blake Hament
1:20pm	<b>Samantha Dizenzo</b> Multiwavelength Diagnostics for Active Intermediate Mass Black Holes in Dwarf Galaxies	Dr. Chris Richardson

<b>Moseley 215: Classical Studies and World Languages &amp; Cultures</b> (Moderator: Dr. Tedd Wimperis)		
12:20pm	<b>Jasper S. Myers</b> Honestly, I Wish I Were Dead <sup>1</sup> : On Death, Desire, Divine Inspiration, and Sappho's Poetic Perversion of Eros <sup>1</sup>	Dr. Kristina Meinking
12:40pm	<b>Renee Driver</b> Translating Identity: The Influence of Sociocultural Contexts on Sapphic Translations by Women <sup>1</sup>	Dr. Kristina Meinking
1:00pm	<b>Zoie M. Browder</b> Percy Jackson, Western Civilization, and the Far-Right	Dr. Tedd Wimperis
1:20pm	<b>Isabel A. Zory</b> #MeTutu: An Analysis of Gender-Based Violence in French Ballet <sup>1</sup>	Prof. Patti Burns
1:40pm	<b>Tessa C. Gladwell</b> Parallels With Poetry: Critical Analyses of Works by Valéry, Monet, and Dior	Dr. Sophie Adamson

<b>Koury Business Center 101 (LaRose Theatre): Biology</b> (Moderator: Dr. Tonya L. Train)		
12:20pm	<b>Kaley Katz</b> Investigating ASXL Variation in Leukemic Cell Lines	Dr. Tonya L. Train
12:40pm	<b>Michelle L. Marder</b> Investigating Interactions Between Bacteria Infecting Patients With Cystic Fibrosis	Dr. Eryn Bernardy
1:00pm	<b>Tyler C. Myers</b> Increasing Efficacy of the Chemotherapeutic Asparaginase in Leukemic Cells by Limiting Glutamine Concentrations	Dr. Tonya L. Train
1:20pm	<b>Adam S. Ohana</b> Molecular Analysis of Fungal Communities in a Truffle Orchard Chronosequence	Dr. Antonio Izzo
1:40pm	<b>Samuel Ramirez</b> Examining the Role of the Gut-Brain Axis in Alcohol Use Disorder in Zebrafish	Dr. Jen Uno

<b>Sankey Hall 308: Economics</b> (Moderator: Dr. Olivia Healy)	
12:20pm	<b>Chloe R. Higgins</b> Dr. Zahra Akbari Socioeconomic Determinants of Health and Health Outcomes: Massachusetts and New York <sup>2,3</sup>
12:40pm	<b>Sarah Mirrow</b> Dr. Steven Bednar Clinic Closures and High School Dropouts: How Access to Abortion Impacts Female Educational Attainment in Texas <sup>3</sup>
1:00pm	<b>Claire D. Przybocki</b> Dr. Steve DeLoach Local Labor Market Impacts of Ukrainian Migrants in Poland <sup>3</sup>
1:20pm	<b>Anna M. Vassallo</b> Dr. Olivia Healy Adolescent Experiences of Sexual Abuse & Depression: Their Impact on Labor Market Outcomes <sup>3</sup>
1:40pm	<b>Georgia Daniel</b> Dr. Steve DeLoach Wages and Whiskey: A Micro-Level Analysis on Personal Wages in the U.S. <sup>3</sup>

<b>LaRose Student Commons 200: Public Health and Exercise Science</b> (Moderator: Dr. Yanica Faustin)	
12:20pm	<b>Cole T. Carney</b> Dr. Cynthia Fair Assessing the Health Care Utilization of Emerging Adults With Type 1 Diabetes in the College Setting: Perspectives of Students, Parents, and Providers
12:40pm	<b>Nicole L. McGinty</b> Prof. Amanda Tapler & Prof. Elizabeth Bailey Putting Knowledge Into Action With Dream Center Girls in Motion (DC-GIM), a Health Intervention for Girls Aged 8-12
1:00pm	<b>Nazaneen J. Shokri</b> Dr. Yanica Faustin & Dr. Molly Green Data Justice: MENA Women, Preterm Birth, and Discrimination <sup>1,3</sup>
1:20pm	<b>Katherine L. Walsh</b> Dr. Svetlana Nepocatykh & Dr. Mark Weaver The Relationship Between Sleep Regularity and Arterial Health in High School Students
1:40 pm	<b>Sean Godfrey</b> Dr. Madison Chandler Vigorous Physical Activity Correlates With Mental Health Related Cognition

<b>Belk Pavilion 208: Art, Art History, and Museum Studies</b> (Moderator: Dr. Evan Gatti)	
12:20pm	<b>Daneiriss Gutierrez</b> Prof. Ryan Rasmussen Exploration of Marginalized Existence Through Cultural Access and Arts of Liberation <sup>1</sup>
12:40pm	<b>Virginia Morrison</b> Dr. Evan Gatti and Dr. Kirstin Ringelberg Ecollage: Collage as an Ecocritical Methodology <sup>2</sup>
1:00pm	<b>Madeleine Hollenbeck</b> Dr. Evan Gatti Museums and Ritual Objects: Examining Curatorial Practices and Reanimating Religious Art
1:20pm	<b>Sonali E. Schroder</b> Prof. David McGraw

Best Practices for U.S. Museums to Engage Spanish-Speaking Visitors<sup>1</sup>**Lindner 102: Biology, Environmental Studies, and Statistics**

(Moderator: Dr. David Vandermast)

12:20pm	<b>Fiona J. Neely</b> Secondary Successional Changes in Elon University Forest Following the 2014 Ice Storm	Dr. David Vandermast
12:40pm	<b>Celia Firmin</b> Tree Mortality and Replacement During Secondary Succession in North Carolina Piedmont forest <sup>2</sup>	Dr. David Vandermast
1:00pm	<b>Bailey Reutinger</b> Analyzing Methods for Processing Tree Ring Data <sup>2,3</sup>	Dr. Nicholas Bussberg & Dr. David Vandermast
1:20pm	<b>Matthew W. Flacksenburg</b> Do Hybrid Lizards Seek Unique Habitats: Insights From Climate Modeling <sup>3</sup>	Dr. Gregory Haenel
1:40 pm	<b>Jack R. Allen</b> Estimating Carbon Sequestration Utilizing GIS in Cane Creek Natural Mountains Area	Dr. David Vandermast

**Studio D, Arts West: Music** (Moderator: Prof. Fred Johnson)

12:20pm	<b>Jack Salfia</b> The Impact of Synthesized Drums on the Sound Aesthetic of Modern Music	Prof. Fred Johnson
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## Oral Presentation Session III (2:20 pm - 4:00 pm)

<b>McKinnon Hall D: History and Political Science &amp; Policy Studies</b> (Moderator: Dr. Lauren Guilmette)		
2:20pm	<b>Ava Ward</b> Righteous Among the Nations, The Experiences of German Medical Professionals From 1933-1945	Dr. Andrea Sinn
2:40pm	<b>Caroline Lundby</b> Competing Narratives in Film Between the Indian State and Kashmir Since 1990	Dr. Jason Kirk
3:00pm	<b>Danny Nickel</b> Cutting Costs on Campus: Early In-Person Voting and Voter Turnout	Dr. Carrie Eaves
3:20pm	<b>Oliver McGowan</b> Building Queer Communities: Creating and Sharing Spaces for Intergenerational Queer Survival and Flourishing <sup>1</sup>	Dr. Lauren Guilmette
3:40pm	<b>Abigail R. Brantman</b> The "Blue Islands" of The Lone Star State; Understanding the Impact of Growing Texas Cities on Statewide Elections	Dr. Thomas Kerr
<b>McKinnon Hall E+F: Symposium: Identity, Politics, Place in a Globalizing World</b> (Moderators: Sandoh Ahmadu and Kiara Cronin)		
2:20pm	<b>Bethany Marzella</b> Between Conflict and Coexistence: Intra-Islamic Relations in Iraq <sup>1</sup>	Dr. Sandy Marshall
2:40pm	<b>Claire D. Przybocki</b> Catholic Nationalism and Muslim Migrants in Poland	Dr. Brian Pennington
3:00pm	<b>Daniel Scheff</b> Mirror, Mirror: Srivaishnava Women's Reflections of Self through a Ninth-Century Hindu Saint	Dr. Amy Allocco
3:20pm	<b>Rachel O. Curtis</b> Examining Self-Sufficiency Through the Lens of Afghan Refugees	Dr. Sandy Marshall
<b>Lakeside Meeting Room 212+213: English</b> (Moderator: Dr. Janet Myers)		
2:20pm	<b>Claire Lancaster</b> Nature's Self-Interest and Human Governance: Exploring the Parallels and Divergences Between Edward Abbey's "Serpents of Paradise" and Legalist Philosophy <sup>2</sup>	Dr. Kathleen Crosby
2:40pm	<b>Avery G. Sutherland</b> COVID-19 Literature: Processing Pandemic Experiences	Dr. Erin Pearson
3:00pm	<b>Kenna Dubraski</b> Hybridity and Heterogeneity in Asian American Experiences: Reading of Lisa See's <i>China Dolls</i> <sup>1</sup>	Dr. Dinidu Karunanayake
3:20pm	<b>Cailey S. Rogers</b> "Padlocks Were Placed Over Their Parted Mouths": Recovering Subaltern Voices in the Postcolonial Female Neo-Gothic <sup>1</sup>	Dr. Janet Myers

<b>Lakeside Meeting Room 214: World Languages and Cultures</b> (Moderator: Dr. Sophie Adamson)	
2:20pm	<b>Isabel A. Zory</b> Dr. Sophie Adamson Reading the Voyeur: An Analysis of Degas' Intimate Writings
2:40pm	<b>Julia N. Duval</b> Dr. Sophie Adamson LGBTQIA+ Resistance in French Written Expression: Alice Coffin, Fatima Daas, and Complexities of Gendered Language in Contemporary France
3:00pm	<b>Sarah Mirrow</b> Dr. Sophie Adamson "I Have to Tell Them:" An Exploration of Intentionality in Holocaust Writings by Berr, Delbo, and Tillion
3:20pm	<b>Anna Sophia Steinki</b> Prof. Pablo Celis-Castillo Entrapped at Home? Conflicts of Identity or Belonging in Jennine Capó Crucet: "How to Leave Hialeah" and "Resurrection" (2009)
3:40pm	<b>Brenna M. Williams</b> Dr. Federico Pous "La Lucha Sigue y Vive": Honduras Fifteen Years After the Coup <sup>1,2</sup>
<b>Moseley 215: Religious Studies</b> (Moderator: Dr. Lynn Huber)	
2:20pm	<b>Olivia Lancashire</b> Dr. Lynn Huber Fire & Brimstone - An Origin Story of Hell
2:40pm	<b>Faith E. Minor</b> Dr. Lynn Huber Trans Jewish Interpretation of Avraham and Sarah <sup>1</sup>
3:00pm	<b>Jasper S. Myers</b> Dr. Lynn Huber & Dr. Kristina Meinking "Once as Woman he Vowed": Gender Nonconformity, Female Same-Sex Erotic Encounters, and Divine Intervention in Ovid's Metamorphoses <sup>1</sup>
<b>Koury Business Center 101 (LaRose Theatre): Biology</b> (Moderator: Dr. Linda Niedziela)	
2:20pm	<b>Chloe Stuart</b> Dr. David Vandermast Dual Analysis of Biomass and Carbon Sequestration in Secondary Successional Forests in the Piedmont of North Carolina Utilizing Geographic Information Systems and Field Truthing Methods <sup>2,3</sup>
2:40pm	<b>Arieh Fischthal</b> Dr. David Vandermast Analysis of the Accuracy Student-Collected CURE Data in an Outdoor Setting <sup>2,3</sup>
3:00pm	<b>Robyn E. Allaway</b> Dr. Jessica Merricks How do Non-Science Majors Perceive Themselves in the Science Classroom? <sup>1</sup>
3:20pm	<b>M. Alayna Thompson</b> Dr. Dave Gammon Can An Old Bird Learn New Songs? Three Promising Methods That Didn't Work
3:40pm	<b>Kaitlin T. Cirillo</b> Dr. Linda Niedziela The Impact of Exercise on ADHD Behavior in Zebrafish

<b>Sankey Hall 308: Economics</b> (Moderator: Dr. Steve DeLoach)	
2:20pm	<b>Christina M. Alescio</b> Dr. Cora Wigger The Impact of Student Loans on the Racial Wealth Gap in the United States <sup>1,3</sup>
2:40am	<b>Anthony Mangone</b> Dr. Brandon Sheridan Exchange Rate Volatility and GDP Growth <sup>3</sup>
3:00pm	<b>David Neubig</b> Dr. Zahra Akbari The Effects of Food Insecurity on Cardiovascular Disease Death in North Carolina <sup>3</sup>
3:20pm	<b>Eric P. Sabatino</b> Dr. Steven Bednar The Cost of Campaign Finance Deregulation: Fossil Fuels PACs Effects on the Passing of Environmental Policy, Pre & Post Citizens United v. FEC <sup>2,3</sup>
3:40pm	<b>Chase K. Gurey</b> Dr. Brandon Sheridan Innovative Defense: The Effect of Military Expenditure on Innovation Within OECD Member States <sup>3</sup>

<b>LaRose Student Commons 200: Education &amp; Wellness</b> (Moderator: Dr. Heather Barker)	
2:20pm	<b>Isabella Martino</b> Prof. Erin Hone Voices From the Field: Impact of Covid-19 on Student Math Understandings and Teacher Practices
2:40pm	<b>Gabrielle Nagel</b> Dr. Heather Barker An Analysis of Social Justice Tasks Used for Teaching Statistics <sup>1</sup>
3:00pm	<b>Allison A. Shibata</b> Dr. Scott Morrison Examining the Effects of Walking Curriculum on Two Autistic First-Graders <sup>1,2</sup>
3:20pm	<b>Meghan Malone</b> Dr. Mary Jo Festle LGBTQ Education and Inclusion in Catholic Schools <sup>1</sup>

<b>Belk Pavilion 208: Accounting, Finance, and International Business</b> (Moderator: Dr. Adam Aiken)	
2:20pm	<b>Noah J. Biggers, Allie B. Rosinger, &amp; Olivia R. Sandor</b> Dr. C. Catherine Chiang ASU 2016-13: An Analysis of the Current Expected Credit Loss (CECL) Model <sup>3</sup>
2:40pm	<b>David Neufang</b> Dr. Adam Aiken Profitability Evaluation of Major Technical Analysis Strategies Applied to the S&P 500 in 2005-2023 <sup>3</sup>
3:00pm	<b>Nina Lichtenberger</b> Dr. Adam Aiken Evaluation of the Diversification, Hedging, and Safe Haven Potential of Commodities for Stock Portfolios Based on Dynamic, Conditional Correlations <sup>3</sup>
3:20pm	<b>Johanna P. Lauff</b> Dr. Scott Hayward The Role of Green Innovation for ESG Performance Scores in the Automotive Industry between 2015-2021 – A Panel Data Study <sup>2,3</sup>

<b>Lindner 102: Psychology</b> (Moderator: Dr. Mat Gendle)		
2:20pm	<b>Alanis Camacho-Narvaez</b> Colonial Mentality, Political Attitudes, and Ethnic Identity Among Puerto Ricans <sup>1,3</sup>	Dr. David Buck
2:40pm	<b>Georgia Daniel</b> Relationships Between Orthorexia, Exercise Dependency, Body Dysmorphia, Social Media Use, and Decision Making	Dr. Mat Gendle
3:00pm	<b>Mackenzie Demania</b> Impact of Sexual Orientation and Gender Identity on Unwanted Sexual Experience and Disclosure Decisions <sup>1</sup>	Dr. CJ Fleming
3:20pm	<b>Sophie I. Miller</b> Telling Stories and Taking Pictures: How Children and Teachers Co-Facilitate Inquiry and Reflection Outdoors	Dr. Maureen Vandermaas-Peeler

<b>Center for the Arts 117 (Studio A): Dance Performance &amp; Choreography</b> (Moderator: Prof. Jen Guy Metcalf)		
2:20pm	<b>Sophie David</b> Submissive Grace: How Men Have Curated the Definition of "Ballerina" Throughout the Romantic, Classical, and Neoclassical Eras <sup>1,3</sup>	Prof. Jen Guy Metcalf

<b>Studio D, Arts West: Music</b> (Moderator: Prof. Fred Johnson)		
2:20pm	<b>Kai R. Mitchell</b> The Emotional Impact of Film Music	Prof. Fred Johnson

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## **Lecture-Demonstration-Performance** (6:00pm)

<b>Roberts Studio Theatre, Scott Studios: Dance Science</b> (Moderator: Prof. Courtney Liu)		
6:00pm	<b>Courtney Liu, Julia Basso, Noor Tasnim</b> The Neurophysiology of Dancing Flow States	Prof. Courtney Liu



## Symposiums:



# AMERICAN STUDIES @ELON



This symposium highlights innovative American Studies research at Elon. As a field, American Studies contends that U.S. life and culture can only be fully grasped by deploying a variety of disciplinary approaches. This symposium features faculty-student teams from Political Science and Policy Studies, American Studies, Religious Studies, History, and English. These four projects illuminate key questions in American Studies: how do race and gender impact opportunity and shape identity? How do shared culture and communal practice act as a kind of civil religion? How do stories both reflect and influence broader American values? In answering these questions, students investigate a wide variety of materials, from political speeches to TV series to historical records to the material culture of music festivals. In the process, they address national politics (the U.S. presidency, World War II), popular culture (festivals and television), and equity and justice (racism, sexism), with a geographic scope that stretches from Tennessee to Illinois to California. Despite the variety of approaches, these projects share the conviction that careful attention to American culture can uncover the beliefs that structure everyday life in the U.S.

## American Studies

### Creation and Curation: The Narratives of Festival Culture

Ashley B. Burnett (Dr. Kathleen Crosby) Department of Religious Studies



With a sensory overload of blaring music that can be heard long before you arrive at the entrance, a kaleidoscope of colors that blur into art, and pungent smells that leave you questioning their source, festivals like Coachella and Bonnaroo might easily be seen as mere secular pursuits. However, as Gilmore (2010), Lucia (2020), and others have argued, festival culture exists at the intersection of relational community and recreational fun. In my work, I examine religious practices found at seemingly secular festivals, including various ritualized processes, such as the ubiquitous presence of altars and the creation of shared communal experiences, in order to unpack how the construction of secular festivals parallels religious practices. This project looks at two festival sites, Coachella 2023 and Bonnaroo 2023, where I conducted ethnographic research. I studied approximately 100 participants and their experiences using a three-step cross-sectional approach that examined the creation of festival culture and how, in return, it is presented and performed within and outside the festival site. My analysis centers youth culture, narrative theory, and digital culture and argues that participants create and curate their experiences, both orally and digitally, in a way that contributes to the authenticity of a festival space as religious worldmaking. This research deepens our understanding of how Gen Z, a group that is less religiously affiliated than past generations, find and make religious meaning.

### **“The Greatest Generation”: Historical Memory of World War II Soldiers in American Popular Culture**

**Cole Picca** (Dr. Andrew Monteith) Department of Religious Studies

I argue that historical memory is not neutral, but instead authenticates certain authors’ interpretations. Popular culture narratives about US soldiers fighting in World War II celebrate them as America’s greatest heroes, which offers a mythic account of an ideal American identity for viewers, readers, or other audiences. American soldiers in World War II were ordinary men who underwent extraordinary experiences and defeated Democracy’s enemy (fascism), thus becoming heroes in America’s eyes, or as scholar Jonathan Ebel says it, “the word of the nation made flesh.” As one site for historical memory, American war films often produce a narrative that American soldiers are inherently good and an archetype of what a good American looks like. Some of this can be explained as “civil religion,” a term that describes how America itself can function as a religion, extending beyond commitments that might otherwise be described by the term patriotism. The HBO miniseries *Band of Brothers* is representative of this dualistic mythology in which US soldiers are portrayed as righteous and deserving of respect for their heroic actions in defeating Nazism.

### **Disease Knows No Line: Community Hospital and Medical Segregation in Evanston, Illinois<sup>1</sup>**

**George Krupkin** (Dr. Waseem Bin-Kasim & Dr. Amanda Kleintop) Department of History and Geography

Evanston, Illinois was one of the first US towns to give reparations money to Black individuals and families affected by housing discrimination. An equally restrictive but often overlooked form of discrimination existed alongside housing segregation in the hospitals and doctors offices throughout the Chicago suburb. To combat this, Community Hospital of Evanston (CHE) was founded in 1914 to serve Black Evanstonians who were barred access to white hospitals. CHE would grow to become an

institution in Evanston's predominantly Black 5th ward, faithfully serving patients until it closed in 1980. My research explores Community Hospital's role in Evanston's history of racial segregation through interviews with former CHE patients and archival research. These sources consistently revealed accounts of doctors and nurses, who were often Black Evanstonians themselves, exhibiting a commitment to compassionate and personalized healthcare for their patients. The trajectory of CHE mirrors that of other Black medical institutions whose occupancy and general support diminished greatly following the Civil Rights Act of 1964, that allowed Black doctors and nurses to practice at larger and more well-equipped white facilities. The inability to compete with larger hospitals coincided with an era of medical improvements that the 54-bed Community Hospital could not keep up with. Despite the experiences of quality, personalized care that patients remember at CHE, it was one of many 5th ward businesses that did not receive the necessary support to survive in a post-segregation era. The final product of my research is a public-facing digital timeline that contextualizes CHE's 66 year lifespan through national hospital trends. The timeline focuses on the people whose dedication to Community Hospital allowed it to become the well respected and welcoming hub of healthcare that Black Evanstonians remember it as. The timeline will be published by Shorefront Legacy Center, an Evanston-based Black archival institution that has circulated similar profiles of historical Black figures and entities.

### **The Woman Who Almost Broke the Glass Ceiling: A Comprehensive Analysis of Hillary Rodham Clinton's Political Belief System<sup>1,3</sup>**

**Katherine Graham McCormick** (Dr. Baris Kesgin) Department of Political Science and Policy Studies

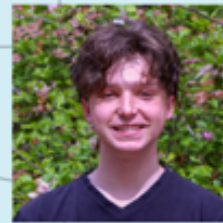
Though Hillary Rodham Clinton (HRC) did not break the ultimate glass ceiling, she powerfully demonstrated what an American female political leader can achieve and paved the way for other women to succeed. Her political impact remains understudied, or otherwise mischaracterized by various biases due to her status as a contemporary and female politician. Using an automated content analysis system to analyze her speeches during her national political career (1993 – 2016), this project develops a longitudinal political personality profile and measures HRC's operational code (beliefs) about the political world: (I-1) direction of strategy, (P-1) nature of the political universe, and (P-4) control over historical development. HRC's profile is compared to two control groups measuring the average profiles of an American female leader, also introduced in this project, and a traditionally male "establishment" leader to explore how her beliefs changed in various roles and amidst sexist pressures. Supplemented with an extensive review of the gender and politics literature and a deep dive into HRC's biographies, this research explores the making of her worldviews and contextualizes the struggles she faced as a woman in politics. HRC's profile underwent significant shifts during role changes and times of political turmoil. The results of this paper suggest that there is a difference between the operational code profiles of male and female American leaders but find no observable impact of pressures to conform to the male establishment on HRC's profile. This study will be highly relevant as more female leaders emerge.

SURF Symposium 2024

## “Identity, Politics, Place in a Globalizing World”

This symposium explores the themes of migration and cultural change in several distinct global settings and discusses how the methods of ethnographic study revealed the human dimensions of major global shifts in state and society. Drawing from projects focused on intra-Islamic relations in Iraq, Catholic nationalism and Muslim migrants in Poland, ideas about womanhood among Tamil Brahmins, and the lives of Afghan refugees, this symposium will present research that centers the lives and experiences of people who are navigating social and cultural change in contested contexts.

CLAIRE PRYZBOCKI  
DANIEL SCHEFF  
RACHEL CURTIS  
BETHANTY MARZELLA



# Identity, Politics, Place, in a Globalizing World

## Examining Self-Sufficiency through the Lens of Afghan Refugees

**Rachel O. Curtis** (Dr. Sandy Marshall) International and Global Studies Program

After years of reduced refugee resettlement capacity under the Trump administration, the US experienced a large influx of Afghan refugees in 2021, following the US military withdrawal from Afghanistan. This influx contributed to a shift away from a primarily caseworker/agency-based refugee resettlement process to a model increasingly reliant on private sponsors and volunteer groups. Regardless of this shift, the US resettlement system remains singularly focused on the aim of rapidly achieving economic self-sufficiency for resettled refugees, not accounting for other areas of self-sufficiency and acculturation that mark successful integration into a new society. Other indicators such as health, safety, and social capital are often deemed secondary, but at what cost? In other words, what impact does this arguably narrow view of self-sufficiency have on refugees achieving a more holistic sense of self-sufficiency and feelings of belonging in their new host community? How do agencies, refugees, and volunteers differ in their understandings of and approaches to self-sufficiency? Through a case study examining Afghans recently resettled in Burlington, NC, this research seeks to examine perceptions and indicators of self-sufficiency and resilience through individual and focus group interviews with refugees, their private sponsors, and their caseworkers. Interviews were coded for themes using qualitative data analysis software. This research reveals that barriers to self-sufficiency include transportation, affordable housing, and communication difficulties, both between refugees and the community and within the loop of their sponsors, caseworkers, and refugees themselves. Additionally, interviews with refugees indicated that achieving self-sufficiency is often seen as being a collective, intergenerational process involving the whole family, as opposed to an individual breadwinner achieving economic self-reliance in a short time. This indicates a friction between agencies, refugees, and volunteer groups and surrounding expectations related to time-commitment, communication, and community-building across lines of religious and linguistic difference. This research contributes to emerging conversations surrounding resettlement pathways as well as to larger scholarship on the effectiveness of US resettlement methods. With the expansion of private sponsorship models across the country, it is important to study the assets and needs of resettlement communities, especially those in less urban areas in North Carolina and the Southeast.

## Between Conflict and Coexistence: Intra-Islamic Relations in Iraq<sup>1</sup>

**Bethany Marzella** (Dr. Sandy Marshall) Department of Religious Studies

This research explores the developing relationship between Sunni and Shi'a Muslims in Iraq during and after the presidency of Saddam Hussein and the continuously shifting relationship between religion and politics in the country. In Iraq, Saddam ruled his country with an authoritarian "iron fist," oppressing many of his people and keeping them in check. The US invasion of Iraq in 2003 left a power vacuum that manifested in sectarian violence, causing many to flee the country. Scholarly research on this topic tends to take a geopolitical approach, privileging perspectives of political parties and leaders, at the expense of understanding the everyday experiences of Iraqis from both sects. This

research takes a comparative memory approach examining how Sunni and Shia Iraqis remember sectarian relations pre- and post-Saddam. To examine this relationship, this research employs ethnographic fieldwork, participant-observation, and interviews with both Shia and Sunni Iraqis in the diaspora, including the US, UK, and Jordan. Additionally, interviews with 2nd generation Iraqis further aid in understanding how these perspectives change generationally. This research applies the concept of sectarianization, which holds that sectarian identities are not static and essential but politically and socially produced, to examine shifting sectarian identities across generations in the diaspora. This research finds commonalities among Shia and Sunni Iraqis who contend that identities such as tribe, class, geography, and family were even more important than religious identities, but that the removal of Saddam Hussein from power dissolved the coexistence between the two sects into sectarian conflict. Moreover, structural sectarianism continues to permeate diaspora communities through the physical separation of spaces. However, though many Iraqis inhabit sectarianized spaces in the diaspora, they attest to easing sectarian tensions in Iraq itself.

### **Catholic Nationalism and Muslim Migrants in Poland**

**Claire D. Przybocki** (Dr. Brian Pennington) Department of Religious Studies

This paper examines Catholic Nationalism in Poland and its influence on the exclusion of Muslim Migrants on Poland's Eastern border with Belarus. Scholars have closely scrutinized the process of racialization inherent to this ethno-religious, anti-Muslim sentiment widespread throughout Poland. Similarly, scholars have investigated right wing parties' relationship with the Catholic church and its implications on media augmenting politically right-wing ideas like the threat of Muslim identity to the Polish nation. The Pole-centric narrative in Poland separates Poland from its European counterparts, and uniquely associates its geographical location with the role of Bulwark of Christianity. This dominate narrative, disputed by religious minorities and solidarity activists, preserves an alienating image of the religious other and sustains the normalization of overt Islamophobia in Poland. This paper will draw on forty semi-structured interviews conducted over a five-week period in Warsaw, Kraków, Białystok, Gdańsk, Wrocław, and Czestochowa. Through ethnographic fieldwork, the subtle relationship between Catholic nationalism and political agendas became clear through channels of containment of ideas, limiting the vision of Poles regarding Muslim migration. This paper will argue ruling administration in Poland mobilize imperceptible power to sustain a narrative of national unity in the Catholic church and evade the burden of accepting migrants from Muslim majority countries. Polish-centric attitudes directly translate to the overt Islamophobia prevailing throughout Poland. Polish media and political attitudes toward the recent Polish-Belarus humanitarian crisis, testify to the liveliness of anti-Muslim rhetoric and the success of Polish Catholic nationalist strategies.

### **Mirror, Mirror: Srivaishnava Women's Reflections of Self through a Ninth-Century Hindu Saint**

**Daniel Scheff** (Dr. Amy Allocco) Department of Religious Studies

Andal was a Hindu poet and saint who lived and wrote in ninth-century Tamil Nadu, South India. Among the twelve poet-saints called *alvars* who composed Tamil-language devotional poetry to Vishnu between the 8th and 11th centuries, Andal is the only woman and the most prominent in



contemporary ritual practice. Her two poetic compositions are centrally important to the South Indian Vishnu-oriented, or Srivaishnava devotional traditions. They are also noted for their vast differences in voice: the oft-recited *Tiruppavai* outlines a vow principally concerned with women's auspiciousness, while the lesser-known *Nacciyar Tirumoli* offers an intimate image of Andal with strong themes of passion, desire, and eroticism. The tensions generated by these disparate voices have invited numerous scholarly and popular assessments of Andal's character, but little academic attention has been paid to devotees' daily engagements with the poet-saint and the implications those interactions have for their lives beyond ritual contexts. During seven weeks of ethnographic research in South India, I traced how elite Srivaishnavas engage and imagine Andal by analyzing ritual, familial, and expressive contexts in which she is prominent. Building upon 15 formal interviews, dozens of informal dialogues, and many hours of participant observation in Hindu temples, I argue that the expressive dichotomies represented by Andal's two poetic works encourage distinct interpretations of her identity which are variously deployed to sustain or negotiate the boundaries of traditional womanhood. Additionally, I suggest that through idealized understandings of Andal elite-caste Srivaishnavas construct two broad-based models of womanhood structured by opposing emphases on transgression and devotion, unrestrained sexuality and wifehood, and the degree to which gender shapes who Andal was and what she wrote. In so doing, I demonstrate the importance of ethnographic methods for better understanding the complex nexus of religion, gender, and material culture.

## Abstracts by Department/Program:

### Accounting

#### ASU 2016-13: An Analysis of the Current Expected Credit Loss (CECL) Model<sup>3</sup>

**Noah J. Biggers, Allie B. Rosinger, & Olivia R. Sandor** (Dr. Catherine C. Chiang) Department of Accounting

After the financial crisis of the late 2000s, accounting standard setters began to look at the processes of banks and financial institutions to determine the efficacy and accuracy of their estimation of losses on loans (Hashim et al., 2019). Up until then these firms estimated credit losses by using the incurred loss model, which required banks to look at past events and incur a loss once they found sufficient evidence of a credit issue (Handorf, 2018). The standard setters found that the incurred loss model was not sufficient to showcase the firm's ability to collect payments from loans in the future. As a result, in 2019, at the beginning of the coronavirus pandemic, the Financial Accounting Standards Board through the U.S. Generally Accepted Accounting Principles (U.S. GAAP) implemented Accounting Standards Update 2016 -13, or for short ASU 2016-13. Under this new model, banks and financial institutions would need to consider all factors that affect the collectability of loans from a debtor (Internal Revenue Service, 2023). ASU 2016-13, also known as the current expected credit loss (CECL) model, would require banks to look at future economic forecasts within their calculations to determine the reserve for credit losses on their financial statements (FASB, 2016). Under the CECL model, banks would likely be required to establish a larger reserve for loan losses; further affecting their lending behaviors, capital requirements, and methods of collecting loan payments. Our research analyzes the financial ratios of several large and small public banks to determine how CECL affected their financial statements before and after its implementation date. Additionally, we evaluate the many estimation methods for expected credit losses under the CECL model, by analyzing financial instruments to identify the most effective method for estimating credit losses.

### Art

#### Exploration of Marginalized Existence Through Cultural Access and Arts of Liberation<sup>1</sup>

**Daneiriss Gutierrez** (Prof. Ryan Rasmussen) Department of Art

My research was motivated by gaps in the representation of works by marginalized groups affected by gentrification that results in physical displacements or loss of third spaces. The resulting exhibition work, *Cuerpos 23-24*, asks how do marginalized people challenge ideas of private ownership and spatial gatekeeping for the sake of 'public good' and deconstruct elitist rhetoric surrounding art access? I also seek to investigate how art can be used to process and respond to our surroundings for positive change and express marginalized survival through visual cultures. I consider my own position as a researcher that is non-white, Mexican-

American, queer, trans, in the contexts of the predominantly white institution, including gallery and academic settings. My work involves self-reflective contemplations of experiences of cultural moments, futures, and possibilities; requiring I immerse myself in diverse nightlife and witness collective effervescence. All research feeds into my final art thesis exhibition focusing on third spaces, marginalized existence in public and private spaces, and the perception of works created by intersectional minorities. My work is a serious synthesis of nightlife observations, political perspectives, and freedom to experience joy at the margins. One venue of research and observation was through creating public works of art and exploring the use of wheatpaste, placing my thoughts of societal processing and questions centering marginalized communities on walls where they could not be avoided by my peers or other viewers. Viewer responses could be physical, verbal, participatory, institutional, or silent. However, institutional responses were generally negative, vague, and aimed to stop the practice for lack of approval via university channels, even if it were for the sake of my studies— which required interventions of discomfort, questioning, and discourse. Institutionally, public art using words is considered signage, perhaps even toeing the line of vandalism. Institutional restriction on art which asks difficult questions in public campus spaces itself is a method of gatekeeping via approved and unapproved artistic speech. It shows a distaste for arts of liberation, which are connected to inabilities to access physical space, material scarcity, and explicit connection with issues that are uncomfortable to discuss.

## Biology

### How Do Non-Science Majors Perceive Themselves in the Science Classroom?<sup>1</sup>

**Robyn E. Allaway** (Dr. Jessica Merricks) Department of Biology

Within the landscape of higher education, there exists a pressing need to understand the multifaceted experiences of students in STEM courses, especially those from underrepresented racial backgrounds. Black-identifying female students navigate unique challenges that can profoundly influence their academic journeys, especially when taking STEM classes as non-majors. These challenges often stem from systemic inequities, including but not limited to access to resources, lack of representation among faculty and peers, and societal stereotypes (Bravata et al., 2020). Among the myriad of challenges faced by students, imposter syndrome emerges as a prevalent psychological phenomenon with far-reaching implications. Imposter syndrome, characterized by persistent feelings of self-doubt and inadequacy despite evidence of competence, has been identified as a significant barrier to academic success and overall well-being (Bravata et al., 2019). For black-identifying female students who are non-majors in STEM classes, the intersection of racial identity and imposter syndrome presents a complex dynamic that warrants thorough investigation (Harvey and Katz, 1968). This project aimed to delve into this complex relationship, using a qualitative approach. A survey instrument was designed and administered via Qualtrics to undergraduate students enrolled in introductory science courses as non-majors. The survey sought to capture students' perceptions of their racial and gender identities, academic experiences, and manifestations of imposter syndrome. The inclusion of both closed-ended



and open-ended questions allowed for a nuanced exploration of the research focus. Analysis of survey responses yielded insightful findings, such as our data not supporting our hypothesis of black-identifying female students, overall, having higher raw scores compared to other groups. Despite exhibiting apparent academic engagement, a significant proportion of participants, including black-identifying female students, reported high scores (>40) indicative of imposter syndrome. This suggests a pervasive sense of self-doubt and discomfort within the STEM classroom environment (Peteet et al., 2015). Moreover, our qualitative analysis sheds light on the experiences and coping mechanisms employed by students in navigating these challenges. By unpacking the unique challenges faced by black-identifying female students, institutions can develop targeted interventions and support mechanisms aimed at fostering inclusivity and promoting student success. Furthermore, this study contributes to a broader dialogue on equity and diversity in STEM disciplines, emphasizing the importance of creating environments that empower all students to thrive.

### **Comparing Genotype and Phenotype of Antibiotic Resistance Profiles of *Staphylococcus aureus* Isolates From Cystic Fibrosis Patients**

**Brooke L. Beall** (Dr. Eryn Bernardy) Department of Biology

Cystic fibrosis (CF) is a genetic condition that affects an estimated 160,000 people worldwide. CF patients commonly become infected by the bacterium *Staphylococcus aureus* (*S. aureus*). Clinicians utilize genetic testing to determine which antibiotic should be used to treat CF patients but literature on *S. aureus* has shown that the genes may be turned off/on which changes the antibiotic resistance phenotype. This project attempts to identify if there is a variation between the predicted phenotype and observed phenotype in *S. aureus*. Resistance was tested by exposing the *S. aureus* to six antibiotics commonly used to treat CF and analyzing the growth of the bacteria. A MIC assay was used to find the minimum inhibitory growth concentration (MIC) for each antibiotic, and to determine if the *S. aureus* was resistant or sensitive based on clinical laboratory standards. The data was compared with the genotypes of the collected isolate to identify if there is a variation between genotype and phenotype. So far, the data collected indicates that variation is present and using the genotype of *Staphylococcus aureus* may not be a useful technique when determining treatment plans for CF. This shows commonly used treatment plans for CF may be ineffective and can be linked with the lack of clinical success in treating the condition. Used in conjunction with clinicians, our methodology can potentially identify better ways to determine antibiotic resistance quickly in a clinical laboratory and best treat patients with *S. aureus* infections.

### **Cinnamaldehyde Effects on Social Behavior in Zebrafish**

**Christina R. Berry** (Dr. Eric Bauer) Department of Biology

This study investigates the long-term effects of cinnamaldehyde exposure on the social behavior of zebrafish (*Danio rerio*) as a model for understanding the neurological impacts of e-cigarette flavoring compounds. While many flavoring agents in e-cigarettes are deemed safe for ingestion, little research exists on their safety when inhaled. Our research aims to fill this gap by examining the behavioral responses of zebrafish to prolonged exposure to 0.00025% cinnamaldehyde, mimicking inhalation exposure through their gills. Zebrafish were chosen due to their physiological similarities to humans,

making them a suitable model organism for studying neurological effects. Anxiety-like responses in zebrafish have been well-documented, providing a baseline for assessing changes in social behavior resulting from chemical exposure. The experimental procedure involved acclimating fish, recording baseline behavior, exposing them to cinnamaldehyde, recording behavioral changes, and observing withdrawal effects after removing the chemical. Video recordings were analyzed using Ethovision software to quantify behavioral changes. Preliminary results indicate hyperactivity in social behavior following cinnamaldehyde exposure, suggesting potential neurological impacts. Fish treated for a week with cinnamaldehyde swam a greater distance, with a mean of  $\pm 19789$  cm for the treated and a mean of  $\pm 9498$  cm for the control and a standard error of  $\pm 1702$  cm for the treated and  $\pm 2557$  cm. The fish also swam at faster average velocities, with a mean of  $\pm 34$  cm/s for the treated and a mean of  $\pm 16$  cm/s for the control and a standard error of  $\pm 3$  cm/s for the treated and  $\pm 4$  cm/s, than untreated fish. Further analysis will provide insights into the long-term effects of e-cigarette flavoring compounds on vertebrate behavior, contributing to our understanding of the safety of these chemicals.

### **The Impact of Exercise on ADHD Behavior in Zebrafish**

**Kaitlin T. Cirillo** (Dr. Linda Niedziela) Department of Biology

Diagnoses for attention deficit hyperactivity disorder (ADHD) have increased dramatically in the last decade. Stimulant medications with adverse effects are the most common treatment for ADHD, but some studies show that exercise is beneficial in managing symptoms of hyperactivity and stress. This research used zebrafish as the model organism due to 1) their gene conservation and 2) their easily monitored behavior patterns, including determining the impact of exercise on ameliorating ADHD behaviors. To conduct this research, a swim tunnel was constructed to exercise zebrafish for 30 minutes daily for 10 consecutive days to represent a long-term exercise regimen. Data was collected by video recording fish after treatments were applied. Lead (1 mg/L) was administered to induce ADHD-like behaviors while exercise was used to test for its ability to potentially alleviate the effects of lead exposure. Behavior analysis software, EthoVision, was used to analyze the behavior videos and measure several stress variables. Zebrafish exposed to lead showed increased stress responses compared to those in the control and exercise groups, including decreased zone transitioning due to increased freezing, a stress response ( $p = 8.2 \times 10^{-11}$ ). Zebrafish exposed to lead also spent more time in the outer region of the petri dish compared to the control group ( $p = 4.7 \times 10^{-3}$ ). The control group traveled further distances in the outer region and crossed boundaries between zones, indicating increased exploration, which is not a stress response ( $p = 6.6 \times 10^{-4}$ ). There were no significant behavior differences in zebrafish exposed to lead compared to those both exposed to lead and treated with exercise. Overall, lead induced stress regardless of exercise interventions and the stress behavior model for zebrafish was consistent. However, ADHD is a multi-symptom human disorder, and further discussion and research are needed to explore exercise interventions with the comprehensive model for stress in zebrafish.

### **Mixed Signals: Studying the Multimodal Signaling of the Cone-Headed Katydid (*Neoconocephalus triops*)<sup>3</sup>**

**Sarah F. Clarke** (Dr. Jen Hamel) Department of Biology

Insects produce the cacophony of sounds that we hear in the spring and summer evenings. Within this orchestra are katydids (Orthoptera: Tettigoniidae), whose calls are species-specific and play important roles in mating. Recent research has revealed that in addition to airborne calls, some katydid species also use substrate-borne vibrations through plant stems to communicate. Our research objective is to contribute to the body of knowledge on such multimodal communication by describing the vibrational signals of the cone-headed katydid (*Neoconocephalus triops*), as well as their use of both calls and vibrational signals in mating; the calls of this species have been previously described. Here, we explain our methods and provide preliminary data from our study. Calls were recorded using an ultrasonic microphone, and vibrational signals were recorded using a microaccelerometer affixed to a plant stem. Male *N. triops* produce continuous, low-frequency vibrational signals with durations of several minutes. Individuals sometimes alternate between calls and vibrational signals, but they also produce both signal types at the same time. Vibrational signals can be energetically expensive to produce. We therefore suggest that the vibrational signals of *N. triops* provide valuable information to prospective mates and that the functions of vibrational signals and calls should be studied. Our findings contribute to a growing body of research about multimodal communication and will be available for future studies in this field.

### **Examining the Impact of the Blood Brain Barrier and the Gut-Brain-Axis on Brain Development in Zebrafish**

**Gabby R. Conover** (Dr. Jen Uno) Department of Biology

The first three years of life are critical for the development of the gut microbiome and the brain. Current research highlights the importance of the microbiome in communication between the gut and brain via the gut-brain axis (GBA). What is less understood is the exact mechanism by which the two interact and to what extent disruptions in the microbiome can affect the brain during critical periods of development. Novel studies in adult mice have shown increased blood-brain barrier (BBB) permeability in response to knockdowns in the microbiome, supporting the BBB as a communication mechanism in the GBA. One way to assess this is through the expression of genes such as *mfsd2aa*, whose protein product acts to regulate which substances pass through the blood into brain tissue. This study uses zebrafish as a model organism to examine the microbiome's impact on the blood-brain barrier during development. In the first round of testing, an antibiotic cocktail was administered for one week to disrupt the microbiome. Bacterial DNA quantification ensures the efficacy of our treatment compared to a control, a significant decrease in the abundance of bacterial DNA indicates a successful treatment. Brain RNA will be used to analyze *Mfsd2aa* gene expression using RT-PCR. Decreased *mfsd2aa* expression in the antibiotic-treated group would indicate that the microbiome modulates barrier permeability. Current tests are being done on larval fish to establish a model system for future experiments and to compare findings between adults and juveniles.

### **Investigating the Effects of Estrogen Concentrations and Chemotherapeutics on Pancreatic Tumor Growth**

**Lauren Copenhaver** (Dr. Yuko Miyamoto) Department of Biology

Pancreatic cancer is the 11th most common cancer in the world, making up a 94.2% death rate for those diagnosed in 2018. Most research on pancreatic cancer to date has focused on males, leaving a gap in our understanding of any gender differences in treatment approaches. This study compares the effects of estrogen and chemotherapeutics on male and female pancreatic cancer cells. This research evaluated the effects of  $\beta$ -estradiol, a type of estrogen most prevalent in humans. It explored how the chemotherapeutics cisplatin and 5-fluorouracil (5-FU) impacted male and female pancreatic cancer growth. The study was split into two phases. Phase one focuses on culturing male (PANC-1) and female (BXPC-3) pancreatic cancer cell lines, treating them with various  $\beta$ -estradiol concentrations (0.01 nM, 1 nM, and 100 nM), and quantifying effect via cell counts. Phase two treated cultured cells with various chemotherapeutic concentrations (1.25, 7.5, 12.5, 35, 50, 75, 100, or 200  $\mu$ M cisplatin, 1, 1.5, 2, 5, 10, 15, 20, and 30  $\mu$ M 5-FU) and used PrestoBlue cell viability assays to quantify the effects of the treatment groups. The results of this study indicated treatment with  $\beta$ -estradiol has no effect on pancreatic cancer cell growth ( $p=0.31$ ). However, when cells were treated with cisplatin and 5' Fluorouracil, there was increased cell death ( $p<0.01$ ) in both male and female cells, as expected. The study will continue to explore the interactions between chemotherapeutics and estrogen as a combination treatment to see the impact on cell growth. Further studies are needed to investigate estrogen and chemotherapeutics on different sexed in vivo models and the potential differences biological and synthetic hormones may have on cellular functions.

### **Evaluating Cell-Specific Differences in Breast Cancer Subtypes Through Integrative Genomics<sup>3</sup>**

**Jennifer N. DeLustro** (Dr. Andrea Perreault) Department of Biology

Breast cancer (BC) is one of the most common forms of cancer that affect women around the world. The disease can be divided into four distinct subtypes: luminal A, luminal B, HER2-positive, and triple negative. The defining characteristics of each subtype are related to the presence or absence of three specific hormone receptors (estrogen, progesterone, and human epidermal growth factor 2). Luminal A and luminal B BC subtypes can usually be managed using hormone therapy, while HER2-positive and triple negative BC subtypes have fewer hormone receptors and need a more aggressive treatment plan. However, previous studies have shown that BC tumors are heterogeneous, meaning they consist of cells belonging to more than one subtype. Heterogeneity complicates the treatment process and may explain why some BC patients come out of remission following the completion of their treatment regimen. This project aims to show there are clear distinctions and similarities when comparing the luminal A and triple negative subtypes using an integrative approach. Integration of multi-omic data including gene expression, transcription factor binding locations, chromatin accessibility, and the 3D organization of the genome allows for the visualization of a multitude of cell-specific characteristics at the genomic level. Computational analysis (using self-generated code in UNIX and R) on publicly available RNA-seq data revealed there is a wide variety of differentially expressed genes between the luminal A and triple negative subtypes, in addition to “normal” breast tissue. Publicly available ChIP-seq and ATAC-seq data were analyzed to determine if these differences in gene expression are due to transcriptional regulation or organization of chromatin. Taken together, these results provide a complete genomic profile of luminal A and triple negative BC subtypes and allow for the identification of molecular differences between these BC subtypes.

## **Investigating Potential Short-Term Sedative Effects of Cinnamaldehyde Exposure on Zebrafish (*Danio rerio*)**

**Julianna Fazzino** (Dr. Eric Bauer) Department of Biology

The goal of this research is to determine the neurological and behavioral effects of the e-cigarette flavoring compound, cinnamaldehyde on zebrafish (*Danio rerio*). Though many flavoring agents present in e-cigarettes have been researched and deemed safe for ingestion within different food and drink products, there is little research present on the safety of these chemicals when inhaled. This study uses zebrafish as a model organism for investigating the potential health impacts of non-ingested flavorants. Zebrafish are small fish that fundamentally have similar neurological structures and functions to other vertebrates, including humans. Zebrafish have similar brain and neurological functioning to humans due to the evolutionary connection between mammals and fish. Therefore, zebrafish can be used as a model organism for humans. This study will specifically look at cinnamaldehyde, a chemical commonly found in e-cigarettes. Preliminary data suggests that cinnamaldehyde acts as a short-term sedative to the zebrafish, though the details of this effect have not been rigorously documented. Therefore, this study will analyze the characteristics of the immediate sedative effect of cinnamaldehyde on zebrafish. To do this, zebrafish were exposed to water containing 0.0025% cinnamaldehyde for 20 minutes during which their behavior was recorded. These recordings were then analyzed using Ethovision software, allowing the quantification of swimming behaviors such as total distance traveled and average velocity of movement. Data collected so far within this research has suggested that when zebrafish are exposed to cinnamaldehyde for 20 minutes, they travel less distance within the tank at a lower velocity compared to when they are not exposed to cinnamaldehyde. This suggests that cinnamaldehyde may cause an acute sedative effect on zebrafish. Further experiments will assess the temporal dynamics of the sedation as well as the dose-response curve for this effect.

## **Tree Mortality and Replacement During Secondary Succession in North Carolina Piedmont Forest<sup>2</sup>**

**Celia Firmin** (Dr. David Vandermast) Department of Biology

In the Piedmont of North Carolina it has long been assumed that the dominant climax forest type is oak-hickory, particularly on dry sites. However, in recent years there has been concern that mesophytic maples and beeches are replacing oaks and hickories during secondary succession. In this study, we quantify tree replacement during secondary succession in Elon University Forest (EUF), a natural area consisting of forests of varying ages. We identified 20 fallen trees (10 hardwoods and 10 pines) and recorded the identities and sizes (DBH) of the trees replacing them in a 100m<sup>2</sup> relevé around the center of each fallen tree. In addition to the identity of each fallen tree, we recorded its diameter (converted to basal area (BA)), and the direction of fall in degrees (transformed to folded aspect to maximize southwest and minimize northeast values). For all trees and for hardwoods and pines separately we examined whether tree size (BA) or direction of fall influenced the number (N), species richness (S), or the Shannon diversity index ( $H'$ ) of the replacement trees. There were no significant relationships between the measures of our fallen trees and those of the replacement trees. We noted that the trees replacing fallen hardwoods were various oaks and hickories, while those replacing fallen pines were most often yellow-poplar (*Liriodendron tulipifera*) and sweetgum (*Liquidambar styraciflua*). In EUF,



secondary succession does not appear to result in the replacement of oaks and hickories by mesophytic species.

### **Analysis of the Accuracy Student-Collected CURE Data in an Outdoor Setting<sup>2,3</sup>**

**Arieh Fischthal** (Dr. David Vandermast) Department of Biology

Classroom Undergraduate Research Experiences (CUREs) have become an increasingly popular way of introducing the scientific method to college students. In 2021 and 2022, a non-majors biology class at Elon University used a carbon storage protocol in Elon University Forest (EUF) to introduce students to the scientific method and to have them collect data for use in an ongoing project. Students measured tree diameters at breast height (DBH) of tagged and numbered trees (stems > 3cm DBH) in 100 m<sup>2</sup> modules to assess annual changes in carbon storage. The purpose of this study was to determine the accuracy of the data collected by these students. We found that students failed to measure between 20.3-33.6% of tagged trees during the two years of data we analyzed. We compared the standard deviation (stdev) of student data from both years, and principal investigator (PI) measurements from 2023, to PI data collected in 2020. We found 1) significant variation in stdev between years, 2) that the stdev of student measurements from both years significantly ( $\alpha > 0.05$ ) exceeded those of the PI from 2023 (stdev range of 0.14-21.7cm in 2021, and 1.34-40.2cm in 2022 vs. 0.0-0.5 for the 2023 PI measurements), and 3), that the stdev of student data increased with increasing tree size. We conclude that the student-collected measurements in this study are not reliable enough to be publishable data. We recommend greater quality control on the part of any instructor who would like to use field data collection as part of a CURE, if scientific use is the goal.

### **Do Hybrid Lizards Seek Unique Habitats: Insights From Climate Modeling<sup>3</sup>**

**Matthew W. Flackenburg** (Dr. Gregory Haenel) Department of Biology

As the world grows hotter, species' ranges are expected to shift to match the changing climate. These changes in habitat can bring previously isolated species into contact. If closely related, these species may interbreed to form hybrid populations of mixed genetics. Understanding the circumstances of contemporary hybrid zones can help to anticipate how future hybridization may affect ecological systems. Two species of lizard, *Urosaurus graciosus* and *Urosaurus ornatus*, have undergone hybridization resulting in *U. ornatus*-type mitochondrial DNA being introduced to the gene pools of *U. graciosus* populations. These introgressed mitochondria have been shown to create metabolic inefficiencies in the hybrid lizards. Despite this apparent disadvantage, genetic evidence suggests the populations have remained stable for millennia. One possible explanation for this phenomenon is that the hybrids occupy a distinct niche, allowing them to persist in specific locations. To assess whether such a distinction exists, environmental niche modeling was used to delineate the fundamental niche of the hybrids and the parent species. Each of the three lizard types were modeled using Maxent, a maximum-entropy modeling software. Maxent compares occurrence records of a species to a set of environmental variables and builds a model that predicts the environmental suitability for the species across a geographic extent. Known occurrences of the lizards were compiled from online databases and previous field surveys and modeled against eight relevant bioclimatic variables. Daily temperature range was shown to be the most important variable in determining *U. ornatus* habitat suitability while

temperature seasonality and annual range were most important for both *U. graciosus* and the hybrids. The hybrid niche model was tested for significant difference against the *U. graciosus* model using a permutation test, and both were compared against the *U. ornatus* model for overlap. The permutation indicated there was no significant difference between the hybrids and *U. graciosus*. In addition, six of the eight hybrid localities fell in areas of predicted suitability for both parent species. The results indicate that if the hybrids occupy a unique niche from *U. graciosus*, it cannot be explained by climate alone.

## **Impact of Liming on Denitrifying Genes in Soil Microbial Communities**

**Giavonna D. Gaw** (Dr. Antonio Izzo) Department of Biology

This study aims to understand some of the dynamics surrounding the denitrifying soil microbial community in a truffle orchard. Burwell Farms in North Carolina cultivates *Tuber borchii* on *Pinus taeda* trees and has orchards at multiple stages of development: 1-2 years old, 3-4 years old, and 7-8 years old. Part of their cultivation process involves the application of liming to raise the soil pH- a step that benefits the target fungus. Past research in soil systems supports the idea that liming builds the denitrifying bacterial community over time. This study took advantage of the multiple stages of orchard age to run a chronosequence study to assess how the denitrifying capabilities of the bacterial community changed as the orchard ages and soil pH increases. Soil samples were collected from the three differently aged plots. Soil DNA was isolated and subjected to quantitative PCR (qPCR) using primers targeting the nitrite reductase gene, *nirK*, to assess denitrifying gene abundance. While the trend shows a decrease in denitrifying organisms as the orchard ages, results reveal that liming has not significantly impacted *nirK* genes in this time span. Subsequent experiments via cloning and capillary DNA sequencing confirm that the *nirK* gene being amplified in the qPCR is of bacterial origin. These findings provide insights into the role of microorganisms in shaping the nitrogen cycle and contribute essential knowledge for the success of the farm by understanding the intricate relationship between soil pH and denitrifying microbial populations.

## **The Role of Environment in Mediating the Psychological Benefits of Physical Activity**

**Robert H. Goecker** (Dr. Jen Uno) Department of Biology

The positive impacts of physical activity and exercise on mental health are well established in current literature. Recent studies involving the gut-brain axis link the intestinal microbiome to emotional and behavioral responses such as stress and anxiety. However, the contribution of the gut-brain axis in mediating the mental health benefits of exercise is yet to be thoroughly explored. As the development of bacterial species within our intestines is significantly influenced by environmental exposure, the effects of where we choose to exercise are open to investigation. The aim and scope of this project is to further explore the connection between exercise, environment, and the reduction of stress and anxiety through different environmental exposures. To accomplish this, participants from the Elon University community provided saliva samples from which basal cortisol levels were determined. This data was then compared to the results of a survey completed by each of the participants. Survey data provided insight into the time that participants spend being physically active per week, the type of physical activity that they normally engage in, the intensity of this activity, and whether it takes place indoors or

outdoors. Survey questions also provided information about the typical emotions and psychological state of the participants, along with any changes in these parameters following physical activity. It is hypothesized that individuals who are regularly physically active will have lower basal cortisol levels and experience a more positive affect than those who are not normally active. Furthermore, those who complete their activity outdoors are expected to experience more psychological benefits than participants who engage in a similar type, time, and intensity of physical activity in the indoor setting. The findings of this research offer timely insight as the Elon community looks for meaningful ways to cope with feelings of uneasiness and worry as we adapt to life after the pandemic.

## **DNA Analysis of Fungal Succession in Truffle Orchard Chronosequence**

**Rachel Hunt** (Dr. Antonio Izzo) Department of Biology

Changes in fungal diversity in a soil environment gives insight into potential fungal interactions occurring in the soil. This project examines various aspects of fungal diversity in truffle orchard soil, where loblolly pine trees are host plants for *Tuber borchii* fungi. *Tuber* fungi are ectomycorrhizal, meaning they form mutualistic relationships on the outside of host plant roots. The truffle orchard soil is composed of both ectomycorrhizal and non-mycorrhizal fungal genera. This research aims to identify any trends in relative *Tuber* abundance among other fungal genera in the soil, and any changes or consistencies in fungal genera distribution in the soil as the orchard ages. Oxford Nanopore sequencing technology coupled with large scale DNA analysis was used to identify fungal genera in multiple soil samples from 1-year-old orchards (n=6) and 7-year-old orchards (n=6). There was a significant increase (T-test,  $P=0.00830$ ) in the relative abundance of ectomycorrhizal fungi among all fungal genera in the soil as the orchard aged. However, there was a significant decrease (T-test,  $P=0.0107$ ) in the relative *Tuber* abundance among those ectomycorrhizal fungal genera in the soil in that same orchard age transition. In summary, this study shows that while *Tuber* remains steady in the soil over time, other ectomycorrhizal fungi became more prominent. This increase in fungal diversity could lead to competition among ectomycorrhizal fungi in the soil. Our findings suggest that when the root network stops expanding and root space becomes limited, there will be some level of competition for host plant roots and nutrients occurring between *Tuber* and other ectomycorrhizal fungi in the orchard soil.

## **Investigating ASXL Variation in Leukemic Cell Lines**

**Kaley Katz** (Dr. Tonya L. Train) Department of Biology

Asx-like 1 (ASXL1) is a protein involved in cellular differentiation, epigenetic modification, and transcriptional regulation. The gene that codes for ASXL1 consists of 13 exons and 12 introns. In acute myeloid leukemia (AML), as well as many other myeloid malignancies, ASXL1 is frequently mutated. These mutations have been observed in approximately 20% of patients with myelodysplastic syndrome and in individuals diagnosed with AML. ASXL mutations have also been found in lymphoid leukemias, but at a much less frequent rate (~2%). These mutations can result in abnormal splicing, termination, or missense mutations. Abnormal splicing can result in a mutated protein that is larger or smaller than normal, while a termination mutation results in proteins that are smaller than normal. This study used gel electrophoresis and Western Blot analysis to compare the size



of ASXL1 in two different leukemia cell lines. Using an ASXL1 monoclonal antibody (11I4), we were able to compare ASXL1 in HL60 (AML) to ASXL1 in Jurkat (Acute T-cell Lymphocytic Leukemia). We confirmed the presence of alternative forms of ASXL1 in both HL60 and Jurkat. Compared to the normal 166 kD for ASXL1, both leukemic cell lines had smaller versions of ASXL1 than expected. In Jurkat cells ASXL1 was approximately 45 kD, while in HL60 cells the protein was 34 kD. This difference in size could be a result of normal alternative splicing, abnormal splice mutations, or termination mutations which result in truncated and smaller proteins. Further research should be done to sequence the genes to determine whether these leukemic cell lines carry mutations (splice-site or termination) or whether they are normal splice variants and whether these abnormal proteins contribute to the uncontrolled, leukemic, growth in these cells.

### **Evaluating Transcriptomic Differences Between Hepatitis B Virus (HBV) and Hepatocellular Carcinoma (HCC)<sup>3</sup>**

**Mandi Lichtenstein** (Dr. Andrea Perreault) Department of Biology

A major global health concern is virus-associated hepatocellular carcinoma (HCC). HCC can be induced by the hepatitis B virus (HBV). This study investigates the molecular mechanisms underlying the pathogenesis of HCC. Specifically, our work focuses on identifying gene expression alterations between liver cells infected with the virus and those that have been diagnosed with HCC.

Understanding the consequences of transcriptional changes is essential for elucidating the progression of HBV to HCC. By deciphering the molecular pathways perturbed by transcriptional differences, this research advances our knowledge of HCC etiology, and may inform the development of targeted therapeutic interventions. Using publicly available RNA sequencing (RNA-seq) data, we will conduct comprehensive transcriptomic analysis comparing normal HepG2 cell lines to HBV-infected and HCC-infected cell lines. Differential gene expression analysis using DESeq2 allows us to identify genes significantly dysregulated in HBV and HCC samples compared to the control, providing insights into the molecular signatures associated with HBV-mediated hepatocarcinogenesis. The major goal of our research is the elucidation of transcriptomic differences between HBV- and HCC-infected cell lines, underscoring the significance of modulated gene expression during hepatocarcinogenesis. These findings deepen our understanding of HBV-associated HCC pathogenesis and offer valuable insights into the broader field of cancer biology and epigenetics.

### **Investigating Interactions Between Bacteria Infecting Patients With Cystic Fibrosis**

**Michelle L. Marder** (Dr. Eryn Bernardy) Department of Biology

Lung infections in cystic fibrosis (CF) patients are the main cause of morbidity and mortality, and most are caused by either *Staphylococcus aureus* (SA) or *Pseudomonas aeruginosa* (PA). SA infections are more prevalent in younger CF patients, but as they age, PA becomes the more common infecting agent. A smaller subset of patients are coinfecting with SA and PA and have worse outcomes than those infected with only one of the bacterial strains. PA is known to kill SA in coculture, so the mechanisms of how SA survives attack is unknown. Therefore, our goal is to identify coexisting isolates of SA in order to study this rare coexisting phenotype. Two PA strains were used in this study. The wild-type PAO1 is known to kill SA while the mucoid PDO300 isolate coexists with SA. We chose to test those

PA strains with clinical isolates of SA, specifically those that came from the same patient isolated over a period of time. In order to investigate these interactions, each bacteria was grown separately and mixed together and cells were counted after 24 hours of growth. We observed three different outcomes for the clinical SA isolates; the majority of isolates were only killed by PAO1, some were killed by both PA strains, and even fewer survived coculture with both PA strains. One particularly interesting group of SA isolates that were collected from the same patient appeared to have evolved coexistence with PA. Further data needs to be collected to determine the correlation between the interaction of SA and PA and other noteworthy clinical phenotypes. Overall, this work will help us identify the mechanisms of coexistence between these two clinically important bacteria and potentially identify ways to prevent coinfection and the accompanying decline in patient health.

### **Investigating the Anti-Cholinesterase Properties of *Crassocephalum Crepidioides* in Larval Zebrafish (*Danio rerio*)**

**Rachel C. Mingus** (Dr. Linda Niedziela) Department of Biology

Acetylcholine is an essential neurotransmitter in the brain that has important functions in learning and memory. Levels of this necessary molecule are low in patients with dementia and Alzheimer's disease. Acetylcholine is broken down by the enzyme acetylcholinesterase. Acetylcholinesterase inhibitors are commonly used to treat dementia and Alzheimer's disease by increasing the levels of acetylcholine in the brain. While increasing levels in dementia patients is beneficial, similar increases in younger individuals have been linked to negative effects such as apoptosis. Previous research in our lab has shown that the plant *Crassocephalum crepidioides* inhibits acetylcholinesterase and therefore has possible applications as a treatment for Alzheimer's. It was demonstrated that treatment with *C. crepidioides* increases acetylcholine, along with learning and memory in older zebrafish; however, this same study done in younger fish found that there were no cognitive benefits. The goal of this research was to investigate if increasing acetylcholine levels is harmful in younger individuals with adequate acetylcholine. In this study, zebrafish embryos were treated with aqueous plant extract as they developed. Zebrafish larvae treated with plant extract showed significant increases in acetylcholine levels ( $p = 0.01$ ). To determine if these increased acetylcholine levels have damaging effects, fluorescence microscopy was used to quantify apoptosis in larvae. Results showed that treatment with *C. crepidioides* does not correlate with apoptosis, and treated embryos had a lower mortality rate ( $p = 0.003$ ) and faster hatching rate ( $p = 0.009$ ). At 10 days post-fertilization, no control embryos had hatched, while 100 percent of treated embryos were free-swimming. This indicates possible positive effects of the plant extract on growth and development. Prior studies have demonstrated that acetylcholine has a role in embryonic development and the release of growth hormones such as IGF-1. Future experiments will investigate the relationship between acetylcholine and growth hormone IGF-1 by measuring its presence in larval zebrafish after treatment with *C. crepidioides*.

### **Increasing Efficacy of the Chemotherapeutic Asparaginase in Leukemic Cells by Limiting Glutamine Concentrations**

**Tyler C. Myers** (Dr. Tonya L. Train) Department of Biology

Acute lymphoblastic leukemia (ALL) is a cancer with a 5-year survival rate of 85% when treated with chemotherapy. However, in patients who develop resistance to chemotherapy, the survival rate drops

to approximately 20%. Asparaginase (ASNase) is a commonly used chemotherapeutic for patients with ALL. It functions by breaking down asparagine, an amino acid that is essential for cancer cell division, resulting in increased rates of cell death. Asparagine is typically present in an individual's diet, but it can also be synthesized by cells through the enzyme asparagine synthetase (ASNS) converting glutamine into asparagine. HL60 (acute myelogenous leukemia) and Jurkat (acute T-cell leukemia) lines were separated into six different treatment groups and exposed to various concentrations of asparaginase for 24 hours (0, 1, 5, 10, 20, and 50IU/mL). To test the influence of glutamine, an asparagine precursor, upon asparagine availability and subsequent ASNase efficacy, HL60 cells were maintained in media with various concentrations of glutamine (0, 0.2, 0.8, 2, 4, and 8mM). The cells with lower concentrations of glutamine (0-0.8mM) had a fourfold increase in mortality when exposed to 10IU/mL ASNase (60% compared to 15%). These results suggest that glutamine concentrations modulate ASNase efficacy and therefore could be targeted to raise mortality in resistant cell lines. A protocol to induce chemotherapeutic resistance will be developed through increased ASNS upregulation and production, which other studies have shown is a significant indicator of resistance. In the resistant cells, new EC50s will be calculated with additional treatments (such as enzyme inhibitors) to reduce resistance and heighten mortality rates. These preliminary experiments provide the baseline for future investigation into ASNase resistance and suggest that glutamine concentration is an important factor in ASNase sensitivity in leukemic cells.

## **Secondary Successional Changes in Elon University Forest Following the 2014 Ice Storm**

**Fiona J. Neely** (Dr. David Vandermast) Department of Biology

How forests respond to disturbances is a fundamentally important question in forest ecology. This study investigates secondary ecological succession in Elon University Forest (EUF), following a significant ice storm in March 2014. More specifically, this study aims to compare forest metrics such as tree species richness, basal area, and diversity from 2010 (before the ice storm), 2014 (the summer after the ice storm), 2018, and 2023. In 2010 researchers from Elon University established eight 20 x 50 m Carolina Vegetation Survey plots within parts of the forest of different ages, ranging from approximately 40 years old to what is known as the Forest Of Continuity (FOC), which includes trees upwards of 250 years old. Within each plot, all trees (stems  $\geq 10$  cm DBH) were tagged, identified, and recorded. We hypothesize that, because the ice storm primarily killed early successional Virginia pine (*Pinus virginiana*), it acted as a catalyst for an increased rate of secondary succession. Our data supports our hypothesis: mortality of Virginia pine after the storm continues to exceed mortality prior to the storm. Forest metrics indicate that much of EUF is in a transitional phase as dying pines are replaced by hardwoods. For example, the average number of trees per plot, and basal area have remained constant since 2014 but tree species richness (26 to 28) and Shannon diversity (2.39 to 2.74) have increased. These changes are consistent with the mortality of early successional species such as Virginia pine that are being replaced by later successional hardwoods. Data from our study indicates that significant storm events, like the 2014 ice storm can cause a hastening of expected secondary successional changes that continue for many years afterwards.

## **Molecular Analysis of Fungal Communities in a Truffle Orchard Chronosequence**

**Adam S. Ohana** (Dr. Antonio Izzo) Department of Biology

Truffle fungi form a mutualistic relationship with their host tree, relying on it entirely for carbon while helping the tree acquire limiting nutrients. In North Carolina, farmers are attempting to cultivate these fungi in orchard settings. Many ectomycorrhizal fungi in the soil compete with the truffle fungi for the tree roots, therefore truffle farmers look to control conditions to favor the truffle fungi. Shifting soil conditions due to orchard succession and orchard treatments therefore can alter the competitive landscape in a fungal community. This study looked at fungal community development as orchards age at Burwell Farms in Warrenton, North Carolina. Growing *Tuber borchii*, a desirable white truffle species, has been their specialty and their farm has orchards at multiple stages of development. The oldest and most profitable orchard is around 8 years old, the middle-aged orchard is 3-4 years old and the youngest orchard is 1-2 years old. It was hypothesized that the fungal community would shift as the orchard ages. We took advantage of the different orchard development stages to study the fungal root community change as the orchard ages. Because ectomycorrhizal fungi - including the truffle - cannot be cultured, we used molecular approaches (DNA community fingerprinting of the total fungi through T-RFLP) to analyze the fungi on the roots. Root samples were collected in May of 2023, and a bulk DNA isolation was done on the ectomycorrhizal root tips found in each sample. DNA sequencing was also performed to determine what genus of fungi were present on the roots. T-RFLP community fingerprinting results support that fungal communities within each stage are more similar than they are between stages. Bulk sequencing data shows that abundance of *Tuber borchii* decreases as the orchards age. These results can be used to start to project trends as competition for tree roots increases.

### **Investigation of the Role of the TNF- $\alpha$ Pathway in Cell Survival of Triple Negative Breast Cancer (TNBC) Cells**

**Catherine E. Oliver** (Dr. Tonya L. Train) Department of Biology

Triple-negative breast cancer (TNBC) is an aggressive form of cancer that accounts for nearly a fifth of all breast cancer diagnoses. Furthermore, TNBC is difficult to treat, as the cells of this cancer lack three receptors which are generally targeted by less aggressive treatment options. Current research suggests that the TNF- $\alpha$  pathway may be utilized to create alternative treatments for TNBC. TNF- $\alpha$  is an inflammatory cytokine that regulates cell growth, survival, and death. There are two forms of TNF- $\alpha$ : tmTNF, the transmembrane form and sTNF, the soluble form. How each of these forms impacts TNBC cells is not fully understood. This project aims to investigate the role of sTNF and tmTNF in cell growth, survival, and death of TNBC cells through manipulation of cellular concentrations of sTNF and tmTNF. TAPI is a compound which inhibits the formation of sTNF, thus decreasing its cellular concentration. To determine whether a decrease in sTNF affects TNBC survival, the human TNBC cell line, Hs578t, was treated with TAPI. Cells treated with TAPI alone showed a decrease from untreated cells, however it is unclear if TAPI alone contributed to this decrease, as TAPI must be reconstituted in DMSO, which itself induces cell death. To further investigate this, Hs578t was treated with 1% DMSO to induce cell death and incubated with or without TAPI. After 72 hours, cells treated with 1% DMSO had a viability of 6%, compared to untreated cells. Interestingly, cells incubated with DMSO and TAPI had a 6-fold increase in viable cells, a statistically significant difference with a p-value of 0.018. This result suggests that sTNF may be involved in promoting DMSO-induced cell death and that reducing sTNF levels via TAPI treatment may protect TNBC cells from DMSO-induced

cell death. Future research aims to explore the role of TAPI alone in cell survival by reducing the concentration of DMSO in TAPI treatment to a negligible amount. Furthermore, the source of this protection will be explored by determining whether a decrease in sTNF and/or increase in tmTNF provides this protective effect seen of DMSO-induced cell death.

### **Prevalence of Freezing Behavior in Zebrafish**

**Sophia del Priore** (Dr. Eric Bauer) Department of Biology

Zebrafish (*Danio rerio*) have become a valuable model organism for behavioral studies. A common behavior of many animals, including zebrafish, when very stressed is to freeze all motion. While some publications have included freezing as a metric for potential behavioral effects of a chemical treatment, a comprehensive understanding of freezing behavior and its potential links to individuals' personalities remains limited. This research aims to shed light on the freezing patterns exhibited by untreated zebrafish in response to a novel tank environment. Leveraging existing data from past studies, I focus on the duration of freezing episodes, the occurrence of movement between freezing bouts, and the identification of specific individuals engaging in this behavior. I seek to determine if freezing in zebrafish is a random occurrence or consistent personality trait among certain individuals expressed in repeated trials in a novel tank. The findings from this study may contribute to a deeper understanding of zebrafish behavior and provide insights into the potential existence of individualized freezing characteristics, thus paving the way for future investigations into the personality traits of this intriguing species.

### **Examining the Role of the Gut-Brain Axis in Alcohol Use Disorder in Zebrafish**

**Samuel Ramirez** (Dr. Jen Uno) Department of Biology

14.5 million people struggle with Alcohol Use Disorder (AUD) characterized by uncontrolled drinking and alcohol withdrawal effects. Both chronic and acute alcohol use are known to disrupt the intestinal microbiome and are associated with mood disorders. The gut-brain axis is a bidirectional communication pathway between the brain and the intestines. Modulation of the microbiome has been shown to alter brain chemistry in zebrafish. Recent research indicates the gut-brain axis is involved in the behavior modifications associated with AUD, however the mechanism remains unknown. The objective of this study is to examine the impact alcohol has on the gut-brain axis. We hypothesize that a reduced intestinal diversity will lead to heightened behavioral responses and alter gene expression of neurotransmitter receptors associated with acute and chronic alcohol exposure. To examine this hypothesis, zebrafish (*Danio rerio*) were exposed to amoxicillin and erythromycin for fifteen days to clear their microbiome. Following treatment, fish were immersed in 0.50% ethanol for one hour and in escalating dosage up to 0.25% for two weeks to mimic acute and chronic alcohol exposure, respectively. Fish were recorded for 10 minutes following treatment to analyze behavioral patterns. Bacterial populations were significantly reduced following treatment ( $n=6$ ,  $p < 0.05$ ). Behavioral results from video tracking software and manual counts show significantly reduced movement in fish acutely exposed to ethanol and antibiotics compared to control fish. This reduction was not observed in the antibiotic only treated fish or the chronically ethanol-exposed fish, suggesting an ethanol induced behavioral shift as well as an adaptation over time that recovered zebrafish behavior to control levels.



To further assess cognitive function, levels of NMDA Glut1 receptor mRNA were analyzed and we observed no significant changes in receptor gene expression in the brains of zebrafish in the treatment groups relative to control groups. Collectively these results indicate that acute alcohol induced behavior correlates to changes in the microbiome, though this correlation is not observed in chronic alcohol exposure. Future studies are needed to better understand what role the gut brain axis plays in alcohol mediated-behavioral observations.

### **Recruitment Strategies for the Black Community in the Pittsboro, NC Water Crisis<sup>1</sup>**

**Aniya Scott** (Dr. Jessica Merricks) Department of Biology

In Pittsboro, a community in central North Carolina, a pressing environmental crisis has been present for over four decades. Pittsboro's proximity to the Haw River results in contamination of its drinking water with industrial chemicals, leading to elevated levels of compounds in residents' blood, causing significant health impacts. With minority individuals having a history of greater adverse health effects compared to their White counterparts, this increases their severity to this issue. To address this issue, we developed a three-phase project that includes characterizing residents' understanding of per- and polyfluoroalkyl substances (PFAS) exposure, quantifying their PFAS blood levels, and designing an intervention to empower residents to engage in health and advocacy initiatives. Successful completion of the project requires strong partnerships with the Black residents in Pittsboro. The purpose of this poster is to acknowledge the intricacies of our community recruitment mechanisms, and reflect on progress towards enhancing resident engagement during this phase of the project. We have utilized two primary recruitment methods. First, social event appearances allowed us to informally engage with residents concerning PFAS contamination and its impact on their health. Secondly, we partnered with a local community organization to host formal events for interested residents to dive deeper into contamination issues. In conjunction with our recruitment efforts, we have initiated snowball sampling, which encourages participants to recommend additional community members to participate. While these approaches have yielded valuable insights into residents' knowledge and concerns regarding PFAS, they also present notable challenges. Primarily, the lack of authentic community connections hinders our understanding of the dynamics within the community. Additionally, inconsistency in face-to-face interactions compromises our engagement and rapport with residents. To overcome these challenges and enhance our research efficiency, we recognize the need to strengthen community ties and establish more consistent avenues for engagement. Leveraging community partnerships can offer a more structured and targeted approach to recruitment, tapping into existing networks to foster deeper connections and understanding within the community. Addressing these challenges head-on, we can better serve the residents of Pittsboro and empower them to address the pressing issue of PFAS contamination and its impact on their health.

### **Development of a Novel Protocol Measuring Antibody Binding by Bacterial Pathogens**

**Max Taylor** (Dr. Eryn Bernardy) Department of Biology

*Staphylococcus aureus*, a formidable opportunistic pathogen identified by the Centers for Disease Control as a serious threat particularly due to its involvement in infections in healthcare settings. This research introduces a cost-effective methodology for examining antibody binding by bacteria,

circumventing the reliance on costly pre-made assays. Our assay focused on the binding of antibodies by *S. aureus*. *S. aureus* expresses a protein called SpA on its surface which is bound by the core structure of antibodies during infection, making it a useful bacteria to use for the development of this novel procedure. To quantitatively measure antibody binding, we obtained a non-specific fluorescently labeled antibody. To test binding by this antibody, we started by growing a laboratory isolate of *S. aureus* called JE2. We incubated tubes with antibody alone, bacteria alone, and a combination of both. After incubation, each tube was split, with one set untouched and the other centrifuged. Fluorescence in each tube's liquid was then measured. Our hypothesis was that if *S. aureus* binds to the antibody, centrifugation would trap it in the pellet, resulting in decreased fluorescence compared to the corresponding non-centrifuged tube. When bacteria and antibody were incubated without centrifugation, fluorescence was high, but centrifugation significantly reduced it, with a remarkable decrease of 28,256. A change of this magnitude did not occur in tubes containing antibody alone suggesting unbound antibody does not move into a pellet. Specifically, there was only a small difference of 2,896 when comparing antibody alone tubes (centrifuged versus non-centrifuged), and we attribute this to just background noise of measuring fluorescence. Overall, this data supported our hypothesis that the antibody binds to *S. aureus* and when spinning in a centrifuge, the antibody bound to bacteria would precipitate into a pellet, but free antibody would not. The major conclusion drawn from this research is validating a practical, low-cost methodology for investigating antibody-bacteria interactions. This approach not only contributes to the efficiency and accessibility of experimental techniques but also has broader implications for advancing research in microbiology and immunology, particularly in resource-limited settings.

### **Can An Old Bird Learn New Songs? Three Promising Methods That Didn't Work**

**M. Alayna Thompson** (Dr. Dave Gammon) Department of Biology

Learning throughout life is an essential skill for humans and other animals. Based on indirect evidence, many bird researchers have concluded that mockingbirds can imitate new songs throughout life. Nevertheless, adult mockingbirds have never imitated a tutor stimulus in any experiment, perhaps because experimenters failed to create an effective social context for learning. I tutored adult mockingbirds in the field using three novel experimental methods: 1) simulating song type matching between neighbors, n=16 adults; 2) using Pavlovian methods that pair a tutor song with a food stimulus, n=4; and 3) simulating the arrival of migrant song tutors, n=19. After performing these experiments, I recorded 945 minutes of song from 28 adults and analyzed recordings by ear and through visual analysis of computer-generated spectrograms. No tutor stimuli were observed in the songs of any bird. It remains unclear how, or whether, adult mockingbirds can learn new tutor songs.

### **CO2 Emission of Different Forms of Agriculture<sup>2</sup>**

**Emma G. Zelkind** (Dr. David Vandermast) Department of Biology

In 2020, the agriculture sector was responsible for 11.2% of U.S. greenhouse gas emissions. This is a significant proportion of total emissions and reducing it moves the U.S. closer to the UN Paris Accord

agreement of net zero emissions. Additionally, many people prefer to purchase locally produced vegetables and providing them with useful information regarding carbon cost is helpful for their decision-making process. This study aims to compare the carbon cost of producing lettuce from seed to harvest in three agricultural methods: large-scale farming, hydroponic farming, and local small-scale farming. We determined the carbon cost of large-scale farming from the USDA. We contacted small-scale and hydroponic farms by email and provided them with an on-line questionnaire, from which we obtained lettuce production by weight and as a proportion of total production, and the sources and amounts of the farm's energy inputs. We found a wide range of carbon production by farming method: large-scale farming practices averaged 0.57 lbs. of CO<sub>2</sub>e per lb. of lettuce, small scale farms ranged from 0.156 to 4.8 lbs, and hydroponic farms ranged from 0.627 to 1.675 lbs. We found that large-scale agricultural practices use less CO<sub>2</sub> on average than do hydroponic and small-scale farms for a standardized unit of produce when measured from seed to harvest. We believe this to be due to differences in economies of scale. Although results indicate reduced carbon costs per unit of produce on large-scale farms, we did not account for the greater carbon cost of transportation associated with large-scale farming nor did we estimate costs associated with other aspects of farming, such as water use and agricultural runoff, which would likely shift the carbon benefit to small-scale farms with local customers. The range of values we obtained illustrates the variability and diversity of carbon-producing practices in the agricultural sector and highlights the need to understand the entirety of carbon costs from different agricultural practices.

## Chemistry

### Aggregation Effects of Amyloid Beta (1-42) and Insulin

**Katherine E. Conover** (Dr. Kathryn Mansfield Matera) Department of Chemistry

Alzheimer's disease has been correlated with the build-up of amyloid-beta plaques due to aggregation of small amyloid peptides. The amount of aggregation of amyloid-beta has been shown to increase substantially over time when in the presence of insulin, leading to a higher risk for the development of Alzheimer's disease in patients with diabetes. The interaction of amyloid-beta (1-42) and insulin was examined under a variety of conditions to investigate aggregation patterns. Through SDS-PAGE and western blot techniques, the aggregation of amyloid beta was studied over increasing time intervals. To mimic a physiologically accurate system in which the aggregation levels were observed, different concentrations of polyethylene glycol (PEG) and insulin were included in the aggregation experiment. Under the same conditions, Thioflavin T assays and Bradford assays were used to quantify the aggregation. Aggregation was the highest when amyloid-beta was combined with PEG and insulin, compared to lower values when aggregated separately.

### Investigating Chemoresistance Mechanisms and Collateral Responses in Pancreatic Ductal Adenocarcinoma

**Christopher D'Inzeo** (Dr. Victoria Moore) Department of Chemistry



Despite great effort in the development of treatment strategies for pancreatic ductal adenocarcinoma (PDAC), response rates to current gold standard chemotherapies such as 5-fluorouracil (5-FU) and gemcitabine remain low. One possible explanation for low response rates involves intrinsic or acquired chemotherapy resistance. This study aims to develop chemoresistant PDAC cell models for investigations into chemoresistance mechanisms and novel combination therapies for chemoresistant PDAC. Currently, Panc 04.03 cell lines have undergone several rounds of treatment with gradual increases in the concentration of 5-FU to evolve chemoresistant cell populations. Cell viability analysis of 5-FU treated PDAC cells has revealed increased sensitivity to the chemotherapeutic gemcitabine, a phenomenon known as collateral sensitivity. Future work will increase 5-FU resistance levels through additional drug treatments and screen common chemotherapies against 5-FU chemoresistant PDAC for collateral responses. Taken together, this work will provide a model to study chemotherapy resistance in PDAC and open avenues for novel treatments of chemoresistant PDAC.

### **Aggregation of Alpha - Synuclein in the Brain**

**Shane Dwyer** (Dr. Kathryn Mansfield Matera) Department of Chemistry

A hallmark of many neurological diseases, such as Parkinson's disease, is the presence of aggregated proteins found in the brain.  $\alpha$ -synuclein peptide monomers exist abundantly in the brain, but these monomers have the potential to associate together, or aggregate, which contributes to neuronal death which may lead to Parkinson's disease. The oxidative effect of  $\alpha$ -synuclein aggregates on surrounding biomolecules, such as lipids found in neuronal cell membranes, has been suggested as a pathway of the progression of Parkinson's disease. It has also been suggested that neurotransmitters alter aggregation patterns of  $\alpha$ -synuclein and may affect the progression of the disease, therefore serotonin was examined to determine its effect on aggregation. Gel electrophoresis showed that  $\alpha$ -synuclein readily aggregates when incubated over time; in addition, the Bradford Thioflavin T assays demonstrated that when the neurotransmitter serotonin was present, aggregation did not occur as readily as when the protein was aggregated alone. UV-Vis spectroscopy was used to observe the oxidative effect of the aggregates; the production of reactive oxygen species (ROS) may be initiated by the presence of these  $\alpha$ -synuclein oligomers as seen in a model system cytochrome c assay. Further experimentation on the ability of  $\alpha$ -synuclein aggregates both with and without the presence of neurotransmitters will be further studied to determine the capability of these aggregates to oxidize other biomolecules.

### **Resisting Resistance: Developing Gemcitabine Resistance in HL-60 Cells to Uncover Collateral Sensitivities in Acute Promyelocytic Leukemia**

**Aoife C. Judge** (Dr. Victoria Moore) Department of Chemistry

Chemotherapy resistance in Acute Promyelocytic Leukemia (APL) is a pressing concern as it undermines the effectiveness of gold standard chemotherapy-based treatments. Approximately 15% of leukemia patients will not respond to initial treatment and half of initial responders will eventually relapse. Primary or acquired chemo-resistance represents a major cause of treatment failure and mortality. It is imperative to find innovative solutions to chemo-resistance. Among these, collateral sensitivity - wherein resistance to one therapy results in sensitivity to a different chemotherapy - emerges as particularly promising. The concept of synergy - where the combined effect of two or more

drugs is greater than that of their individual potencies - is another possible solution. This research aims to develop new treatment methods for chemoresistant APL cells by exploring collateral sensitivities and synergistic chemotherapy drug responses in gemcitabine treated HL-60 cell lines. Current work has focused on creating resistance with independently treated HL-60 cells with 2.5 uM, 5uM and 7.5 uM of gemcitabine. Ongoing experiments focus on the further development of resistant cell lines by increasing treatment concentrations gradually and will subsequently assess how these resistant lines respond to treatment differently when compared to their non-resistant counterparts. As this research progresses, it will contribute to the identification of innovative solutions and optimized drug combinations, ultimately advancing our ability to combat chemotherapy resistant cancers more effectively.

### **Quenching Behavior of Explosives on Organic Luminescors in Non-Hazardous Solvents<sup>3</sup>**

**Lauren Kennedy & Marika Kassaris** (Dr. Karl D. Sienarth) Department of Chemistry

Analysis of samples from crime scenes associated with arson or explosives are severely backlogged at crime laboratories. If sample analysis could be performed on site, investigators might be provided with early leads in such cases. For this to be practical, however, analyses must be done using non-hazardous solvents; most published studies involve hazardous solvents such as acetonitrile or dichloromethane. Our studies focus on luminescence quenching by explosives in aqueous buffers and ethanolic solutions. The most common method for analyzing quenching behavior is to plot the measured quenching vs. the concentration of quencher added: this is a Stern-Volmer plot. One challenge encountered in the development of this method is that, in studies thus far, the Stern-Volmer plot is often observed to be nonlinear. The hypothesized source of this nonlinear behavior is the occurrence of two different quenching processes, dynamic and static, which occur at different quencher concentration ranges. To isolate if one or the other, or possibly both, modes of quenching are occurring, the time required for a luminescor to release a photon can be measured as a function of quencher added, so-called decay time measurements. We will report on our work to determine the concentration ranges of static and dynamic quenching, as well as the transition range in between, using time-correlated single photon counting (TCSPC) to measure decay time. The quenching behaviors of dinitrophenol (DNP) and dinitrotoluene (DNT) as model compounds, as well as the explosives TNT, tetryl, and RDX, on the luminescors diphenylanthracene (DPA) and perylene have been studied in this manner. Results to date suggest that both dynamic and static quenching occur simultaneously, but that dynamic quenching dominates at low quencher concentrations.

### **Release of Nanoparticle Coatings Additives From Common Surfaces via Simulated Dermal Contact**

**Ryan Kolaitis** (Dr. Justin Clar) Department of Chemistry

Both nanoparticles (NPs) and nano-enabled products have become widely available in consumer markets in the last decade. Surface coatings, including paints, stains, and sealants, have seen large increases in the inclusion of nanomaterials in their formulations, in order to boost UV resistance,

hydrophobicity, and scratch resistance. However, these additional nanoparticles can harm the environment and the human body due to their small size. Currently, literature studying the release of NPs and byproducts from coated surfaces has focused exclusively on lumber. In this study, well characterized CeO<sub>2</sub> NPs were dispersed in either Milli-Q water, or a commercial paint primer, and were applied to several test surfaces including sanded plywood, drywall, low density polyethylene, acrylonitrile butadiene styrene, polycarbonate, textured polycarbonate with pebble finish, and glass. Coated surfaces were sampled using a method previously developed by the U.S. Consumer Product Safety Commission to track the release of NPs via simulated dermal contact. Particular attention has been paid to the total amount, and morphology of material released. The total amount of cerium released from coated surfaces was found to be dependent on both the identity of the test surface, as well as the coating solution. Water-based application found 22-50% of the applied CeO<sub>2</sub> NPs removed during testing, while primer-based application showed released rates ranging between 0.1-3%. Finally, the SEM micrographs suggest the release of microplastic particles during simulated dermal contact with plastic surfaces.

### **Effects of Fused Ring Inhibitor Structures on Aromatase Activity: Treatment Alternatives for Estrogen Receptor-Positive Breast Cancer<sup>3</sup>**

**Stephanie R. Land** (Dr. Kathryn Mansfield Matera) Department of Chemistry

Estrogen receptor-positive (ER+) breast cancer represents 66%-80% of diagnosed breast cancers and is characterized as an overexpression of estrogen receptors. Tumor growth rate is accelerated by estrogen synthesis; thus, a viable strategy for targeting ER+ breast cancers is by inhibiting the enzyme that catalyzes the last biosynthetic step of physiological estrogen formation, CYP19A (aromatase). Exemestane is an FDA-approved aromatase inhibitor and is a large, four fused ring compound; however, the structure-activity relationship of this fused ring system has not been investigated and smaller inhibitors must be evaluated. In this inhibitor study, aromatase inhibition was measured by a fluorescent spectrophotometric enzyme assay and the effect of that inhibition was quantified through Michaelis-Menten kinetics calculations. Exemestane was used to establish a baseline for aromatase inhibition and demonstrated a 92.0% inhibition at 10  $\mu$ M and a  $K_m$  value of 8.268  $\mu$ M. A tricyclic structure, 9,10-phenanthrenequinone, yielded the next highest percent inhibition at 47.6% and a  $K_m$  value of 3.220  $\mu$ M. The compounds composed of fewer rings led to lower inhibition. A bicyclic structure,  $\beta$ -tetralone, and a monocyclic structure, cyclohexanone, inhibited the enzyme by 35.5% and 7.18%, respectively. Ring size influences the inhibition capacity of aromatase inhibitors as this study shows that a greater number of fused rings results in greater inhibition of aromatase.

### **Exploring the Moieties of VER-155008: Targeting Hsp70 Inhibition for Breast Cancer Therapy**

**Megan Liebig** (Dr. Kathryn Mansfield Matera) Department of Chemistry

Breast cancer remains a significant global health challenge, necessitating novel therapeutic strategies for improved patient outcomes. One target for these new strategies is heat shock protein 70 (Hsp70), which is overexpressed in breast cancer and is associated with disease progression. VER-155008, an adenosine derived aromatic ring, is a known inhibitor of Hsp70. This research analyzed the structural

features of VER-155008 in order to determine the essential structural components for inhibition of Hsp70. Inhibition was tested using a commercially available chemiluminescent assay kit that analyzed the ATPase activity of Hsp70. Initial results indicate that the adenosine moiety of VER-155008 interacts with the active site of the ATPase region of Hsp70 in order to inhibit the protein, whereas both the benzonitrile and 1,2-dichlorobenzene moieties do not alone cause inhibition. Results indicate that adenosine inhibits Hsp70 at greater levels than adenine. Using a chemiluminescent assay, it was determined that adenosine decreases the percent activity of Hsp70 to 51.5%, where adenine decreases it to only 78.8% of Hsp70's full binding potential. Because of this increased inhibitory effect, the binding ability of adenosine will be further analyzed using UV-Vis and SDS-PAGE. Employing these methods on resulting supernatants from immunoprecipitation experiments will provide information on how well the adenosine is binding to Hsp70.

### **Multifunctional Nanocomposites for Water Treatment<sup>2,3</sup>**

**Grace M. London** (Dr. Justin Clar) Department of Chemistry

Water pollution is a prevalent global issue that poses concerns for health, environment, and quality of living. In fact, the United Nations has included “ensuring availability and sustainable management of water and sanitation for all” as one of their sustainable development goals (UN 2023). While there are a variety of technologies currently used in water treatment, there is still room for improvement in terms of reliability, cost, and efficiency. One area under investigation for water treatment technologies is nanotechnology. A new class of engineered materials that include nanoparticles, may serve as excellent tools for water treatment and remediation. Also, the nature of nanotechnology allows for combining different types of materials and particles into multifunctional composites that can be used in a variety of environments. These hybrid composites can include particles with high adsorption capacity, photocatalytic ability, and magnetic character. Previous work by the Clar lab has made composites with PDMS and boron nitride, as well as PDMS and magnetic neodymium iron boride particle composites using a sugar templating method. This work aims to develop a variety of multifunctional hybrid composites using combinations of PDMS (polydimethylsiloxane), sodium alginate, chitin, boron nitride nanobarbs, magnetic neodymium iron boride microparticles. Adsorption and photocatalytic experiments will be run to characterize and study the degradation of these new composites.

### **Investigating the Sensitization of Pancreatic Cancer Cells by IFN- $\gamma$**

**Gillian Perilstein** (Dr. Yuko Miyamoto) Department of Chemistry

Pancreatic cancer remains one of the deadliest cancers with a five-year relative survival rate of around 12%. Both pancreatic cancer and type II diabetes result from dysregulation of the pancreas and inflammation. Proteins called inflammatory cytokines, which cause inflammation, are produced by immune cells. Many cytokines are associated with different types of inflammatory response, such as IFN- $\gamma$ , which is associated with the induction and progression of tumors. IFN- $\gamma$  specifically activates immune cells and will put cells in an inflammatory state. A correlation has been found between an increased level of intracellular IFN- $\gamma$  and becoming diabetic, which creates an environment that may

lead to cancer development. This research investigated how 24-hour treatment with 100 ng/ml, 75 ng/ml, 50 ng/ml, 25 ng/ml, and 12.5 ng/ml of IFN- $\gamma$  affects pancreatic cancer cell growth in the male PANC-1 cancer cell line. To determine cell viability, a colorimetric assay was completed. The results obtained from this study demonstrate that IFN- $\gamma$  on its own does not influence pancreatic cancer cell viability. In the future, combination studies using IFN- $\gamma$  in conjunction with different chemotherapeutics may potentially increase cell sensitivity to chemotherapeutics; thereby increasing pancreatic cancer cell death.

### **Synthesis and Characterization of Polypyridyl-Carbonyl Complexes of Cobalt, Rhodium and Iridium<sup>3</sup>**

**Emma Puleo, Ivan Nguyen, & Olivia DiGiovanni** (Dr. Karl D. Sienarth) Department of Chemistry

Industrial processes used to make consumer products like fertilizer, medicines and plastics often utilize metals to facilitate their formation. Transition metals in groups 5 to 11 possess tunable properties that make them attractive components of catalysts, compounds used to facilitate transformations. Further development has led to these metals being combined with organic molecules to form organometallic complexes. Previous studies have found that certain rhodium-centered compounds are effective catalysts in the electrochemical reduction of CO<sub>2</sub>. Organometallic complexes with the Group 9 metals ions Co<sup>2+</sup> and Ir<sup>3+</sup> are analogs to the Rh<sup>3+</sup> (also Group 9) metal centered catalysts previously reported, with the potential benefit of being less costly. Our immediate goal is to fully characterize a range of simple organometallic complexes with Group 9 metal cores to provide future researchers with a comparative database of fundamental physical and chemical properties. With the previous Rh-based studies as a model, we have so far synthesized Group 9 metals (Co, Rh and Ir) with terpyridine, 2,4,6-tris(2-pyridyl)-s-triazine and bis(pyridylcarbonylamide) ligands (TPY, TPTZ and BPCA, respectively). Thus far we have acquired FTIR, <sup>13</sup>C and <sup>1</sup>H NMR spectra as preliminary confirmation of successful synthesis of nine of the complexes. In each case, recrystallization from boiling acetonitrile was necessary. Solubility studies demonstrate that, in general, all of the complexes exhibit higher solubility in more polar solvents, although the M(bpca)<sub>2</sub><sup>+</sup> complexes tend to have appreciable solubility in chloroform as well. The solubility of each complex was evaluated via UV-Vis. Future studies will include electrochemical characterization of the complexes as well as elemental analysis and X-Ray crystallography.

### **Utilizing Boron Nitride Nanomaterials for Remediation of Per- and Polyfluoroalkyl Substances (PFAS)**

**Amaya Sheffield** (Dr. Justin Clar) Department of Chemistry

Per- and polyfluoroalkyl substances (PFAS) are manmade chemicals used in commercial products and industrial processes to make heat, oil, stain, and water-resistant coatings. The base chain of PFAS consists of extremely strong carbon-fluorine bonds, making them resistant to natural degradation. Human exposure to these chemicals is linked to health issues including thyroid disease, kidney cancer, and testicular cancer, emphasizing the need for its removal from wastewater and for comprehensive research surrounding water treatment options. Current materials used for PFAS remediation include granular activated carbon, ion exchange resins, and reverse osmosis. This research investigates the

ability and efficiency of boron nitride (BN) nanobarbs and composites in removing and degrading one of the most common PFAS, perfluorooctanoic acid (PFOA). Composites consisted of BN nanobarb powder and polydimethylsiloxane (PDMS) polymer, a novel combination of materials which immobilized the powder and allowed for easier removal after experimentation. Several BN materials and composite materials were tested, with the most effective at reducing PFOA concentration being BN nanobarbs by themselves. Highly concentrated samples of PFOA exposed to UV-C light demonstrated significant UV photodegradation by BN nanobarbs, decreasing from 49.4 ppm to 0.00446 ppm in 4 hours, as analyzed by LCMS/MS. Reuse studies revealed increased efficacy of the material on the second use. Ion Chromatography analysis determined that the concentration of free fluoride ions in solution after UV photodegradation with BN nanobarbs reached approximately 30% of the expected concentration, suggesting the possible formation of short-chain byproducts. This research highlights the efficacy of BN nanobarbs in partially breaking down PFOA.

### **Why is the Ethyl Cation More Stable than the Methyl Cation? Contributions by Inductive Effects, Hyperconjugation, and Internal Solvation**

**Max W. Shilling & Nicholas Berry** (Dr. Joel Karty) Department of Chemistry

Carbocations, such as the methyl cation ( $\text{CH}_3^+$ ) and the ethyl cation ( $\text{CH}_3\text{CH}_2^+$ ), are important high energy intermediates in certain organic reaction mechanisms.  $\text{CH}_3\text{CH}_2^+$  is more stable than  $\text{CH}_3^+$  by about 43 kcal/mol in the gas phase, and that stabilization is provided in three different ways by the methyl group ( $\text{CH}_3$ ) attached to the  $\text{C}^+$  atom. One contribution is from inductive effects, because a methyl group, being electron-donating, will partially cancel the formal +1 charge. The second contribution is from hyperconjugation, because the filled C-H bonding orbitals will mix with the unfilled p orbital of the  $\text{C}^+$  atom. The third contribution is from polarizability effects, because the presence of a methyl group will increase the polarizability of the cation, which provides internal solvation of the +1 charge. All three of these effects take place simultaneously, and the aim of this study is to determine the contribution by each effect separately. To do so, four different valence bond theory (VBT) calculations were carried out for the  $\text{CH}_3\text{CH}_2^+$  ion, and differences in resulting energies were determined. In the first calculation, the electron densities for the  $\text{CH}_3$  group and C-C bond of ethane ( $\text{CH}_3\text{CH}_3$ ) were mapped onto the  $\text{CH}_3$  group and C-C bond of  $\text{CH}_3\text{CH}_2^+$ , and were frozen. In the second calculation, to determine the inductive effects, the electron density of the C-C bond was optimized. In the third calculation, to determine the effect from polarizability, the electron density of the  $\text{CH}_3$  group was optimized. In the fourth calculation, to determine contribution by hyperconjugation, all orbitals were completely delocalized. Results show that the contribution by inductive effects is about 9 kcal/mol, the contribution by hyperconjugation is about 25 kcal/mol, and the contribution by polarizability effects is about 9 kcal/mol. Future studies will be carried out on the isopropyl cation,  $(\text{CH}_3)_2\text{C}^+$ , and the tert-butyl cation,  $(\text{CH}_3)_3\text{C}^+$ .

### **Why is Methylamine a Stronger Base than Ammonia<sup>3</sup>**

**Michael Smith** (Dr. Joel Karty) Department of Chemistry

Ammonia ( $\text{NH}_3$ ) and methylamine ( $\text{CH}_3\text{NH}_2$ ) are weak bases, with methylamine being the stronger base. The methyl group enhances the base strength by stabilizing the positively charged ammonium



ion that is produced upon protonation. Such stabilization by the methyl group can come from two different contributions, inductive effects and polarizability effects. Both effects take place simultaneously, and the aim of this study is to determine the contribution by each effect separately. To do so, three different valence bond theory (VBT) calculations were carried out for the gas-phase reaction  $\text{CH}_3\text{NH}_2 + \text{H}^+ \rightarrow \text{CH}_3\text{NH}_3^+$ , all beginning by mapping the electron densities for the  $\text{CH}_3$  group and C-C bond of ethane ( $\text{CH}_3\text{CH}_3$ ) onto the  $\text{CH}_3$  group and C-N bond of methylamine. In the first calculation, the electron densities of the  $\text{CH}_3$  group and the C-N bond were frozen; in the second calculation, the electron density of the  $\text{CH}_3$  group was frozen, while the electron density of the C-N bond was allowed to optimize; and in the third calculation, the electron densities of both the  $\text{CH}_3$  group and the C-N bond were allowed to optimize. Results show that the contribution by inductive effects toward the basicity enhancement are roughly four times greater than the contribution by polarizability effects. Future studies will be carried out to determine the contributions by inductive and polarizability effects of the methyl groups in dimethylamine,  $(\text{CH}_3)_2\text{NH}$ , and trimethylamine,  $(\text{CH}_3)_3\text{N}$ .

### **Heavy Metal Contamination in Consumer Products**

**Rachel A. Solomon & Jessica Adner** (Dr. Dan Wright) Department of Chemistry

Stories of contamination of agricultural and consumer products by heavy metals are becoming more prevalent in the news. These include discovery of lead and chromium in Chinese cosmetic products, lead and cadmium in chocolate bars, and other agricultural products that uptake metals based on a myriad of environmental conditions. The idea of heavy metal accumulation in agricultural or consumer products is being investigated with two different questions. First, does the Environmental Working Group's dirty dozen (DD), crops which are considered hyperaccumulators of pesticides also accumulate heavy metals? Second, do domestic cosmetics and chocolates show elevated levels of heavy metals? An analytical technique to quantify the amounts of metal in samples is x-ray fluorescence (XRF) spectroscopy. Although XRF is a fast and efficient method to detect metals, it is less sensitive than other, more robust techniques and its efficacy in detecting low levels of contaminants in these products must be considered. Preliminary results indicate lower levels of metal contamination than seen in literature which may require a change to a more sensitive instrument.

### **Intercropping as a Method to Reduce the Concentration of Toxic Metals in Edible Crops<sup>2</sup>**

**Jackson C. Spaeth** (Dr. Dan Wright) Department of Chemistry

Intercropping, or the human-directed planting of two plant species near each other to enhance growth and survival, is a proven method employed in modern agricultural practices. Intercropping has the potential to serve in the context of phytoremediation, whereby plants are used to extract contaminants from soil. This research explores the efficacy of intercropping within heavy metal phytoremediation, allowing two plants to grow simultaneously, where one plant may preferentially uptake heavy metals in contaminated soils, thus preventing or mitigating the uptake of heavy metals by the other. Five companion pairs (one sacrificial crop, one edible crop) will be analyzed, and each companion pair will be exposed to a predetermined heavy metal. Edible crops were determined through a review of the most common edible crops grown in North Carolina, and sacrificial crops were identified to be crops

commonly “intercropped” with the edible crops. The first companion pair of oats (the edible crop) and alfalfa (the sacrificial crop) was grown in the fall and provides the basis of the current analysis. This pair was treated weekly in separate groups for chromium and lead, resulting in six weeks of treatment with six portions of water contaminated with lead or chromium. Observational data indicates that chromium exposure had greater lethality than lead among individual alfalfa and oat samples (i.e. only oats or alfalfa in a pot). Additionally, oats planted with alfalfa within the chromium group appeared taller than oats alone, suggesting that the alfalfa may be mitigating chromium uptake by the oats. Analysis with X-ray fluorescence (XRF) or inductively coupled plasma optical emission spectroscopy (ICP-OES) of the alfalfa and oat samples will show the amounts of metals that were taken up by both species.

## **Examination of Trace Metal Content in Sparklers and Effect on Lungs Utilizing Synthetic Lung Fluid<sup>2</sup>**

**Genesis L. Tolbert** (Dr. Justin Clar) Department of Chemistry

Fireworks produce an array of colors through the burning of metallic particles, a process that produces flames and releases metal oxides as a result. Respiratory exposure to subsequent fumes and pollutants can induce oxidative stress and increase the risk of developing health issues such as lung irritation and cancer. While previous research has examined particulate matter emission from fireworks and related health consequences, little research has been done regarding handheld fireworks, or “sparklers”. This study aims to understand the potential human health risk associated with the use of handheld sparklers and subsequent exposure to fumes produced. Samples included sparklers from three different manufactures and three different colors (red, green, gold). The study was completed in two distinct phases. Phase one determined the trace metal content of both pristine and used sparklers via microwave assisted acidic digestion and inductively coupled plasma optical emission spectroscopy (ICP-OES) analysis. The difference in trace metal content between pristine and used samples indicated significant release of aluminum, a known neurotoxin, as well as arsenic and chromium. Phase two involved the burning of pristine sparklers under controlled conditions and collection of fumes on 0.45µm air filter cassettes. The resulting cassettes were incubated in two synthetic lung fluids, artificial lysosomal fluid (ALF) and Gamble’s solution (GS), to determine the potential bioavailability of trace metals released. ICP-OES analysis revealed greater dissolved trace metal content in ALF. Further research is needed to understand what percentage of fumes produced from burning sparklers enter the breathing zone of end users, particularly children, to better inform risk assessment and modeling.

## **Cinema & Television Arts**

### **Examining the Portrayal of the Queer Coming-of-Age Experience in Contemporary Film<sup>1</sup>**

**Stella R. Bloom** (Prof. Sowjanya Kudva) Department of Cinema and Television Arts

This study identified thematic and characteristic patterns in the queer coming-of-age genre. As a queer person who consumes queer media, I felt that there were redundancies and shortcomings in the genre



and I hoped that by identifying these, I could create a queer coming-of-age film that filled a gap in the genre. These patterns were pulled from the most-watched LGBTQ+ new release of each year from 1998-2023, which were selected by their performances on BoxOfficeMojo, IMDB, and Google Trend Reports. When identifying patterns, I examined the social pressures the protagonists face, protagonist success, treatment from outsiders, self-perception, what informed protagonist relationships, and identities explored other than queerness. The majority of queer protagonists were cisgender gay men and the majority of films contained a coming-out narrative. By dwelling on the coming-out experience, filmmakers strip the queer protagonists of their chance to explore their identities freely, in and outside of their queerness. Additionally, many protagonists' romantic relationships were only informed by a shared secret or trauma relating to their mutual queerness. There was also a lack of support systems in many films for protagonists to fall back on, often isolating them and encouraging personal growth instead of fostering a community. Lastly, there was a wide gap between films that explored queer trauma and those that were meant for mainstream, non-queer audiences, therefore, a lack of films with happy endings that still had a distinctly queer voice and experience. I used these findings to inform an original feature-length queer coming-of-age screenplay, in which I address the void in this genre with a story of a lesbian college athlete successfully overcoming self-sabotage and a victim mindset, finding a supportive community.

### **Recreating the American Prometheus: How Christopher Nolan's Oppenheimer Intertwined Film Theory and Framing Theory**

**Ryan Campbell** (Dr. Barbara Miller Gaither) Department of Cinema and Television Arts

This study will examine the ways that Christopher Nolan's 2023 historical biopic *Oppenheimer* makes use of aspects of film theory to recreate its title character and time period to feel authentic, almost as though audiences are not watching a movie but witnessing real events as they unfold. The relevance of this study comes from the release and acclaim of Nolan's 2023 biopic, along with the renewed interest in J. Robert Oppenheimer and the Manhattan Project. Shortly after the film's release, advocates campaigned for an amendment to the Radiation Exposure Compensation Act to include people irradiated from wind blowing down the radiation from the Trinity Test, suggesting the film likely played a significant role in capturing audience attention and redirecting attention to the Manhattan Project. This study will focus on how the movie uses elements of film theory, such as cinematography to frame Oppenheimer's life and how it portrays his life and actions. Specifically, this will examine a variety of different scenes throughout the movie and analyze them through the lens of film theory and comment on the emotional reaction among audiences that was likely intended. The analysis will also explore how the film framed Oppenheimer's life and actions in a positive, critical, or complex light. The purpose of this research will be to comment on how cinematic choices made by Nolan and the filmmaking team managed to catapult Oppenheimer's story and work back into the public consciousness.

### **Comedians and Cancel Culture: Actions Speak Louder Than Words**

**Declan A. McGeady** (Prof. Harlan Makemson) Department of Cinema and Television Arts

Widespread use of social media has led to the increase in a phenomenon known as cancel culture. Following a controversy, a person is open to the risk of being shamed publicly on various platforms, which can have dire consequences. Celebrities, influencers, and typical people alike are exposed to the risk of having their careers ruined and reputations tarnished, based upon current societal standards. Social media serves as the platform where cancellation can most easily take place. This study investigates cancel culture through the lens of stand-up comedians, specifically that of Louis C.K. and Shane Gillis. Both comedians were cancelled following controversies yet have found their way back to the stage. C.K., was accused of sexual misconduct and Gillis came under fire after footage was released where he used racist and homophobic slurs. Through a qualitative content analysis of fifteen total news articles pertaining to their respective cancellations, three categories of discourse emerged: audience reaction, cancellation calls, and returning comedians. Four conclusions were gathered from this research. The most notable finding of this study is that the actions of stand-up comedians speak louder than words. Louis C.K. had a much harder time returning to the stage in the wake of sexual misconduct allegations than Shane Gillis faced for what he said. Secondly, the way the audience consumes content affects the way they will react. Next, cancel culture was discovered to be a temporarily effective tool for accountability, as both comedians have been able to return to their profession. Finally, comedy itself can be used as a foil to cancel culture.

### **Generational Perspectives in Comedy Writing**

**Jesse S. Riback** (Prof. Kai Swanson) Department of Cinema and Television Arts

This advanced writing undergraduate research workshop explores the significance of recognizing generational differences and diverse viewpoints in the creation of original comedic content for television. Through an in-depth analysis of *Generations* by Jean M. Twenge, students will explore how historical, social, and technological shifts shape humor and character development. This course emphasizes the integration of generational insights into the crafting of nuanced, multi-dimensional characters and narratives for pilot episodes. By analyzing successful sitcoms, engaging with scholarly research, and receiving professional critiques, students will refine their creative process. The culmination of this seminar will prepare students to confidently present their original comedic spec scripts to television studios.

### **Leveraging Generational Diversity for Comedic Impact in TV Screenwriting**

**Jesse S. Riback** (Prof. Kai Swanson) Department of Cinema and Television Arts

This project investigates the role of generational diversity in enhancing comedic tension and character conflict within television screenwriting. Inspired by the innovative humor and societal commentary of Norman Lear's *All in the Family* (1971-1979, CBS), my research showcases how the interplay between contrasting generational perspectives can be a rich vein of comedy. Through a meticulous examination of generational characteristics and their evolution over the last century, guided by insights from Jean M. Twenge's seminal work *Generations* (2023, Simon & Schuster), this research underpins the crafting of original spec scripts that bring to life the dynamics of intergenerational interactions in a comedic format for television. The scripts, an adaptation for *Ted* (Seth MacFarlane, 2023, Peacock) and an original pilot, *Space Monkey*, exemplify the practical application of theoretical insights, illustrating

how generational contrasts help intersect humor and conflict. This research journey culminates in a table read at the SURF Day Presentation, offering a dynamic showcase of how generational nuances can invigorate contemporary comedic writing and contribute to the genre's inclusive evolution. Through this presentation, attendees will gain insights into the creative process of developing comedic narratives enriched by generational diversity, alongside experiencing firsthand the comedic resonance of the scripts.

## Communication Design

### **Antes del sol (Before the Sun): Bridging Acculturation Gaps in Hispanic and Latin American Immigrant Families with a Dual-Language Board Game<sup>1</sup>**

**Matthew T. Newberry** (Prof. Rebecca Bagley) Department of Communication Design

A breadth of past research has identified a pattern of conflict that typically arises in Hispanic and Latin American immigrant families in the United States due to acculturation gaps and linguistic differences caused by Shared Language Erosion. In a distinct, three-generation cycle, the mother tongue can be lost within a family as descendants assimilate into their host culture after just a few decades. As a result, strained communication and discrepancies in cultural perspectives tend to ignite frustration, anger, and resentment among family members. In an effort to investigate how to resolve these separation issues among parents, grandparents, and children resulting from declining heritage language proficiencies, this project investigates the role of board games for educational development in language competency and how they may act as vehicles for interpersonal communication and bonding. Furthermore, the research investigates strategies for second language acquisition through quality time and leisure activities with native speakers of one's second language. The creative element consists of a dual-language board game that features a companion mobile app to facilitate gameplay, in addition to various promotional and branding materials to advertise the project. Ideally, the game will function as an opportunity for family members to connect through gameplay while also helping them become more proficient in the language less comfortable to them. This outcome allows for the project to have additional uses in classroom settings and expansion opportunities for future editions with other languages or dialects.

## Computer Science

### **SolAR: Immersive Learning through an Augmented Reality Application**

**Henry Agyemang** (Dr. Pratheep Kumar Paranthaman) Department of Computer Science

This collaborative research project delves into the immersive technologies domain, specifically Augmented Reality (AR) and Mixed Reality (MR). While these technologies increasingly blend

physical and digital realms, a significant research gap remains regarding user experiences, safety, comfort, immersion, and interaction patterns. Furthermore, there is a need to explore their effectiveness as learning tools. In collaboration with the Greensboro Science Center (GSC), our project pursues a dual objective. Firstly, it aims to evaluate the efficacy of AR technologies as educational aids, particularly within academic contexts. Secondly, it seeks to enhance the visitor experience at the GSC by revitalizing static educational content on their boardwalk. Our strategy involves integrating engagement techniques and 3D visualizations via an AR application named SolAR, seamlessly within the GSC's mobile platform, to facilitate an interactive expedition through the solar system. This research extends previous endeavors and addresses real-world challenges encountered at the GSC. SolAR offers an immersive educational journey through the solar system via augmented reality (AR). It delivers interactive 3D models of planets, their moons, and spacecraft that have explored them, along with informative details about each celestial body. The project also entails the development of both MR and AR applications with a comparative analysis of the two using Electroencephalogram devices to observe users' brain activity. Through this collaborative endeavor, we anticipate shedding light on the potential of immersive technologies to support education and enhance visitor engagement within science centers and similar venues. By bridging the gap between theory and practice, our research aims to provide actionable insights that not only enrich educational experiences but also pave the way for innovative applications of AR and MR technologies in diverse settings.

### **Translating Computer Game Mechanics to Mixed Reality**

**Gerald Fuller & Nikesh Bajaj** (Dr. Pratheep Kumar Paranthaman) Department of Computer Science

Mixed Reality (MR) is a hybrid technology that superimposes digital elements on the physical world with both the physics of the physical and digital world interacting. The application of MR in the video games domain is challenging due to the inherent limitations of the MR devices, such as user comfort, hardware limitations, and interaction modalities. Due to these challenges, there is a lack of development in mixed reality, which can be seen by looking at the app stores for MR headsets. In these app stores, most apps are not games; even the games are not actual MR games but virtual or augmented reality games played on a MR platform. In this research, we aim to explore the development process of converting computer games to a mixed reality platform. We focused on design considerations and interaction patterns specific to the mixed reality environment. As new technologies like the Apple Vision Pro are released and development in mixed reality becomes more commonplace there is a growing scope for investigation in usability design considerations. To translate computer games to mixed reality, we developed two different games: a high-intensity action game and a low-intensity puzzle game. With these two games, we gathered data on the player experience, cognitive, and physical workload. The first data collection method used an EEG headset to measure the six emotional states of the players (excitement, engagement, relaxation, stress, interest, and focus). These emotional states will give insight into whether the design considerations for the game types achieved the overall expected player experience. The second data collection method was three separate post-test surveys for each game. These surveys measured user experience, cognitive load assessment, and self-reported emotional data. Currently, we are analyzing the data collected. We aim to investigate the user experience, workload, and enjoyment in games that effectively use MR.

## **Assessing the Effects of Various Gaming Platforms on Players' Affective States and Workload through Electroencephalogram**

**Spencer W. Graham & Nikesh Bajaj** (Dr. Pratheep Kumar Paranthaman) Department of Computer Science

Game platforms impact player experience in different ways depending on their features, influencing affective states and workload. This study investigates these console-specific impacts, aiming to explore intricate aspects of player experience in gaming. Assessing player gameplay experience traditionally relies on subjective methods like self-reported surveys, where players reflect on their emotions and effort levels post-gameplay. However, supplementing these subjective measures with electroencephalogram (EEG) analysis introduces an objective approach to evaluating player experience. In this study, we explored player experiences across three prominent platforms: the PlayStation 5 (a traditional modern console with haptic controller feedback), the Nintendo Switch (a handheld, portable platform with integrated controls), and the Meta Quest 2 (a virtual reality headset). Employing a mixed-methods approach, we integrated subjective user assessments with EEG data to investigate brain activity, affective states, and workload during a low and a high-stimulation game for each console. A total of thirty participants were recruited to engage in the selected low and high-stimulation game for a randomly assigned platform from the three. The choice of games aimed to represent diverse gaming experiences, catering to different preferences and levels of stimulation. The findings reveal a statistically significant impact of these platforms on seven out of nine experience factors. Notably, the three platforms exhibit distinct influences on player experience and brain activity. PlayStation 5, known for its haptic controller feedback and cutting-edge graphics, evokes different affective responses compared to the portable and versatile Nintendo Switch or the immersive virtual reality environment offered by Meta Quest 2. Using a linear model, we establish correlations between user experience aspects such as arousal, valence, frustration, and mental/physical workload with different brain regions using EEG data, enabling us to map out the neural activity of player experience across the three platforms and shed light on the cognitive processes behind gaming. Qualitative insights from participants' subjective experiences also enrich our understanding of the multifaceted nature of gaming engagement. Bridging the subjective reflections with objective neurophysiological data provides a comprehensive perspective on the intricate relations between game platforms, player experience, and brain activity.

## **Addressing Class Imbalance in Machine Learning Using Variational Autoencoders<sup>3</sup>**

**Clayton McLamb** (Dr. Scott Spurlock) Department of Computer Science

In the era of artificial intelligence, machine learning models are increasingly used to make important decisions; for example, to determine which people should receive loans or whether medical tests indicate the presence of a disease. These machine learning models are trained on datasets that include historical examples of the classes to be predicted, e.g., a disease is present or not. Frequently, datasets are imbalanced: there are far fewer examples of a minority class (e.g., disease is present) compared to the majority class (disease is not present). This type of class imbalance poses a significant challenge for developing fair machine learning models; models often develop an implicit bias towards the majority class, leading to lower accuracy for the minority class. Commonly used algorithms, such as the Synthetic Minority Oversampling Technique (SMOTE), attempt to tackle imbalanced datasets by

generating new synthetic minority class examples to augment the original data. However, these algorithms are typically limited to generating samples as simple combinations of the minority data and fail to capture more complex patterns. Variational Autoencoders (VAEs), a type of neural network, can learn these complex patterns. By combining VAEs with synthetic sampling techniques, minority examples can be generated that more fully capture the complex dynamics in a dataset, thus overcoming this shortcoming of algorithms such as SMOTE. Compared to SMOTE and other recent oversampling algorithms, the proposed method is capable of augmenting otherwise imbalanced datasets more effectively, so that machine learning models trained on these augmented datasets show less evidence of bias based on common metrics such as precision, recall, and F1-Score. Experiments across multiple different classifiers and datasets will demonstrate the effectiveness of the approach.

### **Symptom Tracking Gamified: Exploring the Impact of Gamification Principles in a Mobile App for Symptom and Wellness Tracking**

**John R. Pittman** (Dr. Shannon Duvall) Department of Computer Science

A key factor in determining the quality of medical care is patient-provider communication. A patient's ability to relay symptom information is crucial to provider decision-making and has been shown to improve patient outcomes. In the age of AI and big data, it is unsurprising that there is a shift in the medical field towards more information-focused models of care. The possibility for more accurate, more efficient care is greater than ever, but so is the demand for patient data. Symptom tracking applications offer a way to bridge this gap, giving patients the ability to record and report outside of a medical setting. However, the vast majority of these applications fail to engage users. Principles of gamification found in social networks and language learning applications, for example, are often underutilized in the health tracking space, underscoring the need for further research. We will present the implementation of virtual reward systems in a mobile symptom tracker, with the goal of boosting user engagement, collecting otherwise lost data, and ultimately improving patient outcomes. The symptom tracker will implement a trophy cabinet feature, creating an incremental reward system for various milestones within the app. The presentation will include a demo prototype showcasing this feature and feedback analysis from a qualitative survey comparing it with existing products.

### **Improving Early Diagnosis of Pancreatic Cancer with Synthetic Data<sup>3</sup>**

**Zhuohao Tan** (Dr. Scott Spurlock) Department of Computer Science

Pancreatic cancer is a highly lethal disease, primarily because it is difficult to diagnose in its early stages using traditional methods. Using imaging and biopsy techniques on the pancreas is challenging because the pancreas is hidden deep inside the human body, located behind the stomach. The cancer's asymptomatic characteristics, where physical symptoms typically manifest only in the advanced stages. The physical effects of which only appear in the advanced stage. Researchers have begun applying machine learning models to improve the accuracy of early diagnosis of pancreatic cancer from medical images. Machine learning trains models to identify associated patterns and features within a dataset of medical images. However, accurate diagnosis using machine-learning models is challenging due to the limitations of the current medical datasets, which are often biased. Bias is caused by insufficient training examples of tumors of varying size, and patients are often diagnosed



with cancer at a later stage when tumors are larger. Dataset bias makes training an accurate machine learning model difficult. Therefore, this research focuses on improving the accuracy of pancreatic cancer diagnosis in the early stages by using artificial intelligence to generate synthetic data that closely replicates pancreatic cancer medical images. Generating synthetic samples is intended to reduce the bias of the data and enhance the model's performance in early diagnosis. To evaluate synthetic data, we will train machine learning models using both real and synthetic data to predict whether medical images indicate the presence of pancreatic cancer. We will evaluate how much the synthetic data improves the model accuracy. The addition of synthetic data should lead to models that are more accurate.

## **Navigational Device for People With Visual Impairments**

**Madeline Volchko** (Dr. Ryan Mattfeld) Department of Computer Science

While some efforts have been made to develop assistive devices, the walking cane and living guide are still the most commonly used. We seek to develop a device that will improve the ability for independence and quality of life by providing medium range (2-10 meter) guidance for obstacle detection. We specifically aim to address three common shortcomings we have seen in these new assistive devices. 1) Many of these devices rely on audio feedback; however, this sense is critical for people with visual impairments and should not be impeded. 2) Many devices do not provide warning for obstacles that are waist height or above. 3) Some devices require additional infrastructure such as RFID tags embedded into the ground or objects. Our device provides haptic feedback through motors located on a belt, will detect hanging objects, and does not require embedding sensors in the environment. It is a variation of the device developed by Díaz-Toro, Campaña-Bastidas, and Caicedo-Bravo, which uses stereo cameras to detect obstacles in the environment. We will be improving upon this device by changing how the obstacle detection works to provide a more accurate response to the user. In order to evaluate our device, we designed a research experiment involving participants that either have visual impairments or are wearing a blindfold. The IRB-approved experiment requires these participants to navigate a variety of foam block obstacles using our device. Our device will be assessed on the conclusion of these experiments based on how accurately the device helped participants avoid obstacles as well as through participant feedback collected via pre- and post-experiment surveys.

## **Extracting EEG Artifacts From VR Game Mechanics<sup>3</sup>**

**Alexander Wilson** (Dr. Pratheep Kumar Paranthaman) Department of Computer Science

Electroencephalogram (EEG) devices observe the electrical activity of the brain through electrodes positioned on the scalp. The EEG device also records biological signals called artifacts that can be thought of as stray signals unrelated to the brain activity being observed. Many artifacts are caused by body actions, such as moving, talking, and even breathing, while others are caused by sensor placement and human error. These artifacts pollute the EEG data and make the EEG data unreliable when trying to measure emotional responses. Thus, these artifacts must be removed using various artifact removal methods, each with its own advantages and disadvantages. Artifact removal methods are constantly being innovated and tested to find what works best in a given scenario. While artifact



removal is generally an open field of research, it is even less studied in the field of Virtual Reality (VR) because of the difficulties that arise from the overlapping placements of EEG and VR devices. There has been very little research combining EEG and VR devices, despite the promising results of the combination of the two devices. Because of the small crossover of the fields, there is little information on the artifact patterns that are created by VR game mechanics. In our research, we aim to identify these artifact patterns. We had 17 participants perform specific actions in an attempt to isolate the EEG pattern of the artifacts related to the actions. These artifacts included body and muscle movements in three VR game mechanics: shooting, slicing, and pick-and-place. The participants played three VR prototypes designed to isolate each of the game mechanics and one published VR game. The participants also filled out three questionnaires gauging their experience in VR. We plan to use the isolated EEG artifact patterns from the raw EEG data of the participants playing the published VR game and compare the EEG data to the results of the questionnaires. We will analyze the data in an attempt to provide a standard set of artifact patterns to be used in future research to streamline the artifact removal process.

## Economics

### **The Impact of Student Loans on the Racial Wealth Gap in the United States<sup>1,3</sup>**

**Christina M. Aleccio** (Dr. Cora Wigger) Department of Economics

Student loan debt in the United States has reached unprecedented levels, with outstanding debt exceeding \$1.6 trillion by the end of 2023, (Federal Reserve Bank of New York). This paper investigates the impact of student loan debt on racial wealth gaps, drawing from empirical data gathered through the 2019 and 2022 Survey of Consumer Finances. The survey encompasses participants aged 18 to 95, with an average age of 54. Net worth, in this context, refers to the total value of assets minus debts recorded at the time of the survey. Regression analysis reveals significant findings: for every dollar in student loans taken on, net worth for all individuals decreases by \$3.68 on average. Notably, white individuals experience a larger decrease, with a \$4.92 reduction in net worth per dollar of student loan debt. Income growth positively affects net worth, with each dollar increase in income associated with a \$2.07 rise in net worth for all individuals. However, variations are observed across racial groups, with white, black, Asian, and Hispanic/Latino populations experiencing different increases in net worth per dollar increase in income (\$1.98, \$3.89, \$2.38, and \$6.77, respectively). Taking on student loans also leads to increased income; For every dollar in student loans taken on, black individuals experience an increase in income of \$0.33, while Hispanic/Latino individuals experience a \$0.49 increase. These findings underscore the complex interplay between student loan debt, income, and wealth accumulation, particularly within the context of racial disparities. By understanding these dynamics, policymakers can develop targeted interventions to promote financial equity and economic prosperity for all Americans.

### **Wages and Whiskey: a Micro-Level Analysis on Personal Wages in the U.S<sup>3</sup>**

**Georgia Daniel** (Dr. Steve Deloach) Department of Economics

According to data gathered from 2006, alcoholic overconsumption is responsible for about 79,000 annual deaths, which makes it the third-leading preventable cause of death in the United States (Bouchery et al., 2011). While alcohol is common in day-to-day society, its overconsumption poses significant health and economic challenges. Excessive drinking contributes to diseases, disabilities, and is a primary factor in preventable deaths. Furthermore, alcoholism is more likely to lead to diminished educational attainment, impacting individuals on multiple levels. In regards to economics, heavy alcohol consumption is linked to unemployment, increased absenteeism, and reduced productivity. Studies estimate the considerable economic cost of excessive drinking and emphasizes lost productivity as a major contributor. However, it is crucial to distinguish between alcoholism and moderate drinking, as the latter has been associated with higher earnings and even positive health benefits. This research study analyzes the relationship between levels of alcohol consumption and individual wages within the United States using individual data gathered from the National Longitudinal Survey of Youth (NLSY) spanning from 2001 to 2015. Both theory and prior research suggest that moderate drinkers will experience wage increases while heavy drinkers face decreases. To mitigate confounding factors, the regression model includes control variables such as educational attainment, age, gender, and other controls to provide a more precise understanding of alcohol's influence on individual earnings. Preliminary results indicate that drinking moderately increased wages while negative drinking behavior (specifically drinking before work) are associated with decreased earnings.

### **Innovative Defense: The Effect of Military Expenditure on Innovation within OECD Member States<sup>3</sup>**

**Chase K. Gurey** (Dr. Brandon Sheridan) Department of Economics

In an era characterized by heightened militarization, countries worldwide have experienced substantial increases in defense spending. As of 2020, defense spending of the member states of the Organization for Economic Cooperation and Development reached a staggering \$1.3 trillion, a 5.41% increase from the previous year. While increased government spending typically stimulates economic activity, the link between defense spending and innovation remains unexplored in economic literature. A significant portion of defense budgets, around 70% of the United States', is allocated to the private sector through federal contracts, stimulating innovation in various sectors. This paper investigates whether heightened defense spending positively or negatively influences innovation in OECD member states. Using panel data from all 38 OECD member states from years 1980 to 2022, I chose the dependent variable of patent applications as a measure of innovation and the independent variable of military expenditure as a percent of GDP. Additionally, the variables, unemployment rates, GDP per capita, educational attainment of at least a bachelors degree, and research & development expenditure were also included as various controls. A Fixed Effects regression model is utilized, controlling for heterogeneity across countries. The model was run with and without the United States to account for the nation being an outlier due to its drastic outspending of other countries. Preliminary results indicate a positive association between defense spending and innovation, as evidenced by an increase in patent application, R&D expenditure, and educational attainment rates. However, further robustness testing is necessary to confirm the consistency of these results.

## **Socioeconomic Determinants of Health and Health Outcomes: Massachusetts and New York<sup>2,3</sup>**

**Chloe R. Higgins** (Dr. Zahra Akbari) Department of Economics

This research explores the interplay between socio-economic factors and health outcomes. With increasing attention to non-medical factors influencing health, the study explores the economic dimensions, emphasizing the role of policies and systemic influences on health outcomes in Massachusetts and New York. Utilizing county-level data spanning from 2009 to 2020, sourced from the Social Determinants of Health Database, the study employs fixed effects regressions to analyze key variables which represent employment, insurance coverage, poverty rates, housing, education, access to care, and racial demographics. Health outcomes include child mortality rates and other health measures. The research dissects the impact of healthcare policies through running two different regressions, drawing attention to Massachusetts' pre-existing state-level MassHealth and the federal Affordable Care Act. The central question being investigated is: How do social determinants of health intersect with health outcomes in Massachusetts and New York? The study aims to comprehend the mechanisms influencing health inequities by investigating the disproportionate impact of social determinants on various populations. This research finds that socioeconomic determinants of health have significant impacts on health outcomes, specifically in access to healthcare, unemployment rates, for uninsured populations, median rent, and poverty among underrepresented populations. Initial results show that there are differences between association of socioeconomic factors with health for the states of New York and Massachusetts.

## **Exchange Rate Volatility and GDP Growth<sup>3</sup>**

**Anthony Mangone** (Dr. Brandon Sheridan) Department of Economics

This thesis investigates the relationship between Gross Domestic Product (GDP) and exchange rates across countries to understand how exchange rate fluctuations impact national economic performance. The study will be examining approximately 22 countries all over the world. Exchange rate volatility can theoretically harm an economy by increasing uncertainty, which discourages investment and negatively impacts trade competitiveness. Undervalued exchange rates cause exports to be more expensive and imports cheaper, potentially deteriorating the trade balance and GDP growth. Moreover, it increases hedging costs for businesses and deters foreign investment, further altering economic performance. However, in some contexts, exchange rate flexibility can absorb external shocks, aiding adjustment processes. While volatility often poses challenges, its impact varies based on economic structures and policies. The analysis, which will be from data covered between 1973-2022 aims to isolate exchange rate influences on GDP growth by considering other economic factors such as trade balances, inflation rates, interest rates, foreign investment flows, and unemployment rates. Panel data analysis is employed for its ability to handle data variance both over time and across various countries, offering a robust framework for understanding the effects of exchange rate movements on GDP. This methodology is particularly effective in managing unobserved heterogeneity, leading to more precise estimates of the relationship between exchange rates and GDP. This thesis aims to contribute to more effective economic strategies fostering sustainable growth and global economic resilience. The results of

this analysis will provide critical insights for policymakers aiming to devise strategies that enhance economic stability and growth with exchange rate volatility.

### **Clinic Closures and High School Dropouts: How Access to Abortion Impacts Female Educational Attainment in Texas<sup>3</sup>**

**Sarah Mirrow** (Dr. Steven Bednar) Department of Economics

In 2013, Texas passed House Bill 2 (HB2), imposing harsh restrictions on abortion providers and reducing the number of clinics from 41 in early 2013 to 22 by the end of the year (Grossman et al., 2014). This rapid closure of abortion clinics had a drastic impact on the amount of abortions performed in Texas: every additional 50 miles of driving distance to the nearest clinic decreased abortions by 16% (Lindo et al. 2020). Despite the well-documented link between pregnancy and low educational attainment (30% of white teenage girls cite pregnancy as their reason for leaving high school), there is a lack of research connecting abortion access to female educational attainment that this paper seeks to address. Information on abortion clinics, including opening/closing dates and coordinates, came from the database compiled by Dr. Caitlin Myers (Myers, 2021). The Texas Education Agency (TEA) provided information on all of their public schools – we combined this with the Myers data to calculate the driving distance from each school to the nearest clinic each year. TEA also supplied student-level data with unique identifiers that allow us to track students over time. The data include each student’s school, demographic markers — race, gender, socioeconomic status — and dropout status. We limit the sample to females for academic years 2010 through 2017. Following the methodology of Lindo et al. (2020), we utilize a difference-in-differences approach with a Poisson model to measure the effect of clinic closures on high school dropout rates. We assume that trends in high school dropouts are constant across Texas in order to isolate the impact of differentials in driving distance to clinics. Demographic factors such as race, socioeconomic status, and school fixed effects are controlled for. This model suggests that female students at schools that are 50-100 miles from the nearest clinic are about 46% more likely to drop out of school than those who live less than 50 miles from a clinic. For students at schools that were less than 50 miles from a clinic pre-HB2, an increase to a distance of 50-100 miles leads to a 123% increase in female dropouts.

### **The Effects of Food Insecurity on Cardiovascular Disease Death in North Carolina<sup>3</sup>**

**David L. Neubig** (Dr. Zahra Akbari) Department of Economics

Roughly 12% of the US population faces food insecurity at any given moment in the United States, a serious health concern for the nation. This paper investigates the relationship between food insecurity and Cardiovascular Diseases (CVDs) as a potential consequence. While existing research links food insecurity to poverty and demographic disparities, its specific impact on CVDs remains understudied. CVDs, responsible for one in five American deaths, incur substantial economic costs and individual health burdens. This study focuses on North Carolina, utilizing county-level data from different sources, including the CDC, North Carolina Center for Health Statistics, US Census Bureau, and

Feeding America. Utilizing a Fixed Effects regression, spanning 2010 to 2020, I examine the association between food insecurity and CVD death rates. With the data set used, multiple challenges related to aggregate county data and unobserved heterogeneity have been noted. The regression used includes variables such as poverty rates, obesity, tobacco use, physical activity, and demographic factors. The hypothesis based on past research suggests that higher food insecurity rates lead to increased CVD deaths due to poor nutrition. Preliminary findings indicate that while no causal relationship can be established between food insecurity and the CVD death rate, other variables measured using aggregate level county data such as age, obesity, and poverty levels all show correlations to the CVD death rate. Overall, the study contributes to understanding the nuanced relationship between food insecurity and CVDs, offering insights for targeted policy interventions to address the pressing public health issue of increased CVD death and food insecurity.

### **Local Labor Market Impacts of Ukrainian Migrants in Poland<sup>3</sup>**

**Claire D. Przybocki** (Dr. Steve DeLoach) Department of Economics

In 2014, the Russian invasion of the Eastern part of Ukraine led to around half a million Ukrainians entering the Polish labor market. There was a staggering amount of immigration to Poland in February of 2022 due to an escalation of the Russo-Ukraine war. Since that time another 3.5 million Ukrainians have immigrated to Poland. The shocks of Ukrainian resettlement in Poland derives the question of how Ukrainian migrants have affected local labor markets in Poland. Literature highlights both the positive and negative effects of immigration on local labor markets. Varying literature agrees on positive effects of immigration on wage and employment in local labor markets as well as growth in GDP. In contrast, studies show negative impacts of immigration on native-born employment and wage, as well as implications on the national labor market growth. I use data from Statistics Poland to investigate the effect of temporary migration on native wages by age group at the voivodship (Polish state) level. I estimate Fixed Effects OLS models in order to compare years with fluctuating migration to periods of stable migration on labor market determinants in Poland. Models include controls for unemployment rates, and unobserved heterogeneity. Results reveal evidence for a negative effect between temporary migration on native wage by voivodships. However, these results do not account for the macro effect of migration and the length of time that migrants settle in these voivodships. Results indicate the government could compensate voivodeships to soften the effect of negatively affected wages.

### **The Cost of Campaign Finance Deregulation: Fossil Fuels PACs Effects on the Passing of Environmental Policy, Pre & Post Citizens United v. FEC<sup>2,3</sup>**

**Eric P. Sabatino** (Dr. Steven Bednar) Department of Economics

This paper examines the impact of campaign contributions on federal public policy, in the aftermath of the Supreme Court decisions of *Citizens United v. Federal Elections Commission*(FEC) (2010) and *McCutcheon v. FEC* (2014), on American political dynamics, with a focus on environmental policy. These landmark rulings removed limits on "soft money" contributions (indirect funding), distinguishing them from "hard money" donations (direct contributions with limits similar to those for individuals). This distinction has significant implications for the influence of Political Action

Committees (PACs), including those representing special interests such as the fossil fuel industry, on legislative outcomes. The debate in existing literature revolves around whether campaign contributions secure political favors or merely reflect shared values between donors and politicians. Prior studies have identified a correlation between campaign contributions from fossil fuel industry PACs and legislative decisions on specific bills but lack comprehensive analysis over time or across multiple bills. Moreover, the influence of business PACs on roll call votes at the state level has been deemed inconsequential in past research. To address these gaps, this study analyzes data from the League of Conservation Voters and OpenSecrets to investigate the extent to which spending by fossil fuel PACs affects congressional voting patterns on pro-environmental legislation. It compares periods pre and post the decisions of Citizens United and McCutcheon (2004-2009 and 2018-2023) to assess the change in the ability of fossil fuel PACs to influence environmental policy. This research aims to clarify the broader implications of campaign finance on policy outcomes, especially in sectors where special interests are heavily invested in obstructing public policy.

### **Adolescent Experiences of Sexual Abuse & Depression: Their Impact on Labor Market Outcomes<sup>3</sup>**

**Anna M. Vassallo** (Dr. Olivia Healy) Department of Economics

Developing their moral compass, exploring their identity, and building self-confidence are all parts an adolescent experience. During formative adolescent years, the transition from childhood to adulthood can be impacted by negative occurrences outside of their control that can shape their future trajectories. Research has shown that adolescent sexual violence (ASV) negatively impacts emotional well-being, educational outcomes, and labor force rates. This study empirically investigates whether depression exacerbates the impact of ASV on individuals' income. Using the fourth wave of survey data from the National Longitudinal Study of Adolescent Health, I analyze the impact of depression and ASV on income both independently and concurrently. I used both descriptive analyses and multiple linear regression to help understand both variables effect on income in early adulthood. People who experience ASV are shown to have higher rates of depression. Independently ASV and depression both negatively impact rates of income, and congruently they may have a further negative influence on income. The findings reveal correlations between early sexual abuse, subsequent depression, and adverse labor market outcomes, highlighting the impact of trauma at a young age on an individual's economic well-being. The implications of these results extend beyond individual well-being to encompass broader societal concerns and an imperative need to address the challenges faced by survivors of ASV.

## **Education and Wellness**

### **The Impacts of Technology on the Lives of Students With Down Syndrome Inside and Outside of School Contexts<sup>1</sup>**

**Natalie J. Christian** (Dr. Stephen Byrd) Department of Education and Wellness



The focus of this study is on the types of technology used in and out of school and their impacts on the lives of students with Down syndrome. Research has shown that the most common technologies used by these students include cellphones and tablets, computers, music and gaming devices, or television all of which provide support in both academic and personal settings (Fritz, 2017). Positive impacts have been seen across a variety of technologies including but not limited to augmentative and alternative communication devices, educational games and applications, text-based interfaces, and augmented reality devices (Shahid et al., 2022). Additional research has proven that these technologies provide support in social, physical, health, and cognitive skills, as well as overall growth in autonomy. These findings have been associated with more direct growth in behavior, communication, emotions, mobility, diet, vision, hearing, memory, literacy, and independence (Shahid et al., 2022). The essential research questions of this study were to find what technologies individuals with Down syndrome are using on a daily basis, what technologies have been shown to offer individual growth and accessibility across contexts, and what are the practical applications for these individuals and their families? To collect this information, we conducted a literature review of 10 research articles and compared the findings to an individual case study of a 17 year old student with Down syndrome. We found through this case study that this individual showed positive growth and accessibility across academic and personal contexts through the use of her iPad and the downloadable applications that target her specific areas of need. The findings within this case study support that of the synthesized findings from the literature review. These results can provide insight into future and current educators as well as families of children with Down syndrome on the multi-faceted use and variety of technology that can benefit these individuals' lives. This research introduces the importance of accessibility, integration, and education of universal technology for educators, parents, stakeholders, and individuals with Down syndrome.

### **The Representation of Black Children in Scholastic Book Club Books<sup>1,3</sup>**

**Ellie L. Cotton** (Dr. Lisa Buchanan) Department of Education and Wellness

My research for this study centers on the representation of Black children in scholastic book club flyers. Each month, Scholastic creates flyers for schools to purchase and send home with students. Three of these flyers are for kindergarten, first grade, and second grade classrooms. This research addresses the essential question: Who is being represented in these flyers? This question is significant because these flyers are sent out to thousands of students across America. When choosing what books they want to read, it is important for students to see books that reflect their identities and lived experiences (Bishop, 2012). This was the core focus of my research; to see what kind of representation was in Scholastic book club flyers for Black children. The focus of the study is the flyers sent out for the three primary grades in the 2022 calendar year. This year, Scholastic sent out flyers to grades K-2 eight months out of the year. To find what representation there was, I looked at each book labeled as a picture book in the flyer to see what kind of representation the main character of the book provided. I sorted each of these books into six categories: fiction with a Black main character, fiction with a non-Black main character, nonfiction, inanimate object main character, animal main character, and ensemble cast. In the year of 2022 as a whole, the Scholastic book flyers advertised 1,147 picture books to these three grades, and only 108 of those books included a Black main character. This comes out to just slightly over 9%. This contrasts sharply with the amount of books that feature animal protagonists being 453, or over 39% of the total. In every month, the category of fiction with a Black

main character was in the bottom three categories for representation. Data from this research shows an extreme lack of representation of Black children in Scholastic book club flyers, pointing to the need for a need for increased publication and circulation of picture books with Black characters.

### **The Effects of Quarantine and Pre Schooling on Early Elementary Students' Social and Cognitive Development**

**Catherine R. Carroll** (Dr. Heidi Hollingsworth) Department of Education and Wellness

One frightening aspect of quarantine and online learning that we do not know much about is the long-term effect it will have on children's development, including their social skills (Prothero & Sparks, 2020). Currently elementary school aged students' early foundation of social development may have been hindered, and many experts believe the early years are the most important period of development (e.g., Shonkoff, 2011). The goal of this study was to focus on current 2nd-3rd graders, whose preschool years were affected by the pandemic, to better understand: (a) which specific social skills were affected by quarantine, and (b) how children handled the transition to Kindergarten. Knowing this information could allow educators to focus on promoting those specific skills in the classroom and potentially decrease the likelihood that the effects of quarantine on social development will have a long term impact. This research included five consenting parents of students who are currently in 2nd or 3rd grade in North Carolina. Over the course of the Fall 2023 semester, individual zoom interviews were conducted with participants. These semi-structured interviews were analyzed using qualitative coding. Common themes from the interviews indicated children experienced a lack of community building, lack of routine, difficulty with knowing school routines, virtual school experiences and parents recommended a desire for more unstructured collaborative time in virtual sessions. Further research would be beneficial in providing context as to the extent of long lasting effects, but the majority of participants reported that the negative effects of quarantine on their children's social cognitive development has been minimized with time as their children have reentered physical classrooms.

### **New Digital Apprenticeships of Observation**

**Grant T. Doherty** (Dr. Scott Morrison & Dr. Jeffrey Carpenter) Department of Education and Wellness

The concept of the Apprenticeship of Observation was developed by Lortie (1975) in his seminal book *Schoolteacher: A Sociological Study*. This particular kind of apprenticeship describes the influences that prospective teachers' own K-12 experiences have on their understanding of education. Future educators spend significant time as K-12 students observing their teachers, and this affects their understanding of teaching and what kind of teachers they want to become. More recently, the Apprenticeship of Observation arguably includes new elements, as technology allows aspiring teachers additional opportunities to observe other educators. In particular, many teachers are posting content on social media, and due to the amount of time teens spend on these platforms it is appropriate to investigate how prospective teachers have been influenced by what they observe of these social-media-using teachers and their classrooms. The purpose of this study is therefore to explore new digital Apprenticeships of Observation for prospective teachers. Through 28 semi-structured interviews with

prospective teachers, we identified some of the influences of social media on prospective teachers' understanding of teaching. The participants reported learning about various topics related to teaching and teachers through their social media use prior to and during their teacher education program. Participants stated that they tended to follow practicing teachers who shared their same education philosophy, priorities, and values. Many of the participants said that those looking to learn more about the education profession should use social media, but also must do so with caution. We build on these findings to conceptualize how social media adds new facets to teacher development and identify implications for pre-service teacher education. The results of this research will raise awareness of how outside influences affect prospective teachers' understanding of their profession. This will allow teacher educators to adapt their course content to include surfacing and analyzing such influences.

### **The Case for Teaching Math Outside: A Cross-Case Analysis of Fifth Grade Teachers**

**Sadie Guffey** (Dr. Katherine Baker) Department of Education and Wellness

Much of the American education system is set inside school buildings, with students remaining restricted to their classroom space for learning. In recent years, researchers and teachers are recognizing nature deficit, a lack of connection to and in nature, and the lack of educational engagement and enrichment of students participating in inside-only pedagogy (Louv, 2010). In order to challenge nature deficit, research suggests the importance of teachers taking their instruction outside the classroom space. Some teachers become successful and see benefits in moving lessons outside while others feel unsuccessful and deterred. Our research investigated why teachers take their students outside, specifically in the context of elementary mathematics teaching, and also investigated what may stop them from doing so or stop them from feeling successful in their attempts to teach outside. Through a cross-case analysis, our research investigated the similarities and differences between two 5th grade teachers as they attempted to move their classroom instruction outside. Data was collected with each participant through observations of mathematics lessons in spaces outside their school, such as sidewalks, grassy areas, and forested trails. They also participated in semi-structured interviews about teaching outside. Interviews were then transcribed and open coded to reveal recurring themes within and across the teachers. Analysis of the coding presented two overarching themes of why or why not teaching outside was implemented: "Awareness" and "Considerations". Participant one, Hailey, was aware of the benefits of taking her class outside and enacted this instruction although she identified her lack of "critical colleagues" within her school community as a challenge. Participant two, Isa, was aware of the importance of taking students outside and with the support of a grant and community resources worked to make sure all 5th grade classrooms at her school were able to go outside. While she had the support Isa ended up taking her class outside less often than Hailey. These findings suggest that awareness of the benefits and supports are important for transitioning teaching outside; however, there are other factors which present challenges for continued practice. This study's findings will provide insight for educators who want to take their class outside and help to strengthen the practices of educators who have already begun to implement this practice.

### **Exploring Elementary Educators' Perceptions of Mindfulness-Based Practices in the Classroom**

**Charlotte P. Harte** (Dr. Stephen Byrd) Department of Education and Wellness

This study sought to examine teachers' perspectives on mindfulness-based practices in elementary classrooms. The mindfulness-based practices analyzed in this study can be categorized into three areas including breathing exercises, yoga, and meditation. Specifically, my research looked at teachers' prior experiences, knowledge, and training, if any, with mindfulness. Additionally, I looked at possible barriers to using mindfulness in the classroom. I was inspired to explore this sector of education because of the mental health benefits experienced by students, specifically emotional control and coping skills, when mindfulness is taught in classrooms (Bannirchelvam et al., 2017). Mindfulness has shown success in special education classrooms as well (Magaldi & Park-Taylor, 2016) reducing anxiety students experience. At the same time, current research has determined barriers to incorporating mindfulness into classrooms, such as lack of time, space, and educator training (Wigelsworth & Quinn, 2020). This led to the research purpose of looking at perceptions of mindfulness-based practices, and if there are gaps in training available to educators. To collect data, I sent out a 15-question qualitative questionnaire to elementary educators in the Alamance-Burlington School System. It involved demographic questions and questions related to teachers' experiences with mindfulness including knowledge, training, personal experiences, barriers to implementing, and success stories. The 11 respondents varied from general education classroom teachers to service providers to special educators. After receiving and analyzing responses, we found six out of eleven respondents had received training in mindfulness, ranging from professional development to yoga training to video resources. Ten out of eleven educators had experience with mindfulness, either in or out of the classroom (e.g., mindfulness videos, yoga, and gratitude journals). In terms of implications for students, nine educators had heard of the benefits mindfulness brings especially for students. When asked about barriers to implementation, respondents mentioned time during the day, lack of knowledge of how to structure it, and students not taking it seriously. Educators who had used mindfulness talked about the benefits it brought to students (e.g., regulating emotions by developing skills to calm down and deal with feelings of frustration).

## **The Role of Educators: Increasing Awareness of Social Media's Impact on Adolescent Development<sup>1</sup>**

**Margaret Hayes** (Dr. Ilyssa Salomon) Department of Education and Wellness

Social media has become a key feature of adolescent life and 95% of teens age 13-17 report using some form of social media (Pew Research Center, 2022). In this position paper, I suggest that educators who teach adolescents should understand how social media affects their development and helps prepare adolescents for challenges they may face online. After reviewing relevant literature in psychology and education, I propose three points to consider in addressing the impact of social media use on adolescent development. I also provide recommendations for educators and a sample lesson exploring these topics designed for a middle school audience. First, I assert that Ecological Systems Theory (EST; Bronfenbrenner, 1979) is a useful framework for understanding how new technologies shape adolescent development. EST suggests that multiple, interacting systems affect an individual's development, ranging from friends or teachers to broader culture. Historically, EST categorized mass media as something that adolescents did not interact with directly, but that still impacted their development. However, I suggest that social media provides new opportunities for more direct interaction in ways that likely affect adolescent development. Second, I suggest that context collapse can help explain some of the social challenges adolescents may face online. Context collapse describes

how different aspects of an individual's life (e.g., friends, work, school) can collide on social media platforms. The “collapsing” of these different social groups can result in a variety of challenges that can blur the lines of appropriate and safe behavior. Third, I address how physical, cognitive, and socioemotional development during adolescence contribute to these challenges. Specifically, I discuss how the dual systems model and how the timing of adolescent brain development can make them more likely to take risks. I also discuss how social changes and the importance of peers may affect adolescents' social media use. Finally, I provide recommendations for secondary educators who wish to explore these topics with their students and a sample lesson plan.

### **Mapping the Outdoors: Evaluating Accessibility Through Print Trail Map Design<sup>1</sup>**

**Mandi Jaffe** (Dr. Evan Small) Department of Education and Wellness

This exploratory qualitative study examines accessibility within outdoor education through an interdisciplinary lens. The research is focused on examining visual accessibility through printed trail maps, with a specific focus on users with color blindness and low vision. In this research, low vision is defined as those who are visually impaired or hard of seeing but not those who are blind or with a full lack of sight. While outdoor education frequently discusses accessibility in many forms, there is a gap in the research that specifically addresses the impact of color blindness and low vision accessibility for trail maps. Printed trail maps remain a very commonly used tool within outdoor education and the existing design gap means that they remain inaccessible for some who wish to utilize them. This project integrates the fields of outdoor education with communication design by focusing on the typography, scale, contrast, color, and other design elements of trail maps. Data collection will be done utilizing document analysis and interviews. Throughout the initial phase of the research, interviews were utilized to develop a set of accessibility principles or best practices for trail map design. These interviews were with communication experts, cartographers, and map printing companies. Once the principles are developed, the document analysis will begin and will involve examining trail maps from several of the most common map publishers. Document analysis will be conducted via convenience sampling and will focus on publishers most commonly found at outdoor retailers. As this research is exploratory, an anticipated outcome is to contribute to the field by suggesting a set of principles that publishers could adopt to make their maps more inclusive and accessible. The research could potentially result in an action-oriented approach: developing a partnership with a local smaller map publisher to test the accessibility principles developed in a real-world context.

### **Family Perspectives on Information, Compassion Fatigue, and Disability: Through Christian and Non-Christian Frameworks<sup>1</sup>**

**Kaitlyn S. Leazer** (Dr. Stephen Byrd) Department of Education and Wellness

Becoming a parent to a child with a disability brings many unknowns, especially families who are faced with the question of which ideologies they will choose to view disability and how that view will impact child-raising. Furthermore, perspectives on raising a child through religious and nonreligious frameworks can change. At the same time, those influences guide how disability is viewed, experienced, and faced. Many times researchers focus almost all of their questions and research on areas other than how the parents have felt and what framework has been used to guide them through



their parenting. In this research study, we developed a qualitative questionnaire for families, pertaining to their perspectives on religion as it relates to their child with a disability. Fourteen families completed the questionnaire as well as some who completed focused interviews either on zoom or in person depending on their locations. There were a variety of disabilities represented in these families' experiences. After collecting the data and categorizing them, we compared the responses and looked for major themes. The findings showed that sixty-eight percent of our participants viewed their child's disability through a framework of faith. Viewing their child's disability through a framework of faith gave these parents reassurance that they were chosen to be their child's parents. Several key themes we saw through this framework were that these children are still just as valuable as their abled peers. Their disability and life brings joy to all. Another finding was ways parents communicated how their faith had helped them on their journey. Leaning on faith kept the families going by giving them strength, joy, and perseverance. It also provided a purpose for them knowing that God does not make mistakes. Families also discussed faith based texts that were the most helpful during their parenting journey. Overall, we found that most families struggled to find faith based texts about disabilities. Most families relied on daily devotionals or scripture. Social interactions at the church were also very helpful, families said. This study demonstrated that families who view their child and disability through the framework of faith, believe that they have been chosen to fulfill such an important role as a parent and advocate in this world for their child.

### **Teacher Candidates and the Science of Reading in Practicum Placements**

**Collette Lynch** (Dr. Mary Knight-McKenna) Department of Education and Wellness

On April 9, 2021 the North Carolina General Assembly passed the Excellent Public School Act of 2021. This legislation mandated that all public elementary schools in North Carolina use the science of reading (SOR) for literacy instruction. Elementary and special educators across the state participated in professional development to learn about the SOR. Educator preparation programs were also required to teach literacy instruction aligned with this approach. I was curious about teacher candidates' experiences with the SOR in their literacy practicums. I asked the following question, "What is the reflection of teacher candidates who have learned about the Science of Reading in their Teacher Education Program and who then participate in literacy practicum experiences in public school classrooms?" This mixed methods study included 25 participants who had taken at least one of two literacy courses based on the SOR at their university. All participants were junior or senior teacher candidates from a mid size, private, majority white, university located in the southeastern part of the US. The participants completed a Qualtrics survey about their knowledge of the SOR and their experiences in public school literacy practicum settings. Four of the 25 participants agreed to a short interview about their reflections on the science of reading and their perceptions of clinical teachers' instruction in their literacy practicum. The data was coded related to evidence that answered the research question and then organized. I generated four findings from the categories. 1. Approximately 75% of the participate responses indicates alignment with the SOR as taught in the educator preparation program with the literacy instruction in public school classroom. 2. The participants report that the level of alignment for the SOR is dependent on the grade level of the practicum site. Upper elementary grades show less alignment while primary elementary grades showed greater alignment. 3. The quality of teaching and the attitude of the clinical teacher influences the degree of alignment with



the SOR as taught at the university level. 4. Participants report that literacy instruction in public elementary schools' special education aligns with the SOR in practicum experiences.

### **Examination of Community Facebook Comments During ABSS Mold Crisis**

**Samuel Martin** (Dr. Evan Small) Department of Education and Wellness

This exploratory qualitative research analyzes the crisis communication practices of the Alamance-Burlington School System (ABSS) during a county-wide mold crisis. This crisis prevented students from beginning the school year on time according to the published calendar. Through a discourse analysis conducted using public comments on the ABSS Facebook page, this study sought to examine communication gaps between the school board, teachers, and the broader community. Researchers used the best practices in crisis communication scholarship and the North Carolina State Board of Education's guidelines for state school boards and elected members to identify where communication gaps existed. The main goals of this research are to examine communication gaps between stakeholders and then discuss how to best restore those communication gaps to build and restore lost civility and improve collaborative decision-making practices between local schools and the community. Through the examination of community Facebook comments, the main themes that arose were (1) the questions and speculation from the commenters, (2) the large sense of distrust and anger towards the school board's management and communication, and (3) the unfair burdens felt by the community, students, and teachers due to the decisions made before and during the mold crisis. These themes revealed a long-standing feeling of anger and distrust with how well the school board serves the students, faculty, and staff at each of their schools. For communities and the elected school board officials that serve them, this research seeks to offer practices and strategies to improve collaboration toward the best interests of students.

### **Voices From the Field: Impact of Covid-19 on Student Math Understandings and Teacher Practices**

**Isabella Martino** (Prof. Erin Hone) Department of Education and Wellness

Research, in great detail, has already outlined the immense achievement gaps between students pre pandemic to post pandemic. Students are specifically struggling in mathematical concepts. An American study of 4.4 million students, in grades 3–8 found performance on the Northwestern Evaluation Association (NWEA) growth assessments at normal levels in October 2020 (i.e., after school closures), but math scores in the same assessments are approximately 5–10 percentile scores lower than in previous years (Meeter, 2021). Students are not performing academically at the levels they used to, and students are struggling in ways different than they did pre-pandemic, specifically in mathematics. The purpose of this project is to determine what factors contribute to this significant achievement gap, including changes in specific math concept understandings and skills, and what insights teachers can share regarding shifts in practices and pedagogy since the onset of the pandemic. A survey distributed via social media sought input from K-5 educators across North Carolina through data on reported changes in student mastery of mathematical concepts pre- and post-pandemic. Surveys were analyzed based on quantitative trends in likert scale reports. After analyzing survey data, follow-up individual teacher interviews were used to get deeper insight into these shifts in

understanding, changes in math pedagogy, and classroom practices over the past three years. This project aims to center teacher voices, as most research has focused on student performance data, rather than changes to practices. Teacher interviews were analyzed using qualitative coding, for trends in mastery of student concepts, shifts in math pedagogy, and teaching practices. The results of this research will help to inform my own insight about changing math instruction and our changing students, as well as provide teachers with an outlet wherein their experiences are valued.

## **The Relationship Between Perceived Academic Competence and Physical Competence in Children**

**Rylee McKinney** (Prof. Elizabeth Bailey) Department of Education and Wellness

Physical literacy is the ability to move competently and confidently in various physical activities. Physical literacy has been linked to competency in fundamental movement skills, increased levels of self-efficacy, and increases in long-term sports participation, which often results in increases in fitness. Moreover, research surrounding academic competency has linked academic performance to positive fitness assessment results, suggesting a relationship between physical literacy and academic competency. However, this relationship has not been well-researched. Thus, this study inquires about the relationship between physical literacy and perceived academic competence in typically developing children aged 9-12 y. Thirty-four participants were recruited from after-school community programs (CHAMPS and Alamance Girls in Motion). The participants comprised 19 boys (Age=10.27 + 7.2 y) and 15 girls (Age= 9.73 + 0.7 y). After obtaining consent, parents completed a 12-item questionnaire that targeted their perceptions of their child's perceived academic competency using a Likert scale. Child participants then completed a modified Harter questionnaire to assess their individual perceptions of their academic and physical abilities and the PLAYself (Physical Literacy Assessment for Youth) confidence scale to assess individual confidence in movement skills. Physical literacy was evaluated using the PLAYbasic scorecard to establish observed competency in foundational movement skills, including running, hopping, overhead throwing, ball kicking, and balance. Data was analyzed using the Pearson correlation coefficient and t-tests. Correlation analysis suggested that gender, height, weight, and BMI were strongly correlated (0.03) with the PLAYbasic score, suggesting that physical maturity impacts competence in foundational motor skills. However, there was no significant correlation between PLAYbasic or PLAYself and perceived academic competence in children or parents. Further analysis of the relationship between perceived academic competence between participants with low physical literacy and those with high physical literacy was also insignificant. Scores on the Modified Harter questionnaire and the PLAYself suggest that participants had positive perceptions of their academic and physical competence, even though 15 out of the 34 participants had poor physical literacy based on the PLAYbasic. While the small sample size is a limitation, these findings support exploring these relationships in a more extensive and diverse sample.

## **Experiences and Perspectives of Queer and Trans Pre-Service Teachers<sup>1</sup>**

**Faith E. Minor** (Dr. Scott Morrison) Department of Education and Wellness

My project focuses on the experiences of queer and trans pre-service teachers (Q/T PSTs). Many states (including North Carolina) are currently proposing and passing discriminatory legislation limiting how

gender and sexuality can be discussed in schools (e.g., SB49). Interestingly, literature on Q/T PSTs from other countries and dated from earlier times also reflect anxiety about personal identity in schools and how it may relate to employability, reacting to queer/transphobic language, and being out. There are few studies focusing on the lived experiences of Q/T PSTs. Most are interviews with small numbers of participants from the same teacher education program (TEP). These studies tend to emphasize PSTs' personal identities in the context of the TEP or the classroom placement. Using Sedgwick (2002), I explore how the paranoid position is repeatedly asserted in the themes of these papers. Sedgwick describes the paranoid position as a perspective for analysis, which seeks to anticipate and uncover conspiracies and dangers so as not to be surprised by them. Taking a paranoid position is not openly acknowledged in the majority of these papers, but its presence may be impacting the expectations of Q/T PSTs and how future research is framed. I am interested in how queer/trans identity impacts PSTs' goals around teaching, and whether and how they engage in queer pedagogy and queering curriculum. Participants are current PSTs and first-year teachers who identify as queer and/or trans from around the United States. Participants have been recruited through social media spaces frequented by Q/T PSTs and through snowball sampling. I am engaging each participant in three interviews. I have observed that Q/T PSTs are generally aware of the political climate when they come into classrooms for their field placements, and their narratives tend to reflect a sense of empowerment more than anxiety. Many say their Q/T identity influences their opinion on "good" teaching through making their classroom an accepting environment. When asked how they bring queerness into the curriculum, many discuss "representation" and how important they believe it can be to Q/T students.

### **Physical Education According to Physical Education Students**

**Cade D. Missimer** (Dr. Carol A. Smith) Department of Education and Wellness

Schools are the primary institution for providing physical activity instruction, and a large number of students rely on physical education classes as the only place where they engage in physical activity (Prochaska et al., 2003; Subramaniam & Silverman, 2007). Yet, as far back as 2006, experts recognized that physical education programs had been in peril for some time (Rikard & Banville). Furthermore, student voices are rarely consulted for curricula and non-curricula decisions in physical education (Watts, 2009). With this fact in mind, this literature review sought to analyze K-12 students' attitudes toward and perceptions of physical education in U.S. public schools. Bibliographic databases were used to identify research studies that were relevant, published after 2000, and included a sample size larger than nine students. This survey yielded nineteen discrete studies that span lower elementary school to high school. Overall, this literature review revealed a decrease in positive attitudes toward physical education as students age. The most common influences on K-12 students' attitudes and perceptions were the teacher, curriculum, class activities, and the social nature of physical education. Determinants were mostly consistent across grade levels, but some determinants were unique to a particular age group. This literature review suggests a lack of alignment between the physical education programs that students seek and the physical education programs that they receive, especially as they get older. This review prompts actions from stakeholders so that students may have a greater role in creating the types of physical education programs they desire.

## **A Content Analysis of Religion in Children's Literature<sup>1,3</sup>**

**Amelia Myers** (Dr. Lisa Buchanan) Department of Education and Wellness

Do children's books published since 2018 adequately and accurately represent non-Christian religious traditions practiced in the United States? This content analysis examined the representation of three traditions: Islam, Buddhism, and Judaism, in children's literature published since 2018. I chose to focus on these religions because, according to the Public Religion Research Institute 2020 Census of American Religion, 1% of Americans identify as Muslim, 1% identify as Buddhist, and 1% identify as Jewish. To begin the research process, I narrowed the books to be analyzed to ones that do not explicitly focus on religious holidays, resulting in a subset of books that incorporate religion in some capacity beyond observed holidays. Data collection included a cover-to-cover in-depth content analysis of the text and illustrations. I looked at the genre of these works, determined whether the author has an emic perspective, and noted whether religious elements in the books were explicit or implicit, to name a few of the variables considered. The process yielded both quantitative and qualitative analysis; I collected data using a form I created. Items on the form were either multiple choice questions or short answer questions. The data from this form populated in a corresponding spreadsheet. Then, I quantitatively analyzed the data, quantifying the number of books that fell into categories represented by different multiple-choice responses. Finally, I categorized short answer responses according to themes I found among the answers, qualitatively analyzing this data. Findings revealed that there are more than twice as many picture books written about observed holidays of these religions than books that incorporate religion without an explicit focus on holidays. Moreover, very few books have been published since 2018 about some religions, such as Buddhism. This study offers implications for community and school libraries, families, and classroom teachers.

## **An Analysis of Social Justice Tasks Used for Teaching Statistics<sup>1</sup>**

**Gabrielle Nagel** (Dr. Heather Barker) Department of Education and Wellness

Social justice education is a central theoretical perspective for engaging inequities in the P-20 system. Teaching Mathematics for Social Justice (TMSJ) helps students build mathematical literacy, supports students using mathematics for social change and become agents for it (Koestler et al., 2023). Teaching Statistics for Social Justice (TSSJ) can similarly be viewed with the goals for TMSJ (Lesser, 2007). Improving mathematics and statistics tasks to be relevant to students can not only increase what they learn, but influence what students remember in the future. We collected a large sample of statistical tasks that use social justice topics. About 50 tasks were collected ranging from elementary to high school. These tasks range from engaging elementary students in understanding food insecurities, to AP Statistics students exploring gerrymandering. Our research question of interest was "What are the common elements and themes of social justice-themed tasks used for teaching statistics topics?". Several frameworks were used to analyze the tasks including Reading and the Writing the World of Mathematics (Gutstein, 2006). In which Gutstein encourages teachers to allow students to read the world with mathematics (understand the world around them) and write the world with mathematics (take action steps to address inequities, such as writing a letter to public figures). Findings show that all these tasks encourage students to read the world with statistics, but most of them do not have a suggestion for action. Analysis also includes what kinds of topics were covered. For instance, when analyzing what dimensions of identity are addressed, topics around class and race occur the most

frequently, religion appeared least often, and none of the tasks we found address any topics around sexual identity and LGBTQ identities. In terms of social justice, educators who share tasks, like the ones analyzed in this study, can be used in classrooms to help students learn about social justice in current society and put data into perspective. The findings from this project will help inform the creation of frameworks for developing future statistics social justice tasks.

## **The Perceptions and Awareness of Trauma-Informed Education in Religiously Affiliated Schools**

**Ivy J. Pennekamp** (Dr. Katie Baker) Department of Education and Wellness

This research project addressed a gap in the literature of equity-based, trauma-informed education by examining the awareness and perceptions of this educational movement from educators in religiously affiliated schools. Past research has shown that trauma and toxic stress can negatively impact almost every aspect of a child's school experience, but that trauma-informed education and trauma-sensitive approaches can mitigate the impacts of trauma. The research on trauma-informed education is usually centered in general education and public PreK-12 settings, so this project contributes by specifically investigating educators' awareness, perceptions, and insights about trauma-informed approaches within the context of religious-affiliated schools. We aimed to add this additional layer of educators' voices and experiences to better understand if and how trauma-informed approaches are being interpreted and integrated into religious-affiliated schools. This study was mixed methods in design, utilizing an explanatory sequential design with two distinct, yet interconnected phases, undertaking a survey phase and interview phase to provide both breadth and depth to findings. The first phase was a Qualtrics survey distributed to and through administrators at two religious schools to their corresponding faculty. The survey yielded 14 responses to 80% completion or more, six of which were completed to 100%. At the survey closure, educators had the opportunity to provide identifying information to be contacted for interviewing. Phase two of the study consisted of interviews of consenting participants to provide in-depth details regarding their perceptions of trauma-informed education and its role in their practices and schools. Of the 14, one participant consented to be interviewed to share insights to better understand the religious school context in relation to trauma-informed care. Implications of the findings will guide future research design to further explore this topic in religiously affiliated schools, and inform education policy and trauma-informed education professional development within the religious-school arena.

## **The Inclusion of Special Education Students in Music Classrooms**

**Beth Resch** (Dr. Stephen Byrd) Department of Education and Wellness

The project centered around the topic of the inclusion of special education students in music classrooms. The inclusion of special ed students into general ed classrooms is an integral part of being an educator. Jellison and Draper define an inclusive school setting as "an environment in public or private schools where students with disabilities and typically-developing students of the same or different age come into contact with one another" (January 2015). As a part of my research, I sent out a survey through a Google form to three music educators at the elementary, middle, and high school levels consisting of five questions. A couple of note-worthy questions on the survey asked why they believe the inclusion of special education students in a music classroom is important, what teaching



strategies they use to accommodate these students, and the interactions between general and special ed students. Of note were variations in the data I collected from these teachers since the elementary classroom is general music while the middle and high school classrooms are chorus. The elementary and middle school teachers have a small group of special ed students who come into their classroom with an aide. The students participate for about half the time. Lessons are modified for the abilities and needs of the special ed students. At the high school level, special ed students have their own modified music class, running for about half the class time. Socialization can be overwhelming for some special education students, but this inclusion is important because they need to know how to interact with general education students, and general education students need to know how to interact with them. These findings also show that especially at the middle and high school level, teachers need to recognize the importance of special education inclusion and find a way to accommodate them in a larger ensemble. As a music educator, I plan to make every effort to accommodate special education students in my classroom and encourage my co-workers to push for this inclusion.

### **Perspectives on Walking Curriculum From Educators, Caregivers, and First Graders: A Two-Part Qualitative Study<sup>1,2</sup>**

**Alice Rickards** (Dr. Scott Morrison) Department of Education and Wellness

Walking curriculum is a pedagogical practice in P-12 education wherein educators take students out of the classroom on walks with curricular foci. As such, walking curriculum is considered a form of environmental education that connects students to the natural world and to their local community and encourages ecological imagination (Anderson, 2017; Fettes & Judson, 2011; Judson, 2020). In the first part of this study, we interviewed 19 educators (P-12) from the United States, Canada, Chile, Australia, and Singapore about their perceptions of walking curriculum. Through our analysis of the data (Braun & Clark, 2021), we developed five themes. First, all participants noted multidimensional benefits to being outside, particularly increased student focus and attention. Second, most of the participants articulated that going on walks was good for them as teachers. Third, the participants used walking curriculum for multiple purposes. Fourth, all the participants felt that walking curriculum is an inclusive practice, even one that promotes equity. Finally, the participants shared how going on walks connected students to each other and to the land. In the second part of this study, we focused on a first-grade teacher and her students (N = 10) who go on walks every morning. During the 2022-2023 and 2023-2024 school years, we completed 80 hours of observations with the teacher and students, and we conducted interviews with twenty-three students and sixteen caregivers. We developed five themes based on interviews and observations with the students and four themes based on interviews with caregivers. Given the many longstanding and common barriers to environmental education (e.g., Ham & Sewing, 1988; Kim & Fortner, 2006), walking curriculum is a means to get students outside the classroom, increasing the likelihood that they connect with nature, place, and peers. It also covers typical curricular content and practicing various academic, social, and emotional skills.

### **Analyzing Program Materials and Data in Responsive Classroom<sup>1</sup>**

**Allie Ryder** (Dr. Lisa Buchanan) Department of Education and Wellness



The focus of my inquiry project was Responsive Classroom. Responsive Classroom is an approach to teaching with evidence to support that Social Emotional Learning (SEL) can be linked to academic success. For my inquiry, I investigated what constitutes equity focused Social Emotional Learning and whether the open-source program materials in Responsive Classroom aligned with equity focused SEL. I began my research by completing a literature review of SEL. I then investigated the open-source resources published by Responsive Classroom. Findings indicated that all SEL activities reviewed from Responsive Classroom were equitable for K-8 classroom use with minimal accommodations. This study reaffirmed that SEL can support students to become more collaborative and learn emotional skills while in the classroom. Additionally, there are materials readily available for teachers wanting to incorporate SEL. However, many more sources are available to teachers but require purchase.

### **Exploring Preservice Teachers Perceptions of Linguistic Identity<sup>1</sup>**

**Grace M. Sherriff** (Dr. Jennifer Eidum) Department of Education and Wellness

Language teacher identity and language teacher education are interconnected elements of a preservice teachers' experience. With a growing number of English language learners joining the K-12 student population, teacher education programs should be preparing teacher candidates to use their linguistic identities as tools to create culturally responsive spaces for students. Regardless of whether preservice teachers intend to work with multilingual learners (ML), there is an increasing chance that there will be MLs in more classrooms. Therefore, all teachers will need to be language teachers in some capacity. This quantitative study aimed to explore preservice teachers' perceptions and knowledge about linguistic identity (Block 2014) and how it informs their selection of language-based pedagogies in both language education and general education spaces. Our study responded to this call with the following research question: How does self-perceived identity, specifically linguistic identity, shape preservice teachers' knowledge of language-based pedagogies and practices? To answer the research question, we began by administering a survey to a Teacher Education program at a mid-sized private university located in the Southeast United States to explore how their experience thus far has affected their perceptions of their linguistic identities as pedagogies. Through the survey results, we have concluded that while the preservice teachers surveyed feel comfortable teaching a diverse range of students, there seems to be a gap in specifically teaching linguistically diverse students. Furthermore, the survey results show evidence of preservice teachers not receiving enough instruction in second language acquisition as it relates to their pedagogies and practices. The results from this study will be offered to the university as a means to improve their Teacher Education program by preparing teachers to educate multilingual students.

### **Examining the Effects of Walking Curriculum on Two Autistic First-Graders<sup>1,2</sup>**

**Allison A. Shibata** (Dr. Scott Morrison) Department of Education and Wellness

Nature has positive effects on the mental, emotional, and physical wellbeing of children and adults. Nature-based learning (NBL) leverages these benefits to create an enriching and positive educational experience. Despite the evidence on the benefits of NBL, there is little research on its use with autistic students. Friedman and Morrison (2021) studied the effects of NBL with five autistic students, and

they found that the students encountered affordances related to social and academic proficiencies. Additionally, the educators involved in the case study experienced positive outcomes such as increased creativity in lesson planning and a sense of peacefulness and rejuvenation from outdoor teaching. Friedman et al. (2023) also investigated practitioners' roles in facilitating NBL for autistic children. Four key themes were developed from practitioner interviews from three countries, highlighting their active role in affirming and supporting autistic learners, while also uncovering the challenges faced by both autistic students and practitioners. Because school is often a stressful environment for autistic students (e.g., Brede et al., 2017; Costley et al., 2021; Estes et al., 2011; Rowley et al., 2012), NBL offers an alternative way to support their social and academic needs. One form of NBL, walking curriculum (Judson, 2020), integrates outdoor walks with a curricular focus. My co-mentors and I are conducting a case study (Hancock et al., 2021) at an elementary school with two autistic students and their teacher who go on walks every day. Research questions include: What are the effects of walking curriculum on autistic students? What affordances and challenges do autistic students and their teacher experience on walks with a curricular focus? What are caregivers' perspectives on walking curriculum with autistic students? Data collection includes teacher, student, and caregiver interviews, field notes collected during walks, and document analysis. Data is being collected between September 2023 and April 2024. We will use Braun and Clarke's (2021) reflexive thematic analysis to develop codes and themes.

### **“I Would've Never Had the Courage”: An Exploration of Lived Experiences at LGBTQ+-Affirming Summer Camps<sup>1</sup>**

**Jordan C. Smith** (Dr. Evan Small) Department of Education and Wellness

This study focuses on how LGBTQ+ youth ages 12-17 experience summer camp. The study has two main research focus areas: the impact of explicitly inclusive and affirmative policies and practices of residential summer camps on LGBTQ+ 12-14 year olds and the subsequent identity and community formation that occurs during and after their camp experience. There is very little academic literature related to LGBTQ+ experiences at summer camps or policies and practices of affirming summer camps, making this research a valuable contribution to the field. LGBTQ+-affirming summer camps do exist, with enough prevalence to have “top 10” lists and BuzzFeed videos made about them. These camps provide a unique site to analyze and contribute to ongoing conversations about summer camp design and facilitation through an inclusive lens. This exploratory research primarily focuses on the lived experiences of youth and administrative staff at these camps. By centering camper voices, this study addresses a gap in existing camp research and initiatives. Many existing initiatives and assessments often focus solely on implementation of policy and feedback from and perceptions of staff. However, the lived experiences of campers are vital in the design of a summer camp experience. The research design utilizes the perspectives of camp administrators and context provided by a discourse analysis of camp documents as framing for understanding and contextualizing camper experiences. Semi-structured, individual interviews were conducted with former campers and camp administrators. Eight total participants were interviewed: four former campers, one of whom has also served as camp staff, and four camp administrators. Utilizing a constructivist grounded theory coding framework, the study follows an iterative design process based on the centering of participant experiences. Initial results identify the importance of themes such as community, mentorship, self-expression, and support in forming positive camp experiences. Interviewing former campers allowed

them to reflect on their camp experiences and connect them to their present and ongoing lives. An outcome of this study is producing relevant recommendations for future research. Additionally, documenting experiences of campers provides suggestions for camps looking to create more inclusive and welcoming environments for LGBTQ+ campers.

### **The Primary Causes of Compassion Fatigue in Special Educators**

**Lindsey K. Steinkamp** (Dr. Stephen Byrd) Department of Education and Wellness

The purpose of this study was to investigate the causes of compassion fatigue in special educators. Compassion fatigue can be characterized as feelings of burnout, secondary trauma stress, and depersonalization resulting from repeated exposure to the suffering of vulnerable populations in caring professions, as opposed to burnout which is related to an excessive workload. This is demonstrated in that over 600,000 teachers left the education profession between the years of 2021 and 2022 (Koerber, 2023). One study found that over 70% of participating educators had experienced secondary trauma in their vocational setting that influenced their development of compassion fatigue (Koenig, 2014). This rate of attrition poses a serious problem for appropriately staffing schools to maximize student learning and experience. In addition, compassion fatigue has proven to be more prevalent in the world of special education (Tepper & Palladino, 2007). This project was conducted by combing through and synthesizing existing literature to find a more pointed answer to the overarching question. Peer-reviewed studies that included personal interviews and case studies from multiple types of special education professionals, as well as more wide-spread data analysis were found through research databases to identify common causes of compassion fatigue in special educators, information was compiled to propose three plausible treatments and supportive measures to limit the amount of professionals that are affected. Results of the review showed that there are a number of major contributors to the development of compassion fatigue in special education, including a lack of administrative support and validation; the age, type of disabilities, and number of students; and the amount of specific training they received in their training program. These factors lead to reduced self-efficacy in educators. Implications from the relevant research include systemic changes to increase the amount of support educators receive with instruction, advocacy, and access to self-care resources, as well as fortifying education programs to include more robust practical experiences and psychoeducation. Next steps in this research would include interviews with special educators from a variety of types of schools and circumstances discussing their experience with compassion fatigue or lack thereof before beginning to implement some of the proposed changes to observe their effect.

### **Examining Awareness of Trauma-Informed Education for Children Experiencing Familial Long-Term Illness<sup>1</sup>**

**Mia Vernasco** (Dr. Katie Baker ) Department of Education and Wellness

Educators and educational research continue to emphasize the importance of embedding trauma awareness and sensitivity into teaching practices. The greater movement around trauma awareness is often referred to as trauma-informed care. Past research has shown that trauma and toxic stress affect almost every aspect of a child's school experience (Carello & Butler, 2015; Perfect et al, 2016). Underlying trauma can inhibit students' cognitive functions and lower academic performance (Terrasi

& Crain de Galarce, 2017), but trauma-informed care can mitigate and support healing of the impacts of trauma (Udesky 2018, McInerney & McKlindon 2014). However, the research base lacks more information about teachers' insights around trauma-informed care and approaches when interacting with students of family members or caregivers experiencing terminal illness. Utilizing research from healthcare fields about supporting children of family members of terminal illness, we created a survey about how certain support approaches could be applied to educational spaces. The survey contained both closed and open items and was sent to prospective teachers (PTs) in Elon's teacher education program. Content analysis of the PTs' responses revealed that 66% of the surveyed are aware of what trauma-informed care is; however almost 90% of surveyed were unfamiliar with this specific realm. When offered recommendations about how they might conduct this type of trauma-informed care in a classroom, most suggested tactics regarding the whole-classroom community based on management techniques learned in coursework. Another commonality across responses, many reported trauma-informed care is supportive for the students in the classroom and did not acknowledge the greater context of community and families. This study will offer insight into how to prepare future educators to support and serve every student in their classroom spaces, and how they might collaborate across systems and people to provide support. Teachers with a trauma-informed foundation are more likely to support students to feel safe and valued in their classrooms, which in turn allows the classroom more space to focus on academics. On a larger scale, the survey may also be expanded to help consider how healthcare professionals and educators can work together to support school structures and students.

## **The Evolution of Assessment in Secondary Social Studies Education**

**Lucas Wells** (Dr. Mark Enfield) Department of Education and Wellness

This literature review focuses on the research and uses of formative assessment and standards-based grading as effective tools to meet learning objectives and increase meaningful student learning and instructional quality. These themes are addressed within the context of secondary education social studies classrooms. The driving question that inspired this literature review is as follows: How can high school level social studies classroom change in order to better assess student learning and improvement with designated skills and understanding of content, with context? In this field, formative assessment is viewed as an assessment of understanding, rather than for closing evaluations or grading purposes that focus on memorization. Wiggins and McTighe (2005) make the important distinction between understanding and knowledge-based assessment in their work that features planning and assessment practices widely and highly regarded within the field of education. Through this framework, studies have been done in the past two decades to test, practice, and evaluate the effectiveness of formative assessment and teaching for deeper understanding. A majority of these eighteen studies included in this literature review are taken from social studies classrooms, with several being more general studies of secondary education classrooms. Overlapping the use of formative assessment as understanding, is the use of standards-based grading which is a method of assessment in which teachers are clear and precise with expectations through written standards, in which students can easily follow what is expected of them for any given assessment (Iamarino, 2014). General findings are that formative assessment, as well as standards-based grading, are both quality assessment tools that offer an effective avenue of teaching and learning that evaluates students' progress, improvements, and areas of need in a more personalized manner than traditional tendencies. These are valuable pedagogies of assessment that yield more nuanced results in measuring

understanding rather than just knowledge, in addition to resulting in more well-rounded students. A shift in thinking and consistent application of these principles in all areas of the education field would need to occur within professional development, professional learning communities, and teacher team settings to make a positive meaningful impact on teaching and learning.

## Engineering

### **Efficient Food Waste Compaction in Industrial Kitchens<sup>2</sup>**

**Henry Agyemang, Samantha DiRenzo, Gabe Nicholas, & Mary Hermes** (Dr. Jonathan Su, Dr. Will Puer, & Prof. John Ring) Department of Engineering

Elon University has committed to composting food waste, in which the current process requires biweekly visits from CompostNow: a company that takes compost from the community and turns it into fertilizer. This process requires compost to be stored in individual cans which hold 200 pounds each, although roughly 40-60% of compost weight is that of water. Collaborating with Wastequip, a leader in waste management solutions, our team has engineered a tabletop waste compactor designed to significantly reduce the weight of food waste intended for composting through compaction. The compactor's ability to continuously compact food waste while simultaneously separating its water content, addresses the critical issue of excess weight in compost material. This process not only promises to decrease the frequency of waste collection trips, but also aims to offer substantial cost and environmental savings. Our design relies on the incorporation of a motorized pulley system, which applies force to the inserted compost, effectively removing water through compaction. Additionally, the compactor is equipped with a food insertion funnel for ease of use, roller cleaning brushes for maintenance, and a waste collection drawer for hygienic disposal of compacted waste. Two adjustable rollers allow for the food-insertion slot width to vary based on the load size of waste, while expelling excess water. The food waste is then collected by the internal waste collection drawer, and water is drained from the system. Our device is crafted to fit seamlessly in industrial kitchens (12 in x 18 in), prioritizing both space, efficiency, and safety. Through extensive prototyping and testing, our design has evolved to meet the practical needs of our collaborators, offering a solution to the problem of high-water content. This collaboration with Wastequip allows the company to utilize our design specifications and powered prototype to develop and manufacture further iterations.

### **Sledding Made Simple: Designing a Lightweight, Compact Sled for Kids**

**Nadia Aho, Sasha Hyde, Spencer Spry, & Blessed Eshun** (Dr. Jonathan Su) Department of Engineering

This research addresses a prevalent issue faced by parents attending Elon University football games: the difficulty of keeping young pre-teen children entertained while enjoying the game. The main question driving this scholarship is how to enhance the overall game-day experience for both parents and children, specifically addressing the challenge parents encounter when trying to balance their desire to watch the game with the need to entertain and care for their children effectively. This issue is



crucial because it directly impacts the attendance and engagement of families at Elon University sports events. This project carries significant implications for transforming the way people engage in sports events, aiming to create a broader conversation on family-friendly entertainment. By situating our study within the context of family dynamics at sports venues, we aim to address a gap in understanding and contribute to creating a more inclusive and enjoyable atmosphere for diverse audiences. To answer the research question, our methodology involves the development and implementation of a simple yet innovative solution: providing children with safe and entertaining sleds to slide down the hills adjacent to the football field. This approach not only keeps the children engaged but also allows parents to fully immerse themselves in the game without disruptions. The novelty of our design lies in its durability, portability, unique material, and safety distinguishing it from previous attempts to address the same issue. Through material selection we can monitor the velocity of the sled through the measurement of the effect of various coefficients of friction. The addition of a brake, handles, and curvature act as precautions to minimize any potential impacts or collisions allows us to create a luxury slide at an affordable price. The findings of our research demonstrate that replacing makeshift cardboard sleds with our innovative design significantly improves the game-day experience for families. The major conclusion is that our sleds offer a safer and more practical option, increasing the likelihood of parents attending sports events with their children. This could potentially boost overall attendance at Elon sports events and foster a culture of family-friendly entertainment. Altogether, the project extends beyond the realm of sleds; it aims to create a more enjoyable and family-friendly sports event experience. The implications of our research resonate with the broader academic discipline of event management and family studies, shedding light on the importance of addressing the needs of diverse audiences in sports and entertainment settings.

### **Designing and Assessing the Impacts of Accessible Food Trays for Visually Impaired Students at Governor Morehead School**

**Kevin R. Burkett, Kate B. Becksvort, & Braeden A. Miller** (Dr. Sirena Hargrove-Leak)  
Department of Engineering

Food trays can present unique challenges for visually impaired individuals, especially those requiring canes to move around safely. This project seeks to produce a lunch tray that can more easily be handled by visually impaired individuals. This is a continuation of a project started in an Engineering Design for Service class in which we were connected with Governor Morehead School, a school for visually impaired students from across North Carolina. The objective was to design a tray that can be carried with one arm securely and better accommodates the needs of those with visual impairments while eating and maneuvering to a seat. This process began with talking to students and staff about where problem areas were and what they would like to have changed from the trays they currently use. With this information, combined with additional research, a prototype tray was created and shown to students and staff. Feedback provided included incorporating a raised rim around the cup section for extra security, handles on the sides to have an easier grip, and keeping the weight of the tray manageable. With this new feedback, a final design was created which included as many aspects of the student's feedback as allowable. The objective of this project is to implement that design and produce physical trays to be delivered to the school and observe the effectiveness of these trays. To ensure quality and longevity, this process will include material, strength/durability, and user testing. As part of



these tests, we hope to collect data concerning effectiveness in preventing spills as well as user reception.

### **Development and Optimization of a High-Density Polyethylene (HDPE) Recycling Machine: Design for Sustainable Plastic Waste Management<sup>2,3</sup>**

**Lauren Cicale, Timothy Henderson, Grady Cooke, & Zoë Scherpbier** (Dr. Jonathan Su)  
Department of Engineering

Forty-seven percent of plastic waste is due to plastic bags – nine percent of all plastic waste is recycled, with the vast majority going to landfill. It takes around 400 years for plastics such as HDPE to decompose and there are approximately 5 trillion plastic bags created yearly. We aim to take plastic bag waste and make it reusable in order to decrease the amount of plastic waste found in landfills and the environment. This research project involves the use of High-Density Polyethylene (HDPE) as a recyclable material. We evaluated the efficacy of a process which melts HDPE and converts the product into reusable plastic pellets. The goal of this project was to reduce plastic waste and allow practical accessibility to medium and small-scale recycling. The prototyped design for the machine will incorporate a batch process using a heating element, similar to a toaster oven, to melt the plastic bags down into a mold for the pellets. Multiple variations of the overall process were considered in order to establish a system that produces plastic pellets reliably and safely. It is important to note that HDPE does not release carcinogens and is 100% recyclable when melted. The research was conducted in two parts: experimentation and modeling. Experimentation provided valuable information and first-hand experience with the product, determining the best method for processing HDPE with appropriate viscosity and mold-ability. Certain parameters of the melting process were measured, including the maximum heat that the plastic melted at (~225 degrees Fahrenheit) and burned at (~285 degrees F). The silicon molds could withstand 400-500 degrees Fahrenheit before becoming compromised/burning. The modeling process utilized computer software, such as SolidWorks and Mathematica, to inform the viability of the processing of HDPE, as well as to computationally confirm results that were seen in experimentation. Ultimately, our project aims to develop a machine capable of efficiently melting, cooling, and forming pellets from HDPE, thereby reducing plastic waste and promoting the reuse of materials.

### **Individual Plant Farming Using 3D Point Cloud Data: Robot Arm Data Collection and PointNet<sup>3</sup>**

**Rony Dahdal & Jacob Karty** (Dr. Blake Hament) Department of Engineering

Monitoring crops is an essential task in maintaining the life of plants. Current methods of individual plant farming involve taking many pictures of crops. Because 2D data is collected, parts of the plants are often occluded. This project's aim is to precisely farm crops using 3D data, which will allow better tracking of the health of each pea plant, allowing for optimal care for each plant. This will also lower water consumption, decrease reliance on pesticides, and increase crop yield. Here, 3D data collection for organic 3D reconstruction is explored and a deep neural network is proposed to identify organelles of the individual crop. To collect the images for reconstruction, a RGB camera is attached to a robot arm and a framework is built to move around the crop and take pictures. The reachability of the robot arm is also explored through simulations, ensuring coverage of the plant from many different angles. A

simulation inspired by electron fields is then performed to choose the optimal angles to image the plant. The images are then stitched together with photogrammetry software to create 3D models of the target plants. Using these models, a deep neural network will be trained to segment local regions in order to detect organelle. A proof-of-concept segmentation network is investigated, trained using two datasets of avocados images – seeded and unseeded – to identify organelle such as the seed, interior pulp, and exterior skin. The results collated evaluate the model throughout training using metrics such as RMSE of training and validation datasets.

### **Addressing Stormwater Management Concerns at Christmount Christian Assembly<sup>2,3</sup>**

**Jake Dyer, Skyler Reed, Sarah Gaynor, Braeden Miller, & Emerson Wesson** (Dr. Bethany Brinkman & Dr. Jonathan Su) Department of Engineering

Christmount Christian Assembly is a conference and retreat center located in the Blue Ridge Mountains of western North Carolina. Christmount has experienced erosion from stormwater runoff. In the fall, Christmount staff approached this research team with an opportunity to develop stormwater management solutions. The objective of the project is to create a stormwater management solution that reduces erosion on Christmount’s campus and minimizes the amount of sediment entering nearby waterways. Our team evaluated several stormwater management solutions and determined that swales were the most promising systems we could consider implementing. A swale is a sunken area in the ground that both slows the flow of water and removes potentially harmful compounds through sedimentation and filtration. Emphasis was put on the RV park and camp site areas of campus and visits to Christmount have been made both during standard conditions and after a stormwater event to collect water quality data. A key variable that we have considered is turbidity. Turbidity is the measure of how cloudy the water sample is which is a key indicator of increasing or decreasing sedimentation levels in the waterways around Christmount’s campus. Using this data, we could determine areas where swales would be most necessary and how important it was to consider filtering out harmful particles from runoff in a given area. Our team was then able to model the watershed at Christmount using mathematical estimates as well as topographical and soil maps. By empirically pinpointing the areas of interest for our stormwater management solution we can calculate the volume of precipitation any potential solution would need to withstand. To do this, we estimated using the SCS curve number method which calculates runoff due to a single storm event. This method of modelling helps our team determine where swales should be implemented, how large to make them, and whether any supplementary management systems are necessary. Comprehensively, the primary focus of our research is orienting an effective stormwater management plan in the RV park and camp site areas on Christmount’s campus as these locations do not have sufficient stormwater management systems currently in place.

### **Compactor for Food Waste Composting<sup>2</sup>**

**Sarah Gaynor, Devin Guilbeau, Kanokwan Ngamwong, & Dalton Thompson** (Dr. Will Plier) Department of Engineering

As composting gains popularity as a recycling method, establishments that produce substantial volumes of food waste, such as restaurants and dining halls, are actively embracing composting

practices. Nevertheless, the composting process can incur significant expenses, particularly in terms of transportation fees. Composting services typically gather food waste from these establishments and transport it to dedicated composting facilities. However, this transportation step can be a major cost factor, with expenses directly correlated to the weight of the waste being transported. This engineering project represents a collaborative effort between our team and Wastequip, a leading waste management solutions company, with the shared objective of developing a tabletop Food Waste Compactor. Our target percentage reduction in water content is a minimum of 50%, with a goal of up to 70%.

Additional design specifications focus on safety, ease of use, and ease of maintenance by kitchen workers. The design was inspired by the mechanical principles found in juicers. Our design uses two helical gears and fine mesh casing to efficiently compress food waste and extract excess water. We utilized food-grade stainless steel for the construction of our helical gear and meshing components, ensuring optimal safety and hygiene standards. Additionally, other parts are crafted from food-grade plastic, not only to enhance the overall lightweight design but also to prioritize safety in our product. The controlled rotation of gears ensures efficient compression, resulting in the separation of liquid from the solid waste and the fine mesh allows the liquid components to drain out while retaining the solid residue, optimizing the reduction of water content. To evaluate our compactor's performance, we assessed the weight of food waste both before and after going through the compactor, to quantify the difference in waste reduction through its compacting. We present a sustainable and economically viable solution that addresses one of the challenges that comes with the composting process within industrial kitchen environments.

### **Mitigating Waterlogged Area at South Graham Municipal Park Through Best Management Practices<sup>2</sup>**

**Brooke Gehrke, Lauren Hill, Sidney Lowe, Rane Parr, & Sammy Tucker** (Dr. Will Puer & Prof. John Ring) Department of Engineering

Regular draining from a fire hydrant causes a saturated area between the parking lot and walking path in South Graham Municipal Park. Due to current topography, the water remains in a low area instead of draining into a drop inlet, which leads to Little Alamance Creek. The regular flushing carries sediments from the parking lot; the current slow drainage effectively reduces this sediment load, but improving drainage may reduce this treatment. This project assesses the potential for modified Beneficial Management Practices (BMP) to mitigate the saturated area and improve water quality in the runoff. To uniformly distribute the concentrated flow, a concrete level spreader parallel to the parking lot will control the regular flushing. The limited space would also require a particularly deep, dry detention basin and a vegetated swale to accent the natural landscape while promoting infiltration with an added aesthetic benefit. Modified BMPs will pull elements from more standard BMPs for a solution that focuses on water quantity within a small space. The BMP selected will be evaluated based on effectiveness at holding the drained water, ability to treat TSS, cost to implement and maintain, and aesthetics. The designed BMP plans will be shared with the city engineer and will include an engineering bid package with drawings, construction specifications, a Stormwater Impact Analysis (SIA) with all relevant calculations, and cost estimates.

## **Robotic Arm Attachment for Unitree Go1 Pro: Safe Collection and Disposal of Hypodermic Needles<sup>2</sup>**

**Lily Helm, Jack O'Donnell, & Emmeline Roberts** (Dr. Jonathan Su & Prof. Blake Hament)  
Department of Engineering

The opioid crisis in America is an increasing and uncontained issue that has plagued our generation. In addition to the other risks associated with opioid drug use, users leave hypodermic needles unattended. For this project, we aimed to develop a robotic arm that allows a Go1 quadruped robot to pick up abandoned and dangerous needles. This combats the health risks associated with littered hypodermic needles, such as HIV and hepatitis. We designed the robot arm in three parts: a base, an arm, and a gripper. The base of the arm is a 3D-printed square that is screwed into the bottom of the dog. For the arm portion, we found a design online of a 3D-printed scissor lift that we used to get inspiration from to assemble a functioning arm. The length of the lift was adjustable to fit the height of the dog and since the scissor moved up and down, the degrees of freedom fit our design. We also 3D printed the parts for the gripper. After the parts were fully assembled, we used an Arduino to control the lift and a separate Arduino, activated by a button, for the gripper. Once we 3D printed and assembled all the parts, we used an Arduino that is actuated by a button. After the robotic arm is fully assembled, it will pick up the hypodermic needles and dispose of them at a designated disposal location. Through this work, those in the engineering field provide innovative technology and keep pedestrians and professionals safe in public. Using this technology, future engineers can develop new attachments that can be placed on robots to protect humans from exposure to unsafe situations. The design process and prototypes will be showcased and operated by our team.

## **Creating a Commercial PFAS Water Filter Using BN NanoBarbs<sup>2</sup>**

**Avery L. Johns, Vivian C. Krause, Bruce Vagt, & Seth Wolter** (Dr. Will Plier) Department of Engineering

Per- and polyfluoralkyl substances (PFAS) are “forever chemicals” that are pervasive in our environment and commonly pollute drinking water due to industrial and consumer discharge. These substances have been linked to a variety of health concerns including cancer, birth defects, and thyroid issues. The United States Environmental Protection Agency (EPA) proposed the first standard for the acceptable level of PFAS in drinking water in 2023, highlighting the urgency of mediation for this public health issue. The Burlington-based company BN Nano has manufactured Boron Nitride (BN) NanoBarbs, a nanomaterial with unique properties that has been shown to both adsorb PFAS from water sources and degrade PFAS in the presence of UV light. Here, we present a household drinking water filter utilizing BN NanoBarbs that will target the removal of PFAS to address these newly imposed EPA standards. The filter design consists of porous filtration pellets that fill a cartridge designed to retrofit a Brita water pitcher, with the addition of two flow-randomizing discs. Polydimethylsiloxane (PDMS) was used as the composite base of the filter material, with small pores being created throughout the filter through the sugar-templated casting process. The pellets are made by shredding the filter material into small pieces to maximize the surface area, and thus adsorption sites, to capture PFAS as water percolates in random pathways in the crevices between the filter pellets. Experimentation was performed to select design features like the PDMS composite base, pore size, pellet size, and amount of the filter material to meet our criteria. These design features were

selected to maximize contact time and PFAS removal efficiency, while minimizing cost and flow rate to acceptable levels. The goal of developing a BN NanoBarb filter is to remove PFAS from drinking water to meet proposed EPA standards. We have evaluated success through determining the experimental PFAS removal efficiency of the proposed filter with Liquid Chromatography Mass Spectrometry.

## **Quantifying Cyanobacteria Using Holographic Lensfree Imaging and Object Detection**

**Jacob S. Karty** (Dr. Jonathan Su) Department of Engineering

Cyanobacteria are a common blue-green freshwater algae which can produce a variety of toxins that can be harmful to birds and mammals. Detection and monitoring of cyanobacterial blooms is therefore an important problem, particularly in North Carolina, which relies on artificial reservoirs for much of its drinking water. Previous studies have shown that lens-free imaging combined with holographic reconstruction can be used to detect and image objects as small as  $1\mu\text{m}$  while maintaining a large field of view. Here we recreate this technology with a camera, 3D printed parts, and an LED, and use it to image samples of cyanobacteria in water. We then train a YOLOv5 object detection model from the COCOv6n checkpoint to quantify cyanobacteria in our images. This results in 62.0% mAP, 75.9% precision, and 54.1% recall, and it was able to differentiate between 6 different types of cyanobacteria in new images. We combine this method of imaging, the machine learning algorithm, and a simple method of auto-sampling using a water pump and flow through chamber to show that there is an inexpensive, autonomous method of quantifying cyanobacteria in water. We then include a Raspberry Pi 4 - a credit card sized computer - to control the camera, pump, and LED to make it stand-alone. This autonomous stand-alone lensfree imaging system can detect low concentrations of cyanobacteria and may be valuable in the early detection of cyanobacteria to combat the threat that cyanobacteria poses to drinking water, livestock, and wildlife.

## **Artificial Intelligence (AI) Voice Module for Service Robot Dog (RSD)<sup>1</sup>**

**Amalie J. Keefe** (Dr. Blake Hament) Department of Engineering

Traditional service dogs offer support to visually impaired individuals but have several limitations including extensive waitlist times, complicated training programs, and demanding animal care responsibilities. This project aims to create an intelligent, cost-effective, and communicative alternative to traditional service dogs, enhancing the lives of visually impaired individuals by creating a personalized and effective robotic solution. A robotic service dog alternative presents a significantly more practical and accessible option for many members of the visually impaired community. Our project aims to allow users to communicate directly with their robotic companion using human language. By integrating hardware and software technologies, this AI-powered voice module will be able to take verbal commands and provide responses. This feature will allow users to gather more information about their environment and make precise commands to the service dog, providing a more intuitive experience. Additionally, specific and individual customizations can be made to best suit the user. This module will eventually be integrated into a Unitree Go1 robotic dog using a Raspberry Pi, microphone, speaker, and several Python libraries such as PyAudio and SpeechRecognition for voice recognition and pyttsx3 for speech synthesis. These libraries rely on the Hidden Markov Model, voice



activity detectors, and preinstalled TTS engines. We present a functional prototype demonstrating the robotic dog's capacity to engage in meaningful interactions with its user, supplemented by friendly barks to enhance the user experience. We conduct rigorous testing and validation to evaluate the performance of the voice module, measuring metrics such as speaking range, rate of speaking, and volume of speech synthesis. The outcomes of our research contribute to the advancement of assistive technologies for visually impaired individuals, ultimately improving their quality of life and independence.

### **Factoring out Racial Bias: Developing a Dual Sensor System for Pulse Oximetry<sup>1</sup>**

**Vivian C. Krause** (Dr. Jonathan Su) Department of Engineering

Pulse oximeters are widely accessible health monitoring devices that estimate blood oxygen saturation (SpO<sub>2</sub>) non-invasively and continuously through optical measurements. However, pulse oximeters have been observed to be unreliable for users with darker skin tones. In 2021, an FDA briefing warned about inaccuracies in these devices, coming after a large-scale multi-cohort study, which found that the occurrence of occult hypoxemia in darker skin patients was three times that in light-skinned patients. Occult hypoxemia refers to patients with arterial oxygen saturation below 88%, despite pulse oximetry reading between 92% and 96%, highlighting concern as patients have dangerously low SpO<sub>2</sub> levels that may go undetected, barring them from seeking appropriate medical care. The impact of occult hypoxemia and the unreliability of pulse oximetry was especially magnified during the COVID-19 pandemic, as pulse oximeters were widely used for both at-home health monitoring and in clinical settings. In this work, I have developed a dual-sensor system for pulse oximetry that objectively classifies user skin tone and corrects for skin pigmentation in SpO<sub>2</sub> readings. I calibrated a low-cost dual-sensor system for pulse oximetry experimentally for skin color classification through an IRB-approved study across 20 diverse participants. Skin tone classes for device calibration were developed through machine learning data clustering techniques. To account for skin pigmentation in pulse oximetry readings, I used Monte Carlo simulations to model light behavior through multilayer biological tissue with MCMATLAB. Pulse oximetry measurements were modeled across various melanin concentrations and SpO<sub>2</sub> levels to determine calibration curves that were specific to the set melanin concentration, which were programmed into the prototype to determine oxygen saturation based on user skin tone. With these results, I was able to develop a prototype of a dual-sensor system for pulse oximetry that reads user skin tone and takes skin tone into account when computing SpO<sub>2</sub>. This study demonstrates the potential for a device that provides an objective measurement of user skin tone to correct pulse oximetry readings and addresses a published unreliability in these devices.

### **Paving the Way to Sustainable Stormwater Management: Analysis of Road Pavement Effects on Water Quality<sup>2,3</sup>**

**Rush Lacoste, Kevin R. Burkett, Arianna Skolnick, Gloria Kaso, & Allee Seering** (Dr. Jonathan Su) Department of Engineering

Christmount Christian Assembly, located in Black Mountain, North Carolina, is a nature retreat that has been struggling with erosion in its main campus area and needs a plan to control stormwater runoff in order to protect Swannanoa River's headwaters. Gravel roads have been washed away during



storms, and the campus is interested in the potential pavement of these roads. Concerns arise, however, as to how pavement and its resulting runoff will affect the surrounding river waters and local community, the overall cost of the project, and support from the local populace. Water can be contaminated by RCRA-defined pollutants, such as lead and chromium. The RCRA (Resource Conservation and Recovery Act) is a federal law that provides instruction for properly managing hazardous and non-hazardous solid wastes (The Environmental Protection Agency), and stormwater runoff can be contaminated with these pollutants from their presence in asphalt and other pavements. Exposure to these heavy metals can have a toxic effect on the environment and humans. These contaminants are of certain concern for the streams at Christmount. Our research aims to provide qualitative data to Christmount to accurately predict how the pavement of additional roads will affect local water runoff by measuring how the pavement of these roads will affect the surrounding water system. Through the atomic spectroscopy method of ICP-OES, measurements will be taken of trace metals, lead and chromium, which can be quantitatively analyzed. To model this, comparisons will be made between Christmount's water sources to the water sources of Elon, taking stormwater runoff samples from varying road types, traffic areas, and locations. Various types of pavement, such as hot mix asphalt and warm mix asphalt, will be evaluated for their environmental effects to recommend Christmount as the most environmentally friendly option. A final deliverable will be presented with a stormwater management plan that will evaluate the environmental, social, and economic impacts of using asphalt to pave the site's grounds.

### **Threat Versus Non-Threat Substances: Developing a Classification Methodology Using Principal Component Analysis of XRD Spectra**

**Matthew Joseph McCourt** (Dr. Scott Wolter) Department of Engineering

X-ray diffraction (XRD) is the scatter of the electromagnetic waves with the atomic structure of a material, creating detected spectra which depend on the specific lattice structure of the material. This ongoing research project aims to distinguish between threat (explosives) and non-threat substances through the analysis of XRD spectra, with the goal of establishing a methodology of accurately identifying threat materials. Leveraging the fundamental principles of XRD, this study seeks to establish a robust relationship between spectral features and principal components. The development of a reliable classification methodology is crucial for effectively differentiating between threat and non-threat substances, underscoring the significance of this research endeavor in broader material classification contexts. Principal component analysis (PCA) serves as the primary method for assessing materials within the XRD spectra library. PCA offers a powerful tool for dimensionality reduction and pattern recognition, enabling the identification of key relationships between spectral features and principal components. Additionally, k-means clustering, an unsupervised machine learning technique, is utilized to classify materials based on their spectral characteristics. This approach facilitates a nuanced exploration of materials structure classification, contributing to the differentiation between threat and non-threat substances. This work was implemented using JMP Pro 16 statistics software to explore the relationship between the specified number of clusters and selected materials from the library of XRD spectra; all of the available spectral features were analyzed to determine the material groupings that emerge. The implementation of PCA and k-means clustering yielded a classification methodology capable of accurately identifying threat materials from non-threat materials based on their XRD spectra. The development of such a methodology significantly enhances material

classification capabilities, with new threat substances being accurately classified based on XRD spectra similarities isolated by this research. This research project develops a classification methodology for accurately identifying threat materials from non-threat materials by leveraging the capabilities of XRD and machine learning techniques. The integration of PCA and k-means clustering provides a comprehensive approach to spectral analysis, facilitating the development of a reliable classification methodology for similar materials. This will allow for the identification of whether a material is explosive given only generic X-ray diffraction data.

### **Developing and Constructing a Prototype ROV: VS-1**

**Tyler McKellar, Harshith Ramesh, & MK Anyimah** (Dr. Jonathan Su) Department of Engineering

Our mission is to innovate space rovers to explore untraversed environments like Titan, one of Saturn's moons. We have constructed a prototype of an Arduino-based remotely operated vehicle (ROV). The prototype rover uses a simplified design and is equipped with a thermometer, gyroscope, spectrometer, and camera. Including only fundamental operations required for data collection allowed us to focus on how one rover works in unison with the rover hub. This rover is intended to work simultaneously with other rovers, all of which would be connected to a hub station. The purpose would be to increase land explored within a shorter time frame. In order to begin exploring rover interaction, we researched the communication of one rover with the rover hub. Our process highlights the array of various numerical data transmitted from our sensors; ensuring quick and efficient communication between the rover and the rover hub. In conclusion, our research emphasizes the potential benefits of employing smaller, more agile rovers in space exploration. By increasing land coverage and optimizing data collection efficiency, our approach offers a promising path for advancing our understanding of extraterrestrial environments while overcoming the constraints inherent in real-space exploration.

### **Ion Pumping Technology in Miniature Mass Spectrometry**

**Moris E. Menjivar Alfaro** (Dr. Scott Wolter) Department of Engineering

This research explores the application of miniaturized mass spectrometry for measuring gaseous hydrocarbon species in seawater. Of interest is determining methane levels at varying depths from the sea floor, providing insights into methane generation and chemical changes under different oceanic conditions. Mass spectrometry system designs typically include an orifice for analyte sampling, high vacuum pumps, and pressure control electronics. The closed-system nature of the instrumentation necessary for underwater applications requires changes to the typical vacuum pumping schemes. Herein, we report on the use of ion pumping technology, which captures gases through chemisorption and physisorption. This type of capture pump operates by ionizing gas within the instrument and sputtering a getter metal for its capture. Our studies involve introducing ambient air into a  $\sim 750$  cm<sup>3</sup> vacuum chamber at system pressures of  $1 \times 10^{-3}$ ,  $5 \times 10^{-3}$ ,  $1 \times 10^{-4}$ ,  $5 \times 10^{-4}$ ,  $1 \times 10^{-5}$ , and  $5 \times 10^{-5}$  Torr and sampling flow rates of 0.001, 0.1, 0.1, and 1 sccm, monitoring lengths of time to maintain constant pressure. The results provide insights into the total sampling time as a function of chamber pressure and sampling flow rates, along with assessing the suitability of ion pumps in closed-system mass spectrometry designs. These findings enhance our understanding of hydrocarbon species in seawater,

laying the groundwork for potential future applications of ion pump technology in compact mass spectrometry systems.

### **Building a Human Machine Interface (HMI) System for an FSAE Racecar**

**Moris Menjivar Alfaro, Nicholas Muller, Benjamin Trainum, & Lamar Williams** (Dr. Will Puer)  
Department of Engineering

This project concentrates on developing a Human-Machine Interface (HMI) system in strict accordance with Formula SAE Electric 2023 regulations. Emphasizing driver comfort, safety, and alignment with anthropometric requirements, the HMI aims to offer optimal support for drivers ranging from the 95th percentile male to the 5th percentile female. The project unfolds across three subsystems—seat, pedals, and steering—each tailored to meet the specified guidelines effectively. In the seat design, a two-part structure is used, combining a geometric shell and custom inserts for individual drivers. This approach ensures ease of structural construction while allowing adaptability for diverse drivers. The pedal design centers on simplicity in construction, strength, and suitability for simple steel fabrication. The design facilitates easy adjustability within the chassis, enhancing overall flexibility and driver support. The steering system employs a single universal joint, minimizing costs and simplifying the mechanism. Leveraging 3D printed materials for the steering wheel allows customization and straightforward part replacement. The prioritization of comfort, simplicity, and safety is crucial as the HMI serves as the pivotal link between the driver and the vehicle, significantly impacting overall performance in racing. The methodology involves a systematic design approach, considering specific guidelines for each subsystem. Iterative prototyping, CAD drawings, and testing contribute to refining the design for optimal performance. The project findings reveal that the designed HMI system successfully integrates compliance with Formula SAE Electric 2023 regulations alongside prioritized driver comfort and safety. The major conclusion is that a meticulous, subsystem-focused design approach can combine regulatory adherence with production goals and restrictions, contributing to an enhanced driver experience and overall race car performance.

### **LiDAR for Safety: Affordable Collision Avoidance Systems**

**Nicholas A. Muller** (Dr. Jonathan Su) Department of Engineering

This research project investigates the potential of LiDAR technology for use in autonomous emergency braking systems. The study focuses on designing a low-cost collision avoidance system using a single point LiDAR sensor. With a focus on enhancing transportation safety and efficiency, this research addresses the pressing need for improved reaction times during emergency situations, especially in the case of rear-end collisions. LiDAR technology's ability to provide precise depth perception and detailed 3D visualizations offers a promising solution. The project involves assessing the effectiveness of the single point LiDAR sensor in detecting obstacles at various distances and angles. Notably, a prototype is developed to simulate 360-degree scanning of the environment, providing accurate distance measurements and timely responses to potential collision hazards. Additionally, a real-time interpretation program is developed to evaluate the system's performance and identify potential collision scenarios. A remote-controlled car is employed to simulate real-world scenarios, testing the sensor's ability to respond to rapidly appearing objects and obstacles. Results

indicate that the prototype successfully scans the environment, providing accurate distance measurements and timely responses to potential collision hazards. This research contributes to the ongoing exploration of LiDAR technology's potential in collision avoidance systems, emphasizing the feasibility of creating an accessible and cost-effective solution for enhancing transportation safety.

### **Designing a System That Removes PFAs in Water Using Boron Nitride<sup>2,3</sup>**

**Sonith Riem, Ayesha Awad, Lauren A. Hanchar, & Matthew J. McCourt** (Dr. Will Puer, Prof. John Ring, Mr. Matthew Banks, Dr. Jonathan Su) Department of Engineering

In response to the mounting concern over the emergence of Polyfluoroalkyl substances (PFAs) as water pollutants and the impending EPA policy changes mandating treatment, our design team is committed to developing an efficient and accessible solution. PFAs pose significant risks due to their toxic effects on both human health and ecosystems. However, current treatment technologies are hindered by their high costs and slow implementation. Initially, we proposed leveraging the catalytic properties of BN nanotubes under UV light by incorporating Boron Nitride materials into a Brita-style filter to capture PFAs. However, concerns regarding the hazardous chemicals present in Boron Nitride and their potential contact with water necessitated a shift in our design approach. Consequently, we eliminated the use of free-floating Boron Nitride materials in water. Instead, we turned to electrospun boron nitride fibers, which offer a structured framework for holding boron nitride nanotubes together. Additionally, electrospun fibers can significantly increase surface area, enhancing interaction with water and increasing chemical activity to break down and remove PFAs chains. To ensure containment of the electrospun fibers, our design proposes encasing them within a mesh structure. Furthermore, we intend to shape this enclosure into a spherical form with triangular elements to minimize collisions that can further breakdown of the electrospun fibers encased within the mesh. Our evaluation process involves passing water through the electrospun fibers using a vacuum filter and measuring the remaining electrospun fiber mass to ensure no leakage of fibers into the treated water. Preliminary results indicate that only 0.003g of electrospun fiber residue remains after a single filtration cycle. However, multiple repetitions of the process will be conducted to confirm the absence of any further residue. These results suggest the viability of our design, where the electrospun fibers are effectively contained within the mesh, offering a promising solution to address the issue of PFAs contamination in water.

## **English**

### **Place and Class in Young Adult Appalachian Literature**

**Zoie M. Browder** (Dr. Megan Isaac) Department of English

This research examines how class and location interact in young adult novels based in Appalachia, published between 2012 and 2022. Characters from *Dig Too Deep* by Amy Allgeyer (2016), *Wake the Bones* by Elizabeth Kilcoyne (2022), *Be Not Far from Me* by Mindy McGinnis (2020), *The Raven Boys* by Maggie Stiefvater (2012), and *The Serpent King* by Jeff Zentner (2016) are analyzed. These

novels range from fantasy to horror, with both real and fictional locations, all in Appalachia. This research focuses on how class and place converge in Appalachian young adult literature and how it affects the examined characters. People in Appalachia, as with many rural areas, are often heavily stereotyped in media as backwards, uneducated hillbillies, and this analysis pushes past stereotypical notions of Appalachia and delves into how characters' intersecting identities affect the choices they have and make, how they are seen by others in the novels, and how they present themselves to others in the novels. Using Parton and Kuehl's theories of narrative and counternarrative, this research shows how these novels both challenge and lean into stereotypes. Place inherently influences class in these books, and where these characters are from impacts their lives more significantly than class alone.

### **Hybridity and Heterogeneity in Asian American Experiences: Reading of Lisa See's *China Dolls*<sup>1</sup>**

**Kenna Dubraski** (Dr. Dinidu Karunanayake) Department of English

Lisa See's *China Dolls* (2014) is a historical fiction novel set in San Francisco during the 1930s-1940s. It follows the lives of three Chinese American women who are dancers at a Chinese nightclub. The diversity of the women's personalities and upbringings make them unlikely friends, but they are united in their experiences of sexism and racism. Their lives are further complicated by World War II as it spurs many ethnic and social conflicts. Using Lisa Lowe's "Heterogeneity, Hybridity, Multiplicity: Marking Asian American Differences," I will illustrate how See demonstrates the hybridity and heterogeneity of Asian American culture and dispels homogenous stereotypes. In Lowe's essay, she argues the following: "interpreting Asian American culture exclusively in terms of the master narratives of generational conflict and filial relation essentializes Asian American culture, obscuring the particularities and incommensurabilities of class, gender, and national diversities among Asians" (Lowe 26). The women in *China Dolls* carve their own space between nativism and assimilation and thus defy homogeneous labels. This is demonstrated not only by their different ways of embracing Chinese culture, but also their class differences, ancestral origin, and overall characterization. This research makes a unique contribution to the literary field as currently there is no research containing a cross-analysis of Lowe's theory and See's *China Dolls*. During the pandemic, from 2019-2021 there was a significant rise in federally recognized Asian and Asian American hate crimes [158 in 2019- 746 in 2021] according to the Pew Research Center. Considering how this relates to the characters' encounters with racism, the novel reminds readers that Asian discrimination is still happening. As such, it's vital that there is consistent cross-generational, relevant representation that challenges homogenous stereotypes and racist perceptions of culture through literary research.

### **How do Embedded Consultants (and Their Professors) Make a Difference to Students? The Perceived Benefits to Students of Having an Embedded Consultant in a Disciplinary Course<sup>3</sup>**

**Julia Herman** (Dr. Julia Bleakney) Department of English

This study focuses on the perceived benefits of a course-embedded writing consultant program at Elon University. While prior studies (Dvorak, Regaignon and Bromley) show the value of course-embedded peer writing support programs for first-year students in introductory writing courses, there is less research on students' perceptions of disciplinary writing consultants (DWCs) who are embedded in discipline-specific courses. Additionally, there is little research on how course-embedded consultants



work collaboratively or in-tandem with the professor. This survey-based study asked students--at the beginning and end of the semester in a course in which they had an assigned DWC--to comment on what they expected to learn or did learn from their DWC and professor. This study contributes to the writing field's understanding of the value of a writing consultant and professor working together to benefit student learning in the courses and focuses on how students can benefit from the collaboration between consultant and professor. Our study analyzed 210 student surveys gathered between 2016-2022 from courses with DWCs at Elon. We selected survey data that had DWCs for two consecutive semesters, and we coded the survey responses using a combination of emergent and pre-defined coding categories related to strategies in the writing process. With a great deal of variation in student responses making it difficult to generalize, we nevertheless learned more about students' expectations for learning than about their perceived learning. In general, students expected to learn more general writing strategies (such as steps of the writing process) from their DWC and more field-specific writing strategies from their professor. As the course level advanced, students' expectations became more narrow in scope: for example, in the 1000-level Economics course, 12 students expected to learn about "general college writing" from their DWC, whereas no students in a 3000-level course expected to learn this. The results confirmed what we expected to find regarding students' perceptions of learning in the course, highlighting the need to help students understand the value of learning different aspects of the writing process from their consultant and professor.

### **Exploring the Landscape of Generative AI in Academic Writing: A Collaborative Inquiry at Elon's Writing Center<sup>3</sup>**

**Lauren Jablon** (Dr. Jessie Moore) Department of English

This project focused on understanding the role of generative AI, specifically software like ChatGPT, in students' writing. It outlines an ongoing collaboration among Elon's Center for Writing Excellence, the Center's Director Dr. Julia Bleakney, Elon University's Director of Writing Dr. Paulia Roskinski, and Lead WC Consultant Lauren Jablon. Additionally, the research assessed Writing Center consultants' and clients' usages of and attitudes toward AI in Writing Center appointments. Given the diverse disciplines served by the Writing Center, the project explored how generative AI is used for academic, professional, personal, and civic writing purposes across contexts. To gather insights, three surveys were administered throughout the semester to both clients seeking feedback at the Writing Center and Consultants, gauging if and how they used generative AI in writing-intensive projects. The surveys, ensuring participant anonymity, received Institutional Review Board (IRB) approval prior to being administered and allowed students to respond to questions such as "How did clients you interacted with that used generative AI use it?" and statements such as "generative AI in writing is cheating", among others. In addition, a demographic section was incorporated into the surveys to grasp how identity factors influence perceptions of generative AI. Interviews and focus groups will be conducted as the project progresses further to provide a nuanced understanding of the role of AI through personalized responses. The study, while primarily catering to an internal audience, acknowledges potential engagement from Elon faculty and the broader community upon publication. This study will guide future research conducted at Elon University and beyond, aiding scholars in better understanding the role of AI software in writing centers and academic settings.



## Conditional Love: Parentification and its Outcomes in YA Literature vs. Literary Fiction

**Eleanor Kahl** (Dr. Megan Isaac) Department of English

Because of its younger demographic, young adult literature often focuses on issues and experiences that teens can relate to. And what bigger issues does a twelve-to-eighteen-year-old have than those to do with their parents? As a genre, YA fiction frequently features the nuances of parent/child relationships. In my research, I narrow in on a specific type of such relationship. Parentification was defined in 1973 by Boszormenyi-Nagy et al. as “a parental figure's expectation that a child fulfill the role of a parent within the family subsystem”. This effect can manifest both physically and emotionally in parent/child relationships and is represented in both YA and literary fiction. In my research, I compare the two genres and how they represent this relationship dynamic. While YA novels often show these relationships in a more hopeful light, presenting the characters involved as being capable of change, literary fiction takes a more ‘realistic’ stance. Kazuo Ishiguro’s 2021 novel *Klara and the Sun* is a prime example of an extreme case of parentification between the protagonist, Klara, and her mother figure. Ishiguro explores a relationship in which a mother expects a child in her care to take care of the emotional needs of their entire family system. *Graceling* by Kristin Cashore is an example of a young adult novel that shows a similar effect. However, in this 2008 tale, the protagonist Katsa is instead expected to complete physical duties for her father figure in order to maintain the emotional connection between them. In my research, I compare the ways that Ishiguro’s work of literary fiction impresses upon the reader the impossibility of escape from the cycle as opposed to Cashore’s YA novel with a similar situation. Katsa’s ‘freedom’ from her parent figure’s control at the end of the novel juxtaposes with Klara’s neverending service to her caretaker, showing us how parentification can be represented as either an obstacle that can be overcome or an unbreakable cycle depending on the genre.

## Evaluating the Relationship of Personal Assistants and Loneliness within the Disabled Community<sup>1,3</sup>

**Ella Kinman** (Dr. Prudence Layne) Department of English

Disabled individuals employ personal assistants for help with daily activities as they move through their lives. Personal assistants can be advocates; they might be hired individuals or unpaid family members. As established by previous research, social isolation and loneliness have become more prevalent post-COVID among the general population (O'Sullivan, Roger et al.). Regarding this trend, my research intends to see the impact personal assistants have upon the disabled community. I postulate that personal assistants go beyond the function of advocacy and aid to provide socialization. To that end, I argue that social isolation and loneliness are more prevalent among disabled individuals who do not have personal assistants. I claim this under the assumption that personal assistants inherently extend connection through their position in the home and close work with disabled individuals. The data in this study is from “The National Survey on Health and Disability (NSHD) from 2022 which is administered by the University of Kansas Institute for Health & Disability Policy Studies (KU-IHDPS, [https:// ihdps.ku.edu/nshd](https://ihdps.ku.edu/nshd)) and funded by the National Institute on Disability, Independent Living, and Rehabilitation Research.” The independent variable is personal assistant (yes or no) and the dependent variable is loneliness, evaluated on a 1 to 7 scale. I seek to measure the benefits of relationships between personal assistants and disabled individuals. For bivariate analysis, a

t-test and an OLS multiple regression model are used; controlling for health status, having Medicaid, and whether or not individuals live alone. The purpose of evaluating this theory is to measure the impact personal assistants have in the lives of disabled individuals. The answers found through statistical analysis illustrate the role caregivers play in the lives of their clients, providing clarity about subjective experiences. In a broader context, the value of a personal assistant might encourage policymakers to support caregiver services so that the obstacle of payment can be eased and more disabled individuals can afford a personal assistant.

### **Nature's Self-Interest and Human Governance: Exploring the Parallels and Divergences Between Edward Abbey's "Serpents of Paradise" and Legalist Philosophy<sup>2</sup>**

**Claire Lancaster** (Dr. Kathleen Crosby) Department of English

An exploration of the parallels and divergences between Edward Abbey's environmental philosophy and Han Feizi's Legalism presents a novel intersection in philosophical and environmental studies. Historically, the examination of environmentalism has rarely been juxtaposed with ancient Legalistic principles. This lack of discourse has left a gap in understanding how seemingly disparate ideologies might inform each other, especially when considering the practical application of such ideologies. No significant literature has explicitly acknowledged the similarities between Abbey and Legalism in practice, despite the clear divergence in their ethical frameworks. Abbey's environmentalism—characterized by a profound respect for nature's autonomy and staunch opposition to authoritarian control—appears antithetical to the rigid, human-centric governance model proposed by Han Feizi's Legalism. However, a closer inspection reveals a paradoxical alignment in their methodologies. Abbey, despite his emphasis on individual morality, demonstrates a pragmatic approach to environmental issues. Specifically in "Serpents of Paradise," Abbey's interactions with the natural world mirror Legalism's practicality in harnessing human self-interest for state benefit. An analysis of the paradox between ethical opposition and practical congruence provides strategies for translating environmental rhetoric into action effectively. This analysis is not only academically intriguing, but it bears significant implications for contemporary environmental strategies. Understanding how Abbey's environmental ethics can coexist with a Legalistic approach to practical issues paves the way for more effective, pragmatic environmental policies that still respect the intrinsic value of nature. This research bridges the gap between ancient statecraft and modern environmentalism and offers insights into how we can be more eco-friendly in a practical, yet ethically conscious manner.

### **Decolonizing English in Academia: Exploring the Impact of White Hegemony on Language Usage and Perception<sup>1</sup>**

**Claire Lancaster** (Dr. Jessie Moore) Department of English

Positioned at the intersection of academic inquiry and advocacy, this study explores the profound effects of white hegemony within the English language in academic settings, focusing on how such dominance shapes both language usage and perceptions of language correctness and appropriateness; for instance, African American Vernacular English (AAVE) is often unfairly deemed "incorrect" or "inappropriate" within academic settings. This study not only investigated the impact of white hegemony on students' and educators' perceptions of writing and literature, but it also examined white

hegemony's role in the creation of prescriptive rules for communication and expression. Drawing from sociolinguistics, education, and critical race studies, this study utilized a multidisciplinary method. A thorough literature review synthesizes existing knowledge, identifies the roots of white hegemony within language, and examines white hegemony's prevalence in academia. Survey data offer firsthand insights from the academic community; exploring students' and educators' perceptions of hegemonic language norms, their impact on communication and expression, and their effect on notions of language correctness and appropriateness, the survey data provide a more "tangible" analysis of white hegemony's influence and ground existing theoretical discussions in empirical research. The literature review and surveys contribute to a comprehensive written report with findings and implications sections. The findings section presents evidence of white hegemony's influence on academic language perceptions and practices. The implications section delves into the practical and pedagogical ramifications of the findings and recommends actionable strategies for linguistic diversity and inclusivity. The multidisciplinary approach of this study—with both quantitative and qualitative methods—is designed to enrich the ongoing discourse about decolonizing the English language and fostering more inclusive, equitable educational environments.

### **Exploring Rhetorical Strategies in Misinformative News Media on Social Media Platforms**

**Mollie E. Lund** (Dr. Jessie Moore) Department of English

This research investigates the rhetorical strategies employed in misinformative news media circulated on social media platforms. With a significant portion of American adults relying on online sources for news consumption, understanding the mechanisms of misinformation dissemination is paramount. Specifically targeting the 53% of Americans who obtain news from social media platforms, this study also addresses educators in K-12 and university settings, offering insights into media literacy and combating misinformation. Through the methodological employment of discourse analysis, the study aims to uncover the rhetorical tactics utilized in misinformation campaigns, drawing from both Fairclough's three-dimensional framework for critical discourse analysis as well as van Leeuwen's discourse model of legitimation. The research is guided by a comprehensive literature review that contextualizes the discourse analysis within existing scholarship on misinformation, social media news consumption, and media literacy. I center user-experience-oriented design frameworks to ensure the efficacy and accessibility of the final deliverable—an interactive web-based educational guidebook that enhances users' media literacy skills and fosters a nuanced understanding of the relationship between misinformation and socio-political polarization. The primary audience for this final project guidebook includes Americans who regularly consult social media platforms, and the secondary audience includes educators interested in promoting media literacy skills among students. The guidebook teaches target audiences about the nature of misinformation while fostering the development of users' media literacy skills, thus enabling them to better navigate contemporary information media landscapes.

### **Editorial Assistant or Editor-in-Chief? Exploring the Role of AI in Professional Editing**

**Emily Murrill** (Dr. Jessie Moore) Department of English

As technological advancements continue to shape the landscape of professional writing and editing, professional editors face an uncertain future concerning their roles and how their work is valued. Amidst the rise of publicly-available AI editing platforms, questions have arisen regarding their efficacy and potential to reshape — or even take over — the editing career field. This research project seeks to explore the degree to which publicly-available AI editing platforms can function accurately and successfully with little human intervention. The research is informed by a comprehensive annotated bibliography, which synthesizes existing research on both human editing techniques and AI editing formulas. This literature review is situated in the evolving landscape of scholarship on the intersection of human editing and AI and provides a foundational framework for my research. The first prong of the research methodology is a comparative study, conducted in collaboration with Elon University's Center for Engaged Learning (CEL). A section of the manuscript from CEL's current publication project, *Counterstory Pedagogy*, has undergone editing by the Managing Editor of CEL, who is a seasoned industry professional, without any assistance from AI. Simultaneously, I put the same manuscript section through three different AI editing platforms: Microsoft Word, ChatGPT, and Grammarly. All editing suggestions provided by each platform were accepted and compared against the Managing Editor's edits for accuracy and adherence to the author's original message. Subsequently, a brief informational interview with CEL's managing editor provided insights into her satisfaction with both her edits and those made by AI. The second and final piece of the project is a culminating research report in the form of an industry white paper. This white paper bridges the scholarly research on AI and human editing practices covered in the annotated bibliography, summarizes the comparative study results, and discusses the implications for professional writing curricula as well as careers in editing. By shedding light on the capabilities of AI editing platforms, this research will determine if and how the profession needs to change and aims to inform future professional editing practices and the higher-education curriculum surrounding those practices, ensuring the continued relevance and evolution of the editing profession in the digital age.

### **Witches and Authority: Gendered Institutions of Power in Young Adult Fantasy**

**Carissa Pallander** (Dr. Megan Isaac) Department of English

Narratives in young adult fantasy that portray witches often do so to explore gendered institutions of power. Witches, as a recurring trope in these narratives, act as a symbol of femininity whose power is fortified by matriarchal systems of authority such as covens. However, these narratives also offer opposing patriarchal societies that aim to eradicate the aforementioned structures of female empowerment under the guise of piety or as an unnecessary form of defensive warfare. The conflict between these matriarchal and patriarchal systems of authority often create tension between individual characters. This causes the characters who represent either the trope of the witch or witch hunter to examine the corresponding ideologies that they were raised to follow after interacting with someone from the opposing community. This study's objective is to examine how the opposition between these forms of systematic authority are in conversation with real world societal structures that perpetuate a connection between gender and power. Using witches as a trope to empower women, these narratives present a model of female organized society that can be used to make inferences about how women are supported or expected to submit to authority. The research for this study constitutes the examination of popular titles in young adult fantasy over the past few years: namely, *The Wolf and the Woodsman*, Ava Reid (2021), *Serpent & Dove*, Shelby Mahurin (2019), and *Six of Crows*, Leigh Bardugo (2015).

Further, the study draws upon peer reviewed, scholarly sources that offer insight on these tropes in young adult literature and make connections between witches, gender, and institutions of power within these narratives. This research finds that there is a relationship between matriarchies and magic whereas patriarchies are associated with religion and soldiership. Systems of power governed by women are much more community based and equitable than patriarchies, which rely heavily on hierarchical structures to retain authority. The narratives offer solutions contingent upon either the witch or witch hunter rejecting their upbringing, revealing that neither of these methods of authority are sustainably effective.

### **“Padlocks Were Placed Over Their Parted Mouths”: Recovering Subaltern Voices in the Postcolonial Female Neo-Gothic<sup>1</sup>**

**Cailey S. Rogers** (Dr. Janet Myers) Department of English

This project examines the lack of postcolonial representation within Female Gothic literature historically and analyzes the ways in which modern women writers fill that gap by contextualizing the experiences of subaltern women through the creation of a postcolonial neo-Gothic discourse. My research extends the work of scholars such as Gayatri Spivak, who pioneered the definition of the subaltern woman—one who is oppressed both for her race and gender—and criticized the suppression of colonial voices in canonical Western literature. Using her scholarship as a foundation, my project centers on novels that write back to canonical and imperial texts, including *Wide Sargasso Sea* (1966) by Jean Rhys, a rewriting of Charlotte Brontë’s *Jane Eyre*, and the more contemporary *White is for Witching* (2009) by Helen Oyeyemi. With the combined application of a feminist and postcolonial framework, this inquiry creates a dialogue between scholarly and literary texts to ask: How do postcolonial women writers both adhere to and subvert Female Gothic motifs and themes to represent the intersectionality of gender and racial identity and reclaim the suppressed subaltern voice? How do they reinvent the traditional Female Gothic genre to center postcolonial narratives from the perspective of the colonized as opposed to the colonizers? The conclusion to this study finds that while the act of rewriting is in itself essential to the reclamation of the identity of colonized women, these writers also subvert tropes that associate the foreign with the Gothic to instead depict the imperial home as the site that is monstrous and haunting. By reinhabiting and dismantling canonical Western texts, postcolonial women writers not only expose the injustices of the colonial world both in the past and present, but also rescue the voices of subaltern women who have been silenced and neglected for centuries.

### **COVID-19 Literature: Processing Pandemic Experiences**

**Avery G. Sutherland** (Dr. Erin Pearson) Department of English

Following the onset of the COVID-19 virus in March 2020, the literary world produced an immediate outpouring of texts conveying experiences of life during the pandemic. In addition to documenting this period of time in ways that case counts and death tolls do not capture, these texts are significant to literary studies of trauma because they add to a growing understanding of trauma as including long-term, everyday experiences in addition to singular or violent instances. Through close reading, I analyze COVID-19 poetry, including the anthologies *Together in a Sudden Strangeness* (2020), *Pandemic Poems* (2021), and *Poets with Masks On* (2022), and novels, including Gary Shteyngart’s



*Our Country Friends* (2021), Louise Erdrich's *The Sentence* (2021), Jodi Picoult's *Wish You Were Here* (2021), Elizabeth Strout's *Lucy by the Sea* (2022), and Emily St. John Mandel's *Sea of Tranquility* (2022) through a new historicist lens in order to make connections between the texts and the time period they discuss. I argue that COVID-19 literature captures a tension between individual psychological experience and collective societal crisis. This is seen in the literature's focus on themes of social justice, isolation, and escapism, which each illuminate significant aspects of the tension between individual and collective experience. COVID-19 poetry articulates a complex exploration of social justice during the pandemic, which includes the dynamics of multiple overlapping societal crises and personal experiences of grappling for power, agency, and social impact. Additionally, COVID-19 novels reveal the surprising duality of isolation and connection in experiences of lockdown; this includes the ways lockdown both clarified existing connections between people and facilitated new relationships between individuals. Finally, texts with themes of escapism capture both internal experiences of desiring escape, as seen in the recurring motif of birds and the sky, as well as larger narratives of escapism, which include more speculative stories.

### **The Adaptability of Digital Identities: Guidance for Improving Ones Online Presence**

**William S. Thalhimer** (Dr. Jessie Moore) Department of English

This project studies personal branding strategies for recent graduates and young professionals who are switching career fields. The research offers ways to improve and evolve professionals' online identities to fit the rhetorical conventions and expectations of their new intended profession. Furthermore, it highlights the best possible way of presenting the transferability of the audience's particular skill set acquired from their past to their present/future field. This project tackles the topic of fluid roles and positions in the workforce which has made the average employee more susceptible to position changes. Those between the ages of 18 and 24 in the United States change jobs an average of 5.7 times which is more than any other age bracket. This project focuses specifically on writing-based jobs including multimedia positions. The project involved conducting informational interviews with employers, members of the Student Professional Development Center, recent graduates, and those amid the job hunt to better understand what employers are looking for in their respective specific fields and what the average young professional has at their disposal in terms of submittable content and an online presence. The project also draws from scholarly articles about strategies to properly represent oneself online. As an outcome of this research, I created a web guide with sources linked along with self-made video tutorials on restructuring LinkedIn pages, portfolios, and resumes. This multimodal website acts as a single source of information for those between the ages of 18-30 attempting to reframe their skills and experiences in a professional format that reaches their intended employers.

## **Environmental Studies**

### **Estimating Carbon Sequestration Utilizing GIS in Cane Creek Mountains Natural Area**

**Jack R. Allen** (Dr. Vandermast) Department of Environmental Studies



Cane Creek Mountains Natural Area (CCMNA) is a relatively new park in Alamance County, North Carolina opening officially in 2020. Much of the park is an ancient monadnock, upon which there is no obvious evidence of intensive land use. The forest composition and structure appears to be consistent with that of an old-growth forest. The purpose of this study was to document the composition and structure of the forested parts of the park and to estimate the amount of woody biomass and carbon stored within it. Local parks like CCMNA are valuable in the calculations surrounding anthropogenic climate change and old-growth forests in particular can store a lot of carbon. We collected data from 83 non-permanent plots during the fall of 2022, using prism cruising to identify trees for which we measured diameter (DBH). Our results indicate that the forest is dominated by chestnut oak (*Quercus montana*) and white oak (*Q. alba*), which are 514 of the 930 (55.3%) trees we sampled. The Shannon diversity value was 2.13, Pielou's evenness and Simpson's dominance were .23 and .61, respectively. We calculated aboveground woody biomass using published algorithms that use DBH and species data. From the biomass data, we calculated a range for carbon storage in the trees at CCMNA of 190.8-211 Mg/ha CO<sub>2e</sub> (megagrams per hectare of CO<sub>2</sub> equivalent) based on carbon being between 45-50% of the biomass in woody tissue. This range is in line with calculations of biomass on other Alamance County sites: Cedarock Park (163-181.1 Mg/ha CO<sub>2e</sub>) and Elon University Forest (88.6-98.5 Mg/ha CO<sub>2e</sub>). Our findings indicate the presence of a mature oak-dominated forest in Alamance County that is an important ecological resource for the area, offers co-benefits, and stores a significant amount of carbon.

## Land Use Change and Carbon Storage at Cane Creek Mountains Natural Area<sup>2</sup>

**Akani Bey** (Dr. David Vandermast) Department of Environmental Studies

As climate change worsens, experts seek mitigation strategies that include conserving forests. This research project aims to evaluate carbon storage potential in southeastern US temperate forests. Our study site is Cane Creek Mountains Natural Area (CCMNA), a park in Alamance County, NC. We investigated how land use has changed over a 79 year period. Using GIS software, we digitized aerial photos between 1939-2018 using categories of non-forest, logging, hardwood, pine, and mixed pine-hardwood. We used ground truthing to collect field data at 83 sample sites. We found that the total forested area increased 46.1% from 1939-2018 (240.8 to 352.1 hectares (ha)). Pine forests increased 42.3% (53.1 to 82.7 ha) between 1939 and 2010 but logging in 2014 removed 44.6 ha of pine forest. We estimated the secondary successional transition of pines to hardwoods as 22.7 hectares, a decrease of 27.4% in pine area. During these successional changes from agricultural field to pine to hardwood, more carbon will have been stored in hardwood species as they have denser wood than do pines. US Forest Service allometric equations were used to calculate the carbon sequestered by the forests using the 2023 field data. We found that CCMNA stores 190.7 Mg/ha CO<sub>2e</sub>. The existence of a mature hardwood forest in 1939 and the composition and structure of the forest from our field data, suggest the presence of a forest of continuity (FOC) at CCMNA. The existence of this forest signifies the potential to study an old Piedmont forest (FOC is similar in structure and composition to an old growth forest) with a higher potential for carbon sequestration and with unique species rarely found elsewhere in the Piedmont.

## **Investigating the Impact of Soil Amendments on Carbon Holding Capacity, Cation Exchange Capacity, and Overall Soil Health and Plant Growth in Turf Grass Systems<sup>2</sup>**

**Zachary M. Diamond** (Dr. Kelsey Bitting) Department of Environmental Studies

Grass species, such as turf grasses, play a crucial role in combating climate change through carbon sequestration. They are commonly found in various landscapes, serving aesthetic, recreational, and functional purposes. In a study by Milesi et al. (2005), it was found that approximately 163,800 km<sup>2</sup> of land in the continental United States is cultivated with turf grasses, an area three times larger than that of any irrigated crop. From golf courses and baseball fields to the lawns around Elon's campus, we see them everyday and their ability to capture and store carbon dioxide from the atmosphere is promising for environmental sustainability. Carbon sequestration, the process of capturing and storing carbon dioxide from the atmosphere, is vital in this regard, particularly in storing carbon in soil. This study aims to assess the carbon sequestration potential of turf grass soil systems by integrating various amendments in the soil. The amendments to be tested include, biochar, spent coffee grounds, and basalt rock dust, all of which exhibit promising capabilities to sequester carbon through fixing it in the soil via decomposition of the plants roots. Preliminary findings suggest that these amendments have the potential to enhance carbon sequestration, improve soil health, and promote healthier turf grass growth. This study will include 1 meter by 1 meter square plots, totaling 35m<sup>2</sup>. Amendments will be added once every three months to see season change through consistent incorporation. To evaluate the impact of these amendments, we will conduct several soil health assessments, including measuring soil organic carbon content using a loss on ignition (LOI) test, testing for cation exchange capacity and pH as measures of soil health, and monitoring grass growth through weekly photographic comparisons. This research highlights the significance of turf grass systems as a valuable tool in carbon sequestration efforts and underscores the importance of sustainable land management practices in addressing climate change. Urgent action is needed to reduce our carbon emissions and strengthen ecosystem resilience, with turf grasses holding substantial potential to contribute to these endeavors.

## **The Lightbulb Tunicate: A Study of Climate Change, Invasion Ecology and Risk Assessment<sup>2,3</sup>**

**Jackson Fender** (Dr. Michael Kingston & Dr. Amanda Chunco) Department of Environmental Studies

*Clavelina oblonga*, also known as the lightbulb tunicate, is a species native to the Caribbean. Over the last 80 years, it has become invasive throughout western Europe and on the eastern seaboard of the United States from South Florida to portions of South Carolina. Most recently, it has appeared in Beaufort, NC. This isolated invasion has putatively occurred through ballast water in shipping and has thrived potentially due to changes in climate factors such as water temperature. This research seeks to identify: 1) the geographic patterns in how this species has spread from its native range, 2) environmental factors contributing to this invasion, and 3) surrounding areas that may be at risk. Based on resources including using museum and citizen science records mapped in ArcGIS, we have developed a sampling methodology that covers the coast of North Carolina with primary data collection occurring in June, where we will use a sampling apparatus to scrape wharf pilings under docks and identify the species we collect. We will then generate maps incorporating data such as species location and abundance, water temperature, and salinity levels. Using these maps, we can

predict which areas are at high risk for an invasion, as well as determine how influential factors like climate change are impacting species movement.

### **Soil Carbon Sequestration in Elon Forest: Role of Past Land Use, Forest Age, and Landscape and Soil Characteristics<sup>2</sup>**

**Ryan D. Gibbons & Nate R. Krohmer** (Dr. Kelsey Bitting & Dr. Ryan Kirk) Department of Environmental Studies

Forest soils have the potential to sequester substantial amounts of carbon for long periods of time. However, previous studies have demonstrated that a legacy of agricultural use negatively influences this ecosystem service. The Elon Forest is a 56 acre mixed hardwood-conifer forest with a mixed-use history of agricultural and old growth in the Piedmont area of North Carolina. This site allows for studying the degree to which soils with different land use histories sequester carbon. The lead author created a geospatial database to represent the change in land use of the Elon Forest over the span of 83 years. Based on aerial photographs between 1939 and 2022, the lead author digitized polygons representing the different land use categories present in each year. Once the polygons were created, raster-based analysis revealed the trajectories of vegetation change over time for each 10m x 10m area. This analysis identified five primary trajectories representing different sequences of changes in vegetation and land use. Additionally, the trajectories were split into upland and lowland based on proximity to the streams. The lead researcher used ArcMap to generate five random points within each trajectory for soil sample collection. Using a soil coring device, we collected samples every 10 cm in depth for 50 cm, resulting in a total of 6 samples at each site. We performed standard loss-on-ignition (LOI) analyses to determine the percent organic carbon in each sample. The samples will undergo further analysis to determine grain size and metal oxide content in order to develop a more well-rounded understanding of the conditions within the forest. The findings of this study will provide insight into the current ability of the forest to sequester carbon, and how its land use history has impacted that sequestration ability.

### **Comparison of Carbon Storage in Second-Growth Forests of Panama and the Piedmont of North Carolina<sup>2</sup>**

**Megan Green** (Dr. David Vandermast) Department of Environmental Studies

In recent years, carbon storage in forests has become a topic of increasing interest as the Earth's climate undergoes changes due to anthropogenic climate change. The need to limit CO<sub>2</sub> emissions has focused the attention of policymakers and ecologists on the role that forests play in the global carbon cycle. Forested ecosystems store significant amounts of carbon, particularly in tropical areas. Panama is historically under-valued in the global carbon budget, with most estimates of carbon storage coming from remote sensing and field data from studies conducted in adjacent countries. In this study, we compared carbon storage in two Panamanian tropical forest ecosystems, a montane cloud forest in Parque Internacional la Amistad (PILA) and a lowland tropical forest on Barro Colorado Island (BCI), to three North Carolina Piedmont forest ecosystems, Elon University Forest (EUF), Cedarock Park (CP), and Cane Creek Mountains Natural Area (CCMNA). We used field data, published algorithms, and specific gravity equivalents to estimate carbon storage (CO<sub>2</sub>e, or carbon dioxide equivalent) as 45-

50% of biomass in each forest. In Panama, carbon stored in PILA totaled between 140.0 – 155.6 Mg/ha, and in BCI carbon storage totaled 281.6-312.9 Mg/ha. In North Carolina, CP stores between 160-181.1 Mg/ha, CCMNA between 190.7-211.3 Mg/ha, and EUF between 88.9-99.9 Mg/ha. Carbon storage in second-growth Panamanian forests equaled or exceeded that of second-growth North Carolina forests (EUF and CP) and was equal to carbon storage on CCMNA, an old-growth forest. Our estimates for Panama are based on tree identification at the level of the taxonomic Family, a method that is not traditionally utilized for carbon storage estimates, but that provides greater detail than does remote sensing. Our results indicate that Panamanian forests are significant carbon sinks and that more field research would increase the accuracy of the carbon budget of Panamanian forests.

### **Exploring the Relationship Between Faculty Grading Practices as it Relates to STEM Student Identities<sup>1</sup>**

**Madison Z. Johnson** (Dr. Amanda Chunco) Department of Environmental Studies

Recruiting and retaining students in STEM (Science, Technology, Engineering, and Math) majors continues to be a persistent challenge among STEM educators and institutions. Several studies have established that STEM majors are more likely to change majors after taking their first-year introductory courses than non-STEM majors. The gap between an intended STEM major and completed STEM major is particularly wide in students of color. This lack of representation from students of color is particularly high in the field of Environmental Sciences (ENS), both at Elon and across the United States. As a necessary field to address global environmental problems, the lack of diversity in ENS reduces the capacity of the environmental workforce to develop creative solutions to environmental problems. Diverse socio-ecological factors (e.g. lack of support, faculty gatekeeping, etc.) can contribute to the lack of racial diversity in ENS programs. One relatively unexplored factor is grading practices in ENS classrooms. Students may equate received grades to their ability to be successful in a STEM field. Grades may confirm to the student their proficiency and capabilities to be successful in the major as well as in a future STEM career. This guides the question: do specific grading practices and instructor beliefs about grades correlate with STEM identity and STEM retention in students? This question was addressed through the distribution of an educational and emotional survey to both students and faculty in Introduction to Environmental Science courses, the responses were scored on a Likert scale. This course is required for all ENS degrees and can fill elective requirement for other majors, which resulted in a diverse sample spanning academic years, career goals, and majors. Responses showed most students had a high degree of belonging regardless of grading practices. However, there were notable differences based on student identities.

### **Examining the Correlation of Fungal to Bacterial Ratios with Soil Carbon in Agricultural Ecosystems That Differ in Management Practices<sup>2,3</sup>**

**Paige Kenyon** (Dr. Bitting & Prof. Rutz) Department of Environmental Studies

Soil has the capacity to sequester carbon partially due to fungi and bacterial activity within these complex ecosystems. Fungal:bacterial ratios (F:B) are a metric for assessing soil health and analyzing the microbiota available in soils to interact with plant root systems. However, currently little is known about how F:B ratios contribute to total organic carbon in soils and therefore the ability to sequester

carbon in perennial agricultural systems and annual agricultural systems. Pilot studies have shown that annual agricultural systems favor a smaller F:B ratio due to the constant disturbance in soils (via management practices) and shallow root systems. On the other hand, perennial agricultural systems tend to favor a higher F:B ratio due to less routine disturbance of the soils and a deeper root system. In this study we plan to analyze the relationship between F:B ratios and soil carbon levels in annual agricultural soils versus perennial agricultural soils. Samples will be collected from annual and perennial beds at Loy Farm. We will be using a loss-on-ignition (LOI) procedure and F:B microBIOMETER® test kit to determine total organic carbon and F:B ratios in samples, respectively. This project and its data will contribute to the three gaps within the literature. First, most perennial soil data is collected from natural ecosystems, not agricultural systems as this study provides. Secondly, most observational studies do not compare carbon sequestration rates between annual and perennial systems as this study will do. Finally, many studies that focus on F:B ratios in annual agricultural systems contradict each other with some studies showing that a lower F:B ratio correlates with more organic carbon in the soil and other studies reporting the opposite. Adding my data to this area of study will hopefully provide some clarity to this field of study. Overall, data regarding the relationship between F:B ratios and carbon sequestration in soils can be used for climate change mitigation analysis and soil health analysis in the future.

### **My Experience as a Field Research Assistant: Describing and Measuring Soil Carbon and Related Soil Characteristics at Elon Forest<sup>2</sup>**

**Nate R. Krohmer & Ryan D. Gibbons** (Dr. Kelsey Bitting) Department of Environmental Studies

With the growing anxieties of the global climate crisis, people rarely look beneath them to the soil for solutions. The Earth's soils alone are estimated to contain 2,500 gigatons of carbon, which is more than four times the amount of carbon stored in all plants and animals. In the North Carolina Piedmont region, especially in reforested areas formerly used for agriculture, we have yet to fully understand the carbon sequestration potential of our soils. As a research assistant, I am helping investigate soil carbon and related soil characteristics at Elon Forest. Using geographic information systems (GIS) analysis of historic aerial imagery, the second author chose eight locations with different terrain characteristics and land use histories. We are collecting 50 cm long soil cores and describing soil horizons, color, grain size, and evidence of biological activity. We then used a technique called Loss on Ignition (LOI) to quantify the organic carbon at 10-centimeter intervals. In the future, we plan to use energy-dispersive X-ray spectroscopy (EDX) to quantify the amount of iron and aluminum oxides, which are important because they help to limit the decomposition of organic matter. We will be able to better understand forest soils and identify management strategies to improve the forest soils' carbon capacity.

### **Toxic Incarceration: Environmental Injustice in Immigrant Detention Centers<sup>1,2,3</sup>**

**Eliana C. Olivier** (Dr. Leyla Savloff) Department of Environmental Studies

Environmental justice scholars have only in the last decade begun to examine the toxic elements of incarceration sites and how they add undue burdens onto those impacted. This study proposes that placing detention centers in environmentally degraded areas is intentional, causing distress to those detained and further adversely impacting an already victimized community. The environmental



hazards that affect carceral spaces have been historically under researched, and one area that requires immediate attention is the ecology of immigration detention centers. As environmental conditions decline, they are harmful to those housed in detention centers, creating long-term adverse health impacts. To analyze the correlation between immigrant detention centers and environmental hazards, this research project has two primary goals: to shed light on the environmental hazards faced by detained immigrants, and to locate and quantify the most hazardous immigration detention centers in the United States. How is the location of these facilities in degraded environments intentional? This mixed-methods project draws on interviews and quantitative data to identify environmental hazards in detention facilities. Unstandardized interviews focused on the experiences of people held in ICE detention centers in the past four years. The locations of hazardous detention centers were determined using the Environmental Protection Agency's risk screening environmental indicators (RSEI) dataset. This research is crucial in expanding the limited knowledge on environmental hazards present in immigrant detention centers and how this harms marginalized communities. The United States' creation of harmful environments for detained immigrants provides insight into how our society treats its most vulnerable populations.

### **Dual Analysis of Biomass and Carbon Sequestration in Secondary Successional Forests in the Piedmont of North Carolina Utilizing Geographic Information Systems and Field Truthing Methods<sup>2,3</sup>**

**Chloe Stuart** (Dr. David Vandermast) Department of Environmental Studies

As levels of atmospheric carbon continue to rise, so does public concern about climate change; however, not enough is being done to prevent further damage to our planet. While the scientific community turns its attention toward high-tech solutions, the carbon mitigation opportunities offered by local parks offer local conservation options. This research looks at carbon sequestration, the process of trees absorbing and holding onto atmospheric carbon in living tissue, in Cedarock Park in Alamance County, North Carolina to help better understand the capabilities of county parks to mitigate climate change. During the summer of 2023, prism cruising was employed to collect diameter data from trees <10 cm diameter at breast height (DBH) from 87 randomly selected plots. Precise geographic coordinates were recorded using Google Maps. Subsequent analysis involved calculating tree density, species richness, and Shannon's H' diversity index for each plot. Geographic information systems technology was used to obtain elevation (in meters), slope (in degrees), and aspect (in degrees). Our results demonstrate that Cedarock Park stores between 163-181.1 MG/ha CO<sub>2</sub>e, a significant contribution to local carbon sequestration efforts. This figure aligns favorably with other forests in Alamance County, such as Elon University Forest (88.6-98.5 Mg/ha), Cane Creek Mountains Natural Area (190.7-211.9 Mg/ha), and US Forest Service estimates of carbon storage in Piedmont forests. No significant correlations were found between carbon storage and elevation, slope, aspect, tree species richness, or species diversity. Cedarock Park, due to its classification as a secondary successional forest, is likely to possess even greater carbon sequestration potential than currently estimated. This study underscores the overlooked role of local parks, exemplified by Cedarock Park, in mitigating climate change.

### **Gaming for the Future: Using Games to Explain Heatwaves and Health<sup>1,2</sup>**



**Morgan L. Williams** (Dr. Kelsey Bitting) Department of Environmental Studies

Human-caused climate change is becoming an ever-pressing issue in the world today, causing even those with good health to be at risk. According to the Washington Post, heat is causing a decrease in the health of vulnerable populations worldwide, with people suffering from heat exhaustion without air conditioning or shade. However, some populations face disproportionate impacts from the heat. Particularly vulnerable populations include those with preexisting health conditions and less financial or social capital upon which to draw. To raise awareness of these important issues, we ask: How do we educate people about heatwaves and health in a way that can enhance their knowledge and encourage them to learn more through a hands-on activity? Raising awareness of the health effects of heat can be done using games, which have been known to increase engagement and enjoyment of learning about a topic. Based on the health implications of heatwaves and the populations most affected, this study will design and test a game-based learning experience teaching this topic. The game-based learning experience will investigate the relationship between the game, the topic, and student interest and engagement. Using a role-playing game called “Heat Wave,” designed via the MakerHub Kickbox process, students can take on the perspectives of members of vulnerable communities during a heatwave. Game-based learning is beneficial to learning as it allows players to become engaged in a learning objective via a good game design. Through its simulated environment, games have the potential to motivate players to learn with challenges and get students to practice critical thinking skills. Next fall, we will implement this game as a learning experience in an Environmental Studies classroom and collect data to evaluate student learning outcomes.

## **Passive Nitrogen and Phosphorus Filtration in Stormwater Using Layered Double Hydroxides<sup>2</sup>**

**Seth Wolter & Lauren Hill** (Dr. Scott Wolter & Dr. Will Plier) Department of Environmental Studies

High levels of nitrogen and phosphorous, commonly introduced by urban runoff, agricultural processes, and domestic wastewater infrastructure, contribute to eutrophication of receiving waters. These nutrients can contribute to algal blooms, which can be harmful and sometimes toxic to humans and aquatic life. Layered double hydroxides (LDHs) have shown great promise for sequestering nitrate and phosphate, primary nutrients that contribute to algal blooms. The unique layered structure of the LDH particles allows these materials to act as ultra-high-surface-area sorptive media, trapping charged nutrient molecules between the crystalline sheets. Initial work at the Duke University Center for WaSH-AID addressed the synthesis and testing of LDH materials optimized for nitrate and phosphate removal and assessed their stability in typical stormwater runoff conditions. Herein, we report on practical approaches for integrating the LDH sorptive media in conventional stormwater systems. A water retention basin was selected for construction of a pilot site on Elon University’s campus to provide a real-world testing environment. Stormwater pumped from an underground retention vault located in front of a water basin inflow was delivered to columns containing the sorptive media as well as a control. Water was pumped at 1 gpm/sqft to target flow rate requirements in stormwater treatment systems. Nitrate and phosphate were measured using Ion Chromatography. Differences in the field performance of the sorptive media tested will be discussed and analyzed in the context of laboratory experiments to evaluate fundamental sorbent behavior. Additionally, design principles for the pilot unit in the context of stormwater treatment needs will be discussed.

## Exercise Science

### Does Social Support Buffer the Relationship Between Concussion History and Depression?

**Marguerite H. Bevier** (Dr. Madison C. Chandler) Department of Exercise Science

Individuals with a history of concussion often report higher levels of depressive symptoms than those without (Doroszkiewicz et al., 2021). Studies suggest that sports career-related concussion can be related to mental health symptoms in athletes (Gouttebarga & Kerkhoffs, 2020). In the general population, one factor shown to buffer depressive symptoms is having higher levels of social support. Social support is hypothesized to alleviate depression through the benefits of social relationships (Gariépy et al., 2016). The role of social support in the relationship between concussion history and depression is still unknown. The purpose of this investigation was to determine whether social support moderates the relationship between concussion history and depression in college-aged athletes. Participants in this study were club and varsity-level student athletes ( $N=347$ ,  $M_{age}=18.7\pm 1.1$  years; 49.3% females) at Elon University. At a single concussion baseline testing session, individuals provided information about basic demographics and their concussion history. This included the Patient Health Questionnaire (PHQ-9), measuring depression, and the Multidimensional Scale of Perceived Social Support (MSPSS). One-hundred individuals (28.8%) reported at least one previous concussion ( $M=1.7\pm 1.0$ , range=1-6). Depression scores were correlated with the number of previous concussions: a greater number of concussions related to higher depression scores ( $r=0.19$ ,  $p<.001$ ). Depression scores were also correlated with social support: higher levels of social support related to lower levels of depression ( $r=-0.13$ ,  $p=.02$ ). A regression analysis showed that both number of concussions ( $B=2.90$ ) and the interaction between number of concussions and social support ( $B=-0.03$ ) were significant predictors of depression scores ( $F(5, 320)=7.04$ ,  $p<.001$ ,  $R^2_{adj}=0.09$ ). A greater number of concussions predicted higher depression scores in those with average and below-average levels of social support (simple slopes  $B's\geq 0.46$ ,  $p's\leq .01$ ). This relationship was not significant for those with above-average levels of social support ( $B=0.06$ ,  $p=.78$ ). We found that social support buffered the relationship between concussion history and depression in college-aged athletes. In the future, athletes should be receiving extra support post-concussion to combat depressive symptoms.

### Lean Mass as the Mediator: The Link between Insulin and Bone Health in High School Seniors

**Julia L. Burpeau & Mark Weaver** (Dr. Svetlana Nepocatych) Department of Exercise Science

**BACKGROUND:** Research has shown that lean body mass (LBM) is directly associated with bone mineral density (BMD) and bone mineral content (BMC) in adolescents. In addition, the insulin hormone acts as an anabolic agent in bone formation. A mediating effect of greater LBM on lower insulin levels and increased bone health has been previously observed in similar populations. Therefore, the purpose of this study is to examine LBM as a mediator of insulin and bone health variables in high school seniors. **METHODS:** 84 participants (69% female,  $18\pm 1$  years of age, Body

Mass Index  $24 \pm 5 \text{ kg/m}^2$ ) completed this cross-sectional study. Participants were recruited in their senior year of high school and completed one laboratory visit. Participants' body composition and bone parameters were measured via dual-energy X-ray absorptiometry (DXA) imaging including total lean body mass (TLBM), bone mineral density (BMD), bone mineral content (BMC), and Trabecular Bone Score (TBS) using iNsite™ software. Participants' venous blood was drawn to assess fasted insulin levels. Serum insulin levels were analyzed via enzyme-linked immunoassay (ELISA). Multiple linear regression analysis was used to evaluate the relationship among the variables with significance set at  $p < 0.05$ . RESULTS: TLBM, BMD, BMC and TBS were significantly correlated with one another ( $p < 0.02$ ). In particular, TLBM was positively correlated with BMC ( $r = 0.78$ ), BMD ( $r = 0.65$ ), and TBS ( $r = 0.27$ ), BMC was positively correlated with BMD ( $r = 0.84$ ) and TBS ( $r = 0.34$ ), and BMD and TBS were positively correlated ( $r = 0.45$ ). However, no significant correlations were observed for insulin and TLBM ( $r = -0.05$ ,  $p = 0.75$ ), insulin and BMC ( $r = -0.03$ ,  $p = 0.84$ ), insulin and BMD ( $r = -0.17$ ,  $p = 0.23$ ), insulin and TBS ( $r = -0.13$ ,  $p = 0.38$ ). DISCUSSION: Adolescents with higher TLBM have higher BMD, BMC and TBS. However, higher TLBM was not related to insulin levels suggesting no mediator relationship between insulin and bone health parameters in high school seniors. FUNDING: Funding for this project was provided by the National Heart, Lung, And Blood Institute of the National Institutes of Health under Award Number R15HL159650 and Elon University Summer Undergraduate Research Experience.

### **Investigating the Physical and Psychological Effects of Learning Piano in Arthritis and Attention Deficit Hyperactivity Disorder Populations<sup>3</sup>**

**Roxy Geballe** (Dr. Matt Wittstein) Department of Exercise Science

Today, it is well-accepted that playing a musical instrument, such as the piano, benefits both physical and psychological health. However, both of these domains are rarely studied together. This research explores how studying both psychological and physical outcomes can enhance how we approach treating various clinical populations, such as those with arthritis or attention deficit hyperactivity disorder (ADHD). By studying the combined effects of playing the piano, this work may improve clinicians' ability to treat their patients and lead to exciting new rehabilitation techniques that combine physical interventions with music in accessible and effective ways. Study 1 includes participants with arthritis. With an age range of 20 to 87, five initial participants had limited previous piano experience and an average self-rating piano skill of less than one out of ten. They engaged in one-on-one piano lessons three times weekly for six weeks. Their psychological well-being was assessed before and after piano sessions through quality of life questionnaires, while their physical ability was measured through quantities specifically affected by arthritis: range of motion, grip strength, and pinch strength. Following Study 1, the change in perceived skill and right ulnar deviation was statistically significant. Otherwise, findings did not suggest significant improvements, but various strength and flexibility measurements neared statistical significance. Study 2 includes eight individuals with ADHD. Like in Study 1, they had limited previous piano experience and an average self-rating piano skill of less than one out of ten. They underwent 30-minute piano instruction sessions that occurred two times weekly for four weeks. Because ADHD exhibits a different manifestation of physical and mental abilities, pre- and post-intervention assessments of this population include gait and postural control using a dual-task paradigm. The Stroop and Serial Seven Tests were used to increase the cognitive demands during balance and gait testing. For balance, overall sway, sway randomness, and regularity will be calculated

from a quiet stance on a Bertec force plate using custom Matlab scripts. Step velocity, step length, stride length, cadence, and step time are calculated using a GaitRITE overground walkway. After piano instruction, assessments will be analyzed for physical or psychological improvements.

### **Vigorous Physical Activity Correlates with Mental Health Related Cognition**

**Sean Godfrey** (Dr. Madison Chandler) Department of Exercise Science

Mental health continues to be a pervasive problem in college aged students, now more than ever (Heinze, 2023; NIMH, 2024). Past research has described a positive correlation between maladaptive thought behaviors (e.g., rumination, perseveration, and worry) and depression and anxiety (Visla et al., 2022; Zawadki, 2015). A large body of literature has also established the affective benefits of exercise and, subsequently, the biological mechanisms by which exercise exerts these benefits in the context of anxiety and depression (White et al., 2017). However, the relationships between exercise and maladaptive thought behaviors have yet to be elucidated. The present study sought to determine the associations between physical activity and the aforementioned aspects of mental health through the assessments of various survey measurements. During the study, 62 undergraduate Elon students responded to 6 questionnaires, assessing physical activity (IPAQ-9), rumination (RRS), perseveration (PTQ), worry (PSWQ), anxiety (GAD-9), and depression (PHQ-9). A series of Spearman's correlation tests confirmed that higher levels of rumination, perseveration, and worry were related to higher levels of anxiety and depression ( $r's \geq .557$ ,  $p's \leq .001$ ). These analyses also revealed weak to moderate inverse correlations between vigorous physical activity and each of the 5 psychometric constructs:  $rs = -.391$ ;  $p = .005$  (rumination),  $rs = -.436$ ;  $p = .002$  (perseveration),  $rs = -.346$ ;  $p = .014$  (worry),  $rs = -.352$ ;  $p = .012$  (anxiety),  $rs = -.337$ ;  $p = .017$  (depression). Moderate physical activity and walking were not correlated with these psychometrics. These analyses replicated the finding that higher levels of physical activity engagement is related to lower levels of anxiety and depression. Novel to this investigation, vigorous exercise engagement was also related to lower levels of rumination, perseveration, and worry. Future research should examine the predictive role of vigorous physical activity in the context of mental health, as well as the potential for vigorous exercise engagement to serve as a tool to reduce these maladaptive thought behaviors.

### **Weight Matters: Exploring Body Composition's Impact on Inflammation<sup>3</sup>**

**Emma C. Grossberg & Alex L. Simon** (Dr. Nepocatyck) Department of Exercise Science

Background: Recent studies have suggested that variations in body composition have been related to increase in inflammatory factors such as interleukin-6 (IL-6) and C- reactive protein (CRP) (Ibarra, 2023). Increases in IL-6 and CRP have been linked to chronic disease risk development including heart disease, diabetes, and autoimmune disease. High school is a period of dramatic environmental changes, social upheaval, and psychological stressors which often lead to poor lifestyle behaviors that may affect variations in body composition. Therefore, the purpose of this study is to determine the relationship between body composition and inflammatory risk factors such as IL-6 and CRP in high school students. Methods: 85 participants (50% female) will be recruited to complete this cross-

sectional study. Participants will be recruited in their senior year of high school. Participants will complete one baseline laboratory visit. Body composition will be measured via dual-energy X-ray absorptiometry (DXA) imaging including fat mass (FM) and percent body fat (%BF). Participants' venous blood will be drawn to assess fasted IL-6 and CRP levels. Serums for both IL-6 and CRP will be analyzed via enzyme-linked immunoassay (ELISA). Multiple linear regression analysis will be used to evaluate the relationship among the variables with significance set at  $p < 0.05$ . Anticipated Results: We anticipate that higher fat mass and % BF5 will be related to higher IL-6 and CRP levels. These findings would suggest a relationship between body composition and physiological markers of inflammation and would support further exploring interventions to target body composition to improve IL-6 and CRP.

### **Effects of a Remote Tai Chi Intervention on Measures of Cognitive Functioning in Older Adults<sup>3</sup>**

**Wilson A. Holcombe** (Dr. Aaron Piepmeier) Department of Exercise Science

Prior research has indicated that acute exercise may improve cognitive performance of older adults (Chang, 2012; Chu, 2015; Raichlen, 2017). Tai Chi is a multimodal activity incorporating elements of meditation and mindfulness as well as aerobic exercise. It has received increased attention due to its positive impacts on cognition and global popularity (Dong-Yang, 2014; Reid-Arnt, 2012). Cognitive performance is a key indicator of an individual's ability to perform activities of daily living and of overall quality of life and is crucial to maintaining independence in older adults (Dong-Yang, 2014). However, no prior research has been done on the effects of an acute Tai Chi bout on cognitive performance. The purpose of this study is to assess the feasibility of a remote acute Tai Chi study aimed at improving executive functioning, attention, and memory for older adults (60 years and older). Participants will be randomly assigned into either a control group (n=10) who will watch a Tai Chi video, or the experimental group (n=10) who will watch and follow along with the same Tai Chi video. All participants will complete a small cognitive battery before and following the Tai Chi bout. The cognitive battery will consist of the Stroop Tests (color, word, color plus word) and the Digit Span test which will be used to measure attention, executive functioning, and memory, respectively. We hypothesize our study to be feasible with at least 80% of recruited participants (proposed n=20) completing the protocol. Based on previous literature, we hypothesize that performance in the cognitive domains of executive functioning, attention, and memory will improve in the experimental Tai Chi group compared to the control group.

### **Yoga for Relief: Using Yoga as an Immediate Intervention for Menstrual Pain<sup>3</sup>**

**Sofia Lacayo** (Dr. Aaron Piepmeier) Department of Exercise Science

Nearly 80% of the 1.8 billion people who menstruate each year experience symptoms of dysmenorrhea, or severe menstrual pain, at some point in their lives (McKenna & Fogleman 2021). Accessible and effective pain management may grant people who menstruate a greater quality of life during menstruation. This study will explore yoga as a cost-effective, time-efficient, non-pharmacological, behavioral tool to reduce pain caused by menstrual cramping. Prior research has shown yoga to be effective in menstrual pain management over weeks and months (Rakhshae, 2011; Tsai, 2016; Yonglitthipagon et al., 2017). However, minimal research has been done to assess the acute



benefits of yoga for menstrual cramping pain management. Participants will be recruited and screened for safety and eligibility with inclusion criteria (i.e., the presence of menstruation with cramping) prior to their enrollment in the study. The participants will then complete a demographics survey and the “Working ability, location, intensity, days of pain dysmenorrhea” (WaLIDD) scale to assess average menstrual pain over their last three menstrual cycles (Teherán et al., 2018). The participants will wait until the onset of menstrual cramping at the beginning of their next menstrual cycle and complete the guided and pre-recorded yoga flow video, paired with pain scale ratings before and after participating with the video. Participants are encouraged to use the yoga video as many times as they deem fit or necessary throughout menstruation. Upon completion, the participants will complete the WaLIDD dysmenorrhea scale to assess their menstrual pain experienced while utilizing the yoga intervention. Overall, this study will investigate the impact of yoga as an acute form of pain mitigation or relief for those who experience painful menstrual cramping, thus advancing pain reduction methodologies, improving quality of life for people who menstruate, and allowing for a safe intervention for a large population of people.

### **Relationship Between Stress, Recovery Measures, Hormone Levels, and Performance in Female Collegiate Athletes**

**Katie M. Lowe** (Dr. Caroline Ketcham, Dr. Titch Madzima, & Dr. Eric Hall) Department of Exercise Science

Research focused on factors related to injury prevention and performance specific to females is essential to support athletes and athletic staff; however, there is limited research examining stress, sleep, menstrual cycle symptoms, and hormones in female athletes. This study examined the relationship between menstrual and stress symptoms, hormone levels, sleep, and performance in practice and game sessions in collegiate female athletes. Data was collected at baseline, before, and after 2 practices (P1, P2) and 2 games (G1, G2) during the fall season. Sixteen Elon women’s soccer athletes participated in this study. Saliva samples for hormone testing and ratings of fatigue, soreness, perceived exertion, and recovery were collected. After each practice and game, a questionnaire was administered that included a modified Perceived Stress Scale, Athlete’s Subjective Performance Scale, menstrual and concussion symptoms, and hours and quality of sleep. Hormone levels (cortisol, progesterone, estradiol) were analyzed using an Enzyme-Linked Immunosorbent Assay (ELISA) before and after each practice and game for a subset of participants. There were significant Time (pre, post), Session Type (practice, game), and Semester (early, late) main effects and interactions for various symptoms, sleep, stress, performance, and recovery measures ( $p < 0.05$ ). There were significant Time main effects and Time x Semester interactions for cortisol levels ( $p < 0.05$ ), with cortisol being higher after games and mid-semester when student-related responsibilities and stress included higher demands. There was also a significant correlation between menstrual and concussion symptoms, underscoring the importance of considering menstruation during baseline concussion testing as these variations may influence symptom presentation and interpretation of test results. Continued assessment will provide additional understanding of complexities for female athletes to aid in targeted educational messaging and support.



## **Using Resistance Training to Evaluate Improvements in Depressive Symptoms in College Students**

**Edward J. Markowski & Ella A. Parlavecchio** (Dr. Eric Hall) Department of Exercise Science

While research about the relationship between mental health and exercise has been studied, there has been little research into the effects of resistance training on mental health. Additionally, unguided or autonomously working out (e.g., self-selected exercises) as opposed to planned workouts (e.g., prescribed exercises) has shown more improvement in mental health. Finding more ways to exercise that improve mental health allows for greater outreach and improving the mental health of more individuals. The purpose of this study is to evaluate the effectiveness autonomous resistance training may play in reducing depressive symptoms as opposed to resistance training using a prescribed workout plan. We planned to recruit about 20 male and female participants from Elon University who have not done resistance training more than 2 times a week for the past 3 months. Through a four-week intervention, participants performed either a planned workout program or an autonomous workout program three days per week where an exercise log was kept. The Borg Rating of Perceived Exertion, Feeling Scale, and Felt Arousal Scale were self-reported before, during, and after the workouts in the exercise log. Additionally, participants completed the Warwick-Edinburgh Mental Wellbeing Scale and the Depression, Anxiety, and Stress Scale to evaluate any changes in their mental health over the four weeks. While participation was limited with only 7 people completing the four week intervention, the results were promising. Although there was not a significant difference between the two groups in mental health variables (e.g., wellbeing, depression, etc.), both groups showed improvements in their overall mental health by the end of the intervention. This is consistent with the previous literature demonstrating that exercise improves mental health, but more research needs to be done to determine possible additional benefits autonomous training may have on mental health.

## **Addressing Stigmatization of Mental Health in the U.S. Military and Assessing the Correlation of PTSD Severity to Exercise Attrition in the Warrior Wellness Study**

**Josephine C. McWhorter** (Dr. Eric Hall) Department of Exercise Science

Veterans have a 5x greater chance of developing Major Depressive Disorder, a 15x greater chance of developing PTSD, and a 57% higher risk of suicide than the general population<sup>2</sup>. Two studies will be discussed that examine: 1) mental health (MH), stigma, and help-seeking behaviors and 2) relationship between physical activity and PTSD in military personnel. Study 1: 70 active or retired U.S military personnel completed a survey addressing stigma and help-seeking behaviors, depression, anxiety and psychological openness (PO). Study 2: The Warrior Wellness study evaluates PTSD severity pre, post, and 3-months following a 6-month exercise intervention, as well as exercise adherence post-clinical intervention. Veterans ages 65+ (n=80) were evaluated on PTSD severity and daily levels of exercise. Participants were randomly assigned to the Exercise Intervention Group, or the Healthy Aging Group. Study 1: 14% exhibited moderate to severe anxiety, and 22% exhibited moderate to severe depression. 24% reported diagnosed mental illness; 32% of which reported more than one. There was a negative correlation between PO and depression/ anxiety ( $r=-.273, -.363$ ). Additionally, public-sourced stigma against MH services and help-seeking behaviors were positively correlated with depression/ anxiety ( $r=.568, .635$ ), as was self-sourced stigma ( $r=.492, .582$ ). 90% of individuals agreed/strongly agreed to the statement “exercise has a positive impact on my mental health.” Study 2: PTSD severity scores

were assessed using two measures (PCL-5, CAPS-5) with correlation to increased weekly exercise ( $r = -.372$ ,  $r = -0.552$ ). MH disorders such as anxiety and depression were higher in this population than the national average, with lower PO. This information is vital to help military personnel receive appropriate MH care; through low-stigma alternatives to traditional therapies, such as exercise. From the Warrior Wellness study, it can be concluded that as weekly exercise levels increased, PTSD severity decreased. Using this data, patients can be assessed on an individual level in regards to PTSD severity and exercise adherence trends. Additionally, these data can be used to improve exercise intervention development and encourage the continual use of exercise as a treatment for PTSD symptoms.

### **The Influence of Posttraumatic Stress on Veterans: Assessing Exercise Adherence Following Clinical Intervention**

**Josephine C. McWhorter** (Dr. Eric Hall) Department of Exercise Science

Post-Traumatic Stress Disorder (PTSD) can hinder an individual's cognitive function and can limit an individual's follow through on commitments. Because of this, individuals with more severe PTSD symptoms have higher rates of attrition to clinical intervention, however, studies have shown that exercise can reduce symptoms of PTSD and other anxiety disorders. The Warrior Wellness study evaluates PTSD severity prior to a 6-month intervention, as well as after, and in a second follow-up 3 months following the intervention. Exercise habits were also measured prior to, immediately after, and 3-months after the intervention. The purpose of this study is to assess whether PTSD severity can be an accurate indicator of continuation of exercise post exercise intervention, and whether an exercise intervention program encourages individuals with PTSD to continue exercise without the structure of clinical intervention. If higher levels of exercise are correlated with reduced severity of PTSD symptoms, exercise intervention can be effectively used to treat and reduce PTSD symptoms. Veterans ages 65+ are evaluated on PTSD severity (PTSD Checklist (PCL-5) and the Clinician-Administered PTSD Scale (CAPS-5)) and their daily levels of exercise (ACLS). Participants were randomly assigned to the Exercise Intervention Group (EIG), or the Healthy Aging Group (HAG). The EIG meets 3 times a week for 45 minutes. The HAG participates in information sessions about healthy aging and habits twice a month. Intervention lasts 6 months, and individuals were assessed before, after, and 3 months post-intervention. From 80 measures of PCL-5 severity scores (range of 10-65 of 80) there is a  $-0.372$  correlation ( $p=0.0215$ ) with increased weekly exercise recorded from the ACLS (range of 0-23hrs). Using the CAPS-5 from the baseline and the after intervention records, there is a  $-0.552$  correlation ( $p=0.0925$ ) with ACLS. As weekly exercise levels increase, PTSD severity levels decrease. By understanding that increased exercise decreases severity of PTSD symptoms, exercise intervention should be integrated into care programs and should be used as an aid to treatment. Additionally, this data can be used to predict exercise attrition, and encourages clinicians to take exercise into account when establishing intervention programs.

### **From High School to College: Investigating Sugar's Influence on Body Composition and Insulin Resistance**

**Carolyn E. Oliver & Elle A. Nash** (Dr. Svetlana Nepocatych) Department of Exercise Science

**BACKGROUND:** Research indicates that college freshmen are 5.5 times more likely to gain weight than the general population, with an average weight gain of 7.4 pounds. Many factors contribute to eating habits however, the college transition is where most students go from a dependent state to an independent state where they can make their own choices and decisions with food including foods with added sugar. This transition can have long-term implications for body composition, chronic disease development, and lifelong eating habits. Therefore, the purpose of this study is to examine eating habits including intake of added sugar, and body composition change during the transition from high school to college. **METHODS:** This study will recruit high school seniors (n=75) aged 17-19 years. Baseline assessment will take place during the senior year of high school and follow-up assessment after the first year of college. Demographic and anthropometric measurements will be collected. Body composition will be assessed using Dual Energy X-ray Absorptiometry, DXA (Lunar Prodigy, GE Healthcare, Madison, Wisconsin). The National Cancer Institute Automated Self-Administered 24-hour (ASA24) dietary assessment tool will be used to assess macro- and micro-nutrients including foods with added sugar consumption. Participants' venous blood will be collected via blood draw. The Piccolo Xpress Chemistry Analyzer (Lipid Panel Plus; Abaxis, Inc., Union City, CA) will be used to measure blood biomarkers including glucose, LDL, HDL, total cholesterol (TC), TC to HDL ratio. **ANTICIPATED RESULTS:** It is anticipated that there will be an increase in the amount of added sugar consumed. Additionally, there will be an increase in body fat percentage via DXA analysis and a change in blood biomarker levels. These changes will be associated with dietary intake changes such as increased processed food consumption with added sugar, dining hall food, and personal choices. **FUNDING:** Funding for this project will be provided by the National Heart, Lung, And Blood Institute of the National Institutes of Health under Award Number R15HL159650.

## **The Relationship Between Sleep and Cognitive Function in College Students**

**Matthew A. Patterson** (Dr. Eric Hall) Department of Exercise Science

Improper sleep is associated with many negative effects on people, with these effects being both physical and mental. College students particularly have unpredictable and often poor sleeping habits that impact their well being. The purpose of this research is to analyze the relationship between sleep quantity and quality on cognitive function in college students. Given that higher sleep quality is related to numerous positive impacts on one's life, understanding the impact of sleep on college students can aid in efforts to improve students' qualities of life. Elon undergraduate students (age 18-25, mean age =  $18.8 \pm 1.0$  years) who are involved in a sport at Elon were studied; 601 students (284 female, 317 male) composed of both club and varsity athletes took part in the study. Athletes signed up for testing in Elon's Exercise Science computer lab. These athletes completed the ImPACT concussion test, which includes tests of neurocognitive function in athletes. These tests include visual memory, verbal memory, reaction time, and visual motor processing speed. Number of hours slept was reported when taking the ImPACT. Sleep quality was assessed from 4-items on the PROMIS-29 v2.0. Number of hours slept was not related to visual memory ( $r = .05$ ), visual motor speed ( $r = .09$ ), or reaction time ( $r = .11$ ) with all  $p$ 's > .05. It was, however, related to verbal memory ( $r = .13$ ,  $p = .03$ ). Quality of sleep was not related to verbal memory ( $r = -.07$ ), visual memory ( $r = -.03$ ), visual motor speed ( $r = -.05$ ) or reaction time ( $r = -.01$ ) with all  $p$ 's > .05. More research is needed to determine what aspects of the lives of college students are affected by their sleep. Future research calls for control variables such as time of testing, caffeine intake, or measures of cognitive function and sleep.

### **Differences in Joint Angles During Obstacle Clearance in Immersive Environments<sup>3</sup>**

**Morgan Ptaszek, Stacey Walton, & Oliver Tulsa** (Dr. Srikant Vallabhajosula, Dr. Alys Giordano, & Dr. Pratheep Kumar Paranthaman) Department of Exercise Science

Virtual reality and mixed reality are environments that enable users to interact with computer generated spatial objects. They serve numerous purposes from education to entertainment and have potential for use within physical therapy. One such possible application involves creating a safe environment for training to clear obstacles, thereby potentially reducing fall-risk due to tripping. Obstacle clearance has been studied as a component of intervention using immersive environments but not as a mode of assessment. Previous research has shown that to adjust stride and avoid physical obstacles, visual information pertaining to two steps before crossing is essential. Joint angles, foot placement during gait, and time of obstacle avoidance are crucial components of regulating the dynamics of the joints of the supporting limb and maintaining balance of the whole body. Whether this is true for immersive environments is not known. Thus, the purpose of this study was to assess differences in joint angles while clearing obstacles in immersive environments compared to physical obstacles. 12 healthy young adults walked 10m in physical, virtual, and mixed reality environments while clearing a 6” obstacle placed at 6m from the starting position. Three trials per environment were performed. The obstacle represented the height of a stair step. Twenty-two reflective markers were placed on each participant bilaterally as follows: 2nd metatarsal, base of 5th metatarsal, medial malleolus, lateral malleolus, posterior calcaneus, tibial tuberosity, medial femoral condyles, lateral femoral condyles, anterior-lateral mid-thigh, anterior superior iliac spine, and posterior superior iliac spine. 3D motion capture data were collected. Data are being currently processed to extract joint angles of hip, knee, and ankle. A one-way ANOVA will be conducted to compare the joint angles among the three environments. Based on foot clearance data we have analyzed so far, it is hypothesized that lower extremity joint range of motion will be higher when crossing the obstacle with the leading leg but lower when crossing with the trailing leg in mixed reality environment compared to the other two environments. This would indicate that participants overestimated the height of the obstacle with leading leg in mixed reality but underestimated the height with trailing leg.

### **Prediction of Anxiety and Depression Using Pre-Concussion Screening in Collegiate Athletes<sup>3</sup>**

**Chase R. Siewert** (Dr. Eric Hall) Department of Exercise Science

The accuracy of metrics in mental health among student-athletes is essential for providing appropriate care. This study evaluates the symptoms from the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) for detecting anxiety and depression symptoms among varsity and club student-athletes in a sample of 601. The analysis utilized hierarchical regression models to examine the predictive power of concussion symptom clusters (e.g., affective, sleep, cognitive, physical), gender, and ADHD on anxiety and depression levels. Anxiety was measured using Generalized Anxiety Disorder-7 (GAD-7), and depression was assessed with the Patient Health Questionnaire-9 (PHQ-9). Our approach tested two models, one for depression and one for anxiety. The first model used gender and ADHD (step 1), and the concussion symptom clusters entered in step 2 as stepwise predictors of depression. The second model predicted anxiety with the same variables. For depression, the total

model accounted for 31.2% of the variance with ADHD and gender ( $R^2$ change = .029,  $p < .001$ ), affective cluster ( $R^2$ change = .226,  $p < .001$ ), sleep cluster ( $R^2$ change = .040,  $p < .001$ ) and cognitive cluster ( $R^2$ change = .018,  $p < .001$ ). For anxiety, the total model accounted for 29.4% of the variance with ADHD and gender ( $R^2$ change = .035,  $p < .001$ ) and the affective cluster ( $R^2$ change = .259,  $p < .001$ ). The findings highlight significant associations between ImPACT concussion symptom scores and anxiety/depression levels, suggesting its potential as a screening tool for mental health issues in student-athletes. Emphasizing the need for comprehensive assessments, including assessing factors like grit and resilience alongside standard concussion symptoms, this research contributes to a more nuanced understanding of student-athletes' psychological well-being.

### **Exploring Misalignment of Sleep-Wake Rhythm and its Impact on Stress in High School Seniors**

**Kaitlyn Sumner, Mark Weaver, & Hannah Enck** (Dr. Svetlana Nepocatych) Department of Exercise Science

Studies have found that 60% of young adults suffer from poor sleep quality, which is associated with higher stress, mental illness, and alterations in the sleep-wake cycle. Poor sleep has been associated with higher stress levels and mental illness. Higher stress levels and mental illness have been associated with alterations in the sleep-wake cycle. The term social jet lag refers to the concept of one's midpoint in sleep changing on weekends relative to weekdays. Senior year of high school is a transitional time and is linked to psychological stressors and behavioral changes that enhance the potential for social jetlag to occur. Therefore, the purpose of this study was to evaluate the effects of sleep-wake rhythms, social jet lag and changes in perceived stress in high-school seniors. Methods: This cross-sectional study recruited 110 high school seniors, 84 completed the study (69% female,  $18 \pm 1$  years; body mass index  $24 \pm 5$  kg/m<sup>2</sup>.) Perceived stress was assessed using a 10-item Perceived Stress Scale (PSS-10). The sleep-wake pattern was assessed using an Actigraph GT9X Link accelerometer, worn on the wrist for 7 consecutive days worn 24 hours each day, and a sleep log. Social jet lag was determined by finding the difference between the midpoint of sleep found between sleep and wake times, on weekdays compared to weekends and divided into three groups  $<1h$ ,  $1-2h$ ,  $\geq 2h$ . Multiple linear regression analysis was used to determine the relationship between variables with significance set at  $p < 0.05$ . Results: PSS-10 was not significantly correlated with social jetlag, although it was related separately to the average sleep midpoint on weeknights ( $r = 0.28$ ,  $p = 0.012$ ) and on weekends ( $r = 0.29$ ,  $p = 0.009$ ). In addition, there was no significant difference ( $p = 0.32$ ) observed between PSS-10 and the social jetlag groups ( $<1h$ ,  $1-2h$ ,  $\geq 2h$ ). Conclusion: Social jetlag did not influence a higher or lower perceived stress level. However, participant stress levels tended to be higher when they go to bed later both weekdays and weekend days.

### **The Relationship Between Sleep Regularity and Arterial Health in High School Students**

**Katherine L. Walsh** (Dr. Svetlana Nepocatych & Dr. Mark Weaver) Department of Exercise Science

The prevalence of unhealthy sleep habits is linked to significant pathologies, especially cardiovascular events. Research suggests poor quality sleep and sleep irregularity may be linked to greater arterial stiffness in adults. Poor sleep efficiency, inadequate sleep duration, and poor quality sleep have been associated with hypertension. However, little is known about the relationship between cardiovascular



risk factors and sleep in adolescents. This cross-sectional study aims to investigate how sleep health affects blood pressure and arterial stiffness in high school seniors. This sample includes 84 high school seniors (69% female,  $18 \pm 1$  years of age, Body Mass Index  $24 \pm 5$  kg/m<sup>2</sup>). Sleep health was assessed via five key dimensions using the SATED model: satisfaction, alertness, timing, efficiency, and duration. Sleep regularity, efficiency, and duration were measured via Actigraph GT9X Link accelerometers for 7 consecutive days. Sleep satisfaction was assessed through the 19-item Pittsburgh Sleep Quality Index (PSQI). The pediatric Patient-Reported Outcomes Measurement Information System Sleep-Related Impairment (PROMIS-SRI) questionnaire was used to examine alertness. Carotid-femoral pulse-wave velocity (cfPWV) and blood pressure were measured using VICORDER® to determine arterial stiffness, systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP). Multiple linear regression was used to evaluate relationships among variables with significance set at  $p < 0.05$ . SBP ( $p=0.87$ ), DBP ( $p=0.73$ ), and MAP ( $p=0.93$ ) was not significantly correlated with any sleep dimensions. Sleep satisfaction ( $p=0.50$ ), efficiency ( $p=0.54$ ), and duration ( $p=0.94$ ) were not significantly correlated with cfPWV. However, sleep impairment ( $p=0.02$ ) and sleep regularity ( $p=0.03$ ) were negatively correlated with cfPWV. Greater sleep regularity was associated with lower cfPWV. Individuals who maintain better sleep schedules may have lower arterial stiffness, indicated by lower cfPWV. Further analyses will be performed to explore the relationship between sleep health, cfPWV, SBP, DBP, and MAP, particularly as participants transition to college.

## Finance

### Evaluation of the Diversification, Hedging, and Safe Haven Potential of Commodities for Stock Portfolios based on Dynamic, Conditional Correlations<sup>3</sup>

**Nina Lichtenberger** (Dr. Adam Aiken) Department of Finance

Commodities are commonly believed to be attractive additions to portfolios for three reasons: low correlation with other asset classes, relatively high returns, and positive correlation with inflation (Ali et al., 2020). Beginning in the 2000s, however, commodity markets became subject to an increasing influx of financial investors, leading to a change in market dynamics and challenging commodities' potential benefits (Basak & Pavlova, 2016; Büyükkahin & Robe, 2014). Ultimately, this raises the question whether commodities are still effective hedges, safe havens, or diversifiers. This paper addresses the hedging, safe haven and diversification potential of commodities for stock portfolios between 1992 and 2023, focusing on three events: the Great Financial Crisis, COVID 19, and the Russian invasion of Ukraine. A safe haven is an asset with uncorrelated or negatively correlated performance specifically during market stress, irrespective of the average correlation. A hedge is an asset with uncorrelated or negatively correlated average performance with another asset or portfolio, but it may not necessarily reduce losses during market stress. A diversifier is an asset with a positive, though not perfect, average correlation with another asset or portfolio, without the specific property of reducing losses in extreme market conditions. This paper uses conditional, time-varying correlations computed for various commodity and equity indices based on a DCC-GARCH model. The results show that composite commodity indices are neither effective hedges, nor safe havens. They could be considered as diversifiers, though the average correlation with stocks is relatively high. Furthermore,



this paper finds that the Great Financial Crisis had a major impact on the correlation levels, shifting them into a positive direction. Conversely, COVID and the Russian invasion led to different reactions. While COVID saw higher correlations, the correlation decreased in the aftermath of the invasion. Turning to commodity subindices, energy, industrial metals, and livestock could serve as diversifiers. Gold and precious metals are found to be appropriate hedges, as well as safe havens in the short-term.

### **Profitability Evaluation of Major Technical Analysis Strategies Applied to the S&P 500 in 2005-2023<sup>3</sup>**

**David Neufang** (Dr. Adam Aiken) Department of Finance

Technical trading systems attempt to use past security prices to predict future prices. Although previous research (see Brock et al., 1992; Hudson et al. 1996) has shown limited evidence for the profitability of technical trading systems, practitioners still use such rules (Marshall et al., 2009). Marshall (2009) states that 35% of all trading volume at NYSE (New York Stock Exchange) is estimated to be a result of technical analysis trading. This paper asks whether common technical analysis strategies lead to outperformance of a buy-and-hold strategy applied to the S&P 500 index using data from 2005 and 2023. Specifically, four technical trading systems (MACD, Dual Moving Average, Relative Strength Index, and Bollinger Bands) are tested on this dataset. The portfolio formation process assumes that a strategy uses either 100% of the available capital, or is invested at the risk-free rate. Robustness checks are conducted via break-even transaction cost calculations and parameter variations (i.e., different look-back periods). Moreover, crash risk susceptibility, and volume impact on the success rate of technical analysis-based trades is assessed. In general, the results show no significant outperformance, using either mean or risk-adjusted performance, supporting a finding of weak-form market efficiency for this broad market index. When including transaction costs, most tested technical trading systems are not profitable, due to the large number of transactions. Nevertheless, certain Dual Moving Average variations achieve positive returns. Furthermore, trend-following strategies tend to perform better than mean reversion strategies, due to the high crash risk susceptibility and the number of trades in the latter.

## **History and Geography**

### **Museums and Ritual Objects: Examining Curatorial Practices and Reanimating Religious Art**

**Madeleine Hollenbeck** (Dr. Evan Gatti) Department of History and Geography

Placing ritual objects in museum and gallery spaces shapes the ways they are experienced and transforms their meanings from their religious contexts to works of art expected to adhere to narrowly defined assessments of aesthetic or art historical value. As part of a multi-year research project, I sought to develop better curatorial processes for displaying the ritual objects in Elon's Art Collections. I modeled, tested, and revised these processes through a series of exhibitions in the campus center for religious and spiritual life. I have argued elsewhere that community co-curation is essential when working with ritual art because it ensures multivocality and the decentering of a singular expert voice,

engaging a wider range of perspectives and resulting in a more meaningful display of ritual objects. In this presentation, I argue that in addition to showcasing multiple perspectives, the exhibition of ritual objects must also emphasize multi-sensory approaches. These approaches were inspired by phenomenological analyses of art and architecture that seek to understand a visitor's conscious and unconscious experiences with ritual spaces, many of which are now also museum places. (Pentcheva, 2020, p. 439). These approaches are also inspired by display practices I observed in the Cloisters Gallery of the Metropolitan Museum of Art in New York and the Museo dell'Opera del Duomo in Florence. Each of these museums attempts to deepen viewer experiences by replacing the traditional quiet of the museum with music or immersive spaces. In this presentation, I outline and assess some of the strategies I employed to similarly create a multi-sensory and multi-vocal exhibit, including the use of QR codes, photos of objects in use, and light designed to simulate medieval reading contexts. In doing so, I reassert the importance of using multi-sensory methods to engage participants and to re-contextualize and reanimate ritual objects in a gallery setting.

## **LGBTQ Education and Inclusion in Catholic Schools<sup>1</sup>**

**Meghan Malone** (Dr. Mary Jo Festle) Department of History and Geography

Current headlines depict states and school districts debating the inclusion of lesbian, gay, bisexual, transgender, and queer (LGBTQ) topics in the curriculum and the treatment of LGBTQ students. These issues are especially challenging within Catholic schools because of official Catholic doctrine, which deems same-sex marriage as sinful. When Catholic schools fail to incorporate LGBTQ education or an atmosphere of inclusion of these identities, it often leads to a silencing of LGBTQ voices, negative experiences of students within the LGBTQ community, and a school culture of misunderstanding and disrespect for LGBTQ-identifying individuals. This issue matters to me as both a Catholic and a future teacher whose values are that every student should be seen and treated with respect, no matter their sexual orientation or gender identity, especially in schools that promote God's love and acceptance for all. Not all Catholic leaders have the same views, and there is space within Catholic values and teachings for Catholic schools to incorporate LGBTQ topics and inclusion. Hence, my research addresses the question, "Can Catholic schools equitably and successfully provide a space for LGBTQ education and inclusion within their walls? If so, how?" The methods I employed were the following: reading Church doctrine and statements by church leaders and LGBTQ-friendly Catholics, examining public opinion polls about Catholic attitudes, searching for news articles of what Catholic schools have done in terms of LGBTQ inclusion, summarizing best practices for LGBTQ education from pedagogical journals and books, and interviewing two LGBTQ-identifying Catholic school graduates about their experiences. Study findings indicate that Catholic schools can design curricular outcomes aligned with Catholic values that also promote understanding and respect among heteronormative and LGBTQ students, families, and faculty. Through my research, I discovered a number of different means of incorporating LGBTQ voices and topics into different parts of school curriculum and community in ways that do not openly oppose Catholic teaching, and that affirm LGBTQ-identifying students. The findings imply that if Catholic schools are to provide space in curriculum for LGBTQ history and literature, promote an understanding of what it means to identify as LGBTQ, and show students how to be accepting and respectful of their peers, LGBTQ-identifying students can have a much more positive experience, and Catholic schools may become equitable and inclusive environments for the LGBTQ community.

## **Ecollage: Collage as an Ecocritical Methodology<sup>2</sup>**

**Virginia Morrison** (Dr. Evan Gatti & Dr. Kirstin Ringelberg) Department of History and Geography

Though collage has existed as a medium long before the modern period, its recognition in the art world only began in the early 1900s with the Cubist works of Pablo Picasso and Georges Braque. Today, artists and scholars across disciplines are interested in how collage functions not just as a medium, but as a methodology for better understanding complex relationships, ideas, and experiences. The medium of collage is widened to the expanse of its process, from the selection of materials and techniques to the context in which it is made and interpreted. A broader definition of collage sparks a reinterpretation of the sociopolitical impact of the method and resultant product, especially where collage and politics intersect. Similarly, the role of eco-art as a method has been of recent interest to artists and scholars. Ecocritics have argued that within the Anthropocene epoch—the geological age where humans have dominated the shape of the environment—art and image play an integral role in controlling the public’s perception of nature. Scholars such as Donna Haraway and T.J. Demos call for ecocentric imagery to replace anthropocentric visuals that normalize human supremacy and the exploitation of nature. Collage’s use of appropriation, juxtaposition, and narrative can be used as a political intervention that reimagines environmental perspectives according to ecocentric values. Seeing ecocriticism and collage in parallel, I have developed a method called “Ecollage”, which intends to build community as well as raise eco-consciousness. I held two public Ecollage workshops in the Fall of 2023, one at Duke’s Nasher Museum of Art and the other at Elon University. In these workshops, participants used collage to respond to prompts related to how nature is perceived, treated, and represented. This presentation features examples of Ecollage made during these workshops to explain the significance of this methodology for generating ecocritical perspectives and spreading ecocentric narratives. Visual analysis of these collages will reveal how Ecollaging can serve as a catalyst which disrupts the normalization of ongoing ecological crises to create new ways of seeing and interpreting the ways in which humans, nature, and art are intertwined.

## **Holocaust Education: How Does North Carolina Compare?**

**Meghan Pavlick** (Dr. Andrea Sinn) Department of History and Geography

This research asks the central question of how the state of North Carolina as a case study compares to the greater United States in their requirements for Holocaust education. Recently, the state of North Carolina has passed the “Gizella Abramson Holocaust Education Act” which is an addendum to the national “Never Again Education Act.” This act requires all public schools in North Carolina to implement Holocaust education into middle school and high school history and English curricula or an alternative elective course. This act was a step forward in promoting quality Holocaust education. This research aims to critically evaluate the state of Holocaust education legislation and curriculum standards in this country and how other states compare to North Carolina. By compiling this data, there will be a greater understanding of how Holocaust education differs across the United States along with the progress different states have made in the pursuit of a more comprehensive history education program. Using a critical lens, this research examines North Carolina as a case study by asking questions about specific legislation, positioning within standards, and tangible changes after the passing of the “Gizella Abramson Holocaust Education Act.” By synthesizing this data, a clear comparison across the states is apparent and can be further analyzed. The question of professional

development resources in North Carolina is also be considered. How accessible are resources and what is the quality of those resources? Through this research, the differences in the history and English curriculums of the states will be apparent. North Carolina followed suit after several other states implemented more comprehensive Holocaust education programs, but the degree to which the Holocaust is being taught in public schools significantly varies across the fifty states in the United States. A total of twenty-three states require Holocaust education with varying intensity. North Carolina is one of the most recent to join that group and implement serious changes to their public schools.

### **Best Practices for U.S. Museums to Engage Spanish-Speaking Visitors<sup>1</sup>**

**Sonali E. Schroder** (Prof. David McGraw) Arts Administration Program

Out of all racial/ethnic groups in the United States today, Hispanic Americans are the least likely to visit museums or galleries (National Endowment of the Arts 2022) and the least likely to indicate that arts activities are available and accessible to them (2017). Language is a key barrier to accessibility. Although the majority of Hispanic Americans are bilingual, a third of Hispanic-Americans report primarily using Spanish and having little to no understanding of English (Krogstad & Gonzalez-Barrera 2015). While previous research has shown that bilingual materials, initiatives, and practices in museums provide a greater sense of belonging (Acevedo & Madara 2015), there is little research to show how and why some museums are developing these bilingual practices or guidance for museums' new bilingual practices. For this research, I conducted interviews with nine leaders in the museum field in areas ranging from administration, education, curation, community advocacy, and businesses that provide translation and language training in museums. Interviewees also came from museums of various sizes including large scale national institutions like the Smithsonian, and smaller state institutions like the North Carolina Museum of Art. While recommendations varied among interviewees, all agree that linguistic accessibility is essential to the future of museums. The interview transcripts were analyzed using grounded theory methodology and key themes were compiled including language as inclusivity, the connection between language and culture, and working with, not for Hispanic communities. The research found that beyond translations, museums are co-creating programming through partnerships with community organizations and individuals as a way to get Hispanic/Latinx audiences engaged with the museum. Interviewees also noted challenges and barriers to creating bilingual offerings and gave advice for museums to implement effective bilingual practices-while also recognizing that linguistic accessibility is an iterative process and is never finished. The findings are consistent with current trends in arts administration including a priority on visitor-centered approaches to address issues of accessibility and inclusivity.

### **Righteous Among the Nations, The Experiences of German Medical Professionals From 1933-1945**

**Ava Ward** (Dr. Andrea Sinn) Department of History and Geography

Nazi doctors committed inhumane experiments on Jews and those considered 'genetically unfit' for German society and played a central role in their mass killings. Over half of all German doctors either joined the Nazi Party or an affiliated organization, making them the highest proportion of members of

all professional groups in Germany. Previous research on Nazi medical professionals between 1933 and 1945 focuses primarily on the nefarious crimes committed by doctors who abused their power. An equally important, yet less investigated topic is non-conforming medical professionals who risked their life to help those persecuted by Nazis. Some of these individuals have been distinguished as Righteous Among the Nations, an honor the State of Israel and the Jewish people convey to express gratitude to individuals who took great risks to save Jews. This study uses qualitative and quantitative methods to develop an understanding of the experiences, motivations, challenges, and networks of righteous medical professionals. It also aims to acknowledge them for their courageous and selfless acts. To identify trends, the Yad Vashem Righteous database was used to compile classifying data on all righteous medical professionals. Following the statistical analysis, eight German medical professionals - seven men and one woman - were selected as case studies based on their profession, nationality, and gender. Studying the setting inside the medical community from 1933-1945 reveals that eugenic beliefs were dominant, and a culture of cruelty was widely accepted. Based on a close analysis of archival documents, images, personal information, and awards they received for their heroic acts, this research presents three main findings: First, it argues that the acts righteous medical professionals carried out varied: Some individuals used their medical license, others did not, and some helped through a combination of professional and private means. Second, it found that these righteous individuals were considered outcasts because of their actions within their professional community and that they were constantly under pressure of extreme consequences such as death or imprisonment if caught. Third, this research suggests that religious backgrounds, political beliefs and personal connections of medical professionals are possible motivators. This presentation will discuss these findings.

## Human Service Studies

### **Young, Black, & Grieved: The Grief Process of Receiving a Mental Illness Diagnosis<sup>1</sup>**

**Noah H. Dyson** (Dr. Vanessa Drew-Branch) Department of Human Service Studies

Inadequate utilization of mental health services among African American transitional-age adults (aged 18-26) following a mental illness diagnosis is a recognized concern. This qualitative study explores the experiences of transitional-aged adults as they navigate the grief process following such diagnoses. Currently, little research exists regarding the intersection of grief, race, and age about their utilization of mental health resources and the journey toward achieving psychological stability. Through qualitative interviews and thematic analysis, this project gained insights into the multifaceted nature of grief in the context of life after a mental health diagnosis. The study findings that reveal a unique spectrum of emotions and coping mechanisms among African Americans while highlighting this transitional period's distinctive and challenging aspects. The qualitative findings from this study include key themes: identity disruption, loss of normalcy, and social isolation. This research study underscores the significance of understanding the grief experiences of transitional-age adults' post-diagnosis, enabling targeted interventions and support systems to enhance well-being during the transition to adulthood while managing mental health challenges. The findings emphasize the need for more comprehensive mental health services and the importance of reducing stigma to facilitate a



smoother journey through this critical developmental stage. This poster presentation will humanize the mental health journey of African American young adults and demonstrate that the cognitive challenges faced by this demographic go beyond the symptoms of their diagnosis.

### **Learning Outside the Classroom: A Look at Potential Barriers to Co-Curricular Activities in Public High Schools**

**Sidra Kennedy** (Dr. Bud Warner) Department of Human Service Studies

Research shows positive correlations between students' academic success and their involvement in co-curricular activities, however, there is limited knowledge about the accessibility of such co-curricular activities and those actively offered in public schools. This research is a pilot study looking across four different counties in North Carolina at 20 public high schools regarding the options of co-curricular activities offered from the school and the barriers to access them, while comparing it to the overall school standard. This research addresses the gap in literature by obtaining first-hand accounts through interviews with senior administrators in public high schools, who actively engage in both the academic and co-curricular aspects of their schools, to look at the barriers of access to co-curricular activities and the percentage of students who participate in these activities. This study was conducted using a mixed methods approach through interviews with Assistant Principals at schools as well as quantitative research about each public school that was assessed. Within the research, the main barrier to co-curricular activities was transportation access. This barrier has caused an impact to limit the involvement from students who are in a lower-income bracket, whose parents are more often unable to drive them to and from the different co-curricular activities. There was a strong correlation ( $R = 0.78$ ) between the schools' NC report card grade and amount of co-curricular opportunities offered.

### **Creating an Inclusive Cabin: Experiences of Jewish Camp Counselors in Supporting DEI Efforts and Camper Wellbeing<sup>1</sup>**

**Olivia E. Kogan** (Dr. Jessica Navarro) Department of Human Service Studies

Historically, U.S. summer camps primarily served White and high-SES families, but in the past two decades, there has been a demographic shift to include campers from diverse racial/ethnic backgrounds (Smith et al., 2022). This change extends to Jewish summer camps, where an increasing number of Jews of color are now participating. Camp administrators have responded by hiring staff for equity and inclusion initiatives, increasing counselor diversity, and implementing educational diversity, equity, and inclusion (DEI) programming (Camp Be'chol Lashon, 2022). Despite existing research on DEI programming in camp-specific settings, limited attention has been given to Jewish summer camps (Hutchinson et al., 2008). This study delves into the experiences of counselors at Jewish summer camps, examining their role in supporting the socioemotional needs of non-White campers. It also investigates how formal DEI resources and training impact counselors' ability to lead DEI conversations and address instances of oppression and inequality. In collaboration with a Jewish summer camp in Pennsylvania, this mixed-methods study collected qualitative data from camp administration and quantitative data from summer camp counselors working with non-White Jewish campers. Thematic analysis of administrator interviews identified key themes, including the counselor's role, the presence of affinity groups, emphasis on inclusive conversations, and challenges



in DEI implementation. Quantitative data from 20 camp counselors mirrored administrator challenges and successes. Counselors felt more confident discussing DEI with campers (M = 4.1) and fellow counselors (M = 4.3) on a 5-point scale but less so when approaching administration (M = 3.6). Counselors who received DEI training found it moderately effective (M = 3.25) in preparing them to support non-White campers. Comparing counselor and administrator experiences, the data suggests counselors may not be as comfortable approaching administration about inclusion issues as presumed. Insights from this study aim to enhance Jewish summer camps' capacity to effectively collaborate with and support counselors working with diverse campers, contributing to the ongoing evolution of inclusive practices within these settings.

### **“Homegoing”: Death and Dying in the Urban North and Rural South<sup>1,3</sup>**

**Shannon N. Kutcher** (Dr. Vanessa Drew-Branch) Department of Human Service Studies

The way different cultures relate to death and dying not only impacts individuals' perceptions of death but also impacts end-of-life (EOL) care for specific marginalized groups. The underrepresented experiences are constructed because of individualistic, Eurocentric views that govern services and support. Macro-level regional and socio-political-cultural differences in end-of-life culture between the urban North and rural South are a testament to the diverse tapestry of customs and values that shape how individuals and communities approach the end of life. These findings contribute to a gap in understanding how regions in the United States differ in community support and cultural perceptions of death and dying. This poster presentation discusses these differences in the urban, Northeastern region and the rural, Southeastern region of the United States. The data is collected through narrative interviews from New Jersey and North Carolina. Participants from each region include hospice personnel and members of the regional communities. Utilizing qualitative research software ensures a rigorous and systematic examination of the qualitative data, allowing us to draw meaningful conclusions from the rich narratives the study participants share. The data suggests that both regions demonstrate themes of avoiding death and demonstrating negative connotations with hospice. There is varied spiritual/religious significance and degrees of collectivism between the rural Southeast and the urban Northeast. This analysis also shows variations in access to EOL resources and post-death rituals between the two regions. Participants of both areas voice the need for more EOL conversations and education surrounding EOL care. These regional distinctions' recognition, respect, and sovereignty are used to inform suggestions to cultivate a culturally sensitive and personalized approach to supporting communities during this profoundly significant life transition.

### **Erased: The Hidden Stories of Queer People in the Civil Rights Movement<sup>1</sup>**

**Ethan Lane-Blake** (Dr. Vanessa Drew-Branch & Prof. Sandra Reid) Department of Human Service Studies

"Erased" is a thirty-minute six part mini series biographical digital story series that profiles the lives and contributions of four Black LGBTQIA civil rights activists: Pauli Murray, Bayard Rustin, James Baldwin, and Audre Lorde. The screening of this 6 episode biographical narrative will serve as a call to action, for viewers to educate themselves on both Black and Queer history. The history that is currently being erased through the silencing of "Critical Race Theory" and the passing of the "Don't

Say Gay Bill". The social identities of being Black or Queer deviates from cultural demands and social norms, causing social marginalization and silencing. The first episode will serve as an introductory episode leading the viewers into the next four episodes. The Cass Identity model is the guiding framework for this project. This model serves as a lens from which to gain understanding about the experiences of the Black sexual minority. The final episode will lead to a call to action for the viewers. Historically marginalized Queer and gender non-conforming individuals whose stories have been intentionally excluded; this project aims to give them back their voices. The current socio-political trends are actively working to diminish the experience and existence of Black Queer individuals. In doing so, this will cause Black Queer individuals to ask questions such as where is my role model in the fight for equity & will my freedom ever ring?! The lack of visibility and representation of Black Queer social justice in these social movements has erased their impact on society. This project aims to pay homage through storytelling and right the wrongs of history by highlighting the contributions of historical Black Queer activists while simultaneously inspiring the next generation of Black Queer social change makers.

### **Poaching: Experiences in Motherhood of Justice Involved Black Women<sup>1</sup>**

**Delyla V. Makki** (Prof. Sandra Reid) Department of Human Service Studies

Black incarcerated women experience neglect and maltreatment when seeking maternal health services, which results in higher odds of maternal hardship and poor perinatal health. The incarceration of parenting Black women erodes family structures and can permanently damage family units due to the disruption of attachment bonds between mothers and their children. The purpose of this research is to investigate these experiences as historical reiterations of the destroyed motherly bondage of enslaved mothers due to poaching. My research defines Poaching as stealing maternal bodily autonomy, agency, and the choice of motherhood. We used convenient sampling to identify participants and leveraged resources at rehabilitation or re-entry programs to recruit participants with a \$25 incentive. Qualitative semi-structured interviews were conducted with participants lasting up to 30 minutes to ascertain their personal experiences when interacting with correctional facilities regarding their maternal health. After data collection, each interview was professionally transcribed and analyzed using the Dedoose software to identify consistencies among the respondents' experiences. These consistencies were used to create codes, which were then grouped into thematic categories. I conducted a thematic analysis to interpret the meanings associated with participants' experiences. Current literature proposes that the experiences of maternal bondage of enslaved mothers are parallel to the experiences of incarcerated Black women today and that there are historical motifs of Black women that affect their experience as mothers and as US citizens. Preliminary data suggests that these historical perceptions of Black women in the United States as undeserving mothers may impact their maternal experience while Justice-Involved. The qualitative analysis of participant experiences found that while positionality explains the negative experiences in motherhood of Justice Involved Black Women; trauma-informed practices and positive familial relationships improve their experience.

### **Sociocultural Influences on Digital Parenting Mediation Attitudes<sup>1,3</sup>**

**Rachel R. Mullenix** (Dr. Jess Navarro) Department of Human Service Studies

This study employs the use of multiple linear regression to investigate the combined influence of familism, income, and Latino identity on digital parenting attitudes in the United States. Children today have spent their entire lives in the digital age, playing, learning, and communicating through technology. With each new platform developing faster than it can be studied, parents have needed to improvise strategies for navigating the balance of mediating their children's technology use and allowing their children to develop autonomy, and this process of digital parenting mediation attitudes is influenced by the sociocultural context surrounding each family. For this reason, this study explores the following: At differing levels of income, what is the influence of familism on attitudes about digital parenting in the United States? Does this influence differ significantly between Latino and non-Latino parents? Our findings emphasize the sociocultural relativity of digital parenting practices and can inform the integration of evidence-based and culturally appropriate strategies into 21st century parenting education and support. By recognizing and respecting the impact of diverse cultural values on digital parenting attitudes, human service professionals, educators, and researchers can collaborate to promote culturally responsive digital parenting practices that support the well-being of children and families.

### **Beyond the Binary: Gender Inclusivity in Research<sup>1</sup>**

**Sophie M. Padalecki** (Prof. Monica Burney) Department of Human Service Studies

There is a growing awareness of the need to include gender-diverse individuals in scientific research. However, there is still a significant lack of representation, with only a small portion of studies including transgender or nonbinary participants. Various barriers contribute to this disparity, but a central challenge lies in the pervasive, systemic assumption that everyone fits into traditional gender categories. This research examines the consequences of healthcare and scientific studies past focus on traditional male and female genders, ignoring other gender identities. By conducting a comprehensive literature review, the study seeks to address two primary questions: Does existing literature identify and categorize individuals using a non-binary framework? Does existing evidence suggest that using non-binary identifiers in research impacts outcomes? Through examination of scholarly articles, research studies, and other relevant sources, this research will examine the impact of incorporating non-binary identifiers on various outcomes, such as healthcare access, treatment efficacy, and overall well-being. Further, this study aims to contribute to a deeper understanding of the complexities surrounding gender identity within research contexts and investigate the evidence supporting the adoption of non-binary framework in research practices. This research will also identify other scholarly works that acknowledge non-binary identities, shedding light on prevalent gaps in the literature where the presence of gender nonconformity is overlooked or disregarded altogether. Overall, this research will provide insights into the importance of including diverse gender expressions in research methodologies, and thus advocate for more inclusive approaches to scientific inquiry. By acknowledging that gender extends beyond the male/female binary, healthcare systems and research institutions can ensure equitable care for all individuals.

### **Child Custody for Non-Traditional Families<sup>1</sup>**

**J'Lynn Poplin** (Prof. Monica Burney) Department of Human Service Studies

This research delves into existing literature on nonparents undertaking parenting roles and the child custody mediation processes to discern the necessity for tailored accommodations in child mediation practices for nonparents. Child custody mediation, occurring when guardians undergo separation and negotiate terms for the child's custody, is the focal point of this research. Collaborating with Graham Child Custody Mediation Services in Alamance County, the study aims to identify optimal existing practices. Furthermore, this research will include a review of literature specific to the distinctive needs of nonparents compared to parents, contributing to a comprehensive understanding. Additionally, the research explores the benefits of child mediation. By accumulating these findings, the study aims to find the advantages of child mediation for nonparents, potentially informing the development of specialized approaches within the child mediation process. This research addresses the critical question of whether nonparents require unique accommodations in child mediation and is positioned to contribute valuable insights to the field, bridging gaps in understanding the distinct needs of nonparents involved in custody negotiations. The methodology involves collaborative efforts with a local mediation service and an extensive literature review. The findings aim to shed light on the benefits of child mediation for nonparents, serving as a foundation for future enhancements in the child mediation process to better address the specific needs of this demographic.

### **Child-Centered Play Therapy in the Community: Surveying Students and Alumni on How a Play Therapy Course Impacts Their Work and Lives**

**Sarah N. Tyner** (Dr. Judy Folmar) Department of Human Service Studies

Play is the way children learn and express their needs. It is an outlet for children as they learn a variety of skills through play such as language/verbal skills, emotional regulation, etc. Play therapy is needed for children just as talk therapy is needed for adults. The goal is to understand children in a way only play can offer through child centered therapy and socioemotional work (Blalock 2024). The current research focuses on alumni perceptions on how studying play therapy at Elon has impacted their work and experiences with children. Over 300 emails were sent out to Elon alumni with 49 responses. Responses to open-ended survey questions from many Elon alumni will be shared in this presentation such as how will you use what you have learned in the future? These responses to the questions will be further analyzed through a qualitative analysis of discovering themes within the data collected. Recommendations for what children in the community need from non-parental adults will also be shared.

### **Child-Centered Play Therapy in the Community**

**Mackenzie B. Wright** (Dr. Judy Folmar) Department of Human Service Studies

Children often have difficulty verbalizing what they are thinking and feeling (Bratton et al., 2005; as cited by Piaget, 1962). Play therapy offers them an outlet to express themselves in a way that is natural to them. This child led method can give the child a sense of control which can help them feel safe as they process their experiences and emotions through play (Bratton et al., 2005; as cited by Axline, 1947; Kottman, 2001; Landreth, 2002; O'Connor, 2001; Schaefer, 2001). In the present study, we are researching the impacts of a play therapy course on students' future work with children. There is no research in this area, however, training in empathy has been shown to have positive effects on dental

students (Anishchuk et al., 2022) and teachers (Peck et al., 2014). Through the alumni center, we found lists of past students from the play therapy course and emailed them information about the study. Using the results of quantitative surveys from Elon alumni, we are focusing on how learning play therapy and how it has shaped their approach and experiences working with children. This research will not only further our understanding of play therapy and its effects on how students interact with children, but also how it impacts how they view children.

## Journalism

### **Love, Revenge, Ambition, and Scorn: A Content Analysis of the Portrayal of Women in Telenovelas and American Soap Operas<sup>1</sup>**

**Alexandra J. Borda** (Dr. Daniel Haygood) Department of Journalism

According to the Internet Movie Database, only three American soap operas remain on US broadcast television. During the 1970s, American soap operas hit their peak, with 20 daytime soap operas airing at the time. However, we all know that when something hits its peak, the seeds of its decline are planted. Telenovelas are soap operas produced or primarily watched within Latin America, and they typically have a fixed duration, while American soap operas lack a predetermined endpoint. Within these forms of serialized television, female protagonists also take center stage on screen. To mirror broader societal changes, portrayals of women in both telenovelas and American soap operas have evolved in response to shifting social dynamics. Using qualitative content analysis, this research analyzed six different programs – three telenovelas and three American soap operas – that featured female protagonists over the last 20 years and were identified as some of the top serialized programs. The goal was to characterize the portrayals of the primary female characters in each program and determine similarities and differences. A total of 20 female characters were identified and classified into different roles. Findings from the research show themes of love triangles, scorned ex-lovers, ambitious women, and vengeance. These findings found that these television characters were consistently portrayed in stereotypical "roles" associated with women and followed the traditional narrative. Additionally, this research found that the portrayal of women in telenovelas has drastically strayed away from the “stereotypical” Hispanic woman and female roles. The results indicated that while some stereotypes do exist when portraying women in soap operas, characters in telenovelas broke free from the conventional female roles. However, the lack of evolution within the portrayal of women in American soap operas leads to problematic stereotypes of the portrayal of women in television and media. Yet, the dynamic reversal of gender stereotypes of the portrayal of women in telenovelas breaks away from the stereotypical narrative shown in telenovelas and creates unexpected fierce female leads. In other words, these findings have implications for female consumers of serialized dramas and their perceptions of the changing dynamic of female representation in contemporary television.

## **Hashtag Havoc: Unmasking Young Women's Reactions to Health, Fitness, Food, and Disordered Eating Content on TikTok**

**Ava Girardi** (Dr. Daniel Haygood) Department of Journalism

TikTok has transformed the social media landscape with over 1 billion downloads. It offers a unique platform for global connectivity through short-form videos while empowering users to express themselves in a creative way. TikTok is used by individuals worldwide, but previous research has indicated that the largest demographic segment of users is females at 23.8%, who are also the most frequent users. This can lead to exposure of potentially harmful content relating to dieting, fitness, and body image. The primary purpose of this research was to explore young female users' reactions in the form of comments to the top-liked videos that use hashtags related to fitness, health, eating habits, and weight loss. Its goal was to uncover serious mental health consequences tied to unhealthy eating habits and extreme dieting practices, encompassing various forms of eating disorders, offering valuable data for educational studies and public health initiatives addressing these concerns. A thematic content analysis was conducted by selecting specific hashtags and then identifying the top videos related to these hashtags. Reoccurring themes discovered were body dissatisfaction, low self-esteem, disordered eating, and a fixation on food and health. The comments among female users raised concerns about female creators sharing content that promoted calorie counts below the recommended daily intake. Additionally, the comments revealed a tendency to judge the physical appearance of female creators to explain differences in the users' own body shape, often resorting to making excuses. Users not only eagerly consumed such content but also consistently expressed a desire for more, potentially indicating a willingness to pursue current or future disordered eating habits. The comments were more negative towards plus-size content creators compared to thin and in-shape content creators who posted content concerning weight loss, fitness, food, and dieting. Recorded comments revealed concerns about calorie intake, unhealthy habits, excuse-making, defensiveness, and self-comparison, suggesting potential weight loss actions. Findings also demonstrated that users desired more content, admired fit creators, and expressed vulnerability about weight loss and body image.

## **Management and Entrepreneurship**

### **How Non-Profit Associations Can Increase Membership and Revenue: A Case Study With the American Baseball Coaches Association<sup>3</sup>**

**Grace Dieleman** (Dr. Manoj Chari) Department of Management and Entrepreneurship

The American Baseball Coaches Association (ABCA) is the primary professional association for amateur baseball coaches, and its main goal is to provide professional development through speaker events, conventions, clinics, new technology introductions, service programs, and NCAA legislation education. This mission can be enhanced by increasing its membership across the nation and the world. One of the biggest advantages to being a member of the ABCA is registration access to attend their annual convention held in January, which is the site of many professional development events. Previous research indicates that for such an organization to be successful and generate revenue, membership stability and growth are critical. The current study analyzed ABCA membership and



convention data to assess if geographical factors, member affiliation and professional roles and other factors had an impact on convention attendance and long-term membership. Using tools like Excel, Python, and SQL, the ABCA data was cleaned, transformed, and analyzed using descriptive and classification techniques like decision trees. These findings were visualized in Tableau and Python charts and then mapped to illustrate the effect of geography on attendance, to make the findings more accessible to the ABCA staff. Some of the findings were that, on average, convention attendees lived 175 miles closer to the convention location than members who did not attend. Distance had the smallest impact on the attendance of Pro Team Affiliated coaches and College Summer League coaches; however, it had a large impact on the attendance of High School and NCAA coaches who make up the largest portion of members. Prior research suggests that in a digital age, geographic boundaries are not as important, but these research findings show otherwise. This research is potentially important to the goal of increasing overall working revenue for this non-profit organization that lacks resources to conduct such analyses. It could also aid in selecting future convention locations with the eventual goal of achieving higher membership. These insights can help the ABCA target their marketing and promotion efforts to increase convention attendance and long-term membership.

### **The Role of Green Innovation for ESG Performance Scores in the Automotive Industry between 2015-2021 – A Panel Data Study<sup>2,3</sup>**

**Johanna P. Lauff** (Dr. Scott Hayward) Department of Management and Entrepreneurship

Government regulations and society's expectations placed on companies to fulfill their social responsibilities and reduce their negative impact on the environment have increased significantly in recent years. The automotive industry plays a unique role in that area, as it is the largest CO<sub>2</sub>-emitter in the transportation sector (IEA, 2023). A widely used concept for measuring a company's performance in relation to environmental, social and governance issues is ESG scores, where each letter stands for one of the three dimensions mentioned (Crace & Gehman, 2023). Sustainable products, such as electric vehicles, are a relevant component of environmental scores for the automotive industry. Green-classified innovation could be one strategy for responding to governmental regulations, sustainability pressures and changing customer expectations while leveraging ESG performance (Lin et al., 2019). This thesis examines to what extent automotive companies can positively impact their ESG score through green innovation, measured by green patents. A quantitative research design based on secondary data is used. The sample encompasses 31 automotive companies from North America, Asia, and Europe for which Bloomberg's ESG scores were available for the years 2015-2021. The combination with green patent counts from The Lens by Cambia resulted in 172 firm-year observations. To test the hypotheses, both a correlation analysis and fixed-effects regressions for panel data including control variables were conducted. The fixed-effect approach controls the effect of unobserved variances across firms. A statistically significant positive relationship was found between green patents and both the environmental and overall ESG score. This thesis adds to existing literature by highlighting the important role that green patents play in ESG performance for automotive companies. The managerial implications of the study are that investment in green innovation should be fostered to meet customer needs and drive ESG performance. From a governmental perspective, this thesis could be a stimulus to increase subsidies that foster green innovation investment. From a regulator perspective, the findings could incentivize simplifying patent application procedures. A

possible avenue for future research is to extend this study to other industries and test the model with data from other patent databases or ESG score providers.

## Marketing and International Business

### Alternative Influencer Appeals: "De-Influencing"<sup>3</sup>

**Kaela P. Bernard** (Dr. Lana Waschka) Department of Marketing and International Business

Social media has been shown to exert a significant influence on both consumer behavior and industry dynamics (Gupta and Chopra, 2020). Sellers often rely on glowing reviews with high ratings from influencers, believing that an excessively positive endorsement is key to swaying consumer purchase intentions. However, a recent and counterintuitive trend, de-influencing, has surfaced challenging this traditional approach (Kupor and Tormala, 2018). The counterintuitive trend, de-influencing, is the process of discouraging the purchase of one product in order to enhance the endorsement of another similar product. Social media influencers appear to be utilizing this to be perceived as more authentic when recommending products. Based on the results of the study, companies can better allocate their spendings based on influencer appeals. Influencers help the economy through stimulating consumer demand for products and services while creating jobs for not only social media influencers themselves but for managers, marketers, and other professionals involved in the process (Cong and Li, 2023). We employed the Targeted Maximum Likelihood Estimation (TMLE) methodology, a statistical analysis framework, to estimate the average treatment effect of the de-influencer appeal. This allowed us to use ensemble machine learning algorithms, which place minimal assumptions on the distribution of the data. Data was collected from 186 TikTok accounts with a total of 216 observations. The key dependent variable of interest was the number of comments on each video, which holds with other social media literature (Bowden, 2009; Tavares and Nogueira, 2021). The results show that videos employing de-influencing appeals have significantly higher comments on their videos compared to those that have influencers using the traditionally positive influencing method. We suspect that this is due to increased perceptions of influencer authenticity resulting in greater engagement. We also measured views, likes, shares, and favorites but found no significant difference between the two appeals. Further studies are needed to expand upon our current results. The findings of this work can assist brands, managers, and influencers by offering alternative marketing appeals that are moderately positive rather than extremely positive in order to evoke greater brand engagement from their consumers surrounding both the brand and products.

### Have Any Studies Shown That the SPIN Selling Framework Directly Increases Sales Effectiveness More So Than Other Selling Strategies for Maritime Products?

**Nathaniel E. Brawley-Magee** (George Talbert) Department of Marketing and International Business

The maritime product sector is characterized by a highly specialized and valuable product range, leading to a complex sales environment. Traditional selling strategies, such as feature-benefit selling,

often do not meet the specific needs of this sector due to the unique challenges posed by the high value and specialization of maritime products. This study assesses the effectiveness of adaptive selling techniques, specifically SPIN selling, against traditional selling strategies within the maritime industry. Utilizing the methodological framework of evidence-based management, this research conducts a systematic review of existing scholarly literature and industry reports. The study employs the Topic Papers model, derived from evidence-based medicine principles, to systematically search and analyze relevant data using specified keywords and Boolean search parameters. The findings indicate that adaptive selling strategies, notably the SPIN selling method which focuses on identifying explicit customer needs through situational and problem-solving queries, significantly enhance sales effectiveness in the maritime sector compared to traditional methods. Adaptive selling techniques are more suited to the high-stakes, specialized market of maritime products than traditional selling strategies, offering a strategic advantage in addressing the intricate needs of customers in this niche market.

### **Gender Dynamics in Pharmaceutical Sales: Evaluating the Sales Effectiveness of Women Compared to Men**

**Sydney P. Byers** (Dr. George Talbert) Department of Marketing and International Business

This study investigates the effectiveness of women in pharmaceutical sales compared to men, exploring gender dynamics and their impact on sales performance. Despite facing underrepresentation over the years, women make up a significant portion of pharmaceutical sales representatives (59%), indicating their substantial presence in the industry. Using a systematic review, I summarized results to analyze how gender plays a role in pharmaceutical sales. I used evidence-based management as a viable means to gain insights on how my research could be applied to pharmaceutical sales. Drawing from existing research in both B2B sales and in general sales, I concluded that gender does impact selling effectiveness in industries that require attributes such as being nurturing, relational, and sensitive to others. My findings revealed differences between genders in sales approaches. Women tend to exhibit a greater focus on others, emphasizing relational aspects and responsiveness to negative data. Moreover, they demonstrate a higher level of caution and risk aversion, potentially influencing their sales strategies. Contrarily, men display a more self-oriented approach and are more likely to engage in unethical behavior. Women in sales exhibit higher levels of grit across various measures, highlighting their resilience and determination. Their emphasis on relationship-building and emotional support in the workplace reflects societal and familial roles, contributing to a nurturing sales approach. The pharmaceutical sales environment aligns with traits commonly associated with women's strengths. Sales representatives prioritize establishing trust, responding to subtle cues, and providing personalized service to foster enduring relationships with healthcare professionals. By integrating these insights, this research shows the significance of gender in sales effectiveness, particularly within the pharmaceutical sector.

### **Creating Online Social Presence: E-Commerce and the Purchasing of Private Goods<sup>3</sup>**

**Rachael E. Davis** (Dr. Smaraki Mohanty) Department of Marketing and International Business

*Purpose:* Social presence has the ability to change how consumers purchase, however, there is a gap in the current literature surrounding the impact of social presence in an online consumer context. This paper aims to determine how online social presence can impact consumer purchase likelihood in the context of purchasing private goods such as sensitive medications. *Design/Methodology/Approach:* Online surveys were conducted via Qualtrics, with a total of 340 responses collected - gathered randomly through Amazon Mechanical Turk. A statistical mean analysis was conducted to examine the impact of social presence on purchase likelihood. In our experiment, participants were randomly assigned either our experimental stimuli that included online social presence measures or a control that did not. *Findings:* The results revealed the addition of user icons and user count text increased the consumer's ability to feel the presence of others while visiting the website, which resulted in an increase in a consumer's purchase likelihood. The impact of negative emotions was lessened through the addition and creation of this online social presence. *Research Implications:* This paper presents an overview of the underlying processes that create online social presence and a brief overview of its potential impacts on consumer buying behavior through understanding purchase likelihood. *Practical Implications:* To encourage a higher likelihood of online purchases on company websites, companies should consider the value of adding online social presence indicators through the implementation of user presence widgets, such as current online user data and icons. *Originality/Value:* This research modernizes the idea of social presence by focusing on mere or perceived online social presence as compared to the wealth of literature that surrounds either connecting consumers directly in an online setting or that of real social presence in a physical space. The results indicate methods useful for the corporate world to increase consumer purchase likelihood and thus potential sales.

### **The Influence of Perceived Clothing Style on Men's Mental Well-Being: An Evidence-Based Management Approach**

**Quinn Shannon** (Dr. George Talbert) Department of Marketing and International Business

Men's mental health has increasingly been recognized as a critical issue that merits comprehensive research and targeted interventions. Statistically, men are less likely to seek help for mental health issues due to cultural and societal norms that promote stoicism and self-reliance. This disparity is reflected in higher rates of suicide among men compared to women, underscoring the urgent need for effective strategies that address men's psychological well-being. Identifying and implementing approaches that resonate with men's perceptions and experiences, such as the influence of clothing style on self-esteem and mental state, is crucial. By exploring how self-perceived stylish clothing can enhance well-being, this research aims to contribute to the broader goal of reducing depression and improving mental health outcomes for men, thus providing evidence-based insights that can guide future interventions and support mechanisms. Utilizing an evidence-based management approach helped scientifically determine whether men experience better mental well-being and self-esteem when they perceive their clothing as stylish. Adopting evidence-based management principles, traditionally applied in healthcare, and recently adapted for organizational use, this study systematically reviews the literature to evaluate the relationship between men's mental well-being and their perceptions of clothing style. The EBM approach emphasizes the use of systematic review methods to assess research quality and relevance, involving a meticulous search strategy that filters studies based on specific keywords and methodological robustness. The review identified a direct, positive correlation between perceived stylish clothing and higher self-esteem and mental well-being in men. Despite individual variations, the consistency across studies highlights the substantial role of self-perceived style in

promoting mental health. This study confirms that stylish clothing significantly correlates with improved mental well-being in men. The findings support the use of evidence-based strategies in psychological and fashion research to enhance mental health outcomes. Further research is recommended to explore intervention strategies that can leverage fashion as a practical tool for mental health improvement.

## Mathematics and Statistics

### Danceability! Directed by Braid Index

**Sol Addison & Lila Snodgrass** (Dr. Nancy Scherich) Department of Mathematics and Statistics

In Mathematics, a knot is a closed curve in 3 dimensional space with no self intersections. This project was initially motivated by the efforts of Karl Schaffer in *Dancing Topologically* where he introduced the concept of danceability of a knot diagram (Schaffer, 2021). We can consider the danceability of a knot by asking which knot diagrams can be danced and how many dancers they require to be traversed. A knot is solo-danceable if one can choose a directional flow of the knot and a point on the knot so that a dancer can start at the point, dance in the directional flow of the knot, and traverse the entire knot with the restriction that the dancer must pass through every crossing as the under-strand first.

However, most knots are not solo-danceable—they require more than one dancer to traverse the entire knot! For example, if a dancer reaches a crossing on the over-strand before having already crossed it on the under-strand, an additional dancer is needed. In this research, we build upon Schaffer's work to formally define when a knot is  $n$ -danceable or requires  $n$  dancers to traverse the knot. We use this rigorous definition to define the danceability of a knot as the minimum number of dancers needed to dance the knot, making it an invariant because it can differentiate between two knots. Additionally, we have identified an upper bound for the danceability invariant in terms of other known invariants, such as braid index. Our ongoing research focuses on exploring the danceability invariant for alternating knots, aiming to ascertain a lower bound.

### Mathematical Modeling of Immune Response to SARS-CoV-2

**Ayesh Awad, Rony Dahdal, Mary Hermes, & Carissa Potter** (Dr. Hwayeon Ryu) Department of Mathematics and Statistics

In response to the profound impact of the COVID-19 pandemic on society, the mathematics and broader scientific community has focused considerable research efforts to understand the spread of the virus. Despite a tremendous volume of research in this area, how the human immune system responds to SARS-CoV-2 has not been yet fully understood due to limited analysis of the experimental or clinical information to date. Mathematical models that account for the interaction between SARS-CoV-2 and the human immune system will improve the scientific community's ability to analyze the vast amount of data available. We have developed a mathematical model for the immune response to SARS-CoV-2 to investigate the role of various molecular pathways in successful viral clearance and the key mechanisms responsible for disease severity exhibited by some patients. Specifically, our in-

host model explicitly represents the interactions between the virus, innate immune cells, and selected cytokines. These interactions are formulated in a system of coupled ordinary and delayed differential equations. We conduct parameter estimation based on experimental data from literature and investigate model behaviors via computational simulations. Using this model, we use sensitivity analysis to determine the implications of variation of parameters. Our model demonstrates key aspects of the immune response to SARS-CoV-2, specifically its sensitive pathways, which might be responsible for disease severity exhibited by COVID-19 patients. These have the potential to be used to identify several therapeutic targets that would provide hypotheses to be tested clinically, thus, serving as a foundation for the development of evidence-based therapeutic strategies.

### **Mathematical Modeling of COVID-19 Transmission With Focus on Asymptomatic Carriers and Vaccination Schedules<sup>3</sup>**

**Lauren Beuerle** (Dr. Karen Yokley) Department of Mathematics and Statistics

In 2020, the global COVID-19 pandemic erupted. Without knowledge to combat the disease, hospitals around the globe were overrun. Scientists and mathematicians, using past information on extremely infectious viruses, began investigating the individual effectiveness of social distancing, facial coverings, and eventually, vaccinations. Mathematical models are used to explore the quantitative effectiveness of vaccinations and facial coverings. Insights and predictions from these models can be used to guide the creation of policies in order to prevent future surges in cases. An ordinary differential equation SIR model is developed to predict susceptible (S), infectious (I), or recovered (R) populations to explore different vaccination strategies and minimize virus transmission. Specific focus is placed on the impact of asymptomatic individuals on the transfer of the virus across the population. Parameter information is sourced from previous literature, but proper parameter fitting will be conducted in future work. Model output is validated through available CDC data of reported infections during the pandemic. The products of this model can be used as a reference for preventative measures for future epidemics that follow a similar pattern to COVID-19.

### **Quantifying Gerrymandering: Utilizing Algorithmic Redistricting to Create Quantitative Metrics for Gerrymandering in North Carolina**

**Eli Bier** (Dr. Todd Lee) Department of Mathematics and Statistics

Redistricting is critical for ensuring fair representation in the United States, yet gerrymandering poses significant challenges to this principle by manipulating district boundaries for partisan gain. This paper explores using a weighted k-means algorithm to assess gerrymandering. We aim to produce diverse districting maps of North Carolina, forming an ensemble for comparing individual districting plans. We outline our methodology's evolution from recursive flood fill algorithms to iterative flood fill and ultimately to a weighted k-means approach addressing challenges such as population discrepancies and adherence to administrative boundaries. While our results demonstrate the efficacy of the weighted k-means algorithm in producing varied districting maps, limitations persist in achieving population balance. Ultimately, our findings contribute to the discourse on redistricting and gerrymandering, offering insights into algorithmic methodologies and suggesting avenues for future research to promote fair and representative electoral processes.



### **Statistical Modelling of Alaskan Coral Biodiversity Trends<sup>2,3</sup>**

**Schuyler Cady** (Dr. Nicholas Bussberg) Department of Mathematics and Statistics

Way down in the depths of the ocean, in frigid water and total darkness, are one of the Earth's most critically important organisms. These are cold-water corals, an extraordinarily diverse class of marine organisms. Their habitats plunge deep into the sea near the tropics and rise steadily up to the shore at the poles. They have an enormous range of structures, provide food and shelter for many organisms, and are the foundation upon which oceanic health rests. Warm-water corals have experienced precipitous population declines over the past few decades, but less is known about their cold-water brethren. Current research suggests that cold-water coral health is on the decline, likely due to a combination of factors such as climate change and fishing practices. My research investigated how the diversity of coral communities around the Gulf of Alaska, the Aleutian Islands, and the Chukchi Sea are changing. I used the National Oceanic and Atmospheric Administration's Deep-Sea Coral and Sponge Database, one of the largest data sets available. There were over 86,000 records in the database for these regions, including variables such as count of individuals, taxonomic classifications, and date surveyed. After removing non-corals and unknown records, I analyzed the biodiversity (genus richness) of the remaining nearly 30,000 cold-water corals. I discuss not only how this diversity is distributed around Alaska, but also how the diversity has changed over time and how it changes with depth. Understanding biodiversity trends is vital in predicting how coral reefs may change in the future and in protecting this ecologically crucial region.

### **Mathematical Approaches of Modeling Obesity Trends<sup>3</sup>**

**Danielle DaSilva** (Dr. Karen Yokley) Department of Mathematics and Statistics

The prevalence of obesity has drastically increased over the past several decades and has caused strain within the healthcare system, as obesity puts individuals at an increased risk for a variety of diseases and conditions. This project develops multiple mathematical models for obesity trends in the United States. We first used linear regression to model how the overall trends of obesity have changed over time. Linear regressions enabled us to gain insight into the relationship between obesity and societal factors such as poverty and food insecurity and enabled us to gain insight into the relationships seen in the data. Further, the rise in obesity levels has been theorized to mimic the spread of an infectious diseases. Since infectious diseases are often studied using SIR-models, we next developed an SIR model to study and analyze their effectiveness in modeling obesity. This enabled us to gain an understanding of the population level dynamics however might be overly complex. Finally, we used agent-based modeling strategies to create a probabilistic model of obesity trends. The use of agent-based models is supported by the theory that one's social community may also impact the likelihood of becoming obese. The agent-based model was relatively simple but modeled the population level dynamics well. Developing these and similar models could enable the investigation of various intervention strategies to reduce obesity levels within the United States.

### **The Effects of Multimodal Writing in a Calculus I Course**

**Emily J. Elowitch** (Dr. Aaron Trocki) Department of Mathematics and Statistics

This research was designed to explore the potential effects of multimodal writing on students' perceptions of learning, understanding, and their mathematical ability in Calculus I. In particular, we investigated to what degree Calculus I students perceived multimodal writing as an engaging and effective way to develop their mathematical understanding. We asked Calculus I students to complete four writing projects throughout the semester—writing a letter home, creating educational materials, emailing a classmate, and analyzing the accuracy of ChatGPT results—which were strategically designed to increase both their procedural fluency and conceptual understanding of the material. Students completed pre- and post-course surveys, as well as post-project surveys after each assignment about their perceptions of benefits and drawbacks of each project. The results of this research were positive, with students sharing that they felt that the projects deepened and solidified their understanding of the material and that the projects were more enjoyable and engaging than traditional homework assignments. Further, comparing pre- and post-course surveys revealed that students became more confident in their math abilities over the course of the semester.

### **Investigating Factors That Impact College Satisfaction Among Graduates**

**Grace Gabrielli, Gracie Hartle, Walker Hicks, Kenna Talhelm, & Scout Winter** (Prof. Larry Cantwell & Dr. Ryne Vankrevelen) Department of Mathematics and Statistics

This research explores factors contributing to a graduate's overall satisfaction with their college experience. This research can help current and incoming college students get the most out of their college experience by looking at what aspects of college made the experience the most enjoyable for others. To find this information, we created a survey and sent it out to college graduates via the social networks of people involved in the research. We operationalized satisfaction on a scale from one to ten, with one being "not satisfied at all" and ten being "very satisfied." The survey included a series of questions about the experiences the graduates had in college. Some factors studied were extracurricular participation such as Greek life, athletics, service/volunteering, the arts, clubs, research, internships, and student government. We also researched undergraduate major (broken into STEM, education, business, social sciences, and arts and humanities) as well as the type of degree acquired and the number of years attending college. We used over 150 submitted surveys to explore relationships between the activities stated above and college satisfaction. We found a correlation between several extracurricular experiences and overall satisfaction in one's college experience. While most people surveyed were satisfied with their college experience, this varied based on participation in work/internships, the arts, and according to certain personal priorities.

### **Stress and mental health of high school students through the COVID-19 Pandemic**

**Zainab Elzibair, Lelia Wilson, Lauren Turner, Bisan Abu Khalaf, & Inaaya Siddiqui** (Prof. Larry Cantwell & Dr. Ryne VanKrevelen) Department of Mathematics and Statistics

The COVID-19 pandemic is often associated with increased stress levels due to isolation, uncertainty, and the disruption of normal routines. Our research attempts to assess the way adolescents' stress manifests itself before and after the COVID-19 pandemic and determine the factors that had the

strongest influence on adolescents' stress symptoms. It is important to analyze the root causes of stress in adolescents to better understand behavior. To this end, we analyzed data from multiple public resources including the National Study of Medicine and National Health Interview Survey (NHIS) that encompassed the years 2019 through 2022. We define stress levels as a person's physical, emotional, and mental response to their environment. Initial results show that frequency of worrying and depression increased for both male and female students but at higher rates for female students. Throughout this process, we designed a survey intended to assess the stress of high school students at Walter Williams High School. Due to time constraints and additional considerations regarding surveying minors, we were unable to perform data collection as part of this research. We will share insight regarding the design process and protocols required when conducting research on underage students. The examination of stress and the causes of stress aids parents/guardians, teachers, administrators, and the students themselves in decision-making. Administrators, teachers, and authority figures may consider these stressors when analyzing students' behavior in classrooms.

### **Comparing Measurements of Sleep Obtained Through Self-Report or Wearable Devices<sup>3</sup>**

**Hannah Enck** (Dr. Mark Weaver) Department of Mathematics and Statistics

Getting an adequate amount of sleep is especially important for high school and college students, as it promotes health and cognitive development. Sleep is important to study in this age group, since it can often be hard to balance school, extracurricular activities, and a social life, while getting sufficient sleep. This research aims to look at different measurements of sleep, with the overall purpose of comparing self-reported measurements and direct measurements using wearable devices. The data used for this research come from the NIH-funded Health-E-Start study currently being conducted at Elon, which looks at changes in lifestyle behaviors and metabolic syndrome risk development for students transitioning from high school to college. This study uses many self-reported variables to measure sleep, including the Pittsburgh Sleep Quality Index (PSQI) and the two scales from the Patient-Reported Outcomes Measurement Information System (PROMIS). The PSQI is a questionnaire given to participants that includes questions about sleep habits (Buysse et al., 1989), while the PROMIS scales use patient-reported data to evaluate various aspects of health (HealthMeasures, 2023). Sleep and physical activity are also directly measured using a wearable device, Actigraph. The Actigraph is similar to a watch, which measures movement and lack thereof (ActiGraph, 2024). This research uses statistical methods to assess relationships between the PSQI, PROMIS Scales, and Actigraph data. One variable of interest is the sleep midpoint between the times of sleep onset and waking. Initial results for high school students show significant but moderate correlations between the self-reported and directly measured sleep midpoints for both weekdays and weekends ( $r = 0.58$  and  $0.52$  respectively). On the other hand, initial results for first year college students show a significant correlation between self-reported and directly measured sleep midpoints for weekdays ( $r = 0.70$ ), but a non-significant small correlation for weekends ( $r = 0.32$ ). In this presentation, the relationships between directly measured and self-reported data for a variety of other sleep measures will be evaluated.

### **Use of Alternative Pain Management Strategies in a Randomized Trial of Pain<sup>3</sup>**

**Lainey English** (Dr. Mark Weaver) Department of Mathematics and Statistics

Chronic pain is one of the most prevalent adverse health conditions worldwide. Therefore, effective management of acute pain is crucial to optimize healing, function, and overall well-being to minimize the risk of chronicity. Deep breathing can positively influence pain processes. Additionally, meditation and acupuncture are also examples of alternative pain management strategies frequently recommended to patients. The NIH-Funded BETTER Trial was a randomized controlled trial that enrolled more than 300 patients, 50 years or older, presenting to the Emergency Department or Urgent Care with acute musculoskeletal pain. Study participants were randomly assigned into one of three arms: a full intervention, where patients were shown an interactional education video, received a telecare phone call from a nurse, and follow-up with their primary care provider; a reduced intervention with the interactive video only; and a usual care group. The interactive educational video and the nurse telecare call described recovery and alternative pain management strategies to aid in pain reduction, which included deep breathing. The goal of my research is to determine if the use of alternative pain management strategies differed by treatment arm, and if those differences were affected by various baseline participant characteristics. From our initial analysis, we discovered that patients used deep breathing significantly more than other alternative pain management strategies covered in the study. Additionally, those who were assigned to the full intervention arm used deep breathing significantly more often than those assigned to the other groups. In particular, we found that participants with a low baseline pain self-efficacy score, which measures a patient's confidence to complete daily tasks with ongoing pain, as well as younger participants, used deep breathing significantly more in the full intervention group than those in usual care. The findings of this research could aid in discovering treatments to prevent acute pain from progressing into chronic pain.

### **Exploratory Data Analysis for Teaching Statistics for Social Justice<sup>1,3</sup>**

**Samantha J. Fish** (Dr. Heather Barker) Department of Mathematics and Statistics

One prevalent challenge in statistics classrooms today is finding a way to teach material while keeping students engaged. This is especially true in statistics, a field that is stereotypically seen by some as a frustrating general requirement for disengaged students. However, this study aims to investigate how using CODAP (an interactive statistical software tool) and a social justice backdrop for data analysis to facilitate a smooth transition to statistical reasoning. In this study, we exposed participants to a data collection of fatal encounters caused by the police. Variables in the dataset included age, race, whether someone was fleeing or not, type of death, and others. Our participants were six high school students, working in groups of two, to complete the data analysis. Pre and post-analysis surveys, including demographic questions and personal experiences with statistics, were administered. We introduced participants to CODAP and its features from a smaller sample, and later transitioned to letting them explore and compile a “story” or mini “presentation” about their findings, which they would explain to us after. During this process, we recorded their voices and their computer screens to analyze how students interacted with data in a social justice context and how software such as CODAP can be used to improve learning experiences. We noticed that students seemed to be more invested in data when it was connected to real-world problems or people, and that exploring individuals rather than data points was a pattern. We also observed the different fields people were interested in with regards to statistics and the different ways that groups approached this data and CODAP as a whole. Post-survey responses indicated that students tended to have a more positive attitude towards statistics and seemed to find statistics more approachable. We hope that this study encourages teachers to use more interactive

software such as CODAP to explore data with students. Additionally, we hope that it emphasizes the value of explaining the real-world relevance of data, such as by using social justice topics, so that students feel more connected in their learning.

### **How Elon Students Balance Social Life With Other Factors**

**Naje Gray, Abigail Choi, Chelsea Melendez Liapa, & Thomas Fasan** (Prof. Larry Cantwell & Dr. Ryne VanKrevelen) Department of Mathematics and Statistics

Maintaining an adequate balance between academic and social interests is vital to the success and happiness of students. This research attempts to quantify and analyze the factors contributing to how satisfied college students are with their social life and how well they feel it is balanced with the other important parts of their life such as sleep and academics. We made a broad array of survey questions relating to different aspects of social life and how those factors affect overall social life. Questions were designed to account for the different parts of a student's life (e.g. workload, amount of extracurriculars) and how involvement with those activities would impact their social life. In creating our survey, we considered the layout, structure, and length of the survey to maximize engagement and completion rates. A consideration when creating the survey was identifying obstacles to creating or maintaining a social life and how they might impact overall satisfaction. This research was conducted under IRB approval and the survey was shared electronically with Elon University students through their professors. For the survey, professors were targeted who teach students from a wide variety of majors. A total of 34 students completed the survey and we analyzed the data by looking at the relationship between various factors like number of extracurriculars, frequency of attending social events, ability to manage work, sleep, fun, and overall social satisfaction. Because the sample size is relatively small, further study is likely needed.

### **Comparing College Class Experiences and Preferences**

**Alexa Jacobo, Hellen Portillo Franco, Ivy Robinson, & Kiefer Winter** (Prof. Larry Cantwell & Dr. Ryne VanKrevelen) Department of Mathematics and Statistics

This research analyzes Elon University students' college class experiences and preferences in order to determine how well student preferences are being met. We developed survey questions that gathered some demographic information and asked questions like what class style students prefer (lecture, hands-on, or a mix), what makes students enjoy or regret taking a class, and what times of day students prefer for classes. To gather data, we asked Elon professors to share the survey with their classes by targeting classes with students from a wide range of majors. When analyzing the data from the survey, we made decisions to standardize data for some questions. Some of these changes included using only the first major a student listed, converting class times to all be in minutes, and averaging duration of classes when students provided a range. To see if reality and expectations about class structure align in college students, we compared students' experiences and desires when it comes to a balance of lecture-based or hands-on classes. We were able to determine that most classes at Elon are more lecture-based, while students prefer a mixture of both. We also compared the typical number of peers in a class to students' ideal number, and the results showed respondents reported an average difference of 3 students more than ideal. Survey respondents were additionally asked what factors make a class



enjoyable or disliked by a student. From this data, there is a common trend that professors are the leading cause of making a class either enjoyable or unpleasant. Through this process we were able to determine whether colleges satisfy student desires or not, pertaining to the college class experience at Elon University.

### **Investigating Factors Related to Stress in College Students**

**Avery LaPlante, Sofia Anaya Becerra, Jaden Wilson, Olivia Sharpe, & Ella Vaught** (Prof. Larry Cantwell & Dr. Ryne VanKrevelen) Department of Mathematics and Statistics

Understanding what causes stress in college is very important in our society today. This research was conducted in an attempt to explain different causes of stress in college students. We conducted an IRB-approved survey targeting college students in which we asked questions pertaining to four main categories: social life, academic life, campus life, and personal life. For social life, we asked questions related to their involvement in both on and off campus activities. For academic life, we asked questions relating to academic involvement. For campus life, we asked questions pertaining to safety and general well-being in the campus environment. Finally, for personal life, we asked questions relating to personal care. Questions about how well students felt that they handled stress were conducted on a Likert scale. We conducted a small pilot survey to help inform this process. Before sending out the survey, we had predicted that there would be a strong correlation showing that majoring in STEM was associated with higher levels of stress. Along with this, we believed that the people involved in more extracurriculars would have lower stress levels. The responses to our surveys suggested otherwise, as they showed no strong correlation among these factors and reported stress levels. This lack of a correlation could indicate that other factors, not within this survey, primarily cause stress within students. Being able to collect this kind of information can provide insight on how students deal with stress, as well as some factors that contribute to students' general stress. With our society today, having this kind of information could positively change how colleges take care of their students. A survey like this may also help assess if colleges gauge how faculty and administration can be more helpful and supportive towards students or if the school needs a program benefiting students' mental health, such as an on-site therapist.

### **Coal Mining in West Virginia: A Digital Data Story<sup>2,3</sup>**

**Walter B. Pierce** (Dr. Heather Barker) Department of Mathematics and Statistics

Since the discovery of coal in the mid-1800s, coal production has been the dominant industry in the state of West Virginia. Often, the state is simply referred to as “Coal Country”. Throughout the state’s history, the people of West Virginia have experienced negative side effects from the coal industry’s practices, including significant health, economic, and environmental consequences. This study analyzes a dataset that was created by combining data from numerous different sources including underground and surface mining data from the West Virginia office of Miners’ Health Safety & Training as well as data about Lung Cancer Incidence, Population, Real GDP, and other lifestyle factors. The variables found within this large dataset include total coal tonnage produced and number of mines since the 1890s, mine disaster data, and health and lifestyle factors that may be associated with coal production. Additionally, data is collected at the state and county level, making it possible to



complete regional and nationwide comparisons. This dataset was used to create statistical models, specifically using unsupervised learning methods (James et al., 2013), showing comparisons and relationships between the different variables and how coal production affected the people of West Virginia. Findings from this study address the extent of these effects as well as unique regional patterns between counties. The main output of this project is a “data story” showcasing how the variables relate to each other. Data storytelling uses statistical findings to develop a narrative supplemented by qualitative discoveries (Matie & Hunter, 2021). The presentation uses ArcGIS to map trends in different regions of West Virginia, demonstrating geographical disparities within the state. The data story is interactive and engaging for participants in order to appropriately convey the story of the people of West Virginia. This research is exploratory in nature, and uses statistics to develop an account of the underreported historical and present day impact of the coal industry on local residents. The statistical findings are combined with historical documentation to develop a narrative of the coal industry in West Virginia.

### **Analyzing Methods for Processing Tree Ring Data<sup>2,3</sup>**

**Bailey Reutinger** (Dr. Nicholas Bussberg & Dr. David Vandermast) Department of Mathematics and Statistics

Tree-ring data is used to reconstruct past climate and to predict future climate trends. In each year of a tree’s lifespan a distinct ring is added to the tree's width, and the widths of individual rings vary depending on the environment in which a tree lives. To process tree-ring data, two cores from each tree are typically extracted and combined before analysis. Our preliminary investigation of data from the International Tree-Ring Data Bank found that correlated tree cores (cores from the same tree) do not necessarily have the same ring widths, and trees with low correlation may have worse correlation with local climate data. These findings imply that only trees with moderate or better internal correlation should be used for climate modeling. We aim to improve the modeling of future climate scenarios by assessing the accuracy of tree-ring data collection. To assess the accuracy of different combination methods, we collected 47 tree cores from Virginia pines (*Pinus virginiana*) in Elon University Forest (EUF). We chose Virginia pine for this study because of the abundance of this tree at EUF and because the rings grow with clear distinctions between earlywood and latewood, making annual growth easy to measure. The widths of the rings on each core will be combined and correlated with local climate data using standard statistical techniques. By combining these cores according to existing dendrochronological methods, we can recommend the best method as the one that produces the best-fit with local climate data.

### **Diving into Data: A Cross-Regional Analysis of a Global Citizen Science Marine Debris Dataset<sup>2,3</sup>**

**Jacob Stanley** (Dr. Nicholas Bussberg & Dr. Manoj Chari) Department of Mathematics and Statistics

Marine pollution, in the form of either chemicals or debris, can jeopardize the health of the ocean, marine creatures, and food safety, and exacerbates climate change. Understanding the scale and severity of marine debris pollution is vital, as it directly impacts biodiversity, habitats, and ecosystem services, with implications extending to human health. This study identifies areas with high

concentrations of marine debris, focusing on the Caribbean and Southeast Asia, which have received limited attention despite possessing elevated levels of pollution. By analyzing data collected by Dive Against Debris, a marine citizen science program, this research seeks to derive data-driven recommendations that enhance marine conservation efforts. Methodologically, this research employs a quantitative analysis of Dive Against Debris survey data, examining the types and counts of debris through descriptive statistics and multiple linear regression models. By utilizing citizen science data, this study also contributes to the interdisciplinary field of environmental conservation, bridging the gap between scientific research, policy implementation, and public awareness. The findings of this research shed light on the prevalence of marine debris in targeted regions, as well as its potential implications for marine ecosystems and human health. For example, much of the debris collected is found in either coral reef, seagrass, or rocky reef environments in both the Caribbean and Southeast Asia, with coral reefs being the most common ecosystem. Additionally, the highest debris totals were found off the coasts of the Dominican Republic and Grenada in the Caribbean and Indonesia and Thailand in Southeast Asia, identifying them as problem locations in terms of debris severity. By identifying the most abundant debris items and their distribution patterns, this research underscores the need for targeted interventions to mitigate marine pollution. Moreover, it highlights the importance of leveraging citizen science initiatives like Dive Against Debris in informing evidence-based policies and fostering global collaboration for marine conservation.

### **Numerical Simulation of Jellyfish Swimming**

**Jillian M. Thomas** (Dr. Karen Yokley) Department of Mathematics and Statistics

Jellyfish are among the most energetically efficient swimmers ever studied because of their limited and untraditional bodily components. Each cycle of expansion and contraction of the bell generates a vortex ring to propel the jellyfish and collect food particles from the surrounding environment. We use two-dimensional point vortices to model a cross section of the jellyfish's vortex ring due to its axial symmetry. Vortices with varying parameter values can rotate at greater speeds to propel the jellyfish in different directions. To numerically solve the differential equations in the model, we use the fourth order Runge-Kutta methods in MATLAB. The first goal of the project is to examine the jellyfish's propulsion and maneuvering mechanism, which involves creating simulations for various parameter values in the system of differential equations. Secondly, we study the material transport in the vicinity of jellyfish and its implication on food acquisition. Massless particles are inserted into the fluid flow to observe how the jellyfish and particles around it move through the water as affected by the vortices. To work towards these goals, we are implementing a variety of bell shapes to examine the effects on particle collection because many species of jellyfish have bells that interact with their environment differently. These results have significant implications on fields such as biomimetic engineering. Results from research on jellyfish motion can be used to improve sub-aquatic vehicle efficiency and reliability, especially in cases when speed is not a priority.

## Media Analytics

### **Dancing Queen and the Idolization of a Teen: How Fifty Years Of Lyrics, Media, and Culture Have Influenced the Way Society Views Young Women<sup>1,3</sup>**

**Jessica M. Baker** (Prof. Brian Walsh) Department of Media Analytics

Music is a global phenomenon impacting people everywhere. Specifically, young adults aged 18-34, the widest audience, consume music on a daily basis. This project poses the question: what are the trends in music production by musicians and consumption by the public from 1971-2021, and what is the prevalence of sexualizing, idolizing, or objectifying lyrics in the Billboard Top 100 Year End charting music? The additional question is then asked: how are young adults impacted by popular music, and are they even aware that they are consuming this overtly sexualized lyrical content? In order to answer these questions an analysis of Billboard lyrical data through explicit and implicit lexicons and a subsequent survey of music audiences that evaluated music listening habits and sentiments related to lyrical content was conducted. Analysis of 5100 songs revealed that a vast majority of songs have some reference to sexualizing, idolizing, or objectifying content related to young women. Additionally, men, more than women or mixed groups, are more likely to perform songs with sexualizing lyrics. This could be due to the higher presence of male musicians (70% of Billboard musicians are male); proportionality is still being evaluated. The data from the Billboard analysis suggests that young women are portrayed as desirable objects, both by the women themselves (self sexualizing) and by men (sexualizing others). Additionally, the data suggests that lyrical sexualization is implicit in the earlier years (1971-1989) and gradually becomes more explicit in more recent years (1990s to 2020s). Over the past year, 123 survey responses were collected. Preliminary results of this study suggest that most respondents are unaware of the sexualization in the music they listen to. A majority of respondents stated they did not consume music that sexualized young women on a regular basis, but the lyrical data suggests otherwise; a majority of music on the Billboard charts is sexualizing, directly negating the perceptions that people have of the music they listen to. Cultivation theory is used to interpret these findings, suggesting that people are influenced by sexualizing lyrics, accepting this behavior as the “norm,” thus continuing the cycle of women being hypersexualized.

## Music

### **Chase the Rhythm: Music's Effects on Player Motivation in Video Games**

**Claudia Macari** (Dr. Todd Coleman & Dr. Cora Palfy) Department of Music

Currently, there is a great amount of research on the intersection between ludology, the study of games, and psychology. However, there is less development in the intersection between ludomusicology, which focuses on music in video games, and psychology. This project aims to shed additional light on the intersections between video game music and the psychology of player

motivation. For the purposes of this project, player motivation is defined as the desire to continue through a gaming experience. Previous scholarship gives us a detailed exploration into motivational factors for video game players, but does not elaborate on how music plays a role in facilitating player motivation. Through detailed analysis of motivating psychological needs for players (Bostan, 2009), and categorization of the function of video game music (Munday, 2007; Sweet, 2022; Zehnder and Lipscomb, 2006), this project seeks to provide guidance for those in music and game development on how music can be used as a tool to incentivize players to continue through a gaming experience. The primary product of this project is a scholarly paper, with a secondary creative product completed in collaboration with Elon University's Game Design Minor program. The paper details the functions of music in video games, and how they can be applied in order to appeal to a player's motivational needs. The creative product is an exploration of musical function in video games through composing the soundtrack to BioDive, a student capstone project.

### **The Emotional Impact of Film Music**

**Kai R. Mitchell** (Prof. Fred Johnson) Department of Music

Research has been done on music's general emotional connotations and film music's overall impact on audiences. In my research, I have found there to be less research covering film music's overall impact on audience perceived emotion, interpretations of outcomes, and memory recall. However, advancements in technology and the availability of a wider range of music cognition research over the past two decades have made it increasingly plausible to study the impact of film music on viewers' perceived emotion (Boltz, 2004; Gorban, 1980; Tan et al., 2017; Park et al., 2007; Langkjær, 2015; Nuemeyer and Cohen, 2015). Therefore, I conducted a comprehensive literature review of existing research, aiming to evaluate the extent of film music's emotional impact on viewer's while watching film scenes. With this knowledge, I began the production of four film scores with the intention of conveying a variety of emotive qualities. Each of the four film scores will be themed around a specific emotional quality: horror, comical (romcom), nostalgic, and adventurous. Each score will be synchronized with the same short film clip. The film scores will then be mixed in Dolby Atmos 7.1.2 immersive audio. To present these, the film clip will be shown without music and then shown again with a randomly selected score. Afterwards, the audience members will be invited to complete a brief, anonymous survey regarding the effectiveness of the various film scores. This effectiveness will be measured in different ways: Was the film music supportive of the audience's emotional perception? Did the accompanying music affect the audience's perception of the on-screen visuals? Through this process, I hope to reveal the effects of different mixing techniques, orchestration, musical texture, and harmonic content on the perceived emotion of the film experienced by the audience. The presentation of the final product will foster a greater awareness among general audiences of film music's influence on their comprehension of on-screen emotions, as well as 'off-screen' or non-visualized emotions, such as a feeling of rising tension juxtaposed with a tranquil scene. This research will pave the way for future inquiries into film music's emotional impact by researchers utilizing diverse methodologies.

### **The Impact of Synthesized Drums on the Sound Aesthetic of Modern Music**

**Jack Salfia** (Prof. Fred Johnson) Department of Music

Synthesized drums have been a mainstay in the music industry since their rise to popularity in the 1970's. While synthesis was invented in the 1950's, it took many years for the sound to be accepted into mainstream music. This widespread acceptance started in the 70's, and really caught on in the 80's. Since then, the majority of mainstream music has been made with some form of drum synthesis. There are many unique drum machines that have been influential in different genres, which is what my research focuses on. I have cataloged these drum machines and will be using them in a composition of my own. This album will be a collection of 8-10 songs showing the progression of drum machines through the decades and genres. Each song will focus on a different machine and emulate the different genres they were commonly used in. I will be focusing on the most influential genres and sounds through the years, as these have shaped the sound of modern music the most. I am hoping this album will expose people to some unfamiliar sounds, and contextualize some that they are familiar with. This project serves as a comprehensive overview of drum synthesis through the years, and will explore the future of drum synthesis.

## Performing Arts

### Gender and Murder in Jacobean Revenge Tragedy

**Caroline Borio** (Dr. Megan Isaac) Department of Performing Arts

Murder, death, and violence are characteristic of Jacobean Revenge Tragedy— a categorization of dramatic works written during the reign of James I of England from 1603-1625 by authors such as Thomas Middleton and John Webster. Often, the violence targets the female characters in the play, or they are forced to take violent action themselves through murder or suicide. This research investigates the deaths of female characters through the lens of female agency. The goal is to determine how these plays can be presented on a modern stage. This research will provide a resource for theatermakers as they attempt to produce Jacobean works today. I employ two primary methods, one of which is close readings of the Jacobean texts, and the other is conducting interviews with relevant theatermakers in the US, including actors, directors, and theater educators. The close readings isolate select details within the texts for analysis. I analyze specific moments of female deaths to determine the bounds of female agency in these plays. The next stage of research pays heed to the methods used in theatrical analysis by examining the thought processes and practices of theatermakers who interpret and stage Jacobean Revenge Tragedies. I developed interview questions and presented them to four theatermakers who have worked closely with these plays. Using these methods, I make determinations about ways these plays can be adapted for modern performance. When it comes to studies of Jacobean Revenge Tragedies, there is little existing research that brings literary and theatrical analysis into conversation, so this research fills a gap in the scholarship. Ultimately, the research demonstrates that all female deaths in these plays are tied intrinsically to sexual fear or shame. This denies female agency, and creates a problem for modern production since it is uncomfortable and possibly harmful for a modern audience to see a woman killed for exerting her sexual agency. The interviewees present ways to adapt these plays by editing the text itself, changing setting and circumstances, and implementing feminist rehearsal practices to present these plays in a way that is agentic for both the female actors and characters.

## Telling Queer Stories with Site Based Theatre<sup>1</sup>

**Matthew W. Bobzien** (Dr. Susanne Shawyer) Department of Performing Arts

2SLGBTQIA+ people have been marginalized in the United States with anti-sodomy laws, police harassment, and years without federal protection from discrimination. According to UCLA School of Law, 2SLGBTQIA+ people are nine times more likely to experience violent hate crimes than non 2SLGBTQIA+ people. In recent years, we have seen an increase in anti-queer legislation including “Don’t Say Gay” laws, bans on drag, laws allowing businesses and organizations to discriminate, and more. With queerphobia increasing, it is important that theatre not only tell queer stories, but tell them with purpose and care in a way that benefits 2SLGBTQIA+ artists and audiences. In the late 20th and 21st centuries, many 2SLGBTQIA+ based theater organizations have emerged including In the Margin, Breaking the Binary, and the National Queer Theater. For this project, I examined how the intersection of 2SLGBTQIA+ identities and site-based theatre encourage a production and audiences to enter into sociopolitical conversation. Site-based theatre is when a performance takes place in a location that is not a typical theatre space such as across New York City, around a baseball stadium, or inside an apartment. Playwrights and directors choose to make their productions site-based to increase audience connections to play themes. Site-based productions can be in locations that are open to the public, some in locations with layered meaning to a community or in relation to historical events, and some that open the play up to a new structure. My research draws on the experiences of others and myself presenting site-based theatre and queer theatre as well as Jack Halberstam’s theory of queer time and space. I applied this background to an imagined direction of a site-based production of *Bent* by Martin Sherman. The resulting direction description emphasizes Brechtian alienation, pushing theatrical boundaries, and José Esteban Muñoz's theory of queer futurity. This imagined production demonstrates how site-based queer theatre might be one way to encourage the conversations that need to be had in our current sociopolitical climate.

## Submissive Grace: How Men Have Curated the Definition of “Ballerina” Throughout the Romantic, Classical, and Neoclassical Eras<sup>1,3</sup>

**Sophie David** (Dr. Jen Guy) Department of Performing Arts

Throughout history, a strict gender binary has been forced upon ballet dancers and limited the expression of women. Female principal roles in many narrative ballets are similar interpretations of the “damsel in distress” trope and leave little room for complex emotions, realistic life struggles, or autonomy over one’s life. This project seeks to answer the questions: how has femininity been portrayed in narrative ballets throughout the Romantic, Classical, and Neoclassical eras? How can choreographers use information on ballet’s gender binary to create more meaningful and inclusive works? How can choreographers and educators make space for female voices and value the many different journeys they can express on stage? In order to answer these questions, textual and choreographic research was conducted. Textual research included analysis of various articles, books, and lectures written by expert dance scholars. Choreographic research consisted of analyzing videos of ballet choreography from the Romantic, Classical, and Neoclassical Eras. Discoveries included that the intrigue of female sexuality was one of the driving forces in ballet, as the movement practice formed



around the presentation of women for the male gaze (Garafola 1985, Baro Gonzalez 2019, Daly 1987, Chazin-Bennahum 1997). The choreography given to female dancers is often that of a flowy, delicate nature and presents ballerinas as fragile and “barely there” (Baro Gonzalez 2019, Foster 2022, Swan Lake 2020). In traditional partnering, the male dancer manipulates the female dancer’s body and is usually in complete control of her movement (Fisher 2014, Swan Lake 2012). Most narrative ballets have very similar storylines that present women in only one way: as identity-less objects of male desire (Shomayeva 2021, Swan Lake 2012, Coppelia, Giselle 1977, La Sylphide). Dancers’ tragic stories were fetishized by the men in the audience, as they wanted to see weak women who relied on men for everything (Gutsche-Miller 2017, Swan Lake 2012). The severe lack of female choreographers and artistic directors has only perpetuated these gender roles for centuries (Fuhrer 2022). This project will culminate in the creation of a ballet work that explores how the art of ballet can be preserved while leaving behind these negative implications. The new work, Maleficent, explores female-driven storylines that audiences can relate to and seeks to push the boundaries of ballet technique, storytelling, and artistry. Maleficent will be presented in Roberts Studio Theatre April 13-14th.

### **The Neurophysiology of Dancing Flow States**

**Courtney Liu, Julia Basso, Noor Tasnim** (Prof. Courtney Liu) Department of Performing Arts

Please join us for a 30-minute performance in Roberts Studio Theatre showcasing the work of Performing Arts majors participating in the “Neurophysiology of Dancing Flow States” research project. The performance features six dance solos (dance styles include fusions of jazz, ballet, soft shoe, hip hop, and contemporary dance) co-choreographed by participating students and Performing Arts Assistant Professor Courtney Liu. The dancers’ brain activity will be recorded during the performance using electroencephalography technology provided by the Embodied Brain Lab at Virginia Tech. Select audience members can also volunteer to wear EEG caps during the performance to track their own brain activity while watching the performance. Separate informed consent is required for this experience so please reach out to [cliu3@elon.edu](mailto:cliu3@elon.edu) if you are interested in learning more. We invite the audience to enjoy a reception with food and drink directly following the performance. Posters featuring additional student research projects in the field of Dance Science will also be on display in the lobby of the theatre. This performance is part of an ongoing research collaboration with the Embodied Brain Lab at Virginia Tech to explore the neurophysiology of dancing flow states. It is also the culmination of a 4999 learning experience where students (1) engaged in group and individual discussions about flow states, (2) explored the literature on flow states and dance, (3) applied this research to pre-performance preparations and choreography, and (4) tracked their brain activity using EEG technology throughout the rehearsal process and at the final performance. At the end of the semester students will synthesize their learning and experience in a final paper.

### **Pilates Intervention for University Dance Team Members<sup>3</sup>**

**Henna Reid** (Prof. Lauren Kearns & Prof. Caroline Ketcham) Department of Performing Arts

**PURPOSE:** The objective of the study was to determine if an 8-week Pilates Reformer and Wunda Chair equipment intervention improved lower body strength, endurance, and well-being in collegiate

dance team members. **LITERATURE REVIEW:** Current literature suggests that a weaker lower body leads to higher injury rates among dancers. Reviews also show that a lack of body strength can lead to the compensation of other muscles to produce a more rewarding visual when performing (Fotaki, 2020). This compensation and lack of body awareness can cause injury which can be threatening to the dancer's career (Kautzmann, 2021). Former studies have shown that strengthening the lower extremities can be beneficial for dancers so that the musculoskeletal system of the lower extremities is stronger to support high-impact movement (Koutedakis, 2007). **METHODS:** 15 collegiate female identified dance-team members voluntarily participated in a 8- week Pilates intervention that focused on lower body strengthening. Team members participated weekly in 30 min session utilizing the Reformer (15min) and Wunda Chair (15min in the Pilates Studio. Resistance and number of repetitions were increased at the 4-week mark. Physical performance and well-being measures were collected. Performance was assessed on 10 lower body and core exercises (Prone Single-Leg Kick, Swimming, Double Leg Lower, The Roll-Up, Magic Circle Pulsing, Single Side Lying Leg Lift, Single Side Lying Front/Back Kick, Clamshell Open/Close, Clamshell Tabletop Lift, Chaturanga) using a list of criteria designed by a Pilates expert. Co-researchers were trained to assess performance. Well-being assessments included ABC Mental Well-Being and Promis-29 which included subscales for physical function, anxiety, depression, fatigue, sleep. **RESULTS & DISCUSSION:** A repeated measures MANOVA was used to compare measures pre- and post- intervention. There were significant improvements across all the physical assessment exercises ( $p < 0.05$ ). There were no significant changes in well-being assessments ( $p > 0.05$ ). Open-ended responses of participants highlighted feeling positive impacts of the intervention both physically and mentally. **CONCLUSION:** A modest lower-body and core Pilates intervention (30min 1x/wk for 8wks) significantly improved physical performance in a collegiate dance team. This intervention could be expanded to further support physical and mental well-being and reduce risk of injury and stress often associated with elite dancers.

### **The City-Women: A Play about Queerness in Catholicism<sup>1</sup>**

**Mallorie C. Sievert** (Prof. Kim Shively & Dr. Lynn Huber) Department of Performing Arts

The experiences of young queer Catholic women have received little attention from scholars and artists alike, so this project seeks to rectify this gap by adapting qualitative research about queerness in Catholicism into the form of a creative play. In the field of religious studies, little research has been done on the experiences of young queer female-identifying people in the Catholic Church, and this inequality is also reflected in the works of theater that broach the subject of Catholicism. In response to this, I am in final revisions for a play that attempts to reflect the underrepresented experience of a young queer woman growing up in the Catholic Church in a way that will be accessible to a general audience. Arising out of a need for community, this play gives a voice to those women who have felt not only turned away from the Catholic Church but generally excluded from religious social justice theater. After multiple stages of creative revision, I have developed a story that follows two young nuns in a 17th century cloistered convent who discover their feelings for each other and must decide whether to conform to the life that was chosen for them or forge their own path and discover who their God truly wants them to be. This creative production builds upon research into early Christian narratives that foreground the experiences of young women, including those who challenge gender norms and expectations around marriage, family, and sexuality. Drawing on the themes introduced in

these early feminist Christian texts, this coming of age story explores love, spirituality, and sisterhood, and seeks to redefine what it means to be queer in the eyes of God.

### **Embodying Textures: How Somatic Imagery Effects Psycho-Physical Dynamics in Dance Performance**

**Emma T. Stenger** (Prof. Renay Aumiller) Department of Performing Arts

This research assesses how imagery, a somatic approach to movement, can influence dynamic qualities, drive choreographic intention, and contribute to holistic training of dancers through finding a state of flow. This analysis includes an investigation into how dancers become absorbed in movement and connect to their bodily sensations (Jeong, 2012). Existing research found improvement in dance technical aspects, including alignment and proper muscle activation (Coullianre et al., 2008), and reduction of performance anxiety by occupying the mind with specific tasks (Fisher, 2017). Although Lucznik and Weber suggest imagery influences movement qualities, no studies back up these claims (2018). This research fills the gap by providing qualitative data on imagery affecting movement qualities. The methodology includes a literature review to understand how imagery affects movement quality and technique. Using the Laban Efforts Wheel, I will analyze works from Wayne McGregor, Anouk Van Dijk, Ohad Naharin, and William Forsythe, choreographers known to use imagery in their creative processes. Drawing from existing literature, I will organize images into categories that serve as a foundation for the rehearsal process and intervention. The rehearsal process exposes participants to different types of imagery from the image bank, including anatomical, metaphorical, motivational, and auditory, and teaches imagery as motivation for set movement phrases inspired by the choreography analysis. To establish a baseline, dancers learned a phrase of movement devoid of any imagery or texture cues, which were recorded. Dancers then applied three different images to guide their movement. Data was collected and evaluated using the Laban Effort Wheel, then analyzed for patterns in fundamental components of movement (weight, space, and time). Preliminary research suggests imagery use will increase diversity in movement qualities and dancers will incorporate more drastic shifts in their use of weight, space, and time.

### **The Impact of Adaptive Dance Movement Classes<sup>1</sup>**

**Eliza J. Witt** (Prof. Lauren Kearns) Department of Performing Arts

The current research examines the impact of adaptive dance movement classes in children with physical and behavioral disabilities through an open inquiry investigation. An adaptive dance movement class is tailored to the needs of dancers with varying abilities. As stated in the *Journal of Physical Education, Recreation & Dance*, “The dance process involves meeting psychological, social, and physical needs at multiple levels” (Block & Johnson, 2013). Participants included directors and teachers at dance studios in Illinois, North Carolina, California, and New York with adaptive dance movement classes. A digital survey with a variety of questions was used to acquire data from the participants. Each question was analyzed using graphs and charts to measure quantitative and qualitative data to compare answers and assess gaps throughout the data. The findings of this research showed improvements in the dancers' social, emotional, behavioral, and physical qualities. The research also indicated gaps in the program's class opportunities for younger dancers ages 3-7 years

old along with adaptive dance movement focused undergraduate and graduate degrees. This research aims to encourage public awareness of the positive impacts that adaptive dance movement classes can have on children with disabilities.

## Physics

### **Star Formation Rates in AGN Galaxies: Impact of Separation and Physical Traits<sup>3</sup>**

**Ayanna Bearden** (Dr. Yashashree Jadhav) Department of Physics

Nearly all galaxies, including the Milky Way Galaxy, have a supermassive black hole (SMBH) at their center. Some of these galaxies host an active galactic nucleus (AGN), which is visible as the extremely luminous center region caused by an SMBH accreting dust and gas. Using data from the Sloan Digital Sky Survey (SDSS), we investigate the impact of AGNs on their companion galaxies, particularly focusing on their role in modulating star formation rates (SFR). It is unclear whether neighboring AGN enhances or suppresses the star formation. So, we investigate this using data from the Sloan Digital Sky Survey (SDSS), to find the impact of AGNs in neighboring galaxies concerning their role in the varied SFR. Our analysis revealed a correlation between the proximity of AGN companions and suppressed star formation in neighboring galaxies. As the distance between companions decreases, the AGN expels the gasses needed for star formation. Additionally, our preliminary results reveal that all of our companions are yellow and primarily elliptical, insinuating that these companions would have suppressed star formation. Through this study, we attempt to find the reason for the observed suppression of star formation in our AGN. To do this, we look at different properties of galaxies, including galaxy morphology, color, and separation distance, some of which are also markers for star formation. We analyze these properties and compare them to similar studies by utilizing TopCat which is a tool used to conduct cross matching between multiple catalogs and using the results to further delve into the characteristics of our primary dataset. In addition, we continue to use SDSS for the visual analysis of our sample. Through this continued research, we hope to uncover the nuanced factors contributing to the observed variations in star formation rates, thereby enhancing our understanding of the complex interplay between AGN activity and galaxy evolution.

### **Multiwavelength Diagnostics for Active Intermediate Mass Black Holes in Dwarf Galaxies**

**Samantha DiRenzo** (Dr. Chris Richardson) Department of Physics

Stellar mass black holes (BHs) measure between 3 and 10 solar masses, mass relative to that of our Sun, whereas supermassive black holes (SMBHs) measure between 0.1 million to 10 billion solar masses, and reside in the center of all large galaxies, including the Milky Way. Intermediate mass black holes (IMBHs) are quite rare and measure between 100-10,000 solar masses, falling between the stellar mass and SMBH classifications. Based on the relationship between BH mass and galaxy mass, dwarf galaxies are prime candidates to host elusive IMBHs, which provide a key link in understanding galaxy-BH co-evolution. Isolated IMBHs in massive galaxies are difficult to identify, however, those actively accreting material from their surroundings result in a dwarf active galactic nucleus (AGN) and

make identification easier. Spectroscopy, the analysis of the intensity of light at different wavelengths, can distinguish dwarf AGN from pure star-forming (SF) regions. In specific cases, mid-IR spectroscopy or optical spectroscopy have been used to identify dwarf AGN through specific line ratios. However, strong star formation and absorption of light by interstellar dust often lead to the misclassification of dwarf AGN candidates as purely star-forming galaxies. Therefore, we seek to establish a dwarf dominated sample of galaxies with both optical and mid-IR spectroscopy to find dwarf AGN using multiwavelength diagnostics. We crossmatch the dwarf dominated Environmental COntext (ECO) catalog with Spitzer IR spectroscopy, Sloan Digital Sky Survey (SDSS) optical spectroscopy, which resulted in a sample of 91 galaxies. Utilizing specific IR emission line ratios, 2/15 galaxies are classified as dwarfs ( $\log M^* < 9.5$ ) and 1 as a possible AGN candidate. Future work will entail matching these dwarf AGN with their physical characteristics, such as the rate of star formation, color, and abundance of elements beyond hydrogen and helium. In addition, we will continue to apply new line ratios to the sample.

## Political Science & Policy Studies

### The “Blue Islands” of The Lone Star State; Understanding the Impact of Growing Texas Cities on Statewide Elections

**Abigail R. Brantman** (Dr. Thomas Kerr) Department of Political Science and Policy Studies

The ‘urban Democrat voting norm’ is a pattern of voting behavior in the United States where voters in urban centers often skew towards electing Democratic candidates. Cities within predominantly Republican states have even been nicknamed “blueberries” or “blue islands” in recent literature. Texas, a state known for its historical conservatism and dominant Republican representation, has experienced an influx of new residents since 2000, further populating its multiple large metropolises. While the state is often associated with rural life and agriculture, about 90% of Texas residents live in counties categorized by the Census Bureau as urban. With public opinion polls reporting a near-even split between registered Republicans and Democrats in Texas but conservative Republican candidates continuing to comfortably win statewide elections, Texas firmly stands as a deviation from the ‘urban Democrat voting norm.’ Through an analysis of factors that influence vote choice at the geographic, city, and statewide levels, an effort is made to understand Republicans’ continued command over statewide elections despite Texas’s drastic urbanization. This research takes into account both qualitative and quantitative explanations utilizing election and voter registration records, Census data, and incarceration statistics to offer data-driven reasonings. Additionally, the study employs the chronicled use of preemption laws in the state, the make-up of the Texas housing market, and the literature surrounding urban sprawl cities and Democratic apathy to further inform conclusions. Arguing the complexity of this voting divergence, the answer as to why Texas goes against the ‘urban Democrat voting norm,’ especially in statewide elections, is multifaceted and cannot be simply chalked up to the stereotypical understanding of conservative Texas politics existent in the modern zeitgeist. Furthermore, cities within Republican majority states fight an uphill battle in exerting large scale voting influence and have limited impact on statewide elections despite the relatively sizable populations of urban areas.



## **Fluctuation of American Politics: A Concern for Foreign Policy**

**Lauren Bratton** (Prof. Tom Kerr) Department of Political Science and Policy Studies

American foreign policy fluctuates back and forth, typically when the presidential administration transitions between Democrat and Republican control. These policy fluctuations have the potential to cause issues with foreign nations, allies and adversaries alike, because it is difficult to anticipate American foreign policy actions if policies keep vacillating on a four to eight year cycle. A fluctuating foreign policy can create an impression of inconsistency and unpredictability, causing other nations to question the reliability and credibility of the United States as a global leader. Additionally, this lack of continuity of policy can result in diplomatic disputes, inefficiencies in negotiations, and other forms of international tension, which are detrimental to the long-term foreign policy interests of the United States. In order to create a more unified and consistent foreign policy, the United States needs to establish a clear and consistent Grand Strategy that holds bipartisan support, a monumental task in the contemporary period of hyper-partisan politics.

## **Competing Narratives in Film Between the Indian State and Kashmir Since 1990**

**Caroline Lundby** (Dr. Jason Kirk) Department of Political Science and Policy Studies

This research aims to better understand conflicting narratives—intersecting religious, ethnic, and cultural struggles—and how they figure into an enduring conflict between the Indian state and contested, divided Kashmir: formerly the princely state of Jammu and Kashmir in pre-colonial and colonial-era India. Specifically, I inquire how an increase in Hindu nationalist sentiments, culminating under Narendra Modi, and a trend of global democratic backsliding have influenced this conflict, and, more precisely, how the 2022 film, *The Kashmir Files*, embodies and communicates this conflict. *The Kashmir Files* was chosen as the primary source for this research due to its unique position as a global hit, praised by Modi and other Hindu nationalist leaders, that controversially chronicles the conflict in Kashmir and the region's relationship with the Indian state. This research is guided by a primary inquiry: how does the 2022 film, *The Kashmir Files*, contribute to a complex, multi-actor discourse regarding the conflict in Kashmir? What is the contemporary political significance of this film and what perspectives does it support? This research utilizes film and literary analysis to understand how Hindu nationalist sentiments are presented or communicated in the film, how the film has been received by a variety of audiences, and how the legacies of partition manifest in present-day Kashmir and India, as expressed in *The Kashmir Files*. Studying the impact of film media on perceptions of Kashmir is necessary to better understand the interlocking stories of conflict in the region, and to amplify the voices of Kashmiri people who have been strategically silenced through decades of occupation, displacement, and violence.

## **Climate Change Policy Development: A Multiple Streams Analysis of The Inflation Reduction Act 2022<sup>2,3</sup>**

**Morgan McGlynn** (Dr. Aaron Sparks) Department of Political Science and Policy Studies



Climate change has been on the national agenda since the late 1970s, yet until recently, little progress had been made because of the dominance of the fossil fuel industry within the policy subsystem. In this paper, I draw on Multiple Streams Approach using process tracing methods to examine why significant climate policy was able to pass in 2022, despite growing polarization, when previous attempts had all failed. I examine two key case studies, the failure of Waxman-Markey in 2010 and the success of the Inflation Reduction Act in 2022. In 2010 some climate organizations were hesitant about cap and trade as a policy mechanism to address climate change and failed to stimulate advocacy in their grassroots. Since then, climate groups have rallied around an alternative policy approach, which involves investing in clean technology inspired by the Green New Deal. Activists built significant power within the Democratic party, evident in climate policy remaining prominent on the policy agenda at the beginning of Biden's presidency. Moreover, media outlets have improved their coverage of extreme weather events by tying them to climate change, which has illuminated the severity of the issue. In short, the political dynamics changed with growing grassroots climate advocacy, motivating citizens to elect Democratic leaders capable of passing climate legislation and keeping climate high on the policy agenda.

### **Building Queer Communities: Creating and Sharing Spaces for Intergenerational Queer Survival and Flourishing<sup>1</sup>**

**Oliver McGowan** (Dr. Lauren Guilmette) Department of Political Science and Policy Studies

Queer intergenerational kinship is required for surviving and thriving. Community allows for mutual aid, support, and friendships. Within American culture many queer communities thrive in urban settings, being supportive to communities due to the number of resources that are in a relatively small area of land and the high concentration of people. Building queer community is difficult but building communities in rural, semi-rural, and suburban areas creates greater challenges due to physical distance between people. Looking to Eric Stanley's "Atmospheres of Violence", Samantha Allen's "Real Queer America", Lee Edelman's "Bad Education" as well as other theorists and philosophers, I look at the specific difficulties of building queer community in a place such as Elon University and the greater Alamance County in North Carolina, USA. With Elon University being located in-between two urban areas: the Research Triangle and the Triad and being a predominantly white institution with a culture of individualism, building community looks different than it would in an urban center. Stanley discusses the atmospheres we live in, and how they are permeating and violent. While his book focuses on urban settings, specifically New York City, the atmosphere of violence is different but intense in rural and suburban settings. Allen looks at queer stories in conservative states within the USA, showing that queer people do not all move to a big city and still must find community. The rural south presents unique challenges to flourishing as a queer person, but the American south can become loving and welcoming to queer folks. Edelman discusses the Child and how the child is opposed to community. I oppose this, finding that intergenerational kinship includes children or young people. I resist the paranoid groomer narrative that shows up in discussions about queer adults and children, demonstrating the queer intergenerational kinship does not cause harm to children and adults in theory, but currently in America can cause harm to both queer adults and queer children through the groomer narrative. I argue that there is room for the child and the queer adult to help each other flourish and grow. I reflect on personal experiences on building and maintaining queer community in my personal life as an American queer southerner who grew up in South Carolina. Through helping organizing

queer salons (bi-weekly gatherings of Elon students and faculty as well as Alamance County community members) and through organizing campus events through the GLC, I discuss what it means to me and my southern community to hold space for support, joy, and dreams for the future.

### **Cutting Costs on Campus: Early In-Person Voting and Undergraduate Voter Turnout**

**Danny Nickel** (Dr. Carrie Eaves) Department of Political Science and Policy Studies

National voter turnout rates reveal that young Americans are consistently underrepresented at the polls. With millions of the nation's youngest voters obtaining their right to vote amidst the transition from high school to college, this period highlights an opportunity to instill patterns of habitual voting within the nation's newest voting bloc. Relatedly, college students may face unique barriers to casting a ballot. One potential reform that may increase access to voting for undergraduate students is the convenience of on-campus early in-person (EIP) voting locations. Accordingly, this study investigates the impact of on-campus EIP voting on undergraduate voter turnout in North Carolina poised around the question, "Does the presence of on-campus EIP voting yield a higher turnout of undergraduate voters?" Drawing on theories of voting behavior and civic education, I predict that the convenience of on-campus EIP voting sites should increase voter turnout amongst undergraduates. Utilizing a mixed methods approach, this study examines cross-institutional patterns in turnout by voting method across a selection of North Carolina universities with varying degrees of EIP voting adoption. Accordingly, the study analyzes voter turnout data from the 2016, 2018, and 2020 general elections and supplements it with qualitative interviews with collegiate administrators to provide real-time accounts of voting culture and happenings on select campuses. While some data indicates that the convenience of EIP voting strengthens the turnout of student voters, analytical limitations and varied patterns across institution types confine the study's findings to a realm of correlation. However, this study, supported by affirmative anecdotes from university professionals, offers valuable insights into undergraduate voter turnout and the function of EIP voting sites. Ultimately, these findings have broad implications for policymakers, educators, and public administrators who aim to implement effective strategies, such as early on-campus voting, to promote lifelong voting habits and a more engaged United States electorate

### **Risk Assessment in Pre-Trial Release Decisions: A Comparison Between Judges and Algorithms**

**Aaron J. Simansky** (Prof. Damion Blake) Department of Political Science and Policy Studies

The process of risk assessment is one that has long played a part in our criminal justice system (*Jurek v. Texas*, 1976, p. 275). Determining whether pretrial release is appropriate and if so on what conditions involves predicting whether an offender will show up for trial and if they will engage in criminal conduct while released. The traditional system of having humans assess these risks has been found by research to be inconsistent and unreliable (Danziger et al., 2011; Kleinberg et al., 2017). In light of the increasing abolition of cash bail, some jurisdictions are turning to risk assessment algorithms to make these decisions. Such algorithms are controversial and may harbor the same bias as judges (Arnold et al., 2020; Yang & Dobbie, 2020). In my experiment, I will compare the factors used by judges in ordering pretrial detention with the factors that risk assessment algorithms take into

account when deciding whether or not to recommend pretrial release. Through this comparison, I will be able to analyze whether the factors that judges use in determining whether to grant pretrial release are credible and if judges would be aided by algorithms in performing this task. This research could hold valuable insight into the veracity of different methods of determining who should be granted pretrial release in jurisdictions that have abolished cash bail.

## Psychology

### **“This Green Tomato Does Not Look Ready to Pick!”: Children’s Learning and Engagement in Gardening and Cooking<sup>2</sup>**

**Stephanie Abbazia & Mandy Heffernan** (Dr. Maureen Vandermaas-Peeler) Department of Psychology

Research has shown that gardening is an engaging activity with benefits for young children’s learning, including cognitive and social development (Vandermaas-Peeler & McClain, 2015). Using a mixed methods approach, the aims of this study were to observe children’s learning and social interactions during gardening activities in preschool and to facilitate home-school connections through a cooking activity at home using seasonal ingredients. A photovoice methodology, in which children used child-friendly digital cameras, was incorporated to gain an understanding of children’s interests and perspectives. Children took photographs while in the garden and during the cooking activity at home. Participants included one teacher and 10 four-year-olds from one preschool classroom. One parent/caregiver from each household completed the informed consent and survey of typical gardening and cooking activities. Data sources included researchers’ video recordings of children’s interactions in the garden, the children’s photographs at school and home, and the parent surveys. Qualitative analyses including in-vivo coding and the “Sort, Sift, Think and Shift” approach (Maietta et al., 2021). This process involves “diving in” to allow patterns to emerge and then “stepping back” to identify cross-cutting themes. Emergent themes from these analyses included 1) children’s inquiry and discovery, 2) interest in and knowledge of nature, 3) aesthetics and perspective-taking, and 4) social interactions. Inquiry and discovery were evident through children’s questioning, finding and harvesting vegetables, and developing agency in using the cameras. Children demonstrated knowledge of nature through the identification of plants and animals (e.g., finding a beetle). Aesthetics and perspective-taking included close-up angles (e.g., a sunflower drooping in the garden or the ingredients in the cooking activity) and photographs incorporating light and shadow. Social interactions were captured in photos of cooking with parents and siblings and peer interactions in the garden. Overall, the photovoice method enabled a deeper understanding of children’s curiosity and perspective-taking. Implications of these findings for preschool teachers and families will be highlighted.

### **Advantages of Outdoor Learning for Young Children<sup>2</sup>**

**Stephanie Abbazia, Mandy Heffernan, Abby Smith, Ava Louis, & Mariel Colao** (Dr. Maureen Vandermaas-Peeler) Department of Psychology

Research has shown that outdoor education yields many benefits for young children, including physical, mental, cognitive, and positive social development (Jayasuriya et al., 2016). Mental health benefits such as reduced stress and a healthy sense of wellbeing have also been discovered in children that engage with nature (Kemple, 2016). Studies show that playing outdoors facilitates inquiry-based learning and exploration with different types of play. Feelings such as excitement, pride, achievement, and good self-esteem when mastering new and challenging tasks are found to be a driving force and rewarding experience when children engage in risky play (Sandseter et al., 2010). However, few studies investigate the ways parents and children interact during outdoor play, and more investigation of parental beliefs about outdoor play is needed. This study was conducted to observe parents' and young children's engagement in an innovative Outdoor Learning Environment (OLE) for two 90-minute "Nature Explorers" semi-structured play sessions, organized by an outdoor learning specialist. Sixteen parents/caregivers with 19 children (aged 1 to 5) agreed to participate in this IRB-approved study. Observers coded children's play and parental engagement during the play sessions, and parents were interviewed about their beliefs about the benefits and challenges of outdoor play. Multiple types of play were observed, including solitary/parallel (31%); risky (running at great speeds, climbing, etc.; 18%); and social/pretend (16%). Children particularly enjoyed the water station and mud kitchen. Maps of the OLE and descriptions of the sessions will be presented. Qualitative analyses of open-ended interview responses included in-vivo coding and a "Sort, Sift, Think and Shift" approach (Maietta et al., 2021). These open-ended responses touched upon themes related to caregivers reflecting on their own childhood experiences compared to their child's now, along with their comfort levels with their children playing outdoors with or without direct supervision. Although parents reported being very comfortable with outdoor and risky play in interviews, their behaviors varied widely, with some encouraging exploration and others closely supervising and constraining risky play. The richly provisioned OLE supports myriad nature play opportunities, and the sessions offer excellent opportunities for parent education.

## **Preferred Support Systems for Individuals with Severe Mental Illnesses**

**Alex R. Anderson** (Dr. CJ Fleming) Department of Psychology

Individuals with severe mental illnesses often feel like a burden to their families (Tesfaye et al., 2020). Support from family members is an important element of an individual's recovery from a mental illness (Firim et al., 2015). The purpose of this research is to see which sources of support individuals with severe mental illnesses prefer, and to learn to whom they actually go as their primary support. The data were collected through an online survey that was accessible on the NAMI National Facebook page and directed towards NAMI North Carolina which consisted of help-seeking related questions, mental health history, attitudes, stigma, and support. There were 313 participants ranging from 18-79 years old. The sample consisted of men (11.5%), women (85.2%) and some who self-identified their gender (3.2%) with 81.4% being white, 4.2% being Black/African American, and 3.9% being Hispanic/Latino. The mental health diagnoses among all participants were depression (N=203), anxiety (N=187), and bipolar (N=91). Participants reported that the most common types of formal help-seeking were individual therapy/counseling (95.8%), meds from a specialist (psychiatrist; 87.4%), and class or group therapy (59.0%). When asked who their top three preferred sources of support were, participants endorsed therapy (56.5%), spouse (41.12%), and psychiatry (39.83%). Finally, participants were asked who their top primary support person was, reporting that partners were the overall top choice

(35.22%), friends as the second choice (21.38%), and older family as the third overall top choice (11.64%). These findings suggest that individuals with severe mental illnesses usually seek help, support, and care from their partner or from going to therapy. Understanding preferred support sources and actual use of mental health resources is important because those with severe mental illnesses often need significant family support to get into and stay in effective treatments, and social support from loved ones is an important part of treatment planning and recovery.

### **Colonial Mentality, Political Attitudes, and Ethnic Identity Among Puerto Ricans<sup>1,3</sup>**

**Alanis Camacho-Narváez** (Dr. David Buck) Department of Psychology

Colonialism is when a country and its people are subjugated by another country. This process has historically had adverse economic, cultural, and political impacts on colonized peoples, as well as harmful psychological consequences through the internalization of systemic oppression (i.e., colonial mentality, CM). Studies have demonstrated negative effects of colonial mentality on mental health and ethnic identity development; however, this work has primarily relied on diaspora populations and focused on well-being, stress, and perceptions of discrimination. This study expands upon the existing work in two important ways: first by studying CM within a colonized country (Puerto Rico) and second by examining how CM relates to social and political attitudes which can perpetuate colonial systems. Because of the relation between CM and negative ingroup attitudes, we hypothesized that CM would be negatively correlated with perceptions of the government's effectiveness, beliefs about one's own political efficacy, voting behavior, and ethnic identity. We also hypothesized that individuals higher in CM would be less likely to desire Puerto Rican independence. This study used a mix of in-person and online data collection to recruit Puerto Ricans living on the island to participate in a survey that included measures of government efficacy, internal and external political efficacy, attitudes about Puerto Rico's political status, voting behavior, colonial mentality, and ethnic identity. Results showed that CM was negatively correlated with ethnic identity and internal and external political efficacy. However, counter to our hypothesis, CM and government efficacy were positively correlated, suggesting that people with higher CM think more positively of the government's abilities, but less positively about their own ability to participate in politics and effect political change. The negative relationship between CM and government efficacy might be a way of justifying and maintaining the existing colonial systems. Additionally, individuals with higher CM were both less likely to vote and to favor Puerto Rican independence. Though correlational, one interpretation of these results is that CM may influence Puerto Ricans' attitudes and behaviors in ways that impact the political environment in Puerto Rico and halt decolonizing efforts on the island.

### **Judicial Instructions on Alibis: Impact on Mock Jury Decision-Making<sup>3</sup>**

**Grace Caluri, Jeppe Overgaard Jordoson, & Sophia Solan** (Dr. Meredith Allison) Department of Psychology

Judicial instructions are difficult for jurors to understand and often do not affect their decision-making (Daftary-Kapur et al., 2010; Pickel, 1995). The impact of alibi instructions on juror decision-making and understanding has not been studied. Alibi instructions inform jurors that the onus is on the prosecution to prove the defendant's guilt beyond a reasonable doubt (Connecticut Judicial Branch,



2021). CloudResearch (N = 320) participants read a hypothetical description of an arson, police investigation, and trial. They were randomly assigned to one of eight conditions in a 2 (alibi evidence: store video or none) x 2 (prosecution evidence: gas cans in car or none) x 2 (judicial alibi instructions: present or absent) between-subjects design. Participants rated the alibi's believability (0-10), decided a verdict (guilty/not guilty), and assessed the defendant's character on several traits. They also completed memory and attention check questions, including one asking for their free recall of the judge's instructions plus two assessing recognition memory. For the free recall question, we created operational definitions of accurate (scored as 1, e.g., "if I have reasonable doubt, choose not guilty"), partially accurate (scored as .5, e.g., "I may have reasonable doubt"), and inaccurate answers (scored as 0, e.g., "without a reasonable doubt") for five free recall accuracy variables. An ANCOVA showed that alibis were more believable when there was no prosecution evidence (vs. when prosecution evidence was present) and when there was alibi evidence (vs. when alibi evidence was absent). Having alibi evidence also led to more positive views of the defendant (more likeable, credible, etc.). Judicial instructions did not affect views of the alibi or defendant and none of the independent variables affected verdicts, the majority of which were not guilty. Participant recall for the judge's instructions was poor, as the overall average across the five free response accuracy variables was .42 (SD = .19), but they performed well on the two recognition questions (86% and 96% correct). This study showed that mock jurors considered both prosecution and alibi evidence when evaluating alibis but the alibi instructions failed to have an impact on mock juror decisions.

### **Relationships Between Orthorexia, Exercise Dependency, Body Dysmorphia, Social Media Use, and Decision Making**

**Georgia Daniel** (Dr. Mat Gendle) Department of Psychology

Concerns over accessing and consuming healthy food can produce problematic eating behaviors linked to formally recognized eating disorders and/or obsessive-compulsive disorder—these behaviors are being increasingly categorized under the term orthorexia nervosa (ON; Dunn & Bratman, 2016; Novara et al., 2021). Similarly, maladaptive behavioral patterns related to excessive exercise (exercise dependency) are also widely documented in the sport and health science literature (Oberle et al., 2017; Landolfi, 2012). Although there is considerable debate around the concept of exercise “addiction”, excessive exercising appears to share at least some behavioral and cognitive patterns with substance use disorders (Oberle et al., 2017). Past research has also demonstrated that ON, exercise dependency, and negative body image frequently co-occur, and may share common neurobehavioral substrates (Freimuth, Moniz, & Kim, 2011). This research examined a matrix of relationships between self-reported measures of ON, exercise dependency, negative components of body image, and patterns of social media engagement (using a series of standardized survey instruments) in a sample of 27 undergraduate patrons of a university fitness center. Additionally, relationships between these measures and performance on the Iowa Gambling Task, a computerized measure of decision making that is sensitive to cognitive changes related to substance use disorders were examined. It was hypothesized that individuals scoring high on traits/behaviors linked to ON and/or exercise dependency would also express decision-making strategies that are like those associated with substance use disorders. Several statistically significant ( $p$ 's < 0.05) positive correlations were found between the self-report measures for ON, exercise dependency, and negative components of body image. Significant positive correlations were also found between certain patterns of social media



engagement and measures of exercise dependence ( $p = 0.002$ ) and body dysmorphia ( $p = 0.03$ ), suggesting that certain types of social media use (such as a desire to be a fitness influencer) are related to potentially problematic exercise patterns and unhealthy self-image. However, none of the self-report measures were found to be significantly associated with performance on the Iowa Gambling Task (all  $p$ 's  $> 0.16$ ), refuting the hypothesized similarity between exercise dependence and substance use disorders on this measure.

### **Impact of Sexual Orientation and Gender Identity on Unwanted Sexual Experience and Disclosure Decisions<sup>1</sup>**

**Mackenzie DeMania** (Dr. CJ Fleming) Department of Psychology

Sexual assault has negative effects on survivors, and there are unique risk factors and barriers for help seeking for sexual minority women that affect their experiences and outcomes. These factors may be explained by the effects of minority stress, internalized homophobia, and negative societal stereotypes that lead to more victim blaming. This study addresses how identity affects perception and experience with unwanted sexual attention, exploring the perceived benefits and barriers to disclosing a sexual assault experience, recommendations received and provided, and experience with unwanted sexual attention in those who hold a queer identity. Three focus groups of three participants each were conducted, separated by sexual assault history. Two groups were composed of LGBTQIA+ survivors and the remaining group contained LGBTQIA+ individuals who had not experienced sexual assault. All participants were undergraduates from Elon University, identified within the LGBTQIA+ communities, and held a gender identity that was not male. Groups were asked questions to further understand their experiences and perspectives and responses were analyzed using inductive thematic analysis, which produced sixteen themes. Participants identified *Concern Around Social Reactions* as a major barrier to disclosure and support and justice as benefits of disclosure. Some survivors reported receiving encouragement to seek *Formal* or *Informal Support*, whereas others reported receiving a *Lack of Support*. Participants from all groups would recommend *Formal Support*, *Informal Support*, and *Tentative Justice* to a survivor. When asked if sexual orientation or gender identity affected their disclosure decision, participants explained that their identity did not have an effect because they were *Not Out* or their experience was *Not Identified as Nonconsensual*. Participants answered that their identity did have an effect due to *Societal Issues*, specifically societal expectations of women or due to *Queer Community*. When asked if these identities affected their experience, some participants reported a fear of *Targeting* a particular identity, and that their experience led to an *Adjustment of Gender/Sexuality Presentation*. Centering the queer voice is essential in future research, and information gained from this study will allow for the creation of better interventions and resources for LGBTQIA+ survivors of sexual assault.

### **Variations in Perception of Sexual Assault by Sexual Orientation<sup>1</sup>**

**Mackenzie DeMania** (Dr. CJ Fleming) Department of Psychology

Sexual assault has a variety of negative health outcomes for survivors, especially for women in sexual minority communities. This increase in negative outcomes could be explained by the increase in victim blaming faced by sexual minority survivors and the higher perceived promiscuity and stigma surrounding bisexual women. To better understand this phenomenon, this study utilized an online vignette survey to gauge participants' perceptions of a sexual assault when factors such as the sexual orientation of the victim and the severity of the situation are altered. A total of 238 participants were recruited online and randomly shown one of six vignettes. In each vignette, the sexual orientation of the victim was described as either a lesbian, bisexual, or heterosexual woman, and the severity of the situation was varied, where the high severity vignettes described a rape scenario while the low severity vignettes described unwanted touching. After reading a vignette, participants were given a series of questions asking them to report the effect on the survivor's mental, physical, and sexual health, how helpful counseling would be, and their perceived promiscuity of the victim through rating the accuracy of three provided adjectives. Participants were also asked a question to gauge their perception toward the LGBTQIA+ communities, and this was tested as a covariate with participant responses. Severity significantly affected participant responses when asked about the adjectives promiscuous, sexually experienced, and sexually adventurous, and sexual orientation of the victim significantly affected responses when asked about the adjective sexually adventurous. Perceptions of the LGBTQIA+ communities were also a significant factor for each participant outcome. Negative perceptions of the LGBTQIA+ communities led to a belief that the scenario would have less of an effect on the survivor's health, that counseling would be less helpful, and increased the perceived promiscuity of the victim. The findings highlight the need to reduce stigma in order to increase support for survivors. Building a wider understanding of the needs of the LGBTQIA+ communities can help guide interventions implemented with the intention of decreasing victim blaming and better supporting survivors.

### **It's Not You, it's My Attachment Style: How Attachment Styles Relate to Perceptions of Authenticity in Romantic Partners**

**Elizabeth R. DiGrande** (Dr. Katrina Jongman-Sereno) Department of Psychology

This study investigates a correlational relationship between one's attachment style and perceptions of authenticity in one's romantic partner. Perceiving a romantic partner as authentic is associated with better relationship outcomes, more trust, and decreased anxiety (Wickham, 2013). Past research has shown that authenticity is related to more secure attachment (Gillath et al., 2010). We predicted that individuals with insecure attachment styles (anxious and avoidant) would perceive their partner as less authentic than people with a secure attachment style. In addition, we predicted that people with a secure attachment style would report having better quality relationships and greater life satisfaction than those with insecure attachment styles. Gathered through an online survey platform, 120 participants in a romantic relationship completed a survey measuring demographics, personality, attachment style, perceptions of partners' authenticity, self-ratings of authenticity, relationship quality, and satisfaction with life. Multiple linear regression analysis showed that while controlling for self-perceptions of authenticity, anxious and avoidant attachment were related to a lower perception of a romantic partner's authenticity, supporting our first hypothesis. In addition, greater attachment security was related to better relationship quality and greater satisfaction with life, supporting our second hypothesis. These results demonstrate that one's attachment style is related to perceptions of a romantic partner's authenticity and self-perceptions of relationship quality and satisfaction with life.

Understanding these relationships can contribute to well-being in relationships while laying the groundwork for further research to establish a causal relationship between attachment style, perceptions of romantic partners' authenticity, relationship quality, and well-being.

### **The Importance of Baseline Concussion Testing in Neurodiverse Collegiate Student-Athletes<sup>3</sup>**

**Mark Dobson** (Dr. Eric Hall & Dr. Caroline Ketcham) Department of Psychology

Baseline neurocognitive tests are a key component to concussion management protocols used in helping make return-to-play (RTP) decisions. Previous research has shown that neurodiverse populations including attention-deficit/hyperactivity disorder (ADHD), dyslexia, and autism (ASD) have differences in executive functioning, impulse control, and other symptoms that may impact baseline concussion testing measures and assessing frequency of concussions. ADHD impacts inhibition, working memory, and cognitive flexibility which may result in issues with attention, impulse control, and emotional regulation. Previous research indicates that ADHD is a risk factor for concussion frequency. Research also shows that concussions and ASD have many shared symptoms, specifically regarding mental health and executive functions such as focusing of attention and auditory processing. ASD has high rates of comorbidity with ADHD. Dyslexia is a neurodevelopmental disorder causing difficulties matching letters they read to sounds making them read more slowly. The purpose of this study was to examine the differences in neurocognitive performance, history of concussions, and symptoms in neurodiverse student-athletes. 5628 (female=2921; 18-24yrs) collegiate student-athletes completed the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACTTM) test. Concussion history including number of previous concussions, current symptoms, and severity, were collected as part of the ImPACT. 838 identified as neurodiverse (ADHD=602, dyslexic=161, autistic=8). Outcome neurocognitive composite measures include visual and verbal memory, reaction time, visuomotor speed, and impulse control. Significant differences were found for neurodiverse athletes for number of previous concussions ( $p<0.001$ ), total symptom score ( $p<0.001$ ), verbal memory ( $p<0.001$ ), visual memory ( $p<0.001$ ), reaction time ( $p<0.001$ ), visuomotor speed ( $p<0.001$ ), and impulse control ( $p<0.001$ ). Further analysis breaks out by diagnosis with differences across memory and symptom measures for all groups ( $p<0.05$ ). These findings suggest that neurodiverse identities are important to know as part of concussion baseline testing to support RTP management. Further discussion will include a more detailed analysis of symptoms at baseline for neurodiverse populations and considerations for concussion education and management.

### **Languishing in the Classroom: The Role of Instructional Design and Students' Personality Traits<sup>3</sup>**

**Sarah E. Edwards** (Dr. Erika Lopina) Department of Psychology

Languishing is explained as a state of feeling "meh"; it falls in the middle of the continuum from depression to flourishing (Keyes, 2002). In an academic setting, languishing can be characterized as a feeling of disengagement (Beresford, 2024). Instructional design is commonly defined as a systematic procedure in which educational and training programs are developed to improve learning (Reiser & Dempsey, 2007, as cited in Seel et al., 2017). Demonstration of high-quality instructional design techniques has been shown to increase student engagement (Truong et al., 2019). Given that

engagement is important to stave off languishing, we hypothesize that more engaging instructional design will be related to a decrease in students' classroom languishing (Hypothesis 1). Previous research has shown that languishing is differentially related to personality (Joshani & Nosratabadi, 2008); thus, it is hypothesized that the relationship between instructional design and languishing will be moderated by personality (Hypothesis 2). An online survey was sent in the fall of 2023 to current undergraduate students ( $n=137$ ; age range, 18-23; 81% identified as female, 78.1% were first-year, 86% identified as White). Tests of hypotheses will be conducted using correlation and regression analyses. This research can be generalized to students at medium-sized liberal arts universities, however further studies will need to be conducted to apply these findings across various colleges and universities of different compositions and sizes.

### **A Mixed Methods Exploration of the Relationship between Fathers' Physical Play and Infant Motor Skill Development**

**Parker R. Fairfield** (Dr. Sabrina Thurman) Department of Psychology

Fathers play a critical role in the development of their children, and within the past couple decades, paternal parenting beliefs and practices have gained a greater focus. These advances have led to extensive research on the importance of fathers in child development. Some data suggests that compared to mothers, fathers tend to engage in more hands-on, challenging, physically stimulating play with their infants, though we still do not know the specific ways in which fathers think about their role in supporting their infant's motor development, or how the specific ways in which fathers interact with their infants influence developmental outcomes. The current, two-part study aims to examine the unique behaviors and beliefs fathers have about infant development with a focus on physical play and stimulation of motor skills, and when these behaviors begin in infancy. For Study #1, 259 first-time, American parents (170 mothers) of infants ranging 1-7 months completed the Parental Beliefs about Motor Development and Infant Motor Habits Questionnaires online (PD-MD and MOHAB). Results revealed many similar parenting beliefs across mothers and fathers, but fathers emphasized stimulating infant's motor development significantly more than mothers ( $p=.021$ ), and this was associated with infants spending more time in stimulating positions such as prone ( $p=.026$ ). To further investigate fathers' beliefs, Study #2 involved 13 additional first-time fathers of infants aged 1-10 months who participated in online interviews, of which 12 also completed the PB-MD and MOHAB surveys. Interview questions asked how fathers engaged in physical play and whether they presented motor challenges to their infants. Though the study is ongoing, many fathers described making use of objects or modifying the infant's environment during times of play to induce engagement of specific muscles or body parts ( $n = 12$ ), as well as fathers using their own body to stimulate infants' grasping, crawling, and more ( $n = 8$ ). Responses demonstrate that fathers show intentional engagement in ways that stimulate motor skill development in infants as young as one to months, but that they gauge their interactions based on their child's ability status and around advice they receive from external sources and role models.

### **Eye-Tracking Insights into Autistic Traits: An Investigation of Self-Referential Encoding<sup>1,3</sup>**

**Lindy H. Feintuch & Eva J. Hunter** (Dr. Amy Overman) Department of Psychology

The neurocognitive basis of diminished episodic recollection among individuals with autism spectrum disorder (ASD) is unclear, and prior research shows inconsistencies in the success of using encoding strategies to improve recollection among individuals who report autistic traits (Grisdale et al., 2014; Williams et al. 2017). The present study compared the effectiveness of self-referential and semantic encoding strategies in adults (ages 18-25) with varying scores on the Autism Spectrum Quotient (AQ; Baron-Cohen et al., 2001). 45 participants completed a memory task (adapted from Leshikar et al. 2015) in which they learned adjectives in one of two different tasks, responding with “yes” or “no” if the word described themselves (the “self” task) or if the word was commonly used (the “common” task). Participants then completed a recognition task that measured item memory via “Remember,” “Familiar,” or “New” responses followed by the measurement of source memory where participants determined in which task they originally encountered the adjective (“self” or “common”). Eye tracking data was collected during the study phase based on prior findings that eye movements may reflect hippocampal activity (Hannula & Ranganath, 2009). Eye tracking measures such as dwell time and fixation count did not differ by encoding task, and were not correlated with AQ suggesting no evidence of differential hippocampal engagement for self-referential encoding strategies as a factor or AQ. Furthermore, memory performance indicated a positive correlation between the number of autistic traits (higher AQ score) and the proportion of words remembered via learning through the “self” task. These findings suggest that self-referential encoding enhances memory accuracy to a higher degree in individuals who report more autistic traits without increased hippocampal engagement, further highlighting our understanding of the relationship between ASD-related traits and memory encoding processes.

### **The Bright Side and the Right Side: Optimism and Moral Self-Image as Antecedents of Organizational Citizenship Behavior**

**Julia Johnson** (Dr. Christopher Leupold) Department of Psychology

Organizational citizenship behaviors (OCBs) are voluntary actions taken by an employee which a) benefit their organization, b) exceed their formal job requirements, and c) do not yield any immediate reward or affirmation (Organ, 2006). A proliferation of research over the last few decades has found that OCBs contribute to a positive work environment, with studies focusing on OCB as a predictor, mediator, and outcome variable. The present study examined individuals’ dispositional factors (one’s temperament, as opposed to a personality factor describing one’s presentation of self) as predictors of their engagement in OCB. One potential motivator is optimism, generally described as a positive outlook which can be both dispositional or state-driven. The second, Moral Self-Image (MSI), is a fairly new construct describing how one perceives their own morality (Jordan, 2015). For example, low scorers on the MSI scale feel that they need to do more ‘positive’ things in order to boost their self-image. Using the Broaden-and-Build Theory of positive psychology and theories of moral compensation, this study examines the potential influence of these constructs on people’s likelihood of engaging in OCBs (Fredrickson, 1998). More specifically, it was hypothesized that individuals who scored higher on optimism were more likely to engage in OCB and that low scorers of MSI were more likely to engage in OCB. In the current study, 111 working adults across all organizational levels at a healthcare advertising agency completed an one-time on-line survey that included measures on OCB, MSI, and optimism. Analyses did not find support for either hypothesis. However, subsequent analyses



found a slight positive correlation between OCB and job level. Implications of these findings and limitations are detailed in the discussion section.

### **Assessing the LBDQ50's Fit with College Students<sup>3</sup>**

**Sophie G. Kronenberger** (Dr. Christopher Leupold ) Department of Psychology

Although hundreds of definitions of leadership exist, virtually all refer to it as a process whereby an individual influences other people to achieve a common goal. Over the past half century, leadership has been studied in a broad range of contexts and cultures in order to identify what specific behaviors the construct entails. Three critical lines of leader behavior research in the 1960's and 1970's – the Ohio State studies, the University of Michigan studies, and the Blake & Mouton Managerial Grid – eventually led to the development of the still widely-used Leadership Behavior Description Questionnaire (LBDQ; Northouse, 2019). This 150-item questionnaire was developed with the intent to identify the specific key behaviors that people most preferred to see in their leaders. Recently, Warner-Soderholm et al. (2019) examined the LBDQ's factor structure to determine if the instrument's length could be shortened. The outcome of their study determined that the original factor structure of the tool's twelve dimensions could be maintained while reducing the number of items to 50. This revised instrument, coined the LBDQ50, was found to demonstrate similar levels of reliability and validity across multiple cultures. Like the participants in earlier studies on the LBDQ, Warner-Soderholm et al. (2019) studied working adults. The purpose of the current study was to explore whether the LBDQ50 might be applicable to use among a university undergraduate student population. A sample of 468 undergraduate students completed the LBDQ50 via an on-line survey format, and confirmatory factor analyses found that the factor structure was comparable to that of Warner-Solderholm et al.'s; in fact, on certain dimensions, the student sample fit better. Having such a tool offers leadership educators a formal model and taxonomy of behaviors that they can use to teach their students. Implications of these findings and suggestions for future research are discussed.

### **An Analysis of Effective Self-Regulation Interventions for Elementary School Students With Attention-Deficit/Hyperactivity Disorder (ADHD): A Literature Review<sup>1</sup>**

**Vibha Maheswaran** (Dr. Stephen Byrd) Department of Psychology

Unlocking the potential of students with Attention-Deficit/Hyperactivity Disorder (ADHD) hinges on harnessing the power of self-regulation—a key to fostering positive behavior, sustained attention, and academic success in the classroom. Self-regulation is a multidimensional concept that characterizes one's ability to respond and process emotions to facilitate goal-driven behavior (Granziera, H., Collie, R. J., Martin, A. J., & Nassar, N., 2023). In the context of ADHD, poor behavioral self-regulation is a core symptom of ADHD, as children with ADHD often have a difficult time displaying goal-driven and positive learning behaviors in the classroom (Granziera, H., Collie, R. J., Martin, A. J., & Nassar, N., 2023). This literature review aims to analyze the existing literature about self-regulation interventions for ADHD regarding their effectiveness and equity-mindedness. We present a review of ADHD literature covering the behavioral, attention, and school performance outcomes of self-regulation interventions. The literature review includes eight sources published between 2010 and 2023. Based on the previous studies, self-regulation interventions, specifically used in the classroom



setting, are effective in improving long-term behavior, attention, and school performance outcomes for elementary school students with ADHD. Common effective interventions include mindfulness interventions, neurotransmission training sessions, and behavioral interventions. However, while self-regulation interventions can be effective for students with ADHD, it is important to recognize that individual responses may vary due to the uniqueness and individual experiences of ADHD. Therefore, it is important to consider the generalizability of these studies when applying them to different populations of individuals with ADHD. Overall, analyzing the literature based on this topic allows researchers to understand how ADHD intervention currently benefits individuals and how the interventions can be improved to best serve the needs of diverse learners. Classroom self-regulation interventions hold promise as a valuable tool for supporting elementary school students with ADHD, but further research is needed to optimize their effectiveness and implementation in educational settings.

### **Pick Me Girls and Scarlet Women: Female Intrasexual Competition and Sexual Overperception<sup>1,3</sup>**

**Ryan P. McKenna** (Dr. Jordann Brandner) Department of Psychology

Intrasexual competition is the same-sex competition strategies one takes to secure a mating partner when another member of the same sex is a potential rival. Women often engage in intrasexual competition in the form of derogation of rivals (indirect aggression toward another woman for the purpose of lowering their rival's mate value) and self-promotion (presenting themselves as the best version of themselves to increase their own mate value). Previous research has found that when women perceive another woman as a potential rival, they comment on the other woman's sexual availability as a form of derogation (Vaillancourt & Sharma, 2011). Our study seeks to expand these findings by investigating whether this derogation influences perceptions of women's sexual interest in men. To do this, we will show participants a series of 30 second videos of a man and women in the middle of a conversation and ask whether the target individuals in the videos are sexually interested in their conversation partner. We will compare women's perceptions of sexual interest to the target woman's self-reported actual interest in her conversation partner. We hypothesize that women will be more likely to overreport the level of sexual interest of the target women in the videos. This study will help expand the knowledge about intrasexual competition among women, as past research has typically been male focused. This study also will highlight the disparity between the amount of male-centered research compared to the lack of female inclusive or centered research.

### **Telling Stories and Taking Pictures: How Children and Teachers Co-Facilitate Inquiry and Reflection Outdoors**

**Sophie I. Miller** (Dr. Maureen Vandermaas-Peeler) Department of Psychology

Sedentary lifestyles are becoming more common, childhood obesity rates are increasing, and outdoor play opportunities are diminishing (Louv, 2008; Vilchis-Gil et al., 2015). Spending unstructured time outdoors is associated with children's socio-emotional, gross motor, and cognitive development (Dankiw et al., 2020). Play is crucial for early childhood development, and outdoor play fosters exploration and inquiry (Sandseter et al., 2020). Inquiry is a cyclic process of observing, forming

questions, finding answers, and reflecting (Katrein, 2016). Little research examines reflection in early childhood, and the current project addresses this gap by studying children's inquiry and reflection skills in an outdoor preschool. Ten children ages 3-6 years, already enrolled in the school's Afternoon Forest Adventures class, were observed twice a week interacting with each other, their teachers, and the environment. One research question was: What tools best facilitate the inquiry and reflection cycle, specifically in an outdoor environment in which children are encouraged to lead the class with their interests? During these visits, the researcher participated in the pedagogical documentation process, reporting experiences through audio-recording children's conversations, taking photographs, and creating portfolios (Rayna & Garnier, 2021). Similarly, children took photos and had the opportunity to reflect on them. When teachers and students are engaging in pedagogical documentation, it creates a medium of communication that makes the learning more tangible and easier to talk through with others (Macdonald & Hill, 2018). Detailed notes were taken alongside the photos, videos, and audio recordings by the researcher. Utilizing the Sort, Sift, Think, and Shift method (Maietta et al., 2021), the photos were grouped into patterns identified across children's photos then cross referenced with children's verbal reflections and researcher observations of their play in a series of iterative analytic processes. Three key themes emerged from the data: 1) cameras act as inquiry and reflection tools; 2) cameras serve as an additional form of communication for young children; and 3) photos taken by children interact with affordances of the natural environment. These findings are critical for advancing early childhood education and development because they illustrate effective learning strategies driven by child-led inquiry.

## **Teacher and Administrator Perceptions of Restorative Practices in Schools Restorative Practices<sup>1</sup>**

**Ainsley O'Quinn** (Dr. Katie King) Department of Psychology

Most schools use exclusionary discipline, a practice that removes students accused of behavioral infractions from the learning environment through suspensions or expulsions. This form of discipline is associated with adverse outcomes including lack of support, academic disengagement, and increased interaction with the criminal justice system. Black, disabled, and Queer students are disproportionately involved in this form of discipline (Skiba, Mediratta, & Rausch, 2016). Some schools and teachers have begun shifting to using non-exclusionary strategies to make discipline more effective and equitable. Restorative practices focus on a) proactively building trusting relationships within the classroom, b) repairing any interpersonal harm done while, c) maintaining students' connections to their school environments through restorative conversations. Despite increased use, its value remains misunderstood by school personnel, parents, and communities. The current research study seeks to understand why teachers and administrators implement restorative practices and non-exclusionary discipline in school environments and the challenges they experience, especially if there is no school-wide program. Existing research assesses educators' attitudes following district-wide training and implementation of non-exclusionary discipline and restorative practices (Stewart & Ezell, 2022). The current research differs in that it compares the experience of teachers and administrators who have chosen to implement these practices on their own. Semi-structured interviews were conducted with 12 teachers and administrators who currently use restorative practices and advocate for their use by others. Preliminary findings indicate that teachers and administrators use restorative practices because they are motivated to create a more equitable school environment and positive long-term outcomes for

their students. The lack of school-wide buy-in and time are obstacles that teachers and administrators face. Many participants noted the importance of using these practices proactively which meant that they may not have immediate results. Additionally, they noted that the use of restorative practices requires a substantial mindset shift, as one participant said, “It is like a radical way of reframing the way that you think about justice.” The participants noted that many teachers or administrators may not be initially accepting of restorative approaches, yet they advocated for expanded use and training in order to increase understanding of and support for these practices.

### **Mental Health Risk and Help-Seeking Behavior in College Athletes in Relation to Athletic Identity and Stigmatization<sup>3</sup>**

**Maggie Penman** (Dr. CJ Fleming) Department of Psychology

On average, student-athletes report higher rates of attempted suicide than their nonathletic peers, but are less likely to utilize university counseling services. Research has shown that high athletic identification and perceived stigmatization of mental health are risk factors for high rates of mental health issues and low rates of service use. The current study aims to investigate help-seeking patterns in NCAA student athletes as well as how various barriers, such as athletic identity and stigma, relate to athlete help-seeking behavior using the framework of the Health Belief Model. A survey was completed by 301 Elon University NCAA varsity athletes that evaluated depression (PHQ-9), anxiety (GAD-7), hopelessness (Beck Hopelessness Scale), disclosure expectations, athletic identity, and stigma around mental health. Help-seeking rates and mental health concerns were examined descriptively, and then a linear regression was run to evaluate predictors of mental health help-seeking. Mostly, mental health in the varsity athletes fell into the nonclinical range. Mental health severity ( $p < .001$ ) and perceived benefits of help seeking ( $p = .021$ ) were significantly positively correlated with help seeking behavior, while perceived risk of help seeking ( $p < .001$ ) was significantly negatively correlated with help seeking behavior. In line with the HBM, our results suggest that an individual is more likely to take action when experiencing a personal risk, such as mental health concerns, but only if the benefits of action outweigh the barriers, whether perceived or real.

### **Exposure to Weight Loss Content on TikTok and Antifat Attitudes<sup>3</sup>**

**Samantha P. Pensiero** (Dr. Ilyssa Salomon) Department of Psychology

Antifat attitudes are widespread, increasing, and contribute to harmful outcomes for people perceived as fat (Emmer et al., 2019). According to sociocultural theories of body image, people internalize body ideals they see reinforced in the media, which glorify thinness (Thompson et al., 1999). Social media use is associated with negative outcomes for how people feel about their own bodies (Marks et al., 2020). However, less research has explored how young adults' experiences on social media may shape their attitudes toward others' bodies. Weight loss content is common on TikTok (Minadeo & Pope, 2022), which may contribute to negative attitudes about fatness directed both toward the self and others. The current study explored the relationships between exposure to weight loss content on TikTok, internalized weight stigma (i.e., negative attitudes toward the self), and antifat attitudes (i.e., negative attitudes toward others). We hypothesized that internalized weight stigma would mediate the relationship between exposure to weight loss content on TikTok and antifat attitudes. Participants were

316 young adults ( $M_{age} = 18.77$ ,  $SD_{age} = .94$ ; 249 women; 89.2% White). The survey was conducted online using Qualtrics through the Psychology subject pool. Participants reported how often they saw 11 popular weight loss-related trends (Likert scale; Mindeo & Pope, 2022). Example items included, “what I eat in a day” videos, nutrition advice for weight loss, and “healthy” versions of “junk” food. Participants also completed the Modified Weight Bias Internalization Scale (11 items; Likert scale; Pearl & Puhl, 2014), the dislike subscale of the Antifat Attitudes Questionnaire (7 items; Likert scale; Crandall, 1994), and provided demographic information. The model was tested using the Process Macro for SPSS (Hayes, 2022). The indirect effect of exposure to weight-related content on antifat attitudes through internalized weight stigma was significant,  $b = .07$ , 95% CI [.03, .13] indicating a significant mediation effect. Overall, the results of the study suggest that higher exposure to weight loss content on TikTok predicted higher weight stigma toward the self, which further predicted higher antifat attitudes toward others. These results shed light on how social media content may contribute to the formation and reinforcement of prejudice.

## Evaluating Personality Characteristics in the Behavior of Harvester Ants

**Diana E. Rand** (Dr. William Schreiber) Department of Psychology

Personality is a major domain of psychological science because it allows us to understand behavioral diversity among people as well as the consistency of those differences across situations. Many personality studies have been conducted using non-human animal models, evaluating the evolutionary implications of personality and informing our knowledge of its origins. To claim that non-human animals possess personality requires that behavioral characteristics are consistent over time; additionally, human personality traits typically approximate a normal distribution. The objective of the present study was to examine behavioral characteristics in an invertebrate animal model, harvester ants, to determine if their behaviors meet the criteria to be characterized as personality. We conducted 5-minute tests, separated by approximately 55 minutes, in which a total of  $N = 30$  ants were placed in plastic containers and their behavior was recorded. Containers were prepared with either coarse or fine sand, but were otherwise empty. We measured the expression of several different behaviors in each test: locomotor activity, open field behavior, and self-grooming. Locomotor activity was measured as an expression of exploratory behavior (approximating the Five Factor Model personality trait of “openness”), and open field and self-grooming behavior were measured as expressions of stress (approximating “neuroticism”). We assessed the distribution of these behaviors across our sample and found that only locomotor activity was distributed in a way that approximated a bell curve; self-grooming behavior showed a left-skewed distribution, and open-field behavior showed a right-skewed distribution. We found that none of the correlations of behavior between tests were significant ( $p$ 's  $> 0.13$ ), suggesting that there was little consistency observed in the expression of individuals' behaviors. These findings fail to support the theory that these behaviors can be used to describe personality characteristics in ants. Future research can examine other behaviors, such as necrophoresis and aggression, to see if they provide support for the expression of personality within individual ants.

**Students' Experience of Languishing and Technology Use in the Classroom: Does Personality Make a Difference?**<sup>3</sup>

**Sydney C. Rose** (Dr. Erika Lopina) Department of Psychology

Languishing is a state of being that falls on a spectrum between burnout and flourishing (Keyes, 2002). It can be characterized by low levels of well-being, and a general disinterested state that is not yet considered depression. Existing languishing research has focused primarily on its existence in general daily life activities, and, most recently, within the work environment. There is a current gap in the existing languishing literature, such that not much is known about the ways in which classroom experiences relate to students' languishing. Languishing in the classroom tends to present as disengagement (Beresford, 2024), and one factor that may contribute to disengagement is off-task technology use. Students may disconnect from course content as well as from their instructors and classmates when they are consumed with off-task technology use. Previous research has shown that languishing is differentially related to personality (Joshanloo, 2009), therefore this study investigated whether personality dispositions could moderate this relationship. Two hypotheses were generated and used to guide this study: (H1) Higher levels of off-task technology use in the classroom are associated with higher levels of languishing; and, (H2) The relationship between off-task technology use in the classroom and levels of languishing will be moderated by specific personality traits (extraversion, agreeableness, conscientiousness, neuroticism, openness). An online survey was distributed to college students ( $n = 137$ , 78% first-year; 81% female; 86% White) across the campus of a medium-sized, liberal-arts university. Questions were asked about students' use of technology in the classroom (e.g., "I find it distracting when other students are using off-task technology in the classroom"; created by the researcher), their personality traits (e.g., "I am detail oriented"; Goldberg, 1992), and their mental health ("During the past month, how often did you feel that you had something important to contribute to society?"; Keyes, 2008). Correlation analyses will be used to test Hypothesis 1, and a moderation analysis will test Hypothesis 2. This research can be generalized to students at Elon University as well as at other universities who use technology in a similar manner within the classroom context.

### **Perceptions of Authenticity and Trustworthiness in TikTok Influencer Diet Advice<sup>3</sup>**

**Ben A. Rosenthal** (Dr. Ilyssa Salomon & Dr. Katrina Jongman-Sereno) Department of Psychology

In today's social media landscape, discerning credible health advice is a challenging endeavor, especially as individuals turn to platforms like TikTok (1 billion active users) for informative content. Research has shown social media users tend to trust the advice of influencers, often taking their information at face value (Djafarova and Rushworth, 2017), but little research has investigated the effect of users' perceptions of authenticity relating to influencers' diet advice on body dissatisfaction and well-being. This research examines diet advice by TikTok influencers who have completed a weight-loss transformation and aims to identify cues that allow TikTok users to perceive influencers as authentic and trustworthy. As a first step in our research goals, a pilot study was conducted to identify existing TikTok videos to use as stimuli in a subsequent study and match them on important characteristics. Videos were utilized if they depicted a weight-loss transformation and incorporated diet advice content for their rationale to lose weight. Participants ( $n = 40$ ) aged 18-22 watched 12 videos of TikTok influencers talking about their weight transformations and giving diet advice. Videos were categorized by gender (male or female) and type of weight transformation (from a large body to a thin body, or a thin body to a thinner body). Participants watched each video and answered questions about the influencer's age, gender and the content of their advice, as well as their body size and



attractiveness both before and after the weight loss transformation. We then analyzed participant data to determine whether the variable means for each video were within one standard deviation of the total mean. The purpose behind this was to ensure the individual conditions were matched on perceptions of age, gender, video content, physical fitness, and physical attractiveness. These stimuli will then be used in a subsequent study using a new sample but the same population (college students), which aims to examine perceptions of authenticity relating to influencers' diet advice on participants' own self-reported body dissatisfaction and well-being. This research will contribute to our understanding of how social media platforms can easily influence health-related decisions, opening the doors for future research.

### **What Cues do People Use to Perceive Authenticity in Others?**

**Henry J. Searle** (Dr. Katrina Jongman-Sereno) Department of Psychology

Authenticity has been a common experience among laypeople for millennia and remains an attribute that cultures around the globe value. Authenticity has largely been characterized as congruence between one's beliefs, values, motives and personal characteristics and one's behavior (Jongman-Sereno & Leary, 2020, p. 33; see also Barrett-Lennard, 1998; Harter et al., 1996; Kernis & Goldman, 2006; Wood et al., 2008). Research on authenticity has demonstrated its positive correlation with greater well-being, relationship quality, and psychological health yet little is understood about how people perceive authenticity in other people (Bosch & Taris, 2014; Gan et al., 2018; Henderson & Brookhart, 1996; Liu & Perrewé, 2006; Wickham, 2013). A total of 75 participants were recruited through the online survey platform Prolific to participate in an exploratory, descriptive study examining cues of authenticity and inauthenticity. The mean age of participants was 34.95 with 61% identifying as female, 34% identifying as male, and 5% identifying as non-binary. A total of 4% of participants identified as transgender. Racially, 61% of participants identified as White, 9% identified as Asian, 7% identified as Black or African American, 1% identified as Native Hawaiian or Other Pacific Islander, and 5% identified as other. Approximately 9% of participants reported being of Hispanic, Latino, or Spanish origin. Participants were surveyed through open-ended questions in which they listed five cues they use to perceive others' authenticity and others' inauthenticity. Two researchers used inductive coding to identify common themes in a subset of the sample. These themes were then applied to additional subsamples until 12 themes were identified as cues to authenticity and 11 themes were identified as cues to inauthenticity. Once the themes were finalized, two independent coders categorized participants' responses into the identified themes. Common cues of authenticity described by participants were body language, "Honest/Genuine/Truthful," "They do what they say they will/Reliable/Consistent," and "Aren't afraid to be themselves/Confidence". Typical cues of inauthenticity were body language, "Fake/dishonest/disingenuous," "Uneasy, nervous, agitated," and "Self-absorbed/arrogant/entitled". These results indicate potential cues utilized by laypeople in the perception of others' authenticity that have not been identified in previous literature.

### **Intellectual Humility and Investigative Behaviors in Relation to Overclaiming of Knowledge**

**Emma E. Simpson** (Dr. Katrina Jongman-Sereno) Department of Psychology



Fake news and other forms of misinformation are becoming increasingly prominent in today's world (Bowes & Tasimi, 2022). Research has shown that people vary in their susceptibility to believing false information (Zmigrod et al, 2019), but few studies have explored the factors that potentially aid individuals in avoiding misinformation. Intellectual humility (IH), or openness to recognizing the fallibility of one's opinions and beliefs, is related to discerning true from false information (Zmigrod et al., 2019). Research has also shown that IH is negatively related to one's tendency to overclaim one's knowledge and positively related to engagement in investigative behaviors such as fact-checking (Deffler et al., 2016; Krumrei-Mancuso et al., 2019, Koetke et al., 2022). This study examined investigative behaviors as a possible mechanism in the relationship between IH and the tendency to overclaim knowledge of false information. Through an online survey, participants (N = 120) completed the General Intellectual Humility Scale (Leary et al., 2017), an adapted measure of investigative tendencies, and the Overclaiming Questionnaire-150 (Paulhus, 2003), a questionnaire that asks participants to indicate their familiarity with existent (e.g., prejudice) and nonexistent topics (e.g., consumer apparatus). Correlational analyses showed that IH was not significantly related to claiming familiarity with either real or fake topics. However, high-IH participants were more willing than low-IH individuals to investigate all topics. Additionally, a negative correlation was found between overclaiming bias and investigative tendencies, suggesting that individuals who wanted to learn more about topics on the Overclaiming Questionnaire were less likely to overclaim their knowledge. These findings suggest that people who are aware of the connections among these variables may be more likely to fact-check topics they encounter and avoid overclaiming knowledge. This may have implications for decreasing susceptibility to false information including fake news.

## Public Health Studies

### **“Now she's totally fine. She's thriving. She's doing great:” A Qualitative Longitudinal Study of Resilience in Internationally Adopted Children with Perinatally-Acquired HIV**

**Sydney Barlow** (Dr. Cynthia Fair) Department of Public Health Studies

Relatively few children are born with HIV in this country, however, evidence suggests that a new population of U.S. children living with perinatally-acquired HIV (PHIV) are emerging: internationally adopted children. This unique population has intersecting identities which place them at risk for stigma, discrimination, and adverse mental health outcomes. This longitudinal study explores parental perspectives of their child's resilience across various settings including school, community, doctors' offices, and home. Parents of internationally adopted children with perinatally-acquired HIV (IACP) were recruited through snowball sampling from two tertiary care hospitals and closed Facebook groups. From 2018 to 2021, 11 parents each participated in three semi-structured interviews annually. Parent interviews focused on 12 IACP, (mean age at time of adoption = 5.86 years, range 7 months to 15 years). At the time of the parent's first interview, mean age of IACP was 9.62 years (range 4 to 18 years). Five IACP were female (42%), and seven were male (58%). Interviews were analyzed using the Sort, Sift, Think, Shift qualitative approach. The majority (66%) of IACP were transracially adopted and frequently faced racism in their communities. Results from the three parent interviews suggest that parents of IACP are crucial in fostering resilience through open conversations about HIV and

community challenges. Parents highlighted stigmatization around HIV in their community and with friends. Parents further revealed techniques they used to promote resilience, such as strengthening teacher and IACP relationships, and preparing their child to manage racist encounters. Additionally, they discussed how IACP showed resilience in medical settings by tolerating blood work and developing medication independence through the support of their healthcare providers. Future research should prioritize engaging with IACP to gather their perspectives to further support their growth and development.

### **Assessing the Health Care Utilization of Emerging Adults with Type 1 Diabetes in the College Setting: Perspectives of Students, Parents, and Providers**

**Cole T. Carney** (Dr. Cynthia Fair) Department of Public Health Studies

Undergoing a health care transition and moving to college are significant life events for many emerging adults, especially those with special health care needs. For students living with type 1 diabetes (T1D), the transition is often characterized by stress and difficulty self-managing the disease. The Health Care Transition Research Consortium model provides a framework for the transition experiences of adolescents; however, it does not consider ancillary health services available at college campuses. It is unclear how students with T1D utilize these resources. A sample of 20 undergraduate college students/graduates with T1D, 9 health service professionals, and 4 parents were recruited from the southeast U.S. through snowball sampling. Semi-structured interviews with all groups explored students' experiences navigating the healthcare system and the role that parents and providers play during college. Interviews were transcribed and coded for emergent themes using traditional qualitative methods. Most students claimed personal responsibility for managing their T1D in the context of their new independence in college. Even when discussing emergency situations, students were confident in their intuition, knowledge, and previous experiences to guide them. This attitude was the foundation of most students' health care utilization. Few students used ancillary health services for their management, but those attending a university with a more robust health system were more likely to utilize campus-associated health services, though, usually as a "secondary line of defense". Depending on the university, students mentioned access to a pharmacy, health center, adult endocrinology provider, diabetes support group, and/or disabilities resource center. Students with access to a support group discussed their benefits and/or saw value in the medical support they offer. Most parents seem to be uninvolved in the student's management apart from help with insurance and supplies. Providers see themselves as being important parts of the student's lives as a student advocate, providing necessary tools and resources where knowledge is lacking. It is important for students to have access to specialized health care support while in college and to be made aware of their options even though personal responsibility is common and could discourage involvement with ancillary resources.

### **The Inclusivity of Transgender and Gender Non-Conforming Students in North Carolina Universities' Online Sexual Assault Resources<sup>1,3</sup>**

**Sydney Gilbert** (Dr. Cynthia Fair) Department of Public Health Studies

Sexual assault (SA) is a significant problem on college campuses with 2.2 to 14.8 percent of college students reporting experiences of SA. The rates of SA are highest among transgender individuals (20.9%), even when compared to other sexual and gender minorities (6.4%-15.7%). Little research has looked at universities' inclusivity of TGNC students, particularly relating to a school's SA response and prevention. This study focuses on the level of inclusiveness portrayed in North Carolina universities' online SA resources using a random sample of 50 different North Carolina universities. Sampled schools had an undergraduate population range of 30-36,831, 76% of sampled schools were private, and 66% were religiously affiliated. Each school's publicly available website content pertaining to SA was analyzed for TGNC inclusivity by giving each website an inclusivity score (IS) out of a possible 32 based on various indicators of inclusivity, including SA definitions, TGNC-specific resources, gender neutrality, nondiscrimination, understanding of gender/gender identity, and accessibility (M=16.7; SD=7.8). Schools scored lowest in the resources subsection, with a mean score of 3.1 out of 10 possible points, suggesting that overall, universities should work on improving the amount, quality, and TGNC inclusivity of SA resources on their websites. Additionally, school size (P=0.0209), funding (P=0.0030), and whether a school was religiously affiliated (P=0.0003) were found to be statistically significant in predicting total inclusivity score, but whether a school is a Historically Black College/University was not statistically significant (P=0.8122), suggesting that large, public, nonreligious schools are more likely to be inclusive. As sampled private schools tended to be religious and have a lower undergraduate population, a linear regression model was used to determine the interactions between these variables and showed that size (p=0.005) and religious affiliation (p=0.0089), but not funding (p=0.3368), were statistically significant in the model, suggesting that more funding, education, and resources need to be allocated towards smaller, private, religious universities order to improve TGNC inclusivity. Overall, this study will prove useful for research into improving online TGNC visibility and the development of an online interconnected TGNC-affirming community support system on college campuses by identifying common gaps in inclusivity and characteristics of inclusive schools.

### **Putting Knowledge Into Action With Dream Center Girls in Motion (DC-GIM), a Health Intervention for Girls Aged 8-12**

**Nicole L. McGinty** (Prof. Amanda Tapler & Prof. Elizabeth Bailey) Department of Public Health Studies

Adolescence is a critical phase of development and a key time for laying the foundations of good health. For girls, puberty presents a wide array of physical changes that can impact health behaviors and mental health. Research suggests girls are less physically active than boys, and experience lower levels of self-esteem. Furthermore, Latina girls appear to be more vulnerable to poor health outcomes and have less access to programs to mitigate risks. The purpose of this project was to assess the health education needs of Latina girls using qualitative methods (Phase 1) and to design, implement, and evaluate a program to meet these needs (Phase 2). In Phase 1, focus groups were done with parents and girls, and later a survey was made available for the girls. Findings from the parent focus groups (n=15) suggested needs centered around social, physical, and mental well-being and access to supportive community programs. The girls focus group (n=5) and survey (n=4) identified challenges to mental health, body image, and menstruation. Dream Center Girls in Motion, an 8-week program for girls aged 8-12, was designed to provide information, support, and opportunities to engage in behaviors that could improve overall social, physical, and mental well-being. The program included physical activity,

small group discussion, and mentoring. Twelve racially diverse girls (age =  $9.3 \pm 1.07$ ) were recruited to participate in the program. Nine college women volunteered as mentors. To assess the program's impact, the girls completed the Rosenberg Self-Esteem Scale and the Emotional Regulation Questionnaire for Children and Adolescents (ERQ-CA) before the program's start and upon its conclusion. There was a significant difference in the reappraisal subscale of the ERQ-CA ( $p=0.048$ ), indicating the program may have helped the girls better manage/understand their emotions. However, no statistically significant differences were found for self-esteem or the suppression subscale of the ERQ-CA. In addition to the questionnaires, program evaluations suggested that the program was well received by mentors, parents, and the girls. The positive response to the program suggests it should be continued and would benefit from further research.

### **Medication Nonadherence Among Syrian Refugees in Germany: Interviews with Community Pharmacists<sup>1</sup>**

**Molly P. Packwood** (Dr. Molly Green) Department of Public Health Studies

Between 2014 and 2016, over 646,000 asylum-seekers from Syria arrived in Germany fleeing what the UN called “biggest humanitarian and refugee crisis of our time,” as the civil war in Syria became more grueling. In Germany, access to healthcare services, including medication, is not limited by cost; instead, access can be limited by language constraints, medication adherence, and social determinants of health. For Syrians in Germany, pharmacists provide important communication and counsel regarding medication use and risks, which can help improve adherence meaning the extent to which a person’s behavior corresponds with agreed recommendations from a health care provider. However, many pharmacists lack the language skills to communicate effectively with their Syrian clients. Researchers have found that poor communication between pharmacists and patients can result in medication non-adherence. This study aims to examine how patient/pharmacist communication relates to medication adherence among Arabic-speaking refugees from Syria living in Germany. Participants were recruited through convenience and snowball sampling and were screened for the following criteria eligibility: working as a pharmacist and having clients from Syria. This study collected data through 9 in-depth semi-structured interviews with pharmacists working in neighborhoods with high concentrations of refugees in Cologne. The interview protocol contained 7 questions around communication between pharmacists and clients and adherence and nonadherence among clients. Data analysis began with transcribing the interviews, all 9 of which were conducted in German. Sessions ranged from 9 to 67 minutes, averaging 25 minutes. To date 2 transcripts have been translated into English. Throughout the translation/transcription process, observations were made on the common barriers pharmacies faced when assisting refugees. Preliminary findings indicate that communication is an issue between pharmacists and their clients from Syria. While some pharmacists were able to build rapport and work through communication barriers, others struggled to meet the needs of their immigrant and refugee clients. We recommend that best practices for pharmacies include hiring Arabic speaking pharmacists, maintaining medication information in various languages, and using all available tools to ensure effective communication and improved medicinal adherence.

### **Condom Use Resistance: Perceptions and Experiences**

**Sophie M. Padalecki** (Prof. Amanda Tapler) Department of Public Health Studies

Condom use resistance (CUR) is a successful attempt at avoiding using a condom while engaging in penetrative sex with a partner who expressed the want to use one. CUR is a common and urgent sexual health issue; however, little research explores the various perceptions and experiences associated with CUR. Thus, this study aims to understand attitudes, perceptions, beliefs, and experiences surrounding CUR among women in late adolescence and early adulthood. Participants (n=300) were recruited using the Pollfish global survey network with filters female identifying, 18-24 year olds, and in the United States. Qualitative and quantitative data was collected via survey covering topics such as attitudes and experiences of CUR, CUR tactics, feelings surrounding CUR, stealthing, and relationship dynamics when CUR is involved. Findings highlight several aspects of CUR experiences and impacts. Participants expressed prevalent beliefs, such as the normalization of men resisting condom use (52%), the idea that men resist condom usage more than women (90.66%), and that the unauthorized removal of a condom during intercourse should be considered sexual assault (88.335). Sexual efficacy and confidence was relatively high among participants, with strong willingness to advocate for condom usage. CUR tactics were also analyzed, revealing common strategies employed. With T tests, insights into the dynamics of race, sexual orientation, and education were able to shed light on significant associations with CUR. Black women had statistically significant overall higher sexual decision making confidence than white Women ( $p=0.04$ ), and women of the LGBTQ community are more likely to face adverse sexual experiences regarding CUR than their straight counterparts ( $p=0.01$ ). Finally, qualitative analysis uncovered prevalent emotions associated with CUR, emphasizing themes of fear, violation, anxiety, shame, upset, and feelings of being belittled. Congruent with the literature, this study aligns with established perceptions and prevalence of CUR. However, different from other literature, our findings highlight the emotional distress caused by CUR, shedding a light on the power dynamics in sexual encounters. Overall, this study offers significant public health implications by examining the complex nature of sexual dynamics and power structures, particularly regarding CUR. This study calls for holistic approaches to sexual health promotion by highlighting the need for tailored interventions, exploring the intersectionality of CUR, and recognizing the border connection between mental and sexual health.

### **Data Justice: MENA Women, Preterm Birth, and Discrimination<sup>1,3</sup>**

**Nazaneen J. Shokri** (Dr. Yanica Faustin & Dr. Molly Green) Department of Public Health Studies

Maternal and infant health disparities are an important area of investigation. There is a lack of literature on the birth outcomes of Middle Eastern North African (MENA) women despite their increased risk of experiencing ethnic and/or religious discrimination. MENA women are often made 'invisible' during the data collection process due to the lack of an existing MENA racial category at the federal level, presenting challenges when investigating health disparities for this marginalized but growing population. This concurrent mixed methods research project utilized vital records and semi-structured interview data to investigate and explore the adverse birth outcomes and discriminatory experiences of MENA women living in the U.S. The quantitative strand investigated the prevalence of preterm birth (PTB) for MENA women across six racial/ethnic categories using a two-way cross tabulation: (1) white non-MENA, (2) white MENA, (3) Black non-MENA, (4) Black MENA, (5) other non-MENA, (6) other MENA. The qualitative strand explored racial/ethnic identity, perceived discrimination, and maternal health among the MENA population living in the U.S. The qualitative strand utilized the *Sort and Sift, Think and Shift*© method, an immersive analysis approach. For the



quantitative section, n - 868,277. For the qualitative section, there are currently ten interviewees although we hope for a few more. It is anticipated that overall there will be greater variation in the PTB rates, between non-MENA births and MENA births, for the white racial category as opposed to the Black and other racial categories, with white non-MENA births having the lowest PTB rate. It is expected that the qualitative strand will illustrate how the racialization of the MENA population serves as a contributing factor towards experiences with perceived discrimination and disparities in adverse birth outcomes. Advancing knowledge on the adverse birth outcomes of MENA women will improve the current understanding of the maternal health status of this ever growing population in the U.S. and contribute to the fields of maternal health, migrant health, and health disparities.

## Religious Studies

### Fire & Brimstone - An Origin Story of Hell

**Olivia Lancashire** (Lynn R. Huber) Department of Religious Studies

According to a 2023 study conducted by the Pew Research Center, 62% of all U.S. adults believe in hell, 84% of all U.S. Protestants believe in hell, and 91% of all U.S. evangelicals believe in hell. Even though there are a multitude of perspectives about what hell is and looks like within the Christian tradition, one view in particular is remarkably popular– the belief that hell is a place of fire and brimstone (i.e., burning sulfur). This imagery appears in the media (e.g., the video “Montero” by Lil Nas X), in casual conversations with friends (e.g., someone saying they are “going straight to hell” after making an inappropriate joke), and in some evangelical churches that warn believers of the possible punishments in hell. In this presentation I offer a background to this popular imagery by outlining the historical texts and images that shaped this idea of hell as a real destination, and, more importantly, as a place of punishment. Among the sources I address are biblical texts (from Old and New Testaments), Roman literary works like *Aeneid* by Virgil, and early Christian apocryphal writings such as *Apocalypse of Peter*. When thinking about the imagery of hell, it is important to consider how these ancient depictions both differ from one another and from modern day interpretations. As I will show, some ancient texts try to correct behavioral concerns and maintain strict power differences, while others offer more benign depictions of the afterlife. By looking at these we see that the modern idea of hell as a place of punishment reflects the more extreme visions. Finally, this raises the question of what is behind the tendency to hold onto dualistic visions of hell as a place of fire and brimstone, a question I will explore as part of my continuing project on the intersection between hell and religious trauma.

### Trans Jewish Interpretation of Avraham and Sarah<sup>1</sup>

**Faith E. Minor** (Dr. Lynn Huber) Department of Religious Studies

There is significant debate among interpreters of Talmudic writings as to whether “problematic” interpretations of potentially trans texts can be put to liberatory use? For example, while several



biblical characters are connected to stories which resonate with different trans experiences, such as undergoing a transition or alignment with specific non-binary genders and sexes, many interpreters, including myself, note that exploring these themes through a trans lens can be potentially regressive by reasserting bio-essentialist ideology, or continuing to privilege cisnormativity or heterosexuality (Henderson-Merrygold, 2018; Strassfeld, 2022). I have found, however, trans hermeneutics and trans Jewish biblical interpretation provide models for the resistance required to read these precarious points in ways that generate more radical readings. In this presentation I revisit the story of Avraham and Sarah in the book of Genesis/Bereshit, characters that some Rabbinic interpreters suggest were initially tumtum, a non-binary gender identified in the Talmud, who at some point transition to become man and woman respectively. In rereading these characters, I explore the potential inherent in “bad” trans readings, an idea articulated by scholar Max Strassfeld (2022) to describe work which consciously recontextualizes Rabbinic and Biblical writings. Avraham and Sarah go through a number of transitions through their narrative, such as the gain of specifically gendered commandments (or the loss of sameness between the two of them), and I will explore connections between those shifts and their gender and sex transition. Interestingly, the ancient Rabbis don’t seem to care when the transition happens, and instead focus on how the story can be explained by their tumtum state. I will examine how my reading, as a trans person, contributes to the questions asked by the Rabbis, arguing that while their attention is attuned to the loss that being tumtum presents and the restoration of becoming binary male and female, the lens of trans hermeneutics sees the trans potential in these texts. In exploring some supposedly “bad” readings, I hope to contribute to a more liberatory trans Judaism.

### **“Once as Woman he Vowed”: Gender Nonconformity, Female Same-Sex Erotic Encounters, and Divine Intervention in Ovid’s *Metamorphoses*<sup>1</sup>**

**Jasper S. Myers** (Dr. Lynn Huber & Dr. Kristina Meinking) Department of Religious Studies

The account of Iphis and Ianthe, a story in Ovid’s mythological collection *Metamorphoses* (IX.666-713), serves as a locus for examining female homoeroticism and gender nonconformity in the ancient Roman world. The myth follows a Cretan youth, Iphis, who is assigned female at birth and raised as a boy. Despite Iphis’ outward presentation as a male, Iphis still understands themselves as a female, much to their dismay. After falling in love with their arranged bride, Ianthe, Iphis laments their fate as a woman who desires another woman, which they consider a cruel and impossible fate. Through an encounter with the Egyptian goddess Isis, Iphis is miraculously transformed into a male and subsequently marries Ianthe. The story ends with what can only be described as a satisfyingly happy ending. Reading this myth through the lens of Roman *religio* and mythology, this paper explores expressions of ancient Mediterranean female same-sex erotic encounters and gender non-conformity as they were inspired by acts of divine intervention. Using Saidiya Hartman’s framework of critical fabulation and Terri Givens’ ethos of radical empathy, I discuss what Iphis might reveal about women-loving-women in early imperial Rome (first century CE). Specifically, I explore how Iphis’ “happy ending” complicates the popular Roman category of the *tribas*: a Roman woman who desired another woman in an “active” or “masculine” way (e.g.: penetration, marriage, ownership). Interrogation of this question is critical to unpacking ancient vehicles of lesbophobia and misogyny. This project finds that it is ultimately elements of shame and pride, as well as the performance of gender and sexuality in the public vs. private spheres of life, which determine how women-loving-women were treated in the

ancient Roman world. Such a study is critical to re-examining how we perceive, interact and ally ourselves with contemporary women-loving-women in our contemporary context.

### **"The Metlakatla Controversy": The Complicated History of William Duncan, Missionary to the Tsimshians, 1857-1918**

**Andy Walter** (Dr. Andrew Monteith) Department of Religious Studies

In 1857, missionary William Duncan arrived in Fort Simpson, British Columbia with the goal of Christianizing the local Tsimshian tribes under the Church of England. By adapting to Tsimshian cultural traditions and fusing evangelical and Native customs, Duncan convinced over 800 Tsimshians in 1887 to resettle in New Metlakatla, Alaska, a town in which Duncan carried significant political, social, and economic power. By operating the only local school, church, and businesses, Duncan aimed for complete control over New Metlakatla's daily operations and citizens to create a utopian Christian society founded on the conversion of Tsimshians towards Euro-American values. His autocratic missionary career had multiple controversies, including intense disagreements with the Church of England, both the Canadian and United States governments, and the Tsimshians. Although New Metlakatla's residents willingly followed Duncan, Tsimshian inhabitants asked the United States Government to remove Duncan from power by the turn of the 20th century. By the time of his death in 1918, Duncan's reputation and relationships dramatically declined, marking a shift away from his early career as a well-renowned and progressive missionary. Using archival research, this paper will track Duncan's shifting relationships with authority and tradition throughout his lifetime to argue that New Metlakatla's establishment and subsequent controversies were complex power struggles between Duncan, Tsimshians, and the United States government.

## **Sociology & Anthropology**

### **LGBTQ+ Safe Spaces: Queer Community on Tumblr<sup>1</sup>**

**Renée Driver** (Dr. Devin Proctor) Department of Sociology and Anthropology

Online communities are a prominent venue for youth connection and the development of identity (boyd, 2014; Ridder & Dhaenens, 2019). The blogging platform tumblr especially has become a space where these communities coalesce around issues of identity, particularly among LGBTQ+ youth (Fink & Miller, 2014; Tiidenberg et al., 2021). This study examines the impact of these online "safe spaces" on queer youth, and how their experiences affect their perceptions of the larger community. The purpose of this study is to examine positive or negative social and mental health outcomes for users and analyze how the platform itself facilitates or hinders these outcomes. I gathered data through mixed methods. First, I conducted content analysis and observed interactions on tumblr. After receiving IRB approval, I made my own personal research blog and posted a survey with questions about demographic data and internet behavior. In said survey, respondents were invited to participate further in a series of interviews discussing how their experiences on tumblr have informed their relationship with the queer community both on and offline. Analysis of the quantitative data shows that

LGBTQ+ tumblr users tend to interact with the community very regularly, while analysis of the qualitative data shows that though many people have negative experiences in these spaces, most ultimately value the time they have spent in them. Discussion of said analyses explores these different experiences and illustrates identity creation processes that tumblr's "safe spaces" can foster and, at times, limit.

### **Exploring the Utility of Critical Models: Perceptions of Critical Theory and Introducing Critical Hydra Theory<sup>1</sup>**

**Hayley J. Hawkins** (Dr. Tom Arcaro) Department of Sociology and Anthropology

This project analyzes the effectiveness of a model for teaching about social inequality called Critical Hydra Theory (CHT). Critical Hydra Theory builds on the work of prior critical theories, especially critical race theory, but expands on these theories by bringing in new tools for thinking about intersectionality and with its focus on pedagogy. This study describes Critical Hydra Theory's roots in existing theories and explains what it adds, especially in its pedagogical dimensions. I then draw on qualitative and quantitative data from US university students and refugee learners in Bangladesh, Kenya, and Jordan to analyze the model's effectiveness. I have found that the approach is effective in helping deepen understandings of classism, racism, sexism, ableism, anthropocentrism, and other axes of inequality, as well as the connections between these forces. This study considers how prior exposure to critical theories and pre-existing political views moderate the results, address ethical issues, and suggest ways that the approach might generate long-term impacts.

### **Taking Up Space in the Workforce: Queer in the Postgraduate World**

**Erin M. Rohde** (Dr. Leyla Savloff) Department of Sociology and Anthropology

The transition from undergraduate education into the workforce includes navigating company culture, work-life balance, and job security. In the United States members of the LGBTQIA+ community find safe spaces increasingly important in this process. In the context of this research, safe spaces can comprise both a physical space and a psychological state—a safe space involves a set of conditions that allow individuals to show up as their most authentic selves (Grimes 2020). Defining safe spaces this way allows the consideration of in-person and hybrid work formats, which comprise contemporary work practices. One third of LGBTQIA+ workers in the US have reported negative work experiences in the last 5 years (Sears et al. 2021). Studying safe spaces can enhance not only the experience for LGBTQIA+ workers but create positive changes in organizational cultures more broadly. This research considers the particular experience of bisexuality as bisexual individuals are more likely to avoid disclosing their identity compared to other LGBTQIA+ individuals. They are also more likely to experience negative mental health outcomes (Sears et al. 2021). Furthermore, bisexual experiences are largely under researched in current LGBTQIA+ literature. This research examines the dynamic relationship between safe spaces and positive work experiences for LGBTQIA+ individuals. Further, this research uncovers the role that cultivating safe spaces has in subverting the negative outcomes of bisexual erasure (or bi erasure). Drawing on qualitative methods, specifically participant observation, semi-structured interviews, and content analysis, this research asserts that the development of safe spaces, which involve psychological safety and perceived belonging, can enrich work-culture and

teamwork. The non-numeric data collected in these processes will be analyzed for major themes and patterns and will provide rich insight into the reality of LGBTQIA+ experience in the transition from undergraduate student to member of the workforce. Quantitative data from the Bureau of Labor Statistics will also be considered in order to provide statistical support for any conclusions.

## **El Clima Estudiantil en Elon: Latinx Students in Higher Education<sup>1</sup>**

**Leah M. Schwarz** (Dr. Leyla Savloff) Department of Sociology and Anthropology

Students can access various resources when preparing for their higher education institutions, from the admission and application process to their overall college experience. The main factors identified in this study stem from diverse cultural and racial backgrounds, socio-economic statuses, and education levels; these components contribute to the student's college experience in multiple ways. Latinx students are underrepresented in academia and often receive a subpar education compared to their White peers. No access to Advanced Placement or other university credit courses can explain some of these educational gaps. Before attending a higher education institution, Latinx students face setbacks that can negatively influence their college experience. This study uses qualitative methods to examine past studies on Latinx students in higher education and ethnographic research. I will analyze the experiences of Latinx-identifying Odyssey Scholars, a program for academically-driven students with demonstrated financial need, attending Elon University. Through four interviews and a literature review of past studies on Latinx students in higher education, this research will be helpful to universities with similar demographics to engage in conversations about Latinx college experiences. Among them, the project seeks to promote diversity at Elon University, a private university in the South with around six thousand four hundred undergraduate students. Elon is also a predominantly White institution (PWI), with only eight percent of students identifying as Latinx. This study seeks to indicate possible opportunities to strengthen connections between higher education and the Latinx community. This research uses Elon University to represent a higher education setting and focuses on how academic institutions can better support their Latinx student population. Preliminary results suggest small, mixed-race cohorts work better to foster successful peer relationships and promote student unity. The undocumented students interviewed also expressed a lack of access to on-campus job opportunities. Greater institutional support would motivate students to get involved on campus, increasing their sense of belonging and making them feel more integrated into the student body. My presentation will share updated information from my ongoing research on Latinx involvement in university communities, aiming to contribute to academic discussions on policies and practices promoting an inclusive campus culture today.

# Sport Management

## "At What Cost?": An Analysis of NCAA Reclassification between Division II and Division I Member Institutions

**Anthony A. Bamford** (Dr. Khirey Walker) Department of Sport Management

Despite the four-year penalty, most schools see the transition from Division II to Division I as a net positive. In his 1999 dissertation at the University of Michigan, Cross (1999) noted that the most visible aspect of the institution is the intercollegiate athletic department. Weaver (2010) found that reclassifying, "will bring much needed public recognition to all facets of the university" (p. 6) There is a high correlation between the quality of intangible and tangible resources in how much athletes achieve their highest potential on the playing field (Won & Chelladurai, 2016). In this, there is a meaningful increase in academic support for athletes after a transition from Division II to Division I. For example, Queens University in Charlotte began a new department geared towards academic success for athletes when they made the transition in 2022. The increase in academic achievement and resources help student-athletes at the institution in that there is more effort in retention and individual academic success at the Division I level than there is at lower levels (Brecht & Burnett, 2019). For the study, ten schools that have most recently completed the transition to Division I from Division II were included in the analysis. All data for applications and enrollments to the ten schools was collected using the Integrated Postsecondary Education Data System (IPEDS). Data was collected from the start of the transition year to one year after the end of the transition. For graduation rates and GSR the NCAA's website was used. Similar to IPEDS, there are gaps in the data where schools have not reported information to the NCAA. Two institutions lacked data and as a result, were not included in the final dataset. Thus, there were eight total institutions included in the data analysis. Between graduation rates, graduation success rates (GSR), applications, and enrollment, there were some fairly significant results within this study. There is consistent evidence that graduation success rates for student-athletes received marginal changes but that at most schools there was an increase in GSR at these institutions after transitioning from Division II to Division I.

## Positioning the Future of the North Carolina Sports Hall of Fame

**Emilia M. Cappellett** (Dr. Young Do Kim & Dr. Cara Lucia) Department of Sport Management

The North Carolina Sports Hall of Fame (NCSHOF) aims to connect and inspire all North Carolinians, especially the youth, by leveraging the stories and accomplishments of Tar Heel sports heroes. The NCSHOF's exhibit gallery is housed on the third floor of the North Carolina Museum of History in the city of Raleigh and features more than 200 items commemorating extraordinary athletic achievements (North Carolina Museum of History, 2023). In addition to the museum, it hosts annual events such as the Hall of Fame induction ceremony, fundraising golf tournament, and speaker series to engage its audience. The NCSHOF is confronted with two challenges: outdated exhibits lacking interactivity and revenue, and a lack of engagement programs for a younger audience, with existing initiatives primarily targeting middle-aged and older adults. Despite being a non-profit cultural and educational organization, the NCSHOF must transform itself into a company that can generate revenue, adapt to

evolving modernity and industry expectations, while remaining true to its mission. These NCSHOF's current challenges lead to the following research question: How can NCSHOF boost fan engagement, appeal to younger audiences, and generate innovative revenue streams to stay competitive? Therefore, the purpose of this study is to investigate advancements in museum attractions, exhibit content/design, and engagement programs to develop effective marketing solutions for the future direction of the NCSHOF. Our findings suggest that the NCSHOF should implement engaging programs and exhibits for younger generations and seek brand exposure through partnerships as well as cultivate more compelling and accessible programs. First, the NCSHOF can implement youth summer and spring educational camps for an exclusive experience for children of all ages as well as improve exhibit content to target children. Second, they can emulate what the NASCAR Hall of Fame created with accessibility for outside use of their exhibits and facilities by renting out event spaces for many different possible events. Lastly, the NCSHOF can enhance visibility and engagement through partnerships with local communities and schools. With the collaboration of these strategies, the NCSHOF can propel itself forward in the market by leveraging the key elements of exposure, engagement, and accessibility.

### **Female Collegiate Athletes' Perceptions of Empowerment: Addressing Equitable Practice in College Athletics**

**Juliette P. Cryder** (Dr. Cara Lucia) Department of Sport Management

Collegiate female athletes stand as powerful symbols of empowerment, showcasing strength, resilience, and determination both on and off the field. The nomological network for psychological empowerment is described at the individual level calling for an individual to have a critical understanding of their environment and how they show up as a participant in their community beyond intrapersonal behaviors. Empowerment is how one perceives and gains control over personal issues, understands their environment critically, and takes action to influence challenges in their communities (Lim & Dixon, 2017). The nomological network is the theoretical framework to describe female athletes' perceptions of equitable practice through intrapersonal, interactional, and behavioral dimensions. Researchers (Lim & Dixon, 2017) have stated that despite a male-dominated system, sport helps female athletes develop their physical and life skills and leads to personal empowerment. Sport has created a space where female athletes may encounter tensions between gender expectations placed on them, especially when they compete in traditionally male sports, and become more aware of the gendered culture of sport and society. The overarching question that guided this inquiry was: What perceptions do female collegiate athletes have about empowerment and equitable practice in college athletics? Using interviews of six women, this qualitative study used a phenomenological approach to understand the experiences of female student athletes (Creswell & Ploth, 2018; Rossman & Rallis, 2003). The study explored the experiences of women competing in Division I collegiate athletics and their perceptions of empowerment. Qualitative research relies on trustworthiness to signify rigor (Merriam & Tisdell, 2016), and trustworthiness was demonstrated in this study. Methods of establishing credibility include triangulation and member checks (Lincoln & Guba, 1985), both of which were used. Results from this study indicated three distinct themes: equitable resources, coach-faculty-peer relationships, and positive perceptions. The findings from this study provide insight into how female collegiate athletes perceive empowerment and could be used to inform decision making of



coaches and administrators. The study offers implications for future research and practice to address the complexities and build on opportunities for female athletes competing at the Division I level.

### **An Economic Impact Analysis of College Conference Championships: A Review of the Literature**

**Sarah P. Dawkins** (Dr. Khirey Walker) Department of Sport Management

Conference championships are one of the largest drivers of economic impact in college athletics. Fans of participating teams bring money into local economies as they are willing to travel long distances, stay at hotels, and shop at local businesses during their visits to see their teams play. The purpose of this literature review is to assess how prior research regarding economic impact is structured, as well as determine and analyze common themes within the literature. Literature collection for this project began by studying Howard & Crompton's (2004) inviolable principles of economic impact analyses and alternative benefits for sporting events. With this, research continued by further analyzing into each principle/benefit and finding other scholarly articles that discussed them. Afterwards, economic impact analyses were analyzed if they followed Howard & Crompton's (2004) principles, and how they can be applied to other studies. The literature reviewed indicates that economic impact analyses are often overestimated as studies tend to exclude important factors to make the subject appear more valuable. To avoid this, Howard & Crompton (2004) suggested following the five inviolable principles central to the integrity of economic impact analyses. After completing the literature review and collecting data, this study will continue by analyzing the economic impact of conference championships for a Division I conference. Every championship will be evaluated individually to determine the economic impact on the host community, and later data from all championships will be combined to estimate the collective economic impact of all championships hosted by the conference. This will help determine which sports bring in the largest economic impacts, and which cities benefit most from hosting these events. Alternative contributions to economic development will also be analyzed as these factors can unite community members and fans which can lead to long-lasting social benefits.

### **Supporting the Supporters: An Analysis of Division I Athletic Trainers and Their Pursuit of Fulfillment**

**Grace Dieleman** (Dr. Khirey Walker) Department of Sport Management

Athletic trainers (ATs) play a crucial role in college athletics, by supporting student-athletes and contributing to their overall welfare and performance. They do this through providing them with injury prevention exercises, rehabilitation after injury, immediate care in the event of an emergency, athlete physicals to ensure that they are fit to train and compete, and so on. This career path has high demanding hours, little pay, and lots of pressures. ATs must walk the line between the health of athletes and meeting the competitive demands of the program. This includes pressure from coaches and athletes to return to competition as quickly as possible, without compromising the athlete's health. In National Collegiate Athletic Association (NCAA) Division I schools, coaches play a greater role in their job security (Lacy et al., 2020) and ATs' decisions are even more difficult due to the possibility of their salary being at risk. Collegiate ATs consistently work more than 60 hours per week and are on

average, less satisfied with their jobs (Easton & Singe, 2022). Additionally, collegiate athletics is dependent on the athletes and the ATs that show up seven days a week to provide enough support to keep them on the field in such a demanding and high-pressure environment. Thus, the purpose of this study is to examine fulfillment and well-being for collegiate athletic trainers within a Division I institution. Specifically, 8 semi-structured interviews will be conducted with current Division I athletic trainers to gather insight and perspective regarding their experiences within their day-to-day roles. Upon completion of the interviews, data will be transcribed and coded into themes and subthemes, then analyzed as a comparison to other reported experiences within the field.

### **Crafting a Winning Fan Community: A Sport Marketing Case Study of Tampa Bay Sun Football Club**

**Sammy P. Fisher, Will R. Haynes, & Cierra R. Hopson** (Dr. Young Do Kim & Dr. Tony Weaver)  
Department of Sport Management

League growth and franchise expansion to new markets are commonplace in professional sport. The United Soccer League (USL) has launched its first professional women's soccer league, the USL Super League, and is set to kick off in August 2024 with eight clubs. One of the clubs, located in Tampa Bay, Florida, is called Tampa Bay Sun FC (TBSFC). In their inaugural season, TBSFC faces fierce competition against the already established professional teams in the city, most of whom have won titles in the past five years. Due to the challenges of entering a new market, building a diverse fanbase is crucial to the success of TBSFC. In conjunction with TBSFC's posed marketing task, this study relies on secondary data and existing literature in sport marketing to answer the research question: How can TBSFC effectively differentiate its brand and cultivate a passionate fan base leading up to its inaugural season? Therefore, the purpose of this study is to examine the current Tampa Bay market and the business of professional women's sport to provide evidence-based marketing solutions. Our findings suggest that a focus on three key initiatives would be most beneficial to the club's growth. The first innovative marketing strategy is youth engagement through after-school care via a mentorship program. 104 students were studied on their mentoring perspectives, with 91% seeing improved satisfaction (Watson et al., 2009). The main goal of youth engagement is to retain younger audiences by establishing direct relationships. The second strategy is the use of short-form media. It only takes 15-90 seconds to create, yet 66% of social media users indicated that it is the most engaging type of content and 2.5 times more engaging than long-form media. The last strategy is the implementation of a pride theme night. Women's soccer has become a haven for LGBTQ+ communities. Looking at the NWSL, their pride night saw a league-wide 32.1% increase in ticket sales, highlighting the success this promotion can have. Through these initiatives, TBSFC will not only become a community-driven organization but also a Tampa Bay powerhouse that will ignite the city.

### **Perception vs. Reality: How Fantasy Experts, Scouts, and College Students Value NFL Players<sup>3</sup>**

**H. Heath Foster** (Dr. David Bockino) Department of Sport Management

Fantasy football, a virtual game tied to real players' performance, has become a significant influence in modern sports culture. It not only shapes fan engagement with the National Football League (NFL) but also affects league marketing strategies and media-related player evaluations. Notably, the NFL, a

multi-billion-dollar industry, and its revenue streams, are intertwined with the public perceptions of a players' fantasy value, which may differ greatly from their actual on-field value to a team. NFL players undergo evaluation by two distinct groups: fantasy football experts and NFL scouts and managers. Each has contrasting criteria for what makes a 'good' player. Fantasy football experts prioritize statistics, consistency, and maximizing fantasy points in the short run, emphasizing opportunities and touchdowns (Becker & Sun, 2016). In contrast, NFL scouts and managers heavily consider a player's physical attributes and long-term potential to contribute to a team's success (Mulholland & Jensen, 2014). This study aims to fill a gap in previous research by comparing these distinct evaluation styles and analyzing the best NFL wide receivers and running backs for each group over the past season. The lists of players will be determined by a variety of advanced metrics closely aligned with each evaluation style. College-aged students familiar with the NFL and fantasy football will then rank these players independently before attending a focus group, helping determine if public perception aligns more with fantasy experts or NFL scouts. Previous research suggests participants will lean towards the former, offering valuable insights into the game's real-world impact. League marketers and broadcasters can use this information to highlight undervalued players either by narrative or through on-screen metrics. Additionally, this research can lay the groundwork for further exploration of how fan perceptions of a player in different sports leagues contrast with their actual value to a team on-field.

### **Promotions and Themes: An Empirical Analysis of Attendance Factors in the National Women's Soccer League<sup>3</sup>**

**Lena Gunn** (Dr. Alex Traugutt) Department of Sport Management

The National Women's Soccer League (NWSL) has experienced significant growth and increased popularity over the past decade. However, understanding the factors that influence attendance at NWSL matches remains a critical area of research. The primary purpose of this study was to evaluate the impact of themes and promotions on match attendance, shedding light on the ways in which marketing and fan engagement strategies can enhance the league's growth and sustainability. Previous studies have examined a multitude of variables that influence attendance across various levels of sport, with promotions and themes generally having a positive impact on attendance. This study sought to build on prior research by examining the impact of promotions and themes on attendance in the NWSL, a league that has yet to be explored in such a manner. The data for this study included all home games for the 2023 season ( $N = 167$ ). While collecting data from multiple seasons would have been preferred, the league and teams do not publish information on themes and promotions from previous seasons. Individual game home attendance, as a percentage of stadium capacity, served as the dependent variable. The thirteen independent variables included in the model were derived from previous studies and featured a mix of internal, external, and performance-based factors. The results from the regression model indicated that five of the independent variables were significant at either the 5% or 10% levels. The significant internal variable, Themes ( $p = .073$ ), was positive and suggested that games featuring a theme were associated with a 9.7% increase in attendance. The remaining four significant variables were all external. Detailed findings from the model will be presented. The results of this study offer specific and valuable insights for the NWSL and underscore the impact that games featuring a theme have on attendance. Additionally, the significance of external factors suggests that teams should not solely focus on internal marketing strategies but also consider the wider

socioeconomic and competitive landscape of their area. These findings offer actionable insights for NWSL teams to better target their marketing efforts and potentially attract a broader fan base.

### **"Handle with Care": A Qualitative Analysis of Recreational Youth Baseball Coaching and Mentorship**

**Kenny Mallory, Jr.** (Dr. Khirey Walker) Department of Sport Management

Previous research examined how coaches have designed sport specific coaching strategies and implemented mentorship programming as a method to enhance youth athlete experiences. For example, McCallister et al. (2000) investigated how volunteer youth sport coaches attempt to blend teaching young athletes about their respective sport, but also attempting to teaching life lessons, such as teamwork and respect. Youth sport coaches discussed fulfillment yet difficulty of mentoring children about life skills outside of their respective sport considering that there tends to be backlash from parents and guardians regarding the messages and how they are delivered (McCallister et al., 2000). Although there have been prior studies that focus on the mentor experiences of coaches, there is a gap in literature that has a more comprehensive view of mentorship in the scope of coaches, parents, and participating athletes. For this study, 30 semi-structured interviews were conducted with parents and coaches of teams within the City of Burlington (NC) 10U League to gather meaningful descriptions of youth athlete-coach mentorship and the expectations from both coaches and parents regarding coaching styles, needs, and the league itself. The research team attended four games of the participating team during the regular and postseason. Interviews were completed at the competition site and each participant was provided the same four questions including: why recreational baseball instead of travel baseball, what are your expectations of the coaching staff, what are areas where the league has benefitted your child, and where are areas where the league can grow to enhance your child's experience. As a result of this study, the implementation and utilization of mentorship within recreational youth baseball is both necessary for the participants, but also for the coaches. The themes resulting from the interviews reference a transparency regarding both the purpose and need for the league, but also a desire to increase opportunities to grow the ability of all participants, whether coach or player.

### **#Coachruinedthesportilovecheck: TikTok Exposing the Detriments of the Coach-Athlete Relationship**

**Celsey V. McMahon** (Dr. Shaina M. Dabbs) Department of Sport Management

TikTok is a short video platform that can shoot, publish, and share content. As the fourth most popular social media platform with 1.1 billion active monthly users globally, 1 billion videos are viewed daily. Social media provides young people with expanded access and connectivity, empowerment, and community formation (Fu & Cook, 2021). In sport, athletes leverage TikTok to create trends, user-generated content, and higher levels of fan engagement. TikTok provides a closer look at the coach-athlete relationship, the most influential factor in athlete self-efficacy development. Athletes with coaches who use expertise, reward, and admiration experienced greater amounts of affective and cognitive learning, building authentic connections with coaches. Conversely, destructive coaching styles that undermine motivation, satisfaction, and success negatively impact athletes' relationships,

well-being, and engagement (Weight et al., 2020). This research is one of the first to investigate how athletes use TikTok to create a community related to the detrimental impact of a negative coach-athlete relationship. When searching the word “coach” on the explore page, the first autofill answer was #coachruinedthesportilovedcheck. This trend shows color pictures of athletes playing transition to black and white to convey lost love for the sport. Through content analysis, this study examined the first 100 videos to appear when using the #coachruinedthesportilovecheck. A total of 3.84 million views and 574,000 likes were accumulated. Athletes expressed themselves by lip-syncing to sad songs (23%) with in-text comments over the videos. Videos averaged 48 comments including “took one coach” and “I’m sorry younger me”. Over 74% of videos represented female sports. Softball (21%) and men’s basketball (31%) were most represented. Only 5 out of 100 athletes were still playing. Results show an alarming trend; coaches may influence athletes to quit their sport. Performance and psychological well-being are at the heart of the coach-athlete relationship. Practitioners can use this information to intentionally help coaches manage interpersonal exchanges more effectively. Lastly, trends on social media can show issues that would otherwise remain hidden. TikTok is a platform that creates a community where athletes feel comfortable sharing experiences while simultaneously shedding light on a potentially detrimental issue.

### **The Winter Experience: An Assessment of Merging "The Game" & "The Winter Classic"**

**Teddy Morgan** (Dr. Khirey Walker) Department of Sport Management

As the Columbus Blue Jackets played their inaugural season in 2000, they laid down a firm foundation for hockey in Central Ohio. This has paid dividends since in 2023, Olentangy Liberty brought the region’s first-ever state title. By combining the rivalry between Ohio State University and the University of Michigan with a new rivalry between the Columbus Blue Jackets and Detroit Red Wings, hockey can further grow in the state through more youth participation and increased attention to the Blue Jackets through its association with “The Game”. The Michigan Wolverines versus Ohio State Buckeyes is one of the biggest College Football rivalries, and although its on-ice matchups receive less attention nationwide, it is nevertheless a fierce rivalry. The Buckeyes and Wolverines have played twice in Cleveland’s baseball and football fields, but bringing it to Ohio Stadium, also known as “The Shoe”, will bring the matchup to the level of its gridiron counterpart. This, combined with a matchup between the Blue Jackets and Red Wings that weekend, will put all eyes on hockey in Columbus, which will bring in revenue to make the sport more accessible in Ohio and create “Buzz” by associating these rivalries with each other. The purpose of this study is to analyze the potential of remaking “The Game” to become a dual competition with the National Hockey League and NCAA hockey. Details are provided through a marketing plan that will elaborate on specific components that would be included in potential hockey games between the Columbus Blue Jackets/Detroit Red Wings and the University of Michigan Wolverines and The Ohio State University Buckeyes at Ohio Stadium. Data pertaining to the event proposal was collected through the gathering of resources from both intercollegiate athletic institutions, both professional franchises, and community sponsors within Central Ohio. Once information was collected, prior executed events and common themes were examined to begin construction to the proposed event.

### **Mounting Pressure: A Textual Analysis of State Legal Regulations on College Sport Gambling**



**Bronson Myers & Pedro Rabadan Arbuties** (Dr. Khirey Walker) Department of Sport Management

Gambling is a controversial and complex issue that raises ethical concerns in the college sport industry. One of the major concerns regarding gambling in college sports is the potential for corruption when student-athletes, coaching, and other personnel engage in gambling activities; the integrity of the game can be at risk. The debate whether gambling should be introduced into college sports or further restricted reflects a broader debate at the intersection of sports and business. Balancing the excitement and entertainment value of sports with the need to protect the integrity of college sports is necessary, and finding a solution that satisfies all involved remains an ongoing challenge. With the growing presence of sports betting on college sports and partnerships between universities and sports betting companies, college sports betting could have a major impact on the sports industry. The American Gaming Association predicted that \$15.5 billion (i.e., about \$48 per person in the U.S.) will be wagered on the NCAA March Madness Basketball tournament by 68 million people. (Browne, 2023). To put into context exactly how many people are sports betting on March Madness this year alone, the previous statistic represents roughly a quarter of the United States population. (Browne, 2023). Although sports betting is a widely encompassing industry, its impact on college sport is controversial, with various states approaching the ability to wager on college sport competition in numerous ways. As a result, this study comprises of a textual analysis of state regulations regarding if and how gambling on college sports takes place. Details within each state's law regarding college sport wagering will be analyzed, and the areas of focus impacted by ongoing sports betting activities will be studied to determine the overall consequences and severity of its effects.

### **Examining College Football Success and Money Donated to Football Bowl Subdivision Athletic Departments**

**Ryan Pleasants** (Dr. Khirey Walker) Department of Sport Management

With the many different issues facing college athletics today, it is more important than ever to understand the reason why fans donate money to college athletic departments. In today's world, athletic departments must decide how much time and money they want to devote towards Name, Image, and Likeness (NIL). In the past, it was a simpler question to donate money to a specific sport program or give to the athletic department. There is not much current research that addresses NIL, which could be a factor in total dollars donated to athletic departments. The overarching research question was "What are the greatest factors for donations to the school athletic department?", using football as the sport to weigh on-field variables. To answer this question, correlation tests and regression models were deployed, using variables that encompassed on field factors, such as making a bowl game, making a "New Year's Six" bowl game including the College Football Playoff, and making and winning their respective conference championship. Knight-Newhouse dataset was used to collect financial data of each Football Bowl Subdivision (FBS) school from 2005 to 2022. A correlation test was conducted to examine the relationship between the on-field variables of success and money donated. The finding of this study suggested that there was little correlation between any of the on-field variables and money donated, which is in line with most of the previous research on this topic. According to Cohen et al. (2016), despite a college football team's high levels of success for a long period of time (i.e., 25 seasons), there was no significant change in athletic giving. Overall, this current research is in line with past literature in that the reasons for athletic giving are greater than wins



and losses on the field of play. One of the key findings of this study is that conference affiliation played a minor role in donations to Big 12 and SEC athletic departments but did not have any affect on donations to schools in other conferences.

### **Viewer Affinity for Live Sports Broadcast Innovations<sup>3</sup>**

**Elliot Rezek** (Dr. David Bockino) Department of Sport Management

The NFL is one of the most popular sports leagues in America. In the first two weeks of the season alone, NFL games are averaging 17.5 million viewers per game. However, the way NFL games are consumed is changing with the advent of new broadcast techniques that may cater to audiences with different levels of football experience. My research aims to evaluate the response of viewers from various football knowledge bases to new camera angles being used in NFL broadcasting. The traditional broadcast angle shows the two teams on the line of scrimmage and depicts the players' movement up the field as horizontal movement across a viewer's screen. The new camera angle dubbed "All 22", shows the field from behind the view of the offense, making the downfield movement of players appear as vertical movement on the viewer's screen. The reviews of the "All 22" camera angle have been mixed. Some viewers enjoy the new camera angle, as it allows them to see plays unfolding from the offense's perspective and the defense's response to specific movements, which is especially noticeable on throwing plays. Other viewers say that the camera angle is disorienting, especially to viewers who are not as familiar with the intricacies of football. This study will gauge the viewers' affinity for the new camera angle using data from individual interviews complemented with data from eye-tracking software used while watching plays from both camera angles. The use of eye-tracking can indicate feelings of stress, interest, or confusion upon viewing certain material. Conducting interviews on and tracking the eye movements of participants who are avid and casual football viewers allows me to gain insight into how and when to use this camera angle during broadcasts. Furthermore, this study will indicate if the new camera angle is inviting or isolating to viewers new to the sport, which could have implications for viewership trends.

### **Using Losses to Gameplan for Wins: Applying a Machine Learning Model to Historical Game Data to Improve Team Performance<sup>3</sup>**

**Ethan J. Singer** (Dr. Alex Traugutt) Department of Sport Management

Sports analytics have been a topic of discussion for fans, with some believing that analytics are ruining the sport, while others believe there is value in applying data to formulate strategies. This research will attempt to determine whether consistent data-driven strategies could be developed to improve the performance of the Elon men's basketball team. The national recognition a university receives for being successful and making March Madness can increase applications and revenues, as well as boost student morale. Thus, these findings have the potential to be impactful at various levels. Using data analysis has been shown to improve team performance, even in the major leagues. In 2002 the Oakland Athletics baseball team optimized their lineups using statistical analysis and the team nearly won the World Series that season. Strategies for the Elon men's basketball team were developed using game data from the past five years that was further cleaned and processed. Multiple machine learning models were initially tested to find the most accurate model. Linear regression and random forest models were

selected that incorporated various team and opponent statistics to predict the probability of an Elon win. It was found that more team offensive rebounds and limiting opponent three-pointers made were the most significant predictors to increase win probability. Both team and opponent turnover totals were also significant in the model's output. Additional results will be discussed as well as their practical implications. Using this information, Elon could effectively implement data-driven strategies to improve overall performance.

### **Foul Balls: Who Do They Benefit?; Evaluating the Impact of Foul Balls & if They Benefit the Pitcher or Hitter**

**Evan Wu, Tristan Hiestand, Tobias Coker, Alex Wigder, & George Lyche** (Dr. Mark Cryan & Dr. Ryne VanKrevelen) Department of Sport Management

This presentation will be centered on the work of the Elon SABR Analytics Competition Team, jointly supported by the Sport Management (School of Comm) and Math & Statistics (Arts & Sciences). The competition team will conduct a systematic “analysis and presentation of a baseball operations decision — the type of decision a team’s GM and his staff is faced with over the course of a season. The cases are developed by former SABR Board President Vince Gennaro, co-founder of the SABR Analytics Conference, author of *Diamond Dollars: The Economics of Winning in Baseball*, and consultant to MLB teams.” (from SABR Analytics Conference Case Competition 2024, retrieved from <https://sabr.org/analytics/case>). The student researchers broke down the cost of a foul ball by using complex statistical models to predict the foul ball run value and opportunity cost (run value of a take and non-foul swing). This project utilized pitch-by-pitch data from Baseball Savant, every pitch from the 2023 MLB regular season. This research project includes identifying and defining the actual research question being asked, defining relevant terms, deciding what data is appropriate and what assumptions must be made. The goal is producing a solution that isn’t necessarily the “right” answer, but is a logical, data-based solution. Student researchers will employ traditional baseball knowledge, use of coding in R, and utilize currently available analytics metrics, both historical and predictive. To determine foul ball run value, the student researchers re-classified observations based on count states, outcome (foul, take, non-swing) and used random forest (machine learning) models to project changes in run expectancy. The students utilized the ggplot2 package in R, as well as Canva graphic design in order to create visualizations for their findings. As a public-facing final product, the student researchers created a website using the shiny package in R. This website takes inputs of pitch type, speed, and matchup handedness information in order to display a summarize graphical representation of their results (for the given inputs), in the form of a color-coded strike zone.

### **The Facility Arms Race: How It Affects the Success and Integrity in College Athletics**

**Ben Zipay** (Dr. Khirey Walker) Department of Sport Management

Since the earliest days of college athletics, universities with a strong desire to win have always sought ways to differentiate themselves from their competitors and attract the highest possible level of athletes available. The race to become the best of the best by heavily upgrading athletic facilities is referred to as the college athletics’ arms race (Varga & Lingrell, 2018). The largest and most successful colleges in the nation understand the value that top notch facilities provide for attracting the best athletes. For

this reason, the college athletics' arms race has seen continuous growth and shows no signs of stopping. As one could imagine, this limits the facility arms race to large Power Five conference members (e.g., Atlantic Coast, Big Ten, Big Twelve, Southeastern, and Pacific-12) with networks and alumni capable and willing to fund the amenities needed to attract top student-athletes to the program. When it comes to financing such extravagant venues, there are multiple methods, but student fees are one of the most common. Most recently, colleges and universities have been utilizing the usage of student fees and boosters to fund their newest amenities. A survey specific to The Ohio State students was carried out to determine the extent of how aware students are of their fees funding athletic programs and facilities (Denhart & Ridpath, 2011). The aforementioned study determined that most students were aware that a portion of their fees was directed toward athletics, but a staggering minority of them understood just how much money was allocated. In the completion of this study, a comparative analysis was implemented to assess how institutions are constructing new athletic facilities to remain competitive with conference and national members, as well as if student fees are used to fund the facilities. Specifically, this study will analyze newer athletic facilities of the Atlantic Coast Conference member institutions in the last ten years and details that will be compared include, but are not limited to: 1) cost; 2) square footage; 3) amenities; 4) team utilization (i.e., which team is the facility for); 5) location on campus; 6) student fees (i.e., if student fees are used to fund facility costs).

## Strategic Communications

### **Brilliantly Black: Success and Resiliency in PWI's<sup>1</sup>**

**Jasmyn Brown** (Dr. Vanessa Drew-Branch) Department of Strategic Communications

Black students are isolated and lack belonging in predominantly White educational spaces. Education is the accelerant for success in the Black community, and despite racial challenges, Black students have flourished in predominantly White spaces. This study is an analysis of qualitative comments generated from TikTok, a social media platform. The creator of the TikTok video is a student at a predominately White institution (PWI) and created the post to ask for advice about surviving in PWIs. The project Resilience and Black Brilliance (R&B) will depict a marginalized perspective and showcase the achievements of Black students. The story will be told through an interactive tri-poster.

### **Golfing in the Gulf – Saudi Arabia's Strategic Use of LIV Golf as a Sportswashing Tactic**

**Jacob D. Kisamore** (Dr. Kenn Gaither) Department of Strategic Communications

This study explores how American media outlets have covered LIV Golf, a breakaway professional golf tour funded and operated by Saudi Arabia's Public Investment Fund. LIV's new format, lighter schedule and lucrative guaranteed contracts attracted many of the world's top ranked players, but its funding has also drawn international condemnation due to Saudi Arabia's oppressive government and human rights record. Critics have billed LIV as a sportswashing attempt by Saudi Arabia as part of its Vision 2030 plan, a way for the country to diversify its economy and legitimize its image on a global stage. The media has covered LIV extensively since its launch, with both general and sports outlets

writing stories about the new league. This study employs a mixed-method content analysis to examine how four media outlets – The New York Times, USA Today, ESPN and Golf.com – cover LIV. A sample of over 300 articles from selected timeframes in 2021, 2022 and 2023 were analyzed to determine which common frames and themes are used throughout coverage of LIV and establish how coverage by the two general outlets compared to the sports outlets. The results revealed that the general news outlets covered LIV Golf’s Saudi Arabian involvement more and used the term sportswashing more often than did sports outlets. Additionally, through the qualitative analysis, key frames emerged, with some articles focusing on sportswashing and Saudi Arabia’s government and human rights record through a critical lens with other articles taking a more passive tone that focused more on golf rather than Saudi Arabia’s involvement. Other findings and their implications are discussed.

### **Environmental Activism on Instagram: Exploring the Effects of Advocate Type and Image Type<sup>2,3</sup>**

**Katelyn R. Litvan** (Dr. Qian Xu) Department of Strategic Communications

Instagram has been credited by youths as one of the ideal social media platforms to engage in education and activism about environmental issues. Any advocate can share environmental activism messages on Instagram. However, an advocate’s identity can influence how a post affects followers’ attitudes and behaviors toward the advocated issue. To understand the impact of advocate’s identity and how it interacts with different types of images used in the Instagram, this study employs a 3 (advocate type: celebrity, intellectual, ordinary person) x 3 (image type: picture of an event scene without advocate presence, picture of an event scene with advocate presence, text graphic only) between-subjects experiment. A total of 155 undergraduate students participated in this online experiment and were randomly assigned to viewing one of the nine fictitious Instagram posts, addressing the topic of land pollution. The analysis revealed main effects of advocate type, such that the intellectual was perceived as significantly more authentic and more credible than either the celebrity or the ordinary person. There was no significant difference between the celebrity and the ordinary person for any of the dependent variables. This study also found several significant main effects of image type. The advocate was perceived of significantly less authenticity and credibility when the post included a text-only graph than when it included a picture featuring an event scene either with or without the presence of the advocate. The post using the text-only graph was also considered as of less persuasive intent than those using a picture featuring the event scene either with or without the advocate's presence. Participants also demonstrated more positive attitudes and behavioral intentions toward the post using a picture featuring the event scene either with or without the advocate’s presence than the post with a text-only graph. The results of this experiment could provide practical implications on the choice of influencers and visual strategies for environmental advocacy campaigns on social media.

### **Frames of Death: The Rhetorical Goals of Official Social Media Posts in the Russo-Ukrainian War**

**Miles B. Vance** (Dr. Daniel Haygood) Department of Strategic Communications

The ever-rising prevalence of social media in daily life has presented a substantive impact on the field of propaganda. Governments now regularly utilize the incredible power of social media to disinform, distort, and otherwise sow chaos among a target population. This phenomenon has been observed and studied since the early days of the internet, but interest in the field has steadily increased since the Russo-Georgia War in 2008, when Russian propagandists utilized the internet to spread misinformation with zeal. Additionally, recent conflicts around the world have displayed examples of social media propaganda being used alongside traditional mediums of propaganda as part of a mental warfare campaign. The most recent example of this can be seen in the current phase of the Russo-Ukrainian War, which began after Russia invaded the eastern oblasts of Ukraine in February 2022. This research examined translated examples of social media content posted by Russian, Ukrainian, and Wagner-affiliated social media channels on social media platform Telegram and analyzed the content for rhetorical goals and devices. The study employed the analysis of two posts from each side for three different events: the fall of the Ukrainian city of Bakhmut, the Kerch Bridge explosion, and the one-year anniversary of the invasion. This leads to a total of 18 individual posts. The results of this study show that the most common themes of social media content were legitimization, deflection, humor, and violence. These themes have been observed by scholars in the past, and they remain prevalent today. The most common approach was legitimization, as both sides sought to emphasize the importance of the war to their home populations amidst a steady decline in morale. All three sides appear to use similar tactics, although Russian channels often defer from posting directly violent content when compared to their Ukrainian or Wagner counterparts. Ultimately, Russian, Ukrainian, and Wagnerite propagandists seek to engage the viewer through these methods and attempt to directly manipulate the morale of civilians on every side of the conflict.

## World Languages and Cultures

### Percy Jackson, Western Civilization, and the Far-Right

**Zoie M. Browder** (Dr. Tedd Wimperis) Department of World Languages and Cultures

This research analyzes the first five novels in Rick Riordan's *Percy Jackson and the Olympians* series, published between 2005 and 2009. Aimed at middle grade children, the books introduce young readers to the world of Greek mythology—transposed onto the 21<sup>st</sup> century United States, which is positioned as the current epicenter of Western civilization. The Southern Poverty Law Center states that white nationalists, avid supporters of white supremacy, “believe that white identity should be the organizing principle of the countries that make up Western civilization,” and the first five Percy Jackson novels subtly exhibit ideals and use language that aligns with that of white nationalist and far-right groups. Whether this is casual xenophobia with villains having Middle Eastern accents or the Founding Fathers being demigods and therefore direct inheritors of Greek democracy, the West is idolized in alarming ways across the books. Through careful examination of these moments, this research identifies and problematizes commonalities between the rhetoric used in the novels and that used by far-right groups. Building on scholarship on the (mis)use of the Ancient Mediterranean world in both children's literature and by white supremacist groups (Murnaghan, Zuckerberg), I then consider the impact on

children encountering the novels in their formative years. Understanding the context in which these novels were written—post 9/11 America—helps elucidate why there are more problematic elements in the early novels. Riordan’s later books are more inclusive and push the greatness of Western civilization less than the books examined in this research; however, a new generation of young readers are turning to the novels with the release of the Disney+ series of the same name. Though Riordan was not purposefully pushing a far-right agenda, it’s important to consider the unintended effects of the rhetoric used in the novels.

### **Decoding Aesthetic Descriptions of Cynthia in Propertius' Elegies**

**Ava N. Crawford** (Dr. Kristina Meinking) Department of World Languages and Cultures

This project explores how the Roman elegiac poet Propertius (circa 50-15 BCE) communicated his feelings toward his literary girlfriend, Cynthia, via aesthetic descriptions of her appearance and demeanor. The figure of the elegiac *puella* (‘girlfriend’) served as a narrative framework in ancient Roman love poetry. For this reason, scholars such as Alison Keith (2012, 2015), Maria Wyke (1987, 2002), and Alison Sharrock (2000) argue that we should regard the *puella* as a literary construct and not an account of a historical person. Similarly, the poet himself acts as a character in the poems; his roles both as the narrator of each poem and as the person afflicted with love for his *puella* necessitate that we approach the poetry with a careful interpretive eye. Throughout his four books of poems, Propertius cyclically both praises and condemns Cynthia; this inconsistency and seeming fickleness highlights the complicated relationship that the poet creates between the two characters. My project analyzes Cynthia’s physical appearance by separating Propertius’ descriptions of her into two aesthetics, one natural and one stylized. I then look at specific components of Cynthia’s aesthetic description as indicators of the narrator’s attitude toward her. Propertius tends to praise Cynthia in what I term a “natural state,” when her hair is undone and she has no adornment and conversely criticizes her when she is wearing jewelry and elaborate hairstyles in a “stylized state.” My project reads Propertius’ emotions through aesthetic descriptions of Cynthia to clarify how he sees not the outward appearance of her character but how he feels about her constructed persona. Building on the work of Keith, Wyke, and Sharrock, my project contextualizes these aesthetic descriptions in the socio-cultural world of early first-century CE Rome, when the emperor Augustus encouraged morality and family values. Cynthia’s aesthetic in the elegies provides us with a deeper understanding of how Propertius, both the author and the character, feel about her. Additionally, the setting of first-century Rome is essential to the elegies as Propertius’ commentary on Cynthia’s aesthetic is compounded by the multi-faceted culture of the Augustan age.

### **Translating Identity: The Influence of Sociocultural Contexts on Sapphic Translations by Women<sup>1</sup>**

**Renée Driver** (Dr. Kristina Meinking) Department of World Languages and Cultures

During her lifetime, the Lesbian poet Sappho (c.610-570 BCE) composed over 10,000 lines of poetry. The surviving fragments of Sappho’s work have been translated countless times throughout history, each translation different from the last. Historically, male scholars have dominated this landscape and produced the majority of published translations. Over the last century, however, women scholars and



translators have risen to prominence and have made significant contributions to the study of Sappho and her poetry. Translators such as Mary Barnard, Anne Carson, and Diane Rayor help us to see these ancient texts anew, engaging with and drawing out elements of the poems previously ignored, suppressed, or overlooked. In this project, I examine the importance of women's perspectives in our understanding of Sappho's poetry and suggest that a scholar's sociocultural context vis-à-vis feminism and attitudes toward LGBTQ+ identities shapes their rendering of the text. My analysis focuses on Sapphic fragments 1, 31, and 102 as translated by Barnard, Carson, and Rayor. These specific fragments offer critical insight into the intertwining nature of translation and identity: each poem forefronts female longing, and the Greek text includes both gendered and non-gendered pronouns. The rendering of these specific pronouns is consequential because it directly reflects translators' context and explores the question of Sappho's homosexuality. Through analysis of the aforementioned translations, one can see the significance of women's perspectives in the rendering of ancient texts and the value in contextualizing Sappho's work in modern feminist and queer lenses.

### **Vestal Virgins, Women of the Imperial Household, and Augustan Propaganda**

**Marissa J. Duffield** (Dr. Tedd Wimperis) Department of World Languages and Cultures

Ancient Roman authors often linked the survival of the state with the chastity of women, particularly matrons (married women) and the virgin priestesses known as Vestals. 'Improper' conduct such as unchastity or impious behavior was an impetus for crisis. This improper conduct was a catalyst for divine retribution and, as a result, the control of female sexuality became a central theme of propaganda during the time of Augustus (31BCE-14CE), Rome's first emperor. In this paper, I argue that both the Vestals and the women of the imperial household occupied analogous roles in Augustan propaganda as symbols of state stability and extensions of the emperor in imperial propaganda. I examine primary sources of both material culture and literature as well as relevant scholarly sources. My focus is on the depiction of women in the Forum of Augustus, the Roman poet Ovid's *Fasti*, and the construction of Livia's character by Roman authors. My research explores the masculine co-opting of women and their social impact in Augustan propaganda while still highlighting the agency and influence of these women. The Vestals, whose primary responsibility was tending to a flame that was symbolic of the survival of the Roman state, were key to the stability of Rome. By positioning himself closely with the Vestals both legally and artistically, Augustus framed himself as another guarantor of Rome's continued stability and prosperity. Further, Augustus, who styled himself as the restorer of traditional Roman morality, needed to model those standards in his household by having a wife, Livia, whose chaste virtue was unquestionable. Livia's image as an ideal Roman matron thus also played an important role in shaping the perception of both the imperial family and the empire. Existing research focuses on the unique legal similarities between the Vestal Virgins and the women and argues over the intentionality of their legal proximity. My research, rather, analyzes the extensive cultural impact these women had in the fashioning of the Roman Empire.

### **LGBTQIA+ Resistance in French Written Expression: Alice Coffin, Fatima Daas, and Complexities of Gendered Language in Contemporary France**

**Julia N. DuVal** (Dr. Sophie Adamson) Department of World Languages and Cultures

Within French-speaking contexts, language serves as both a tool for self-expression and a barrier to queer visibility and recognition. While words offer a means for queer individuals to express their identities and experiences, the lexicon, such as gendered nouns and adjectives, reinforces binary notions of gender. This project asks if and how language can both reinforce and resist the marginalization and erasure of non-binary and gender-nonconforming identities in the context of two contemporary texts in French by lesbian feminist authors, Fatima Daas and Alice Coffin. In *La Petite Dernière* (2020) Daas tells the semi-autobiographical story of “Fatima,” a young woman navigating her identity as a queer Muslim of Algerian descent in contemporary Paris. Daas challenges societal norms and stereotypes, offering a nuanced portrayal of the complexities of identity and belonging. The text is particularly useful for an examination of the intersectionality of race, religion, and sexuality, as well as the negotiation of queer identities within the French socio-cultural landscape. *Le génie lesbien* (2020) by Alice Coffin is a personal essay in which the author reflects on her experiences as a lesbian feminist activist in contemporary France. Through personal anecdotes and political analysis, Coffin explores the intersections of gender, sexuality, and activism, advocating for greater visibility and rights for lesbian and queer women. The text provides insights into the challenges and opportunities for resistance within French-speaking contexts, shedding light on the complexities of language, power, and identity. Studied together, the texts offer perspectives from authors with very different upbringings and writing styles who serve as prominent voices of contemporary French society. Additional insights from close readings of secondary sources, such as interviews with the authors and journal articles, help inform the analyses. Despite contrasting approaches to the communication of queer identity, research findings suggest that both Daas and Coffin continue to grapple with ways to use language to reinforce and resist power. By comparing and contrasting their written expression, one gains a deeper understanding of the complex intersections of language, gender, and sexuality in modern French discourse.

### **Julius Caesar’s Portrayal of the Celtic Peoples in Book Six of the *Commentarii de Bello Gallico*: An Analysis of Roman Imperial Propaganda**

**Chapin C. Epps** (Dr. Kristina Meinking) Department of World Languages and Cultures

This study examines the ways in which the Roman general Julius Caesar portrayed the various Celtic tribes encountered during his campaign for Gaul between the years 58 and 50 BCE. Taking Caesar’s *Commentarii de Bello Gallico* (*War for Gaul*, 58-50 BCE) as a starting point, this study explores the representation of the Celtic peoples as ancient historical models of colonial and ethnic propaganda that laid the framework for later western European nations. It is important to note that Caesar’s “Gaul” consisted of geographically diverse tribes that would have not viewed themselves as one unified people with the same culture - a theme consistent with the colonialist practice of ignoring the diversity of cultural and ethnic identities in the occupied region. Imperialist propaganda diminishes the native people’s capability to self-rule to justify the invading state’s aggressive actions to extend their rule over foreign territories. This theme is prevalent in Caesar’s representation of his subjugation of the Gallic tribes. Notably, we do not have any written primary sources from the ancient Celts themselves which is why I am analyzing Caesar’s *Commentarii de Bello Gallico* as a piece of imperial propaganda rather than an accurate ethnography of the early Celtic peoples. I focus on Book Six in which Caesar provides a general description of Celtic political structures, social organization, and religion as it offers particularly salient opportunity to assess how the Roman imperial government viewed foreign peoples under their dominion. Through analyzing Book Six, I will demonstrate how Caesar wrote his

commentary on Gallic culture, beliefs, and battle prowess in a way that would bolster his own political and military leadership abilities to his contemporary Roman readers

### **Parallels With Poetry: Critical Analyses of Works by Valéry, Monet, and Dior**

**Tessa C. Gladwell** (Dr. Sophie Adamson) Department of World Languages and Cultures

Poetry breathes life into words on a page. From traditional lines of Alexandrine verse to the most modern, experimental forms, words in poems are vital carriers of sense, sound, rhythm, and meaning. Assembled, they give a poem its voice. This project explores to what extent one can speak about a poem's "texture" and "movement" the way one might describe a painting or an article of clothing. Close textual analysis of symbolist poetry by Paul Valéry (1871-1945) uncovers qualities that are applicable to wide-ranging artistic creations. In his 1922 poem, "Le cimetière marin," for example, his use of six ten-syllable lines in each stanza animates the poem through a rocking rhythm that parallels the ocean's tide. His assonance and alliteration, as seen in verses such as "Ô récompense après une pensée," expand the poem's texture, and his personification and punctuation of time help establish the poem's shifting movement. In order to compare and contrast Valéry's written expression with innovative artists in other mediums, this research draws on works by impressionist artist Claude Monet (1840-1926) and haute couture designer Christian Dior (1905-1957), both of whom represent two distinct time periods but, like Valéry, rebelled against mainstream trends through their insistence on executing their vision. Monet's *Woman with a Parasol* (1875), in particular, has been lauded for its textured paint strokes and layered colors that impose feelings of movement on the canvas, though it was controversially received by the public at its debut. Dior's headline suit from his 1947 collection, *Bar*, was also somewhat provocative for its curvaceous lines and various textiles like silk, taffeta, and wool during a time of ration. Whereas texture and movement are commonly associated with poetry, this research is unique in that it brings together three different forms of revolutionary artistic expression and time periods to highlight shared outcomes: an imitation of life through art. This project aims to contribute to the field of literary analysis by aligning language around three different genres and highlighting the multidimensional possibilities of interpreting poetry when using fashion and art as informants.

### **Faust and Legal Philosophy in the Age of Goethe**

**Blake Healey** (Dr. Kristin Lange) Department of World Languages and Cultures

This study examines how an awareness of shifts in German legal philosophy between 1770 and 1830 might help modern readers better understand the play *Faust: A Tragedy*. Written between 1772 and 1832 by leading German intellectual Johann Wolfgang von Goethe, *Faust* is a seminal text of both German and world literature. The play comments extensively on the inherent tension between the letter of the law and true justice, but its portrayal of the law is not static. In fact, sections of the play depict and criticize noticeably different aspects of 18th and 19th century Germany's legal and political system depending on when each scene was written. This project sought to explain *Faust*'s fluid portrayal of the law by comparing key scenes' discussion of legal themes to conversations about the law among then-contemporary legal philosophers. In order to facilitate a chronological analysis of the play's plot, this project divided *Faust* into two sections, one written between 1772 and 1806 and a second written

between 1825 and 1831, and compared the way in which characters within these two sections view and discuss the law. The sections' differing depictions of the law were then compared with the two predominant intellectual currents within German legal philosophy at the end of the 18th and the beginning of the 19th century. This comparison revealed that Faust's depiction of the law mirrors shifts in then-contemporary German philosophy, with scenes written before 1806 embodying late Enlightenment German intellectuals' impatience with Europe's absolutist monarchies and increasing awareness of the limits of human knowledge. By contrast, scenes written during the 1820s function as a commentary on Romantic thinkers' yearning for an idealized national German past. While Faust's portrayal of late 18th and early 19th century philosophical debates may seem far removed from present societal concerns, questions regarding the law's ultimate justification and purpose within human society continue to occupy modern thinkers and political actors. As such, examining the legal and philosophical dilemmas presented by Faust is both highly relevant to discussions concerning our own legal system and a worthy subject for continued academic inquiry.

### **Navigating Historic Moments Abroad: Insights From the 2023 Presidential Election in Buenos Aires, Argentina<sup>1</sup>**

**Lauren Jablon** (Prof. April Post) Department of World Languages and Cultures

This research delves into the question of how U.S. students studying abroad can adeptly navigate significant historical events, using the 2023 Presidential election in Buenos Aires, Argentina as a case study. The study contributes to the World Languages and Cultures community and academia as a whole by contributing to essential conversations regarding the importance of self-reflection while studying abroad. By recounting the challenges faced during this historic event from an outsider's perspective and comparing them with existing research on the topic, the project provides practical advice for prospective U.S. students preparing to study abroad, fostering global consciousness and social awareness. The narrative unfolds the anxiety surrounding the run-off election between Libertarian candidate Javier Milei and former Minister of Economy Sergio Massa. As an outsider, I encountered confusion, frustration, and discomfort as Argentinians suffered with no clear leadership. Growing up in Washington, DC with a background in U.S. politics, I have always been interested in the inner workings of politics and in investigating the injustices embedded within political systems. I quickly recognized the distinctiveness and deep-rooted corruption in Argentinian politics. The election of Javier Milei, with the second-highest approval rating since former President Juan Domingo Peron, reflects a shift from decades of political manipulation. Public endorsements from former President Donald Trump and CEO of Tesla, Elon Musk followed Milei's win. Drawing from this experience, I share valuable insights and lessons learned. Utilizing this experience as a case study, the project highlights acquired skills during study abroad, including cultural self-awareness, reflection on cultural biases, integrative learning, and effectively connecting international experiences with prior studies and experiences. This project is significant for its insights on reconceptualizing perceptions of "normal," navigating historical events abroad, and interacting with diverse cultures, providing valuable contributions to the broader academic community.

**“I Have to Tell Them:” An Exploration of Intentionality in Holocaust Writings by Berr, Delbo, and Tillion**

**Sarah Mirrow** (Dr. Sophie Adamson) Department of World Languages and Cultures

This project seeks to understand how authorial intention and expected readership influence the language and storytelling of three female French Holocaust writers – who wrote for love, for fellow inmates, and for the world. Close readings of the original French texts generate an analysis of how written expression varies with intentionality and builds on past critics such as Alexandra Garbarini and FL Kaufman, who have explored the relationships between writing and witnessing traumatic world events. The first text, "Le Journal de Hélène Berr," is a personal diary written by a young Jewish woman. Berr's work transitions from an intimate journal into a rich tapestry of personal philosophy and recording of the lives of Jews in Paris under Nazi rule. Her intention to leave it to her fiancé shines through – she wanted her story to be remembered, which is reflected in the development of her tone, rhythm, and structure of entries. In contrast, Germaine Tillion, while imprisoned in Ravensbrück, wrote an operetta to entertain her fellow inmates. Unlike Berr's writing, Tillion's "Opérette à Ravensbrück" is darkly satirical and serves as a method of escapism. This is evident in the structure and harsh comedy of a song beginning about fresh food and ending with a chorus lamenting the rutabaga. Tillion's humor served as what Holocaust scholar and psychologist Chaya Ostrower calls a "lubricant for social interaction," intended to strengthen group cohesion, morale, and resistance. Finally, poet and Auschwitz survivor Charlotte Delbo wrote with a duty to "convert her suffering into a mission as a witness to the events" (Prévost). Her poems in "Aucun de nous ne reviendra" are charged and unflinching, meant to horrify readers into comprehension of the events of the Holocaust. The language in each text is distinct from the others and belie the intentions of each author: to be remembered by a loved one, to escape through amusement, and to bear public witness to tragedy. As Berr's fiancé – and recipient of her journal – states, her words "give strength to others who are able to understand them" – a poignant description that underscores the importance of studying work from this era.

### **“Honestly, I Wish I Were Dead”: On Death, Desire, Divine Inspiration, and Sappho's Poetic Perversion of Eros<sup>1</sup>**

**Jasper S. Myers** (Dr. Kristina Meinking) Department of World Languages and Cultures

This paper analyzes the ancient Greek poet Sappho's utilization of *eros* – a technical Greek literary term referring to sexual and/or romantic desire, envisioned as a divine force – as a mode for expressing the subversive reality of female homoerotic encounters in the ancient Mediterranean. During Sappho's life, *eros* was known throughout the ancient world as a divine malady of the soul, cursing the afflicted with physical ailments including, but not limited to: chills, sweats, fever, pain, and psychological torment. While commonly translated into English as "love," perhaps a more apt rendering would be "forbidden love," given that *eros* primarily affected those whose desires were impossible to fulfill. The subject of erotic affliction was often portrayed in Greek literature as an active, masculine figure who was consumed with desire for the object of his affections. Whether we examine the Ovidian telling of Apollo's divine rape of Daphne (I.473-524), or Sokrates' rhetorical exploration of the plight of the *erōmenos* (the sexually active, dominant homoerotic male) in a pederastic relationship (239c), it is clear that the conversation around *eros* privileged masculine perspectives. A man under *eros*'s influence was predisposed to inflict traumatic violence upon the object of his desires. As such, *eros*



was employed as a heteronormative framework to justify the rape of women. Sappho, well aware of this, incorporates *eros* into her first-person narrative poems with the intention of subverting the conventional portrayal of erotic affliction. The non-platonic desire existing between two women in the ancient world was a phenomenon outside of the widely recognized dynamic of “active” and “passive” participants in sexual encounters. Such a desire might even be thought to be impossible. As such, any kind of sexual or romantic liaison between women was inherently erotic, as it was a partnership that could never truly bear fruit. Sappho uses *eros* in her poetry as a locus to articulate this “bittersweet” (Sappho, *fr.* 130.2) conundrum, effectively queering *eros* with the purpose of highlighting the marginalized, female homoerotic perspective.

### **Narrative Inauthenticity in Books II & III of Vergil’s *Aeneid* as Support for an Anti-Augustan Reading of the Poem**

**Hammond Sherouse** (Dr. Rosemary Haskell) Department of World Languages and Cultures

This study explores the narrative inauthenticity of the Trojan hero Aeneas’ tale to Dido, queen of Carthage, in Books II and III of Vergil’s *Aeneid* as evidence for the validity of a politically subversive reading of the poem. Beginning with a textual and narratological analysis of the epic, the study then moves into a New Historicist interpretation of the work’s meaning in the cultural and political context of the early Roman Empire in the first century BCE. Lubomír Doležel’s theory that the only “narrative facts” which can be considered authentic within the constructed framework of a given story are those which are confirmed by the words of its primary “anonymous Er-form” narrator (rather than those of any “personalized narrative agents”) has been previously applied to Odysseus’ self-narrated tale in Books IX-XII of Homer’s *Odyssey* (Richardson, 1996). Taking a similar approach to the identically constructed tale in the *Aeneid* reveals that the speech which contains the poem’s only account of Aeneas’ actions during the fall of Troy is not only “inauthentic” according to Doležel’s criterion, but contradicted at various other points in the narrative (Miller, 1909) and riddled with depictions of, and allusions to, other myths of deception (Bednarowski, 2015) which further call into question the trustworthiness of Aeneas as a narrator. Furthermore, it has been argued that the *Aeneid* at one point alludes to an older mythological tradition in which rather than simply escaping from Troy, Aeneas is said to have secured his life by betraying his countrymen and contributing to the destruction of the city (Casali, 1999, Scafoglio, 2012). Since the Er-narrator of the *Aeneid* never weighs in on the issue, a reading of the *Aeneid* as adhering to the traitor-Aeneas tradition is just as valid as a reading which takes Aeneas’ word at face value. This study concludes that, considering the Roman emperor Augustus’ investment in the *Aeneid* as a major work of propaganda (Ruden, 2023) and the poem’s identification of Aeneas with Augustus himself, such a narrative ambiguity as described above is tantamount to a subversion of the epic’s superficially pro-Augustan message.

### **Entrapped at Home? Conflicts of Identity or Belonging in Jennine Capó Crucet: "How to Leave Hialeah" and "Resurrection" (2009)**

**Anna Sophia Steinki** (Prof. Pablo Celis-Castillo) Department of World Languages and Cultures



This study examines two short stories from *How To Leave Hialeah* by Jennine Capó Crucet: “How to Leave Hialeah” and “Resurrection” (2009). It analyzes the stories’ protagonists in terms of their relation to the culture, customs, and values of the immigrant Cuban communities where they grew up. The research is focused on the analysis of the psychological and social impact their parents have on them - the second generation. These stories take place in Hialeah, a Cuban-American suburb of Miami. Both protagonists face conflicts because of their Cuban-American identity. They don't feel completely identified with that new “American” community or country that calls them to integrate; but they don't feel completely identified with the culture of their parents or the community or place where they grew up. Crucet’s short stories provide a broad picture for understanding the complexities of cultural identity within the context of the Cuban-American experience in the United States and their challenges of assimilation. In the case of, “How to Leave Hialeah”, the protagonist decides to leave Hialeah to study, and during her time away, she is identified as Cuban or a member of a minority group, which she realizes is an identity intertwined with stereotypes and cultural misconceptions. These stereotypes and misconceptions are the biggest challenges that the protagonist faces once leaving Hialeah, and in consequence, she experiences a negative shock associated with these stereotypes after growing up in Hialeah. Similarly, in “Resurrection”, protagonist Jesenia - a young Cuban-American from Hialeah - struggles with feeling trapped between two worlds. The feeling of entrapment is heightened between appealing to her family's values and traditions in combination with her desire to find a sense of belonging within American society, leading to internal conflict. For the stories’ protagonists, the combination of living in the United States, along with growing up in Hialeah with their immigrant families, leave them with a sentiment of being trapped, often between two worlds. The sentiment of being trapped between two worlds plays a role in their ability to navigate both worlds and what they are willing to lose in the process of finding their identity and belongingness.

### **Freedom of Religion Versus Freedom From Religion: The Differing Impacts of French Secularism Policies**

**Mara J. Waskiewicz** (Prof. April Post) Department of World Languages and Cultures

Throughout French history, the French state has adopted various positions in relation to religion. From an absolute monarchy that was consecrated by the pope to a strictly secular state, citizens of France have seen a wide variety of beliefs about religion, leading to today in which 30% of French citizens consider themselves atheists (Cadène, 2021). The essential question surrounding my research is: What role has religion played in the history of France and how is secularism important today? For a society that once had religion at the forefront of everyday life, in order to understand French society today, one must first understand what led to its downfall. I used my lived experiences and scholarly sources in order to uncover the reason for this change in French culture. My experience living with a “traditional” French family during my semester in France who attended Catholic mass each weekend and was heavily involved with their church allowed me to understand that religion can still be present in France even if this is not the case for most families today. My reading and analysis of scholarly sources allowed me to understand the reason why many people in France are no longer Catholic. The corruption of the Catholic church in the 18th century led to the dechristianization of France and to the strict policies surrounding *laïcité*, which translates to “freedom from religion”, not “freedom of

religion” (Donadio, 2021). This has made it more difficult for minority religious groups to practice religion. In conclusion, religious perceptions in France have changed drastically throughout their history due to persecution of individuals by the Catholic church and *laïcité* today has influenced religious individual’s abilities to openly practice their religion, particularly those of minority religious groups.

### **"La lucha sigue y vive": Honduras Fifteen Years After the Coup<sup>1,2</sup>**

**Brenna M. Williams** (Dr. Federico Pous) Department of World Languages and Cultures

June 28th, 2024, will mark fifteen years since liberal President Manuel Zelaya was overthrown by the Honduran military, the national economic/political elite, and the Obama-Biden administration (collectively known as *los golpistas*). The coup resulted in mass violence: anti-*golpistas* assassinations, drug-trafficking, gang violence, poverty, environmental destruction, and forced migration as neoliberal policies made Honduras “Open For Business.” The nation’s democratic crisis deepened when conservative *golpista* President Juan Orlando Hernández (JOH) ignored the Constitution and ran for reelection in 2017, winning through fraud. In response to the coup, many Hondurans immediately began to protest, uniting with organizations such as COPINH, OFRANEH, COFADEH, MUCA, MCA, and COPA—forming the National Front of Popular Resistance (FNRP). After over a decade of struggle, in January 2022, Xiomara Castro, wife of Manuel Zelaya, was inaugurated—becoming the first female president of Honduras and the first president from the new LIBRE party. The following month, JOH was arrested and extradited to the US on drug-trafficking charges. However, two years into Castro’s presidency it has become clear that the fight for human rights and environmental protection is far from over. Land defenders continue to be assassinated and their demands ignored, victims of the coup still await justice, and the Constitution has been partially suspended to allow for a policy of mass incarceration “justified” through the War on Gangs/Drugs—all with the support of the Biden-Harris administration. By analyzing documentation produced by activists and journalists on the ground, this presentation seeks to explain how Honduran social movements have fought against *golpismo* over the last fifteen years and articulate the challenges they currently face under the new progressive administration. This study argues that the violence of the coup has yet to be repaired and in many ways continues due to LIBRE’s alignment with the interests of the US government and Honduran elite—the authoritarianism didn’t end with JOH. This presentation seeks to inform a US audience about their government’s actions abroad in hopes of advocating policy change. In the words of the Honduran Resistance: “la lucha sigue y vive” (the struggle continues and lives).

### **#MeTutu: An Analysis of Gender-Based Violence in French Ballet<sup>1</sup>**

**Isabel A. Zory** (Prof. Patti Burns) Department of World Languages and Cultures

The Paris Opera Ballet in the 19th century was defined by an environment of grooming and sexual abuse of child dancers. At this time, rich subscribers of the ballet paid large sums to access the dressing rooms of the ballerinas after performances, and sponsored their progress and education in return for sexual acts. Over time, the Opera Ballet and audience evolved to become more focused on the

presentation of an art, rather than an exhibition before the claiming of a prize. However, sexual abuse of dancers continued albeit with a shift in perpetrator. This shift has carried through to today where there is still room for abuse behind the scenes by those in power. This project analyzes primary source writings of the opera's patrons and secondary source articles on the intricacies of gender in ballet to determine the specific historical causes of the abuse that ballet dancers face today. Many of these roots such as rigid hierarchies, a highly competitive environment, and methods of teaching have already been critically examined by writers such as Kathleen McGuire and Lynn Garafola. However, the supporting role of male dancers to the ballerinas and the over-emphasis on chemistry between lead dancers has been under-researched. These elements aid in creating a cultural climate that disproportionately supports and elevates men to a role of authority. When compiled, these points add to a culture that allows men in dance more power and anonymity to commit gender-based violence. This research is centered at the cusp of feminism and the arts, and comes into play today in an era where there is an increased focus on the prevalence of sexual abuse against women and the right to speak out against abusive practices. By taking this historically informed approach to analyzing the roots of today's current power dynamics, this work contributes to a larger conversation surrounding the mechanisms that allow for abuse in professional ballet.

### **Reading the Voyeur: An Analysis of Degas' Intimate Writings**

**Isabel A. Zory** (Dr. Sophie Adamson) Department of World Languages and Cultures

Edgar Degas (1834-1917) was a celebrated French painter known primarily for his work with ballerinas and prostitutes, two categories which often overlapped in 19th century France. The artist was prolific, and created an estimated 1500 paintings, monotypes, and drawings of ballerinas. These pieces have been called voyeuristic, as the viewer is seemingly hidden, peering around the corner to watch the dancers in their most vulnerable, intimate, and unrefined moments. His stark and unadorned paintings of exhausted, slumped ballerinas and ungainly prostitutes entering the bath can be read in an ambiguous fashion, as either the celebration of women's natural state or a denunciation of the 'false image' he believed women presented to the public. This project seeks a fuller comprehension of Degas' gaze through an analysis of his writings. An abundant writer in his youth, eight of his sonnets have been published posthumously, and there are approximately 1200 of his letters gathered in several editions of his personal correspondences. Degas' sonnets capture a semblance of the sublime in his subjects, painting them in the light of a tempest of nature. He offers a more nuanced lens in many of his letters, in some moments referring to women as forces of nature and lauding the power in their sexuality while scorning the same power in others. Through close textual analysis of his sonnets and letters, this research shows that Degas' written expression may provide important insights into the artist's representations of his milieu. The project also complements existing critical work by dissecting Degas' texts in their original language, and it unveils a complicated man who wavered between awe and disgust of the sexuality of women with whom he was in contact. Close readings of his letters offer insights into Degas' artistic expression as a cultural touchpoint of the time leading up to the turn of the century. As the culture around him shifted, the voyeuristic eye in his paintings seems to peer from the 19th century into the more sexually liberated 20th.

## 2024 Carret Essay Contest

### Thomas Jefferson's Divided Times

In this year's common reading, *I Never Thought of It That Way*, Monica Guzmán describes American national politics as “dangerously divided”:

If there's one thing that most people on the left and right can agree on, it's that the way we treat and talk to the other side is broken. We can't stomach the ideas across the political divide, let alone the people who hold them (Guzmán xvii).

In what ways did Jefferson and his contemporaries contribute to their own dangerously divided times and/or help Americans to negotiate these divides? Choose at least one divisive issue and analyze how Jefferson attempted to resolve it.

First Place: “The Sound of Sally” by Maya Simmons (Mentors: Dr. Shaina Jones and Dr. Cassie Kircher)

Second Place: “Book Banning: A Modern A&S Act?” by Kenna Dubraski (Mentor: Dr. Erin Pearson)

Third Place (Tie): “1798's Phaedrus” –by Claire Lancaster (No mentor) and “Looking West” by Lola Moore (No mentor)

#### “The Sound of Sally”

**Maya Simmons** (Dr. Shaina Jones & Dr. Cassie Kircher) Department of English

When the Carret Essay Contest was introduced to our senior seminar class in the Fall, I did what I had done for the past two years: think about what I could write and let the prompt fade from my mind. However, this January I had the privilege of studying abroad in Ghana where I was immersed in a new culture through dance. With dancing, we also learned a lot about the history of the country. The different regions and tribes make Ghana so unique to other African countries. As one of the countries on the West Coast, it has one of the highest amounts of slaves that were taken. My world was flipped upside down when I got to witness the Assin Manso Slave River and Ancestral Graveyard and the Cape Coast Castle, home to the slave dungeons and the Door of No Return.

I and the other Black-identifying students on the trip stepped into the silky water of the Assin Manso Slave River and an immediate heaviness fell over us. We dipped our hands and washed our arms in the current, letting us feel where our ancestors once walked. Despite the implications of the river, the most beautiful part was when the gold flecks in the soil stuck to our hands – an undeniable reflection of Ghana's first namesake, the Gold Coast.

As we went through the dungeons of the Cape Coast Castle, the feelings were overwhelming. The anger, however, didn't come until we learned about what went on right above the dungeons. The only ventilation was right in front of the entrance of the church above the male dungeons, where the European churchgoers were easily exposed to the screams and smells of the heinous activities going on below them. The anger persisted when we witnessed how European occupants were living with huge windows, scenic views, and hundreds of vents.

My return back to the States was a hard transition, and I knew I had to write about everything I saw. Still, the Carret Essay Contest was the last thing on my mind until my mentor reintroduced the poster to me and prompted me to think about the prompt through the lens of slavery. That was my light bulb that led me into a rabbit hole of research about a founding father that I previously did not know much about.

Thomas Jefferson, the primary author of the Declaration of Independence who coined the words “all men are created equal”, owned men and women and children himself. In his creation of this document, he was vehemently against the slave trade and what it meant for people. However, he eventually evolved to not seeing my ancestors as people at all. Jefferson’s solution was simple: to prevent an uprising such as the Haitian Revolution and send the slaves back to Africa or the West Indies.

In this poem, I respond to Jefferson's idea that the slavery issue could be resolved by sending all the Black slaves back to Africa/the West Indies. I emphasize their struggles to survive the horrors of slavery and their connection to America now. Jefferson's relationship with Sally Hemings in the poem foregrounds the horrible complexities of the divide between being free and enslaved.

The title and use of Sally Hemmings throughout the poem stems from her initial erasure from history. I did not know of her story with Jefferson until doing further research for this contest, but now that I know I hope to bring more people awareness to her and the things she and her children had to go through from the man who claimed to find slavery such a heinous act.

*The Sound of Sally: A Sestina* has layers beyond what even I could predict, but I hope to capture the divisive issue of slavery, Jefferson’s unsuccessful attempt to resolve it, and its impact today.

### **“Book Banning: A Modern A&S Act?”**

**Kenna Dubraski** (Dr. Erin Pearson) Department of English

Thomas Jefferson was one of the most patriotic and passionate presidents America has seen (1801-1809). As a strong advocate of the constitutional right to freedom of speech and press, Jefferson emphatically argued against the Alien and Sedition Acts, which, under John Adams, allowed the persecution, arrest, or even deportation of foreign-born immigrants who spoke out against or criticized the American government. This included both verbal and written protest, which severely limited political and artistic expression. Not only was the act unconstitutional, but Jefferson deemed it “tyrannical” (Online Library of Liberty). This essay is inspired by President Jefferson’s position as he fought for the right to freedom of speech and press, and I wish to apply this urgency to book banning. I assert that book banning has become a modern day Alien Act, which primarily silences the voices of historically suppressed individuals, such as Black Americans, women, and members of the LGBTQ+ community. Since 2021, book banning and censorship has increased drastically (Associated Press News). The consequences for this are extensive, but most notably include: a lack of critical thinking practices for students, an erasure of history that is still relevant in modern-day America, and a vanquish of personal freedoms. In this essay, I will focus on the convergences between book banning and the Alien Acts in a speculative historical perspective. I argue that the silencing of oppressed groups during times of division connects the Alien Acts to modern-day book banning, and I will specifically examine the banning of Toni Morrison’s work. I will apply psychological theory to argue why the banning of fiction limits the social and intellectual growth of children and adolescents, which further encourages

division as children are not prone to understanding diverse perspectives.

Finally, I will provide an analysis of whether Thomas Jefferson himself would support the banning of Toni Morrison's books, especially considering racial context. In doing so, this essay will shed light on the concerns of a modern-day issue by drawing knowledge from the past.

### **“1798 Phaedrus: Jefferson and Adams Discuss the Alien and Sedition Acts”**

**Claire Lancaster**, Department of English

In “1798’s *Phaedrus: Jefferson and Adams Discuss the Alien and Sedition Acts*,” I combine my Creative Writing and Professional Writing and Rhetoric disciplines to venture into the complex interplay of politics, constitutional law, and human ethics through the lens of a historical dialogue. This piece drew its inspiration from Plato’s *Phaedrus*, in which Phaedrus and Socrates engage in a fictionalized dialogue about the metaphysics of presence, the nature of the soul, the philosophy of love, and the purpose of rhetoric. Much like Plato, I employ a fictionalized conversation to explore convoluted issues; in the case of “1798’s *Phaedrus*,” however, the persons of the dialogue are Thomas Jefferson and John Adams, and the topic of discussion is the Alien and Sedition Acts. I believed this format would provide a rich, multi-perspective examination of the contentious matter and engage readers by mirroring their internal debates; for instance, readers may question the constitutionality of the Sedition Act just as Jefferson is articulating its unconstitutionality.

At the heart of this piece lies a fascination with the ways in which historical narratives illuminate the enduring elements of the human condition. By revisiting the Alien and Sedition Acts—a series of laws that, from a contemporary standpoint, challenge our understanding of the Constitution—I sought to investigate the delicate balance between security and liberty, the ethical quandaries that those in power face, and the continuing divisions within American political life. The dialogue, set against the backdrop of a nation on the brink of both internal and external turmoil, serves as a conduit for this investigation, inviting readers to consider the Acts’ implications not merely in their historical context but in relation to the perennial questions of justice, governance, and moral integrity; it prompts contemplation of how we, as a society, confront divisive matters, negotiate the landscape of political ideology, and strive for resolutions that respect our collective values and rights.

### **“Looking West”**

**Lola Moore**, Department of English

I am a Creative Writing major and have been writing fiction for several years. I enjoy writing character-driven short stories because I am fascinated by how our relationships with one another impact who we are. This is why I decided to focus this piece on Thomas Jefferson and his fictionalized inner dialogue on the issues he faced, rather than the external factors. Writing historical fiction was a new experience for me as an artist, and I have only recently become interested in writing nonfiction after being very honored to win the nonfiction essay contest judged by Jessie Van Eerden last month, which gave me the confidence to write a more fact-driven piece for this contest. I thoroughly enjoyed creating this story and visualizing what the process of searching for Western expansion was like for



Jefferson. In the future, I would love to write more historical fiction and fictionalize other historical figures in their times.