Spring Undergraduate Research Forum

Welcome to SURF 2020

The 27th 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. However, due to COVID-19, we are not able to hold SURF in-person and on-campus this year. Instead, we have prepared this abstract book in recognition of all of the hard work of the undergraduate researchers and faculty mentors.

This year, SURF was scheduled to have 247 presentations and two interdisciplinary symposia named "Environmental Contexts of Development" and "Profiling South Asia: Knowledge, Representation, and Self-Understanding in Global Contexts". Students from Williams High School, Burlington, NC, originally planned to join us by presenting their two posters. Each SURF abstract was reviewed by two Elon faculty members with disciplinary expertise.

SURF is usually a part of CELEBRATE! – a weeklong series of events that bring to light our students' wonderful academic and creative pursuits. Although we will not be able to gather on campus to support the student presenters and performers this year, let's celebrate their accomplishments through this abstract book. In this collection of abstracts, students share the joy of exploration and discovery that are the hallmarks of an intellectual community.

We want to extend our deep appreciation to the entire campus community for being flexible about SURF this year. Thank you for your strong support and commitment to undergraduate research and mentoring.

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;
- Involve critical analysis of the process and/or outcome of the activities.

Quality undergraduate research and creative activity result in a product that has potential for peer-reviewed dissemination in the form of presentations, publications, exhibitions, or performances.

The Undergraduate Research Student Association (URSA) is an organization on campus that acts as the student-run counterpart to Elon's Undergraduate Research Program. They help first-year 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.

To contact URSA:
Faith Glover, President of URSA: fglover@elon.edu
URSA@ PhoenixConnect

TABLE OF CONTENTS

* Note: Each page number has a different embedded hyperlink. Clicking it will bring you to a particular section in this abstract book.

Symposia

Symposium I. Environmental Contexts of Development

Development is a highly complex process which influences and is influenced by many multi-directional relationships between developing people and their environments. This symposium considers the myriad of influences on developing young people, ranging from infancy to adolescence, and their environmental contexts. These projects explore environmental contexts of development using Bronfenbrenner's (1977) bioecological model, which is an interdisciplinary framework used to understand how a person's individual characteristics interact with various levels of their environments, extending from those most proximal (e.g., home settings, parent-child relationships) to more distal environments (e.g., community resources, political systems, cultural ideologies, etc.). Student research projects presented in this symposium constitute a range of developmental topics – childhood outdoor play, risky play, psychotherapeutic intervention for pediatric cancer patients, international adoption and HIV disclosure narratives, and patterns in infants' manual interactions with objects. Taken together, the diverse range of developmental phenomena discussed in this set of presentations are each influenced by multiple levels of the bioecological model, including individual child characteristics, caregiver's beliefs and practices, home settings, community resources, the political climate, sociocultural values and ideologies, and historical factors, including technological advancements. Featuring research conducted by students and faculty members in Human Service Studies, Public Health, and Psychology, this symposium unites developmental science research agendas across interdisciplinary perspectives.

A Retrospective, Cross-generational Study of Children's Play Behaviors in Venezuela

Isabel Blanco Araujo (Dr. Maureen Vandermaas-Peeler) Department of Psychology

Through unstructured outdoor play experiences, children develop cognitive, physical, social, and emotional skills (Wilson, 2012). Over the past generation, children's opportunities for unstructured outdoor play have been increasingly restricted due to growing demands on their time; a lack of safe, accessible places; increased technology; and parents' fears related to safety (Charles & Louv, 2009). However, little research has examined these trends in Latin American countries. This study investigated the influences of a rapidly changing social ecology on children's play patterns in Caracas, Venezuela. Venezuela has experienced economic and political crises over the past 15 years. This drastic social change provides a unique opportunity to study generational shifts in play patterns. Semi-structured interviews were conducted with 18 adolescents and 18 parents. Transcripts were coded and analyzed using Bronfenbrenner's bioecological framework, in which biopsychological characteristics are studied over the lifespan, across generations and historical time (Bronfenbrenner & Morris, 2006). Findings indicated that although adults and adolescents described vivid memories of childhood play, the frequency of nature and unstructured play activities declined from one generation to the next. Adults remembered playing in community spaces such as parks and in the streets of Caracas. Adolescents talked about playing at home and school in safely enclosed spaces. Although parents and adolescents grew up in the same city with similar environmental affordances, the socio-political climate and rise in insecurity were described by both groups as primary influences for the decrease in outdoor and unstructured play. As expected, increased technology over time also influenced this shift in play. These findings highlight the importance of the sociocultural context in which play occurs and contribute to the sparse body of knowledge on outdoor, nature, and risky play opportunities for children in Latin America. Considering the Venezuelan context, the findings regarding intentionality of play and lack of accessible safe spaces showcase the importance of parental influence in creating outdoor play opportunities. Additionally, in the future, policy makers and city planners could take these findings into consideration in order to create more spaces for exploration within a safe context in Caracas.

A Qualitative Longitudinal Study of Adoption and Disclosure Narratives Among U.S. Families With Internationally Adopted Children Living With HIV

Amanda Bingaman (Dr. Cynthia Fair) Department of Public Health Studies

In 2010, loosened restrictions on immigration of HIV-infected individuals allowed children with HIV to be adopted into the U.S.. Consequently, an increasing number of families pursued the adoption of international children with HIV, yet little is known about their families' experiences. This project explores parents' adoption and HIV disclosure narratives, both of which may influence adjustment to the HIV diagnosis as well as their child's identity development. A purposive snowball sample of 24 parents of 27 internationally adopted children with HIV (IACH) was recruited at two pediatric infectious disease clinics. All parents identified as white and 22 as Christian. Mean age of children at enrollment was 9.2 years. Parents completed two semi-structured audio-recorded phone interviews approximately one year apart. The first interview centered on the adoption story and HIV disclosure decisions. The follow-up interview

focused on parents' and children's experiences within their families and communities. Drawing on analytic principles of constant comparison, transcripts were analyzed for emergent themes. Analyses revealed that adoption and disclosure narratives changed over time. Parents took cues from their child to determine how much adoption and HIV-related information to divulge. Parents wrestled with when to share potentially traumatic adoption-related information and decided to withhold information based on the child's age and maturity, nature of the adoption story, faith, and contact with the birth family. Parents revisited adoption narratives as children matured and began to acknowledge racial/ethnic/cultural differences between themselves and their adoptive parents. Adoption narratives were shaped by level of HIV disclosure to the child and became increasingly complex as children gained understanding of their HIV status. Parents indicated that "HIV is socially, but not medically difficult." They discussed medical aspects of their child's diagnosis with them first and, subsequently, sought to help their child prepare for HIV-related stigma by normalizing HIV in the home and building their child's confidence. Adoption and HIV disclosure narratives play an important role in the development of IACH, as adopted children learn to manage their illness and develop their own unique identity across the lifespan. Understanding these narratives may help healthcare providers offer higher quality individualized comprehensive care to IACH.

Psychotherapeutic Interventions and Utilization by Pediatric Psychosocial Providers

June Burke (Dr. Cynthia Fair) Department of Public Health Studies

Children with cancer and their families experience drastic challenges in their lives as they face physical changes due to medical treatment, various alterations in social and familial roles, and the sudden threat of death. The Standards of Psychosocial Care for Children with Cancer and their Families are evidence-based standards designed to serve as guideposts for psychosocial care to pediatric cancer patients and their families. One standard states, "All youth with cancer and their family members should have access to psychosocial support and interventions throughout the cancer trajectory". This study was designed to identify and explore the psychotherapeutic interventions providers are currently using with pediatric cancer patients and their families. An online survey with a list of psychotherapeutic interventions based on relevant literature was disseminated to psychosocial care providers through national and international professional organizations' listservs. Two hundred forty-two psychosocial providers responded to the survey, including psychologists (41%), social workers (29%), music therapists (10%), child life specialists (5%) nurses (4%), psychiatrists (3%) and other (8% e.g. health educators, teachers). Most providers identified as either early (39%) or mid-career licensed professionals (34%) and worked in the United States (80%). Participants endorsed psychotherapeutic interventions provided to patients and their families and the frequency of interventions offered. Interventions most often offered to pediatric patients were psychoeducation (66%), health promotion interventions (e.g. exercise interventions, online apps) (60%), mindfulness-based interventions (58%), cognitive behavioral therapy (57%), and supportive individual therapy (54%). For caregivers, psychoeducation (62%), referrals to social support groups (52%), anticipatory guidance (50%), and cognitive behavioral therapy (47%) were most commonly offered. Psychosocial providers offer a wide range of psychotherapeutic interventions to pediatric cancer patients and their families. Cognitive behavioral therapy and mindfulness-based interventions are

frequently used evidence-based interventions. However, evidence-based interventions and protocols designed specifically for the pediatric oncology population (e.g. Bright IDEAS Problem-Solving Skills Training, Surviving Cancer Competently Intervention Program-New Diagnosed) were not commonly endorsed, further underscoring the importance of fully integrating the Standards of Psychosocial Care for children and their families. Future research should focus on increasing accessibility to population-specific evidenced-based interventions and translating science to practice.

Standing Experience and Environmental Contexts: What Affects Infants' Manual Interactions With Objects?

Alexandra N. Grillo (Dr. Sabrina L. Thurman) Department of Psychology

Manual interactions with objects appear early in infancy and are the primary way infants gain information about the world, but these interactions change with postural development. With each novel posture, infants gradually learn about and more readily adapt to the relationship between their new body position and the wider space. In the current study, we investigate how learning to stand affects infants' manual interactions. We ask, do infants modify their manual interactions with objects when trying to stand while hindered or assisted? Participants will be infants who are capable of standing while leaning on an object (novice standers) or who can stand on their own for at least 20 seconds (experienced standers). So far, we have collected data from 10 infants. Infants were prompted to manipulate an interactive toy on an infant-sized table in three 1- to 2-minute standing conditions: control, supported (infant placed in a standing harness), and hindered (infant stood on foam flooring at a "wobbly" table). Sessions were video-recorded and synchronized for coding in Datavyu. We coded infants' hand use (e.g., unimanual, bimanual) and manual exploratory behaviors: no contact with the object, rudimentary exploration (e.g., banging, slapping), or sophisticated exploration (e.g., fingering, pushing buttons). We used non-parametric Freidman and Wilcoxon tests to assess differences in manual behaviors within and between conditions. Preliminary analyses from the current sample of 10 infants revealed in all conditions, rudimentary and sophisticated behaviors were the most commonly displayed (*p*s $< .05$). However, no contact was displayed significantly more in the control and supported conditions compared to the hindered condition (*p*s $< .05$). Rudimentary manual exploration was more commonly displayed in the hindered condition compared to the control ($p < .05$). All other forms of manual exploration were similar across conditions. In all conditions, infants displayed significantly more unimanual than bimanual behaviors (*p*s $<.05$). These results suggest infants' manual interactions with objects are affected when standing upright becomes more difficult. Gains in postural experience may help infants better control their body and adapt to environmental demands. This could impact object interactions, a main strategy of information gathering, leading to differences in learning opportunities.

Exploring Outdoor Play: A Mixed-Methods Study of the Quality of Preschool Play Environments and Teacher Perceptions of Risky Play

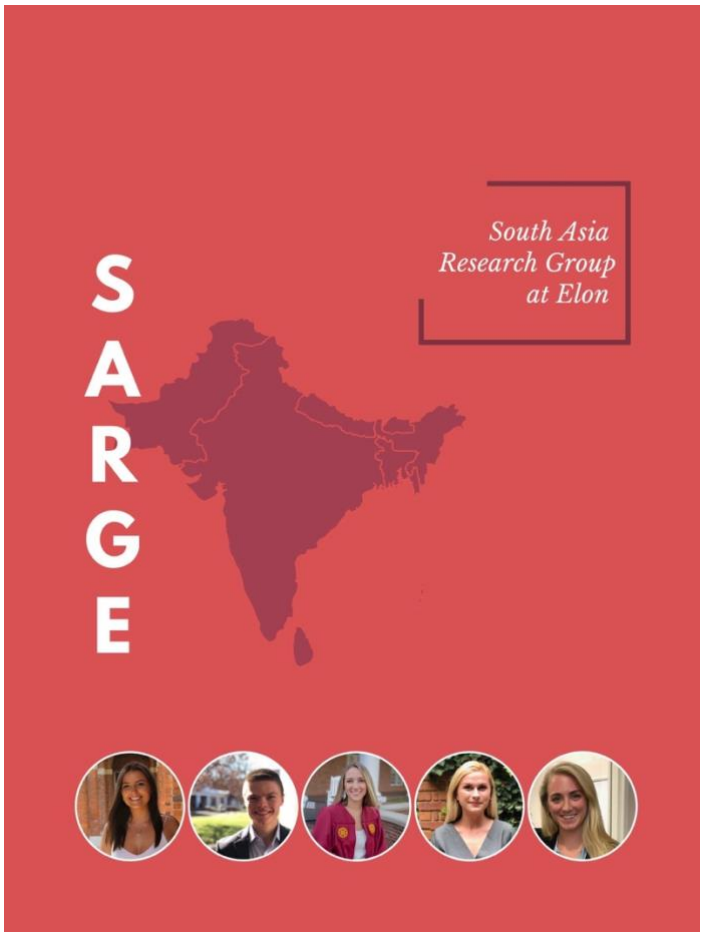
Annie C. LeMasters (Dr. Maureen Vandermaas-Peeler) Department of Psychology

Risky play occurs when play is accompanied by thrilling feelings with a real or perceived level of risk (Brussoni et al., 2015). Research has demonstrated cognitive, social, and physical benefits of engaging in risky play for children's development (Sandseter, 2009). However, risky play opportunities are declining as children are spending less time outdoors as compared with previous generations. Elements of the sociocultural context, such as playground quality, and teachers' and parents' attitudes about risk, influence outdoor play opportunities. This study explored the connections between outdoor play environment quality and teacher perceptions of play in 10 federally funded preschools in two neighboring counties. The quality of the 10 preschools' outdoor play environments was assessed using The Seven Cs Scale, an environmental rating scale of the character, context, connectivity, clarity, chance, change, and challenge of outdoor playgrounds (Herrington, Lesmeister, Nicholls, & Stefiuk, 2007). Playgrounds scored lowest in challenge, demonstrating a lack of risky play opportunities such as play at great heights and high speeds. Playgrounds scored higher in context scores, demonstrating appropriate safety measures and clear boundaries, and higher in connectivity scores, illustrating appropriate entrances, exits and ample pathways. Playgrounds could be improved by incorporating more diverse opportunities for risky play into their design. The Tolerance for Risk in Play Scale (Hill & Bundy, 2012) was used to assess 58 teachers' perceptions of risky play. On a scale of 0 (lowest risk tolerance) to 100 (highest risk tolerance), the average risk tolerance score was 29. Although a minority of respondents reported tolerance for risky play, most teachers were unaccepting of risk. Across the categories of risky play, teachers were most accepting of rough and tumble play and least accepting of play with dangerous elements and tools. During a focus group, teachers reinforced these findings and also expressed concerns regarding safety regulations that restrict play. Findings highlighted the importance of the sociocultural context for risky play opportunities and the need for further teacher education on the importance of risky play.

Symposium II. Profiling South Asia: Knowledge, Representation, and Self-Understanding in Global Contexts

This symposium features student members of the South Asia Research Group at Elon (SARGE), an informal association of students and faculty members doing research in or about South Asia or South Asian communities in the diaspora. SARGE is providing student-generated programs for peer and faculty mentoring on the practical skills of field research in South Asia and on project conception and development. This symposium considers how the practices, values, self-understanding, and social location of various communities in or from South Asian countries shift as they collide with other worlds, whether those collisions are in the workplace in Dubai or the security line at Dulles.

These projects examine the varied and sometimes troubling patterns that characterize the interactions and exchanges reported by South Asians around the globe as well as their political and social ramifications. Projects explore changing practices of representation, including how the flow of goods and ideas between India and the Gulf states impact interreligious relationships in both places; how South Asian Muslims and Sikhs negotiate airlines' profiling practices; how public information can run up against village-level values. The student projects that this symposium draws from represent a range of South Asian topics—village health knowledge among adolescent girls, airline security policy, changing mosque architecture in South India, Muslim college students in the US, and religious minorities in Pakistan. They represent methodologies employed in a variety of disciplines—Public Health, Political Science, Journalism, and Religious Studies. Together they highlight distinctive patterns in the transfer of knowledge in and about South Asia today.



Transferring Knowledge into Action: Examining the Impacts of a Rural Indian Adolescent Girls Program at the Individual, Familial, and Community Levels

Griffin P. Barriss (Prof. Amanda Tapler) Department of Public Health Studies

The Comprehensive Rural Health Project (CRHP) in Jamkhed, India, uses the evidence-based "Jamkhed Model" to solve public health issues by utilizing communities' existing resources and adapting public services in consideration of communities' values. CRHP's Adolescent Girls Program (AGP), a critical component of the Jamkhed Model, teaches girls valuable health and social justice lessons to be agents of change in their communities. While it is believed that AGPs play a pivotal role in their communities (CRHP, 2014), resource restraints inhibit CRHP from conducting research on the impact of AGP graduates on their communities', reflecting similar gaps in the literature regarding the impact of AGP graduates in communities across the globe. Building on existing relationships between Elon University in North Carolina, USA, and CRHP, this project investigates how knowledge gained by AGP graduates diffuses into their communities. By conducting semi-structured interviews with AGP graduates in cooperation with the CRHP research team, we will describe what knowledge graduates gain from the program and how that knowledge influences AGP participants, their families, and their communities in the short term and potentially for years after graduation. Using convenience sampling, the most appropriate system of data analysis given CRHP's community connections and graduates' sporadic availability, 25 to 30 AGP graduates between the ages of 18 and 35 will be interviewed in local villages around the Jamkhed block in Maharashtra, India. In January 2020, we conducted pilot interviews and focus groups with local stakeholders to ensure that interviews would be effectively phrased to elicit the anticipated responses. Pilots allowed us to test our interview questions and rework questions addressing community engagement, AGP programming, and plans for raising children among AGP graduates that were less clear in their original vernacular. Since then, the CRHP research team has begun collecting data from local AGP graduates, which will be completed by Summer 2020. At that time, the Elon researchers will join the CRHP research team for data input and analysis. Our findings will contribute to the literature on adolescent girls in community health interventions across the globe and help CRHP assess the impacts, efficacy, and outcomes of their existing programs.

Negotiating Islamophobia: The Experiences of College-Age Muslims in North Carolina

Marjorie Anne Foster (Dr. Amy L Allocco & Dr. Glenn Scott) Department of Journalism

Drawing on extended ethnographic research, my project analyzes the experiences of college-age Muslims in North Carolina and examines how they negotiate their religious identities in the face of stigmatization, Islamophobia, and political and social turmoil. Whereas much recent academic literature takes 9/11 as its point of departure and isolates pre- and post-9/11 Muslim identities (e.g., Ahmed 2015, Ali 2018, Al-Khatahtbeh 2017, Bayoumi 2009), most of the 45 students I interviewed were born in or after 2001 and have no direct experiences of pre-9/11 realities. I argue that the identities of the current generation of college students are definitively shaped by the policies and general Islamophobia that reflect broader anti-Muslim rhetoric, mass shootings and attacks targeting Muslims, and the Trump presidency. The narratives collected during my

community-based fieldwork in 2018-19 reveal that although Muslim college students labor under the multiple burdens of explaining and representing their religion, negotiating perceived disapproval and mischaracterizations of their faith and practices, and navigating their minority identities in majority college cultures, they also report increasingly tangible expressions of solidarity from non-Muslims that provide needed respite from the prevailing Islamophobic climate. I present an overview of the way Islam has been perceived in the United States in both eras before describing the current climate for Muslims. Using my interview data, I examine the impacts of Islamophobia on Muslim college students' evolving identities and experiences as minorities on campuses, and their struggles to find community. Finally, their narratives also describe the supports extended to them in recent years.

"We Become Capable of Handling Everything": Gender and Gulf Migration in Kerala, South India

Kathryn B. Gerry (Dr. Amy L. Allocco) Department of Religious Studies

Worker migration from Kerala to the Gulf touches virtually every household in this South Indian state. Women–whether as family members of migrants or those who migrate themselves–have a unique set of relationships with migration. Drawing on 55 semi-structured interviews and one month of ethnographic fieldwork in India, this paper examines the intersections of gender and migration in contemporary Kerala. I argue that the pervasive phenomenon of worker migration from Kerala to the Gulf catalyzes significant social change in terms of gender roles and expectations and newly positions women as economic agents. My fieldwork reveals that women take jobs abroad out of personal circumstances, especially economic necessity, as well as to align with local ideas about modernity. Furthermore, it reveals that women whose spouses emigrate experience increased independence and autonomy in their daily lives at home. Both categories of women are attuned to others' perceptions of their roles vis-à-vis migration, which range from respect and admiration to jealousy and disdain. Despite these sometimes negative evaluations, women report that they are empowered on the everyday level by worker migration. This project builds on scholarship examining the status of women in Kerala (Eapen and Kodoth 2003), the experiences of migrant spouses (Osella 2016), and female Christian nurses' Gulf migration (Percot 2006). It extends this work in new directions by analyzing the personal narratives of individual women who work in the Gulf, head their own households in Kerala, and experience stigmatization because of emigration and absence.

US-Pakistan Relations & Pakistan's Religious Minorities: Deepening Disenchantment, 2008-2016

Erin T. Jenkins (Dr. Jason Kirk) Department of Political Science & Policy Studies

Pakistan's tumultuous history involving treatment of religious minorities has dominated politics in the nation since its founding. Pakistan has been a strategic ally of the US for decades; however, relations have often been strained due to cultural and ideological differences as well as a substantial lack of trust. Scholars have investigated the state of religious tensions in Pakistan as well as Pakistan's relationship with the US, but there is limited work that attempts to draw direct

connections between the two. Focusing on the time period of Obama's presidency, this research investigates how the understanding of Pakistan's religious minorities in the US relates to foreign policy making, and uses Pakistan as a case study to draw broader conclusions about the ways that domestic political shifts can shape foreign policy decisions. Documents from the congressional record, reports by human rights groups and relevant legislation are chronologically examined to form a broad picture of how US-Pakistan relations developed during this period. Early results indicate a shift in rhetoric around Pakistan's religious minorities following the 2010 midterm elections; religious protection, especially of Christians, begins to be a popular rhetorical tool, specifically for the Republican Party, in order to create reasoning for a congressionally-led change in foreign policy goals. Further results and implications for the current administration are discussed.

Islamophobia in the US Airline Industry

Sonya A. Walker (Dr. Ariela Marcus-Sells & Prof. Colin Donohue) Department of Journalism

Over the course of seven months I conducted over 25 interviews with Muslims and Sikhs about their experiences in airports, and with pilots and other airline personnel – a population whom previous literature on Islamophobia in the United States has not addressed. Both the personal perspectives revealed in this presentation and recent news reports surrounding racial profiling of Muslims – and people mistakenly identified as Muslims – illustrate the ongoing impact of Islamophobia in the United States. Moreover, by including testimony by pilots and airline personnel, this research highlights how airports and airplanes serve as a vehicle for Americans, including pilots, travelers, and those who consume media to perpetuate stereotypes and monger fear about Muslims. My project connects the themes that emerge from these interviews to the academic literature on Orientalism and Islamophobia in the United States (Said 1978). I argue that airports, specifically, are a location in which gendered narratives about the Muslim 'Other' not only persist, but are justified under the guise of national security. This project is immediately relevant to the current American moment in that Islamophobia has been increasing since the 2016 election and Islamophobic rhetoric is perpetuated by the President of the United States, notably resulting in the controversial and high-profile travel bans from several Muslim-majority countries put in place by an executive order.

Abstracts by Department/Program

Art

Chinese Contemporary Art and It's Role in the Contemporary Art Community

James P. Reardon (Dr. Wen Guo) Department of Art

With the rise of Chinese contemporary art in the global Contemporary arts community, the Chinese "label" still seems to be inescapable in defining the meaning-making process and trading process of Chinese contemporary art. This article looks at Chinese Contemporary art and its struggle of identity crisis in the global contemporary art community by comparing the works of Zhang Xiaogang and Miao Ying, who represent artists from two generations (the older generation born before 1980s and the younger generation after 1980s) of Chinese contemporary art through a western gaze. The study employs document analysis by analyzing archived interviews, media reports, and scholarly articles, among other relevant publications. The article strives to 1) investigate the artworks of Zhang and Miao and their personal backgrounds, ideologies and creative apparatus's, and 2) how the creation process of the two artists have entangled with the global Contemporary Art Community which is dominated by western the culture and market forces. The article concludes that the identity of Chinese contemporary art should be viewed beyond the ethnic expectations that bind the meaning-making and value of Chinese contemporary art and artists, though the Chinese "label" may provide an entry point of reception.

Biology

Possible Antivenom Properties in Ning (*Dioscorea hispida*) as a Treatment for Malayan Pit Viper (*Calloselasma rhodostoma*) Venom as told by Montagnard Community Members, the Indigenous Tribes of the Vietnamese Highlands

Christopher G. Adamik (Dr. Catherine Bush) Department of Biology

Ning (*Dioscorea hispida*), a yam native to Southeast Asia, contains an extremely poisonous alkaloid known as dioscorine. This alkaloid attaches to the nicotinic acetylcholine receptors (nAChR) causing convulsions and death. If the tubers of ning are processed properly, they can be consumed in times of famine. Montagnard community members report that unprocessed tubers of ning can be consumed orally as an antidote to venomous snake bites. A particular case study in the community identified ning as the plant consumed in response to a Malayan pit viper (*Calloselasma rhodostoma*) envenomation specifically. To our knowledge, there is no current research that links these two species together as a potential antidote and venom, respectively. A literature review was conducted on the compounds within both species to attempt to hypothesize the plant's alleged medicinal use. Malayan pit viper venom contains thrombin-like enzyme (TLE), which causes blood coagulation leading to possible tissue death and amputation. Ning contains a storage molecule, diosgenin, which has been demonstrated in rat models as having

anticoagulative properties. Consuming unprocessed ning, while it has its beneficial aspects, also exposes the patient to the dangerous effects of dioscorine. Approximately 80% of the compounds found in Malayan pit viper venom cannot be attributed to a specific function. It is hypothesized that an unknown snake venom compound outcompetes dioscorine at nAChR, nullifying the deadly effects of dioscorine. Every year, more than 450,000 individuals in Southeast Asia receive amputations in response to venomous snake bites and have little access to healthcare. There is a potential that ning can decrease these life changing injuries.

Assessing the Learning Environment of Introductory Biology Courses for Non-Science Majors at Elon University

Juliana Balta (Dr. Jessica Merricks) Department of Biology

Most colleges require undergraduates to take a lab science class, but studies suggest that non-science majors struggle because they perceive the content to be abstract and irrelevant. This can lead to negative experiences in class, and ultimately, negative impressions of science. Instructors must find the best strategies to enhance learning for this sensitive population. The American Association for the Advancement of Science has called for a shift from passive lectures, which focus on a product (i.e. a test), to an active learning environment where students process and synthesize content. We know that a process-centered environment is optimal for biology students, but few studies have assessed its effectiveness for non-science majors. Additionally, it is unclear whether differences in students' cognitive development impact how they process abstract science content. We assessed the effectiveness of these two strategies for non-science majors in an introductory course at Elon University. First, we measured students' abstract thinking skills using the Bakken Test of Piagetian Stages (2001). Our goal was to determine if variation in abstract thinking skills correlated with learning gains. Then, half of the students participated in a "product-centered" treatment, which involved a traditional lecture and a demonstration of a skill to be assessed on their exam. The other half participated in a "process-centered" treatment, in which they were encouraged to focus on their learning process by interacting with the material and working as a team to master the skill (e.g no emphasis on the exam). The same instructor led both treatments and focused on the same skill. We measured learning gains through a knowledge assessment administered before and after the treatments. Students completed a Likert-scale survey to gauge their perception of the learning experience. We also recorded both treatments and coded a range of behaviors, such as distraction or active engagement. We predicted higher learning gains in the process-centered treatment, independent from cognition level. We also predicted that students in the process-centered treatment would report greater enjoyment compared to the product-focused treatment. Our surprising findings uncover how process-based learning may influence student perceptions and ability to learn biology.

The Role of the Gut-Brain Axis in the Capacity for Learning in Zebrafish

Colin J. Deutsch (Dr. Jennifer Uno) Department of Biology

Starved (low calorie) and overfed (high calorie) diets are common in food insecure areas and can shift gut microbiota diversity. While there is increasing evidence linking the gut microbiota composition to psychiatric disorders including anxiety and depression, little is known regarding the impact gut microbes have on learning behavior and capacity. Current literature supports that alterations in intestinal microbiota diversity and richness can influence learning and memory processes. The aim of this study is to examine the influence of gut-brain axis on learning capacity using the zebrafish as a model. We hypothesize that a decrease in microbial diversity and abundance will negatively impact learning in zebrafish by way of changes in serotonergic and dopaminergic neurotransmission. Fish were grouped and fed a control diet, a starved low caloric diet and an overfed high caloric diet. Afterwards microbial DNA and RNA from zebrafish brain tissue was isolated. Bacterial abundance was quantified with primers designed against 16s ribosomal RNA. Dopamine and serotonin receptor expression was examined using TaqMan primer probes. Overfed fish exhibited a significant increase weight relative to starved fish, in addition starved fish displayed a 7.0 mg decrease in weight ($p<0.001$, $n=5$). Both overfed and starved fish exhibited a decrease in intestinal microbial abundance. Associative learning was assessed using a plus-maze protocol. Interestingly we observed modest, though not significant increases in learning in the starved fish relative to overfed and control fish. Coinciding with this data, overfed fish showed no significant changes in serotonin or dopamine receptor gene expression compared to control diets, however starved diets illustrated an increasing trend in serotonin receptor expression and a significant increase in dopamine D1 receptor expression ($p<0.04$, $n=11$). These results indicate that starved and overfed diets decrease gut microbial abundance and may influence learning capacity through the gut-brain axis in starved fish.

Evaluating the Migration of T cells After Treatment With PI3K and mTOR Inhibitors

Olivia F. Duffield (Dr. Yuko Miyamoto) Department of Biology

The ability of immune cells to fight infection hinges on their ability to migrate throughout the body, patrolling for infectious agents. The cell surface receptor, CXCR4, is critical for T and B cells to sense a pathogen and migrate toward the source of an infection. Recent work has implicated the PI3K/Akt/mTOR signaling pathway in the regulation and control of cell migration. When PI3K is turned on, it activates protein kinase B (Akt), which then activates mTOR. Activated mTOR interacts with different downstream targets to control cell migration. Research has shown that mTOR regulates the expression of CXCR4 in B cells and metastatic cancer cells. We investigated the role of PI3K and mTOR on the expression of CXCR4 in T cells. While much is known about how PI3K and mTOR regulate cell metabolism, knowledge of how the PI3K/Akt/mTOR signaling network acts in cell migration is unclear. Furthermore, how chemicals that inhibit mTOR affect migration is also unknown. Jurkat and CEM T cells were treated with inhibitors of mTOR, Rapamycin and PP242, and the PI3K inhibitor LY294002. Contrary to published results, flow cytometry and Transwell assays with Jurkat T cells indicated that they do not express the CXCR4 T cell receptor; <1% of cells tested positive for CXCR4 and the cells did not respond to the chemoattractant CXCL12 in migration assays. Research with Jurkat cells was discontinued and only the CEM cells were used in further experimentation. Western Blot analysis on CEM cell lysates confirmed mTOR protein inhibition by PP242 (600 nM), but not Rapamycin (30-100 nM). Flow cytometry analysis showed that 65% of CEM cells

express the CXCR4 receptor, but treatment with inhibitors, LY294002 (0.5-5.0 μM), Rapamycin (30-100 nM), and PP242 (200-600 nM) had no effect on the expression of CXCR4 ($p=0.24$, 0.5, and 0.42, respectively). In conclusion, inhibition of mTOR and PI3K did not have an effect on CXCR4 expression, meaning that these proteins do not intersect with proteins that cause internalization or desensitization of the CXCR4 receptor in T cells. Future research should focus on other cytoskeletal proteins to determine if the PI3K/Akt/mTOR is potentially controlling migration through them.

Behavior of *Orchelimum erythrocephalum* During Male-Female Encounters

Emma D. Ebright & Nicole K. Marici (Dr. Jen Hamel) Department of Biology

In many animal species, communication and movement are central for finding mates. Although these behaviors are necessary for reproduction, they can also increase individual predation risk, and such risk may not be evenly shared between males and females. To evaluate the potential risk associated with calling and movement for males and females of a focal species, a necessary first step is to quantify individual behavior: who is signaling, who is moving, and how much? Here, we quantified signaling and movement of males and females for an acoustically communicating insect species, the red-headed meadow katydid (*Orchelimum erythrocephalum*). Because males of most katydid species produce acoustic calls, we predicted that males would call to attract females from stationary positions, and that females would move in search of males. Because females of other species in the same genus mate only once, we also predicted that females would be choosy, and that few of the focal females would mate during trials. We observed and video recorded male-female interactions and generated ethograms and activity budgets for pairs that did and did not mate. For pairs that mated, we also quantified behavior before, during, and after copulation. Preliminary findings suggest that during mating interactions, females moved more than males; that males moved less during trials in which matings occurred than during those in which mating did not occur; and that males called for 70% of the time, on average. Matings occurred infrequently, consistent with the prediction that females are choosy with respect to mate selection. Our findings suggest that male and female *O. erythrocephalum* both engage in behavior during mating interactions that likely increases their individual predation risk.

Investigating Fisetin Neuroprotection Against D-galactose-induced Aging in SH-SY5Y Neurons

Sean R. Janovic (Dr. Tonya Train) Department of Biology

Neurodegenerative disease (stroke, Alzheimer's, Parkinson's) is the third leading cause of death in the U.S. behind only heart disease and cancer. A possible contributing factor to the onset of age-related neurodegenerative disease is the accumulation of senescent cells in the brain. Cellular senescence is irreversible cell cycle arrest that protects against cancer and aids in development and tissue repair. New insights indicate the negative impacts of senescent cells as they accumulate in tissue with age. Senescent cells are detrimental when they release inflammatory SASP (senescence-associated secretory phenotype) factors that cause damage to

nearby cells. Although cellular senescence has been identified as a source of chronic inflammation and a hallmark of aging, its precise impact on neurodegeneration and the aging process remains unknown. Recent studies have identified molecules, termed senolytics, that selectively induce apoptosis of senescent cells. Fisetin, a flavonoid, has been characterized as both a caloric restriction mimetic and a senolytic. This study aims to evaluate whether fisetin modulates D-galactose-induced senescent aging in SH-SY5Y neurons. D-galactose (D-gal) is a reducing sugar that is commonly used as a brain aging model and is an effective inducer of senescence. Preliminary experiments have successfully induced neuronal senescence and evaluated apoptosis. Induction of senescence required a 72 to 120 hour treatment with 200 mM D-gal and was measured by colorimetric β-galactosidase staining. D-gal treatment resulted in approx. 70% and 5% senescent cell burden in treated and control cells respectively. Apoptosis was measured by annexin V staining and flow cytometry. Preliminary results showed no significant difference in apoptosis in D-gal treated cells. We expect an increase in apoptosis upon fisetin treatment due to its senolytic activity. Future experiments will include western blot of intracellular proteins and senescent cell quantification utilizing flow cytometry.

Assessing How Non-Major Student's Attitudes Towards Stem Cells Affect Their Learning and Acceptance of the Topic

Jamie M. Kauffman (Dr. Jessica Merricks) Department of Biology

Science knowledge and acceptance are the primary goals of science education. When students understand and accept biological concepts, they can apply that knowledge accurately to societal movements and civic engagement. Previous studies indicate that negative biases and attitudes towards science topics can significantly impede general understanding. Preliminary research in our lab suggests that negative attitudes among non-science majors is linked to lower learning outcomes in a traditional lecture course, but less is known about the impact of active learning strategies on this phenomenon. The goal of my study was to test the impact of active learning instruction on students' attitudes and perceptions of stem cell biology. I conducted my study in two sections of an integrated lab-lecture course for non-science majors at Elon University. Students learned the material through lecture videos and assignments prior to attending class, and gained a deeper understanding through in-class activities. Participants answered a pre-unit questionnaire regarding their attitudes towards stem cell science as well as a content knowledge assessment. After completing the lecture video and active class engagement on stem cells, students answered a post-unit questionnaire and content knowledge assessment. I also conducted a focus group to gather qualitative information regarding students' attitudes and engagement during class. Using a mixed-methods approach, I analyzed changes in students' attitudes and content knowledge, and reported qualitative measures of student engagement and understanding of stem cell biology. I predicted that students with negative attitudes about stem cells would demonstrate lower learning gains compared to students with positive attitudes. Because of the active nature of the course, I expected student attitudes to improve after the unit. Our results highlight the role of active learning in shaping the attitudes and perceptions of students, and may have significant implications for improving learning gains in non-science learners. Insights from this work may also inform future strategies for effective science communication and outreach for the general public.

Investigating the Calling Song of the Red-headed Meadow Katydid (*Orchelimum erythrocephalum*)

Davis W. McGuirt (Dr. Jen Hamel) Department of Biology

Many insects produce acoustic calling songs to attract potential mates. Calling song production may also impart vibrations into substrates such as plant stems. Both the acoustic and vibrational components may attract predators, in addition to mates. Here, we characterized the acoustic and vibrational components of the calling song of the red-headed meadow katydid *(Orchelimum erythrocephalum),* and we also assessed whether the substrate-borne vibrations propagate in the field. Acoustic calling songs were recorded from feral males (n=15) using microphones, and substrate-borne vibrations were recorded from the calling songs of colony-reared males (n=16), using microaccelerometers. We characterized two syllable types in calling songs, ticks and buzzes. We measured the temporal and spectral parameters of each syllable type. To assess whether substrate-borne vibrations may propagate through vegetation in the field and be detected by predators, we recorded the vibrational component of calling songs with one microaccelerometer affixed to the same grass stem as a signaling male, and a second to an adjacent stem in the same grass cluster. Buzzes and ticks are broadband acoustic signals, with peak frequencies of 11.02 ± 1.26 kHz and 10.71 ± 2.03 kHz, and durations of 501 ± 260 ms and 15.20 ± 2.87 ms, respectively. Substrate-borne vibrations associated with buzzes and ticks were also broadband, with 90% bandwidth for both syllables ranging from ~ 1-11 kHz. However, 90% bandwidth was greater on the focal plant stem than on the adjacent stem for buzzes (paired t-test, t=2.51, df=15, p=0.024) and ticks (paired t-test, t=3.47, df=15, p=0.004). In summary, both acoustic signals and their associated substrate-borne vibrations were broadband, and energy from substrate-borne vibrations propagated to adjacent plant stems. Invertebrate predators such as spiders are likely capable of detecting the lower frequency vibrational components. Consequently, behaviors to reduce detection by predators should be expected.

Exploring the Zebrafish as a Model Organism for Studying Celiac Disease

Erika R. Monteith (Dr. Jennifer Uno) Department of Biology

Celiac disease (CD) is an autoimmune disease triggered by gluten consumption in genetically predisposed individuals. CD affects the small intestine and is characterized by villous atrophy and crypt hyperplasia associated with intestinal inflammation, diarrhea, and abdominal pain. All living organisms have microbes in their digestive tract, collectively called the microbiome. These microbes normally cause neither harm nor disease, however, the microbial communities associated with CD differ from non-CD patients. Currently, most CD research is performed in humans; however, zebrafish have emerged as valuable model organisms for studying the disease. The use of zebrafish to study gastrointestinal biology has resulted in advances in our understanding of intestinal health given the fish's similar intestinal structure. The aim of this study is to examine the potential use of zebrafish as a model to further investigate the pathology associated with CD. In order to do this, zebrafish were treated with a course of antibiotics to clear the microbiome. Fish were then fed a wheat-based or a bloodworm-based diet. Following one week of dietary treatments, bacterial DNA was collected, and intestinal tissues were

examined. Results indicate a significant decrease in the anti-inflammatory bacteria *Bifidobacteria* in the wheat-fed fish ($n=3$, $p<0.05$), while they also exhibited a slight non-significant increase in proinflammatory *E. coli*. Because villous atrophy and IL-1beta cytokines are key diagnostic features of CD, the histology and mRNA of IL-1beta in zebrafish intestines will be examined. We hypothesize that zebrafish given a wheat-based diet will produce similar villous atrophy as humans and have a similar cytokine profile as seen in CD patients. Collectively this data may indicate that zebrafish have similar responses to gluten as humans and, therefore can be valuable model organisms for CD.

A Study of the Functions of Multimodal Signaling in Insects

Jean L. Ross, Ciara Kernan, McKenna Gray, & Hannah ter Hofstede (Dr. Jen Hamel) Department of Biology

Animals communicate with one another about activities that are central to their survival and reproduction. Many animals communicate using more than one kind of signal, including chemical, acoustic, tactile, and vibrational signals. Such "multimodal" communication is a focus of study in behavioral ecology because findings about why animals use multiple signal types vary across species, and general principles about multimodal communication are still being developed. We study why Neotropical katydids communicate using both acoustic and vibrational signals in mating contexts. We hypothesize that males produce acoustic signals to provide information to females on species identity and location of signaler. We also hypothesize that males and females produce vibrational signals to indicate their presence on the same plant as a potential mate. With three experiments, we measured the behavioral responses of katydids to acoustic and vibrational signals. We played male vibrational signals to females, male acoustic signals to females, and female vibrational signals to males. Our preliminary findings suggest some shared functions between signal types, including eliciting searching behavior and serving as localizable signals for receivers. Such redundancy may be a strategy to increase effective signaling in contexts with variable environmental noise. Our findings will help to advance understanding about why animals use multimodal communication and inform future work to determine if findings for this focal species may be generalized across closely related species.

Investigating the Role of Asparagine Synthetase in Chemotherapeutic Resistance in Leukemic and Neuroblastoma Cells

Andrea G. St Laurent (Dr. Tonya Train) Department of Biology

Asparaginase (ASNase) is one of the first-lines of chemotherapy used in the treatment of acute lymphoblastic leukemia (ALL). It breaks down asparagine in the body forcing the cell to undergo apoptosis. Yet, some patients develop resistance to ASNase treatment. Asparagine is produced in the cell by the enzyme asparagine synthetase (ASNS). One explanation for resistance could be increased ASNS expression leading to the production of more asparagine than can be broken down. Here, we investigated whether using a competitive ASNS inhibitor, albizziine (Alb), to decrease ASNS activity would reverse ASNase resistance in leukemic cell lines. Two human leukemic cell lines with varying ASNS expression were utilized, Jurkat and

HL-60. Real time-PCR analysis showed an 8.9-fold increase in ASNS mRNA in HL-60 relative to Jurkat. In addition, HL-60 was resistant and Jurkat sensitive to ASNase-induced apoptosis; as determined by staining the cells with Annexin V-FITC and flow cytometric analysis. After 24 hours, 0.1 IU ASNase treatment resulted in a 43.27% increase in apoptosis in Jurkat cells, but no significant increase in HL-60 cells. The addition of the ASNS inhibitor, Alb, in combination with ASNase resulted in increased apoptosis in both cell lines. HL-60 apoptosis increased 6-fold when treated with a combination of 0.1 IU ASNase and 1mM Alb. Alb also increased Jurkat sensitivity to 0.1 IU ASNase from 43.27% apoptosis with ASNase alone to 67.15% in combination with ASNase. Alb alone did not induce any significant death. These results suggest that the ASNS inhibitor, Alb, can restore sensitivity to ASNase induced death in leukemic cell lines and therefore warrants further investigation into its role in reversing ASNase chemotherapeutic resistance.

Song Development in Northern Mockingbirds (*Mimus polyglottos*)

Andrew C. Tovsky (Dr. Dave Gammon) Department of Biology

Although much research exists on vocalization patterns in northern mockingbirds (*Mimus polyglottos*), development of these patterns has not been examined much. I explored how fall song differed between hatch-year and after-hatching-year male mockingbirds. I expected a number of acoustic measurements to be lower in hatch-year mockingbird song than in that of after-hatch-year mockingbirds. Audio samples were gathered from two hatching-year mockingbirds, 12 after hatching-year mockingbirds, as well as from 34 mockingbirds whose ages were not confirmed. All songs were assessed using two benchmarks: percentage of syllables that were mimetic (mimetic frequency), and the consistency with which syllables were repeated (stereotypy). Results showed that both mimetic frequency and stereotypy were lower in the songs of hatch-year than in those of after-hatch-year mockingbirds, suggesting a clear trajectory of development toward higher mimicry and greater stereotypy in older birds.

Investigating the Behavioral Ecology of Solitary *Orchelimum erythrocephalum*

Rebecca B. Usher (Dr. Jen Hamel) Department of Biology

The red-headed meadow katydid (*Orchelimum erythrocephalum*) is a potential model species for studying topics of interest to behavioral ecology, including acoustic communication, mate searching behavior, and predator avoidance. Although behavior for other species in the genus has been well described, there is little published about this species, which is abundant in the North Carolina Piedmont. Here, to create a descriptive foundation for behavioral study, I observed and filmed 45 solitary individual *O. erythrocephalum* in the field, each for a 20 minute period. I quantified behavior from videos, and I constructed ethograms and activity budgets for males and females, for both daytime and nighttime observations. Both males and females were more active during the day, as they spent more time walking and performing other behaviors than at night, and behaviors such as jumping and pivoting were most frequently followed by walking. Males produced airborne sound by stridulating for > 75% of the time during daytime trials, but males did not stridulate at night. Some aspects of activity budgets differed between sexes, as

males fed for more time than females at night, and females walked for more time than males during the day. Differences in behavior between sexes and between day and night contexts may be driven at least in part by predation risk. This work will provide a foundation for studying signaling behavior, predator avoidance, and behaviors associated with finding mates for *O. erythrocephalum.*

Assessment of Behavioral Impact of Chemicals on Adult Zebrafish

Ryan Wagner & Grayson Clark (Dr. Eric Bauer) Department of Biology

Humans are exposed to many chemicals every day, either through eating, drinking, smoking, or inhaling. For many chemicals, we are not positive about what they are doing to our body. Certain chemicals may be safe through one mode of exposure but not another. Particularly, e-cigarettes have been regarded as a healthy, or safer alternative to cigarettes because they use chemicals generally regarded as safe. However, there has been little research done on the connection between these generally safe chemicals and potential neurological interactions resulting from long term exposure to the inhalation of said chemicals. This project uses zebrafish, Danio rerio, to test the behavioral impact that short-term exposure to e-cigarette chemicals could potentially yield. It is known that disruption of brain function will produce a behavioral change and zebrafish physiology is very similar to mammalian physiology, so zebrafish are an acceptable model to represent the potential behavioral impacts e-cigarettes could have on humans. Behavioral analysis was performed by exposing the fish to a novel object and monitoring their swim patterns with tracking software. Their swimming behavior at 3 time-points relative to nicotine treatment was compared. The initial findings of the zebrafish indicate that nicotine induces anxiety as the fish exhibited symptoms of stress, but did not change the fish's learning patterns. These findings are useful because they can be used to highlight the effects that nicotine has on humans.

Behavioral Impact of the Flavorant Cinnamaldehyde on Adult Zebrafish.

Cory Weller (Dr. Eric Bauer) Department of Biology

Humans are exposed to a myriad of chemicals daily, via ingesting, dermally, or inhaling. For many of these chemicals, we lack a full understanding as to what they may be doing to our body. Additionally, even if one chemical is shown to be safe to consume in one modality, i.e. eating, this does not guarantee that the same chemical will be safe to consume through another modality, i.e. inhalation. This is a common situation in vaping solutions which use flavorants approved for ingestion but in the novel modality of inhalation. It is entirely possible that how a molecule enters the bloodstream and interacts with the body will differ between the digestive and respiratory systems. Our research uses behavioral assays of swimming and neophobia in zebrafish (Danio rerio) to look for potential neurological impacts of vaping flavorants. Neophobia (fear of novelty) is a complex task and requires engaging several high-level cognitive processes (visual processing, object recognition, and memory formation and recall) which lead to alteration of behavioral output by the animal. Even minor disruptions by a chemical of neurological functions will manifest as differential behavioral choices as compared to control

animals. Zebrafish are an acceptable model to study the potential behavioral impacts of e-cigarettes on humans due to physiological evolutionary conservation in the vertebrate lineage. We test fish one week before chemical treatment, immediately following treatment, and then one-week post-treatment. Preliminary results using the flavorant cinnamaldehyde have shown that treated zebrafish swim 30% further and with 29% faster swimming bursts than control fish. This effect persists at least 1 week post-treatment. In addition, cinnamaldehyde-treated fish react with slightly greater fear to changes in their environment. By analyzing general activity and the response to novel objects and environments, the effects of various chemicals on the neurological functions of zebrafish will be studied. Analyzing the response of these fish can yield significant physiological information pertaining to e-cigarette use in humans.

The Effect of Migraine Drugs on Learning and Memory in Zebrafish

Carrie E. Williams (Dr. Linda M. Niedziela) Department of Biology

Migraine is the 3rd most prevalent disease in the world and is characterized by severe throbbing pain, visual disturbances, nausea, vomiting, dizziness, extreme sensitivity to light, sound, touch, and smell, as well as tingling or numbness in the extremities or face. There are several classes of preventative drugs used to treat migraines, including antidepressants and anticonvulsants. Anticonvulsants, in particular, are thought to have long-term neurological side effects, which may negatively affect learning and memory. These side effects can be assessed through habituation, which is a form of non-associative learning in which response to a stimulus decreases after prolonged exposure to that stimulus. This research is focused on two objectives. First, developing and testing a working, short-term habituation protocol in zebrafish. This model organism was chosen due to their genetic similarity to humans, resulting in comparable developmental learning and memory. A total of three different protocols were tested in order to determine which protocol would serve as a successful tool to study the effects of migraine medication. Each protocol tested involved various training regimens. The first protocol tested (Roberts et. al 2011) consisted of a 20-minute pre-test, 4-hour training audio file, and 20-minute post-test immediately following training. In preliminary trials, this protocol appeared to be successful in habituating the zebrafish. However, the results of further tests were highly variable exhibiting a range of 29% habituation down to 0%. Two additional protocols were also tested. The highest performing protocol will then be used for the second objective, to test the effect that anticonvulsant, Topiramate, may have on learning and memory in 10-day old, embryonic zebrafish.

Chemistry

Comparison of the Stereochemical Effects on the Cyclization of Sorbitol and Allitol Sugars and Non-sugar Model 1,4-pentanediol by B(C6F5)3 and Allylsilane Co-catalysis

Erin B. Armstrong (Dr. Jennifer Dabrowski) Department of Chemistry

Many products utilized every day come from crude oil, including gasoline, plastics, and cosmetics. While it is well known that fuels come from crude oil simply through refining, it is

less commonly known that crude oil is the main starting material to produce numerous ingredients used in consumer products. Non-renewable resources have simpler chemical structures than renewable resources and are mainly composed of hydrocarbons that function as the backbone for more highly engineered products. Because of that simplistic structure, crude oils require a series of chemical modifications in order to be developed into useful products. The purpose of this research is to find an alternate way to produce consumer products so that crude oil is no longer heavily relied upon. Initial investigations utilized silyl-protected sorbitol and allitol (Si-sorbitol and Si-allitol). These are linear six-carbon sugars that vary in their stereochemistry (the arrangement of groups in 3-dimensional space) which was hypothesized to affect reaction efficiency and selectivity. Reactions were conducted in CDCl3, and a co-catalyst system involving trimethylallylsilane and trispentafluorophenylborane, B(C6F5)3. This reaction resulted in a five-membered ring via cyclization as determined through NMR analysis (proton, carbon, COSY, NOSY, HSQC). Preliminary optimizations of isolation protocols were conducted including purification through silica gel chromatography and subsequent removal of silyl protecting groups. Optimal cyclization occurred when the reactions were performed in the glovebox under nitrogen gas (N2). Multiple trials were performed to screen catalyst loading and to monitor reaction progress over time. Si-sorbitol required lower temperatures and extended reaction times to achieve selective single cyclization, as a second cyclization was discovered to occur at room temperature. Conversely, Si-allitol cyclized at room temperature to exclusively form a single cyclization product. Exploration of a non-sugar model system, silyl-protected 1,4-pentanediol (Si-1,4-pentanediol; linear five-carbon alcohol), indicates that the sugar scaffold is critical for the observed reactivity due to its failure to cyclize. Future studies will investigate which groups of sugar molecules are responsible for the observed reaction differences.

Development of a Lab to Improve Student Understanding of the Photoelectric Effect and Its Implications

Nathan D. Blohm (Dr. Anthony Rizzuto) Department of Chemistry

The photoelectric effect was originally discovered in 1887 by Heinrich Hertz and Albert Einstein's contributions to explaining the effect led to his 1921 Nobel Prize. The study of the photoelectric effect has significantly contributed to a shift in understanding of chemistry and physics. The photoelectric effect led to the wave-particle duality of light theory, opened research into subatomic particles, quantum theory, advanced electronics, and has drastically improved our understanding of both fundamental chemistry and analytical methods. Despite the importance of the photoelectric effect, the topic is often only briefly mentioned or overlooked entirely in undergraduate chemistry lecture courses and is rarely explored in a lab setting. Because of this, undergraduate chemistry students often lack sufficient understanding of the concept and its implications. The purpose of this research is to develop a modifiable photoelectric effect apparatus and accompanying lab procedure for undergraduate students to perform in order to improve student understanding of the photoelectric effect and its implications. The apparatus includes a glass vacuum chamber with an anode and cathode with the anode designed to be interchangeable so that the work function of various metals/alloys can be analyzed. Different wavelengths of laser light will be directed at the anode to eject electrons across the vacuum chamber toward the cathode collector plate. Photocurrent will be measurable using an ammeter

built into the circuit, whereas voltage will be controlled using external leads. Future stages of this research will involve assessing students' improvement in understanding of the material and its implications. It is expected that students who partake in the lab and related assignments will perform better on examinations and will have improved their understanding of fundamental chemistry and quantum physics concepts.

Kinetic Studies of the Aqueous Carbonate System by Raman Spectroscopy

Jake Boyar (Dr. Anthony Rizzuto) Department of Chemistry

Despite its integral role in physiological buffering and the global carbon cycle, the central piece of the carbonate system, carbonic acid (H_2CO_3), remains incompletely characterized in an aqueous environment. Carbonic acid has only been identified previously using a high-powered x-ray source, a technique that is not viable for every research laboratory. Therefore, this research has put forth a novel alternative approach to the detection of carbonic acid was selected to study the decomposition of carbonic acid. Raman spectroscopy has been employed to study the decomposition of aqueous carbonic acid. The high-resolution technique allows for differentiation between the very similar derivatives of carbonic acid (i.e. carbonate, CO_3^{-2}, bicarbonate, HCO_3^{-1}, and carbon dioxide, CO_2). The formation of carbonic acid in aqueous solution is achieved by mixing bicarbonate and hydrochloric acid via a fast-flow liquid microjet system wherein the reaction time is entirely under experimental control. Using the rate of disappearance of the carbonic acid feature, which is inversely related to the appearance of bicarbonate, it will be possible to collect quantitative kinetic information about the decomposition of aqueous carbonic acid.

The Aggregation of Amyloid-beta and Insulin Peptides

Sarah A. Brown (Dr. Kathryn Matera) Department of Chemistry

Neurological diseases, such as Alzheimer's, have been correlated to the aggregation of peptides within the brain. Peptides, such as amyloid-beta (Aβ) and insulin (Ins), are prone to aggregation. Whether Ins and Aβ are aggregated separately or together, both smaller, soluble oligomers and larger, insoluble fibrils form, which have been associated with toxic effects within the brain. With Aβ correlated to Alzheimer's disease (AD) and Ins to diabetes, the resulting aggregation patterns of the two peptides together are used as evidence supporting the hypothesis that having diabetes increases the risk of developing AD later in life. To examine the aggregation patterns of these peptides, solutions of aggregated Ins and Aβ were analyzed via gel electrophoresis to examine oligomeric characteristics, Bradford assays to quantify soluble protein, Western Blot assays for determination of specific peptide characteristics, and Thioflavin T assays (ThT) to measure fibril concentration. For further analysis of the aggregation patterns, the insulin B chain (InsB) was substituted for normal Ins (which consists of covalently linked A and B chains). In addition, three mutated InsB chains (K29A, P28D, P28K/K29P), two of which are current diabetes treatments, were then analyzed to further establish modes of aggregation between the peptide strands. The findings demonstrate that when Aβ and any of the forms of InsB were aggregated together, there was a larger presence of both oligomers and fibrils than when

aggregated separately. The double mutant InsB was observed to stabilize aggregation preferentially in the oligomeric form when in the presence of Aβ. Further examination of peptide aggregation between both Ins and Aβ with another small protein, α-lactalbumin, have identified key components of the peptide chains that aid aggregation and helps link AD and diabetes.

Stabilization of Amyloid-beta Oligomers Using Indole, Catechol, and Serotonin and Its Effects on DNA

Elizabeth A. Chapman (Dr. Kathryn Matera) Department of Chemistry

Alzheimer's disease (AD) is one of many diseases that causes the breakdown of cerebral tissue and subsequent symptoms like difficulty in forming memories, confusion, personality changes, and inhibition of motor function. The amyloid hypothesis states that amyloid-beta (Aβ) peptide aggregates are involved in neuronal death and is one of the most accepted explanations for AD propagation. Small, soluble aggregates of Aβ, known as oligomers, have oxidative effects on the brain, which can result in the brain damage characteristic of AD. This damage is believed to occur via oxidation-reduction reactions taking place between oligomers of Aβ and biomolecules, such as DNA, lipids, and proteins, within the cell. Based on previous research showing that catecholamine neurotransmitters, such as dopamine and norepinephrine, are able to stabilize oligomers and reduce toxicity, this research studied similarly structured catechols to determine if they also have these effects. Experiments assessing the damage to DNA via oxidative effects from these stabilized Aβ oligomers were conducted, and a possible mechanism for aggregate stabilization involving dityrosine linkages between peptide chains was investigated. Agarose gel electrophoresis was used to determine the amount of DNA oxidation due to incubation with Aβ aggregates and small molecules. Dityrosine fluorescence spectroscopic assays were also conducted to determine if the small molecules had an effect on dityrosine formation during aggregation. It was shown that small molecules with catecholic structures may mediate toxicity against DNA more effectively than those small molecules without those catecholic structures. Determining how Aβ oligomers are affected by small molecules in the brain will help ascertain the mechanism of AD pathology on biomolecules such as DNA and lead to more effective treatments against the disease.

Investigating Possible New Reference Electrodes for Non-aqueous Solvents

Connor J. Gaudette (Dr. Karl Sienerth) Department of Chemistry

The most common type of reference electrode in use is the saturated calomel electrode, but it is not amenable for use in non-aqueous solvents. Another common electrode is the silver/silver chloride (Ag/AgCl) electrode immersed in a solution of silver ion. Although the reference solution is separated from the solution of interest by a porous glass frit, a significant problem that occurs is leakage of silver ion across the frit. Silver ion can cause adverse chemical reactions and also will exhibit an unwanted signal in electrochemical experiments. This research is focused on testing novel silver-based electrodes that provide a reliable reference potential without the problem of silver ion leakage. Silver chloride was deposited on silver wires using a common redox reaction, and silver hexafluorophosphate ($AgPF_6$) was deposited on silver wire

electrolytically. These treated electrodes were then coated in a variety of polymers to provide a novel interface between the reference electrode and the solution of interest. Creation of a silver wire based reference electrode that could be used in non-aqueous solutions without the potential for leakage of silver nitrate into solution would have a significant impact on the field of electrochemistry. The short and long term stability of each reference electrode, in terms of potential and chemical decomposition, was investigated by voltammetry in a non-aqueous solution with a standard redox solute, ferrocene.

Bioavailability and Speciation of Metal Oxide Nanoparticles in Surface Coatings: Modeling and Evaluating Potential Hazards of Product Use

Avery C. Hatch (Dr. Justin Clar) Department of Chemistry

Recently, surface coatings including paints, stains, and sealants have become a focus of "nano-enabled" consumer product engineering. Nanoparticles are defined as engineered materials between 1 to 100 nanometers (nm) in size. Specifically, zinc oxide (ZnO) nanoparticles (NPs) have become prominent additives in surface coatings to increase ultraviolet light resistance and resistance to wear. As more products available for purchase incorporate NPs during manufacturing, questions arise regarding the long term environmental and human health effects of these materials. This study modeled the bioavailability of NPs similar to those found in consumer products. The initial stages of this research have focused on incubating NPs in multiple synthetic biological fluids (SBFs) in order to model metal dissolution within biological fluids during inhalation that could occur throughout product application and use. Experimental samples either incorporated ZnO NPs into commercially available nonenhanced stains or utilized available ZnO NP enhanced counterparts. Samples were taken at various time points during a two-week incubation and analyzed via Atomic Absorption Spectroscopy to determine both the total zinc concentration and the percentage of ionic zinc present to estimate bioavailability and toxicity. Zinc concentrations were found to be dependent on the SBF and the consumer product. X-ray absorption data were used to evaluate the speciation of remaining nonionic zinc. The trends seen in x-ray absorption spectra support the conclusion that the inhalation of zinc NPs in a surface coating matrix will lead to not only a major conversion into soluble ionic zinc, but a conversion of general suspended zinc into multiple additional complex organic species, as well. Future analysis will focus on additional relevant NPs.

Assessing the Release and Transformation of Metal Additives from Consumer Plastics

Margaret H. Hughes (Dr. Justin Clar) Department of Chemistry

The use of consumer plastics spans a very broad range, including electronics, food packaging, and even clothing. Trace metals are often added to plastics to reduce degradation/discoloration, as well as increase strength and flexibility. However, trace metals can be toxic to humans and the environment when unintentionally released from these plastic products. For example, polyvinyl chloride (PVC), commonly used in piping, is specifically known to contain large amounts of tin (0.5 – 2 wt%). Previous research has investigated the release of tin compounds from PVC piping under bench-scale flow systems. However, these studies do not address other exposure routes,

including inhalation of secondary particles produced during PVC construction activities (cutting, sanding, grinding, etc.). In this study, elemental tin and organotin mobility are being tracked during simulated construction activities. PVC piping is put through a series of sanding and grinding processes to generate different sized fractions, that then undergo incubation in a variety of synthetic biological fluids (SBFs). Tin concentration for each sample is then measured using ICP optical emission spectroscopy in order to track tin release from PVC particulates. Preliminary results from this experiment have displayed an average tin release around 0.62 wt % of the PVC in solution, with variation in sample solution pH, ranging from 4.2-10.4. Further results of this project will give the scientific community insight into the likely environmental and human health consequences from the use of PVC, due to tin additives.

Investigating the Kinetics of the Aqueous Carbonate System Under Physiological Conditions

Samantha C. Johnson (Dr. Anthony Rizzuto) Department of Chemistry

Carbonic acid is known to be a prevalent intermediate in one of the most important biochemical systems in our bodies, our blood buffer systems, and continues to be an active area of study. In an aqueous system like mammal blood, carbonic acid and carbon dioxide are linked in a chemical reaction that involves an intermediate, bicarbonate ion, or HCO_3^-, which can react in one direction to form CO_2 and in the other direction to form carbonic acid. This intermediate follows a unique kinetic mechanism widely unknown due to its rapid bidirectional dissociation properties. Knowledge of this mechanism could provide necessary information to help control blood pH. The current investigation focuses on the kinetics of carbonic acid under a series of physiological conditions, namely those of our blood buffer system. Initial studies have involved creating different buffer solutions mimicking the pH of blood and utilizing various spectroscopic methods such as Raman and FTIR. Preliminary results show how carbonate and bicarbonate behave and present themselves in Raman and FTIR spectroscopy. Current studies involve synthesizing and spectroscopically identifying carbonic acid *in-situ.* Monitoring the spectroscopic features and/or the buffer concentrations as the reaction progresses will allow for the extraction of quantitative data informing upon the kinetic mechanism. Further investigations will be conducted to observe the effect of carbonic acid on buffering capacities of mono- and di-basic phosphate, as well as Gamble's solution, to mimic lung fluid.

The Effect of the Myeloperoxidase Enzyme on Protein Tissue Oxidation and Its Possible Implications in the Pathology of Rheumatoid Arthritis

Savannah L. Kile (Dr. Kathryn Matera) Department of Chemistry

Numerous research studies have established a correlation between Rheumatoid Arthritis (RA) and a high level of the mammalian enzyme, myeloperoxidase (MPO), in the synovial fluid of patients' inflamed joints. Additionally, extracellular MPO has been found locally among necrotic tissue in the joints. Evidence has shown that this tissue, mostly composed of collagen, has been damaged as a result of oxidation. Because MPO is known to catalyze oxidation reactions of biological molecules by reducing hydrogen peroxide to water, MPO is likely part of the RA

pathology; however, its exact role is still unclear. To investigate MPO's role, initial studies were done to determine if a model system using horseradish peroxidase (HRP), an enzyme that has similar catalytic activity to MPO, binds to collagen. More specifically, it looked to determine if HRP binds to three of the predominant amino acids found in collagen, hydroxyproline (polar), proline (nonpolar), and phenylalanine (nonpolar, aromatic) using UV-visible spectroscopy. This model study provided the groundwork for MPO binding studies. The MPO binding studies were conducted following the methodology of the HRP binding studies. Additionally, gel electrophoresis (SDS-PAGE) was used to qualitatively determine if collagen had been oxidized in the presence of hydrogen peroxide. The Kd values for the HRP and MPO binding studies, which are a measure of how well the enzyme binds to a compound, were calculated and the binding affinity of the three substances (hydroxyproline, proline, and phenylalanine) to these two enzymes were compared. Additionally, the collagen samples and the oxidized collagen samples visualized with SDS-PAGE had visibly different banding patterns. The banding patterns result from different sized protein fragments. Therefore, it was determined that gel electrophoresis can be used in the future to qualitatively determine if collagen has been oxidized in the presence of MPO.

Investigating the Oxidative Mechanism Behind Atherosclerosis

John P. Post (Dr. Kathryn Matera) Department of Chemistry

Coronary heart disease (CHD) is the leading cause of death worldwide and accounts for 1 in 7 deaths within the United States. The majority of CHD cases are caused by atherosclerosis, an inflammatory disease characterized by the formation of fibrous plaques on inner arterial walls. Research has shown that oxidation of low-density lipoproteins (LDL) has been implicated in the formation of fatty plaques leading to atherosclerotic lesions. However, the exact mechanism by which this takes place is unknown. In this study, a ubiquitous lipid in living systems, phosphatidylcholine (PTC), was oxidized with the naturally occurring enzyme myeloperoxidase (MPO), and in the presence of hydrogen peroxide, to better understand the biochemical mechanism behind atherosclerotic plaque formation. PTC was chosen as the substrate since it is the most prominent lipid constituting the surface layer of LDL in humans. Additionally, PTC has the potential to be oxidized by MPO since lipids with similar oxidation sites, such as oleic and linoleic acids, have been successfully oxidized by MPO in prior studies. MPO was chosen as the enzyme since it is readily found in atherosclerotic plaques and is positively correlated with plaque formation. The results of this study, obtained through spectroscopic binding studies between PTC and MPO, enzyme kinetic assays, and NMR spectroscopy, provide evidence towards the biological relevance of PTC in plaque formation. A dissociation constant (K_D) value of 3.355 mM indicated that that while PTC and MPO do not have a high affinity for each other, PTC is able to enter the binding pocket of MPO and become successfully oxidized. Additionally, ^{1}H and ^{13}C NMR spectroscopy both indicate that C=O double bonds disappear when PTC is fully oxidized with H_2O_2.

Abuse Deterrent Formulations of Hydrocodone Using Coconut Oil

Jared E. Rosbrugh (Dr. Joel Karty) Department of Chemistry

An increase in prescription opioid related deaths due to abuse of the medications via inhalation and intravenous injection has reached an all-time high, sparking new research on ways to deter the abuse of prescription opioid pills. Medications that have undergone modifications in an effort to achieve abuse deterrent characteristics are called "abuse deterrent formulations," or ADFs. The long-term goal of this research is to develop and evaluate an ADF for the prescription opiate hydrocodone and its derivative hydrocodone, by suspending the opiate in a medium of coconut oil, a soft solid at room temperature. Natural softness of the coconut oil prevents the conversion to a powder, which would deter inhalation of the drug. Additionally, the coconut oil should sequester the drug when heated in water, which should deter the conversion of the opiate to an aqueous solution that can be used for intravenous injection. Finally, the ADF should still retain significant inhibitory effect on neuron activity when ingested as intended. The short-term aim of this research is to evaluate the ability of coconut oil to sequester models of the drug molecule from an aqueous solution. Initial testing has been carried out on quinidine and naloxone, as models for hydrocodone. Samples of the drug model in coconut oil were subjected to boiling and the resulting aqueous solution was tested using high performance liquid chromatography (HPLC). The HPLC methodology has been optimized to allow for the drug model to elute from the column in about 3 minutes. Preliminary results indicate that boiling the ADF in water does release the drug model, but the resulting concentrations are significantly smaller than without coconut oil present. Further testing will be conducted using other models of hydrocodone to develop a more extensive proof of concept.

Catalytic Cyclization of 1-amino-1-deoxy-D-galactitol Towards a Renewable Alternative to Petroleum-Based Medicines

Eleanor R. Scimone (Dr. Jennifer Dabrowski) Department of Chemistry

It is well-established that crude oil is converted to consumer energy products such as gasoline and oil by a simple refining process. Less commonly known is that the same crude oil is also transformed into many common medicines through a series of complex steps, including the formation of various ring sizes. In order to create a greener pharmaceutical industry, this research focuses on developing reactions that convert renewable resources, particularly sugars, into the same ring structures. This project utilizes a sugar currently used as a precursor to a cancer therapeutic (1-amino-1-deoxy-D-galactitol or D-glucamine). Our goal is to efficiently transform D-glucamine into a five-membered ring structure using a catalytic reaction. Two catalysts, tris(pentafluorophenyl)borane and allyltrimethylsilane, have been shown in prior findings to be necessary to alter similar sugar structures which lack amino groups (e.g., D-galactitol). Initially, the alcohols were silyl-protected to allow for a more facile analysis of reaction progress and outcome. Preliminary studies combined D-glucamine, pyridine, and chlorotrimethylsilane under room temperature conditions to afford the trimethylsilyl product. Optimization of purification techniques were conducted and toluene was found to be essential in order to isolate the desired product. The structure was elucidated by a series of NMR experiments, including proton, carbon, COSY, TOSCY, HSQC, and HMBC. Two cyclization reactions have been run thus far, one using wet CDCl3 and the other using dry CDCl3. A total of six distinct carbon products were found to have formed (three from each reaction, both creating one major and two minor products). From both trials, only one minor product has been isolated, neither containing the

catalysts. However, upon encountering issues in regards to solubility, the four other products have not been isolated. Additionally, because of the same solubility difficulties, none of the structures of the six products have been entirely identifiable. Ongoing research entails optimizing the conversion of the silyl-protected D-glucamine using the co-catalysts to form the desired ring structure with respect to reaction efficiency and selectivity.

Sustainable Access to Medicinal Compounds Using Green Solvents

Sara I. Spicker (Dr. Jennifer Dabrowski) Department of Chemistry

The primary focus of this research is to synthesize medicinal compounds under more sustainable conditions. Some efforts have been successful utilizing green (i.e. environmentally harmless) starting materials; however, the majority of solvents in which reactions are conducted are non-renewable, toxic chemicals. Our research looks at alternative, greener solvents to allow the dehydrative cyclization of the sugar starting material (Si-galactitol), utilizing allyltrimethylsilane and co-catalyst tris(pentafluorophenyl)borane, to form therapeutic precursors and yield results similar to those in known reactions, which use more hazardous reagents and solvents. Solvents investigated include: 2-methyltetrahydrofuran, cyclopentylmethyl ether, methyl tertbutyl ether, sulfolane, acetonitrile, Cyrene™, toluene, and isosorbide dimethyl ether. To increase the likelihood of solubility of reactants, solvents were selected based on polarity and their aprotic nature, as the two key criteria. Reaction progress was monitored by carbon-13 nuclear magnetic spectroscopy (^{13}C NMR) for efficiency and reactivity. Since the starting material and medicinal product have distinct carbons structures, the ^{13}C NMR for each reaction is compared to the spectrum of the known, desired medicinal component. Reactions were completed in a glovebox, held under nitrogen, as the components are very sensitive to the oxygen and water in air, and most are flammable. Our results indicate that cyclopentylmethyl ether and toluene are the most promising solvents as they have the least amount of starting material still present over time. Future studies will focus on optimization of cyclopentylmethyl ether and close monitoring of toluene over a shorter time frame. Ultimately, our results will allow for a greener way to synthesize sustainable medicinal compounds.

Quantifying Nanoparticle Release from Surface Coatings via Dermal Transfer: Exploring Various Methodologies

Sydney B. Thornton (Dr. Justin Clar) Department of Chemistry

A major area of growth for “nano-enabled” products has been the addition of nanoparticles (NPs) to surface coatings including paints, stains and sealants. Zinc oxide (ZnO) NPs, long used in sunscreens and sunblocks, have found growing use in surface coatings to increase their UV resistance, although conditions under which these NPs may be removed from the coated surfaces is poorly understood. In this study, 20 nanometer ZnO NPs were dispersed in either milliQ water, or a commercial deck stain. Diluted ZnO NP solutions were painted on sanded pine plywood in equal weight increments. Three wipe materials were used to mimic dermal transfer (Texwipes, Ghostwipes, and lambskin condoms). Estimates of ZnO NPs and byproducts of dermal transfer were obtained using two methods: an apparatus method developed by the Consumer Product

Safety Commission (CPSC) and a handwipe method developed by the National Institute for Occupational Safety and Health (NIOSH). A template was created to ensure consistency among surface area with each wiping event for the NIOSH handwipe method. The results showed that the NIOSH handwipe method released significantly less ZnO NPs than the CPSC apparatus method, demonstrating how slight variations in research methodology can drastically alter experimental results.

Analysis of Adonitol as a Resource for Future Sustainable Consumer Products

Put Usaphea Vanna (Dr. Jennifer Dabrowski) Department of Chemistry

Crude oil is a naturally unrefined source of many consumer products such as fuels, and ingredients in healthcare products and cosmetics. Since crude oil exists in a finite amount, there needs to be a replacement. Renewable resources are an attractive alternative such as readily available sugars, which can be found in nature, in living tissues, and also can be industrially grown. While research has been conducted to transform sugars (e.g., glucose, fructose, etc.) into biofuels, less research has been pursued to access more complex consumer products. The focus of this research is to determine whether various sugars are good candidates for producing the same materials that are currently derived from crude oil. Our initial studies investigated the efficiency of a three-step protocol for using adonitol, which contains five C atoms in its molecule, as a building block for the formation of a five-membered or six-membered ring. These rings are a common motif found in consumer products and are challenging to prepare from the molecules found in crude oil, requiring multiple steps. The current project is based on previous studies of six-carbon sugars utilizing tris(pentafluorophenyl)borane [$B(C_6F_5)_3$] and allyltrimethylsilane as co-catalysts. Reaction conditions similar to those involving the six-carbon sugars were applied to adonitol, and the results indicate that a five-membered ring is preferentially formed, as determined by proton, carbon, COSY, and HSQC NMR spectroscopy. Purification and isolation were performed utilizing silica gel column chromatography. Current efforts are underway to optimize reaction yields and extend these conditions to other five-carbon sugars.

Determination of Residual Nicotine Content in Various E-Liquids

Connor T. Willis (Dr. Justin Clar) Department of Chemistry

E-cigarettes and e-cigarette liquids contain a complex mixture of components, including nicotine. Most research currently done with e-cigarettes and e-cigarette liquids focuses on human health effects of utilization of the products and how the body interacts with components. Very little research has been conducted exploring the environmental impacts of e-cigarette and e-liquid release in environmental systems. This project aims to quantify, using High Performance Liquid Chromatography (HPLC), the amounts of nicotine and total additives from the improper disposal of e-cigarette cartridges and liquids within a water supply. Initial experiments using HPLC quantified and validated advertised nicotine content, 0.5 milligrams per milliliter, in various commercial e-liquids, including Juul pods. Subsequent analysis will determine leachable nicotine from e-liquid containers soaked in test fluids, to mimic disposal into the water supply.

Measuring residual nicotine content in used e-liquids containers and pods and using that information to determine environmental impacts is the ultimate goal of the project.

Cinema & Television Arts

How Do Video Game Live Streamers Develop Their Brand? A Look into Channel Aesthetics and Streamer Community Building

Gilbert H. Schultz (Dr. William Moner) Department of Cinema & Television Arts

Live streaming is an emerging practice in the entertainment industry, primarily among video game players. Many "streamers" have wide audiences, and some make millions of dollars a year playing video games through donations and advertising placed on their videos on platforms including Twitch and YouTube (Jensen & Castell, 2018; Hilvert-Bruce, et al. 2018; Zhu et al., 2017; Gerber, 2017). The streamers that attempt to build an audience on these platforms cultivate a brand that indicates what that channel is about and who is involved, identified by a channel logo and the personality represented by the brand (Kerttula, 2016; Avis et al., 2012). These attributes are similar to social media influencers on other platforms, which have been the subject of study in the past; however, minimal research has been done on streamers as influencers (Khamis et al., 2016). Many scholars have addressed video game live streaming and brand theory separately, but have sidestepped observing both simultaneously due to the newness of streaming as entertainment media. Therefore, this study focuses on how streamers design and develop their brands on YouTube and Twitch to better understand how these streamers gain success through audience building and revenue. This study employs mixed methods, analyzing the development of 8 streamers' brands on YouTube and Twitch. Qualitative, semi-structured, case study interviews with streamers were conducted to observe how individual streamers design and develop their brands. Findings indicate that streamers work to build a welcoming community through use of live chat features on each platform, overlays on their videos that highlight viewers that donate and follow their channel, and through social media use. Furthermore, streamers spend a great deal of time developing their brand, often three or more hours a week, constantly refining their channel's look, from overlays, to video thumbnails and titles, and logo design. Implications of this study showcase how video game live streamers act similarly to social media influencers on other platforms.

Computer Science

AB: Fighting Algorithmic Bias

Jack J. Amend (Dr. Scott Spurlock) Department of Computer Science

With the rise of technology, more and more data is becoming available. This has allowed us to use data in machine learning algorithms to do some amazing tasks like recognizing objects from a picture or diagnosing someone with a sickness. However, in some cases, machine learning algorithms have been found to reproduce unintended biases when biases are encoded into the

underlying data used to train decision-making models. To combat this problem, we are investigating approaches to remove bias during the process of creating machine learning models. Specifically, generative adversarial networks (GAN) can be used to reduce the likelihood that protected attributes (like sex or race) are incorporated into learned models. This project compares alternative strategies to allow GAN-based training to create models that are both accurate and fair.

Developing a Mobile Application to Facilitate Aural Training and Synesthetic Experiences

Adam R. Behrman (Dr. Duke Hutchings) Department of Computer Science

Music learners around the world are eager to improve their skills, but some may struggle to find a teacher or an instrument. Additionally, current teaching methods for certain skills, such as relative pitch (RP), may be ineffective at best. An alternative currently being proposed to these methods is using sound/color associations to improve music recognition. Can a mobile app be used to facilitate this training? We will introduce Chroma, a mobile application designed for the purpose of developing chromesthesia (that is, a neurological condition in which sounds involuntarily and consistently produce a visual response) in music learners through musical note identification tests and an augmented reality (AR) visualizer. Past and current methods of teaching synesthesia and commonly-taught aural skills such as relative pitch (RP) will be evaluated. This study also addresses the "unteachability" of absolute pitch (AP) and explores its relationship to synesthesia. The benefits of mobile applications for learning are discussed, as well as the use of AR for visualizing chromesthesia via a novel multiple pitch detection algorithm. The authors also introduce a new test combining a traditional test for AP and a training program to develop chromesthesia into one simple pitch identification quiz. The sample for this study is Aural Skills 1 students at Elon University. The authors hypothesize that students who engage with the app as a part of regular piano training will: 1) Develop synesthetic experiences, and 2) improve their musical skills faster than those who do not have access to the app. In order to improve the functionality and effectiveness of the training, the authors will collect data based on students' performances on pitch identification tests over the course of one semester (roughly 12 weeks). At the end of the test period, an assessment will be conducted to determine the effects of the app and overall user satisfaction.

Chasing Rainbows: Colorizing Black and White Images with Adversarial Learning

Drew Bowman (Dr. Scott Spurlock) Department of Computer Science

Due to advances in photographic technology, photos have undergone a drastic change from being limited to a monochromatic palette to being able to express a full range of color. The purpose of this research is to reintroduce full color back into historical black-and-white images. Currently, artists painstakingly colorize historic photographs, and spend anywhere from hours, days, and even upwards of a month restoring a single image. Training an artificial intelligence to colorize photographs would reduce this timeframe to mere milliseconds per image. This training is difficult because constructing a plausible colorization is ultimately subjective and doesn't have a singular correct answer. To solve this challenge, a model capable of colorizing an image several

different ways (a multimodal model) was trained. A multimodal model is required because some colors are naturally suited for certain types of images. A model that only generates one colorization per image tends to generate an "average" colorization that is dull and brown and doesn't look like a real photograph. Models that generate multiple colorizations per image allow each prediction to include more vibrant (and ultimately more plausible) colors because it can specialize for different cases. The project incorporates a generative adversarial network (GAN), which, unlike traditional approaches, can evaluate a subjective quality like the plausibility of a given colorization without having to explicitly identify a quantitative measure. Results of this project will further the discipline's understanding of how to construct a GAN that generates multiple outputs and how to evaluate subjective plausibility. This project successfully built models capable of producing multiple colorizations for images of a man-made space (hotel room interiors) and nature landscapes, including historic landscape photos taken by William Henry Jackson in the 1870's. These findings suggest that artificial intelligence may be proficient at a variety of artistic and subjective tasks formerly believed to require a human to perform.

The Effect of Quick Release and Dwells Time on Encumbered Interaction

Sam Jimenez (Dr. Duke Hutchings) Department of Computer Science

Smartphones have become ubiquitous as technology continues to develop. Recently it has become common for smartphones to have pressure-sensitive screens to assist with interaction. In this work we address two themes from previous literature: the viability of the 2 common pressure-based techniques Dwell and Quick Release; and the ease in which users can generally interact with a smartphone while physically moving and encumbered. Past research has shown that Quick Release is superior to Dwell due to the shorter interaction time and removal of fatigue, however, the research was not conducted with users in motion or encumbered, a common scenario. We endeavor to compare the speed and accuracy of Quick Release and Dwell as users interact in a mobile, encumbered situation. We developed an app similar to past research experiments implementing Dwell and Quick Release. The app was designed to systematically vary the desired pressure level and button location on the screen. Participants used the app while holding two weighted bags, similar to past research on encumbered smartphone use. Participants were then instructed to walk a set course while completing two sets of 25 dwell and two sets of 25 Quick Release actions. Our results show that Quick Release was twice as fast when compared to Dwell, however, Quick release achieved a 95% success rate, whereas Dwell achieved a higher rate of 98.33%. The results showed that Quick Release's errors clustered around pressure zone boundaries, suggesting that fewer pressure levels would be more effective. There is also evidence that the location at which pressure was exerted on the screen affected both techniques' interaction time similarly. Finally, when looking at the first and second sets of iterations per technique, there was no significant difference in speed showing that both techniques are quick to learn.

Making Waves: Additive Synthesis via the Continuous Wavelet Transform

David J. Temming (Dr. Scott Spurlock) Department of Computer Science

Additive synthesis is the process of adding simple sounds (individual sine waves) together to create more complex, rich sounds. This is possible due to the way these simpler sounds interact with one another when played simultaneously. Additive synthesis applications offer a multitude of creative synthesis options due to the user having full control over the frequency content of the sound being synthesized. In addition to synthesizing brand new sounds from simple building blocks, it is possible to analyze and replicate real-world sounds. In theory, any natural sound can be replicated through this process, but only with recent advances in computing power has accurate additive replication of complex sounds been possible. Accurate additive replication pushes the boundaries of creative sound design and real-time/procedural audio. This project focuses on additive "re-synthesis," the process of additively replicating specific sounds. Most additive models implement the Short-time Fourier Transform (STFT) as a method of analyzing input audio. Our research focuses on implementing the Continuous Wavelet Transform (CWT), an alternative to STFT, to assess its ability to identify main constituent frequency components in input signals with a variety of sonic characteristics. CWT analysis was chosen because it is relatively unexplored and may be better suited to handle challenging sonic characteristics than STFT, such as noise content and transient presence. The implementation of CWT analysis and additive reconstruction is performed by an application we designed to take audio files as input, perform CWT analysis on the input, and build new additive audio files. The application measures accuracy of the replication by performing a sum of square differences (SSD) between the input and output files. The model has some difficulty in assigning proper amplitude for high frequency content, but handles noise replication remarkably well and has relatively low SSD measurements for a variety of complex input signals. Qualitative assessment, such as visual comparison of the input and output waveform and listening back to the signals, supports the success of the model. Overall, we conclude that the CWT is effective in analyzing a variety of complex input signals, such as those containing noise, transient events, and variation in pitch.

Monitoring and Reporting Metrics for a Raspberry Pi Cluster

Garrett J. Wibbelsman (Prof. Joel Hollingsworth) Department of Computer Science

A Raspberry Pi is a low-cost, credit card-sized computer that has become very popular in many areas of computing. Due to their size and cost, individual Raspberry Pis are limited in their computational power. In order to expand what these cheap computers can do, it is common to connect multiple Raspberry Pis through a network. Together, the Pis work to form a powerful virtual computer called a cluster. We have built an 8 Pi cluster that is currently being used by a computer science course at Elon University. This research consists of collecting metrics from each individual Pi to view its contribution to the cluster. Along with individual metrics, we present summary statistics for the cluster as a whole. The goal of collecting these metrics is to track how the cluster performs for various tasks. We developed a web-based system that presents these statistics using ReactJS, a popular web-development language. This system is designed to be expandable, allowing Pis to be easily added to the cluster.

Economics

The Effect of Concealed and Open Carry Laws on Crime Rates

Erin E. Byrne (Dr. Brooks Depro) Department of Economics

In recent discussions of gun control, a controversial issue has been how open carry and concealed carry laws will affect crime rates in a given state. On the one hand, some argue that open and concealed carry laws can act as a deterrent when it comes to a person acting out a violent crime. From this perspective, open carry/ concealed carry laws lower crime rates. On the other hand, however, others argue that having more guns present in a community will increase crime rates and frighten the public. In short, the issue is whether concealed and open carry laws increase or decrease crime rates. Given the lack of random assignment, I use a state-level panel for the years 1991-2014 and the differences-in-differences method to show whether states treated with concealed/open carry laws experienced higher violent crime rates relative to states without such laws.

A Dam Problem: Investigating the Impact of Dams on Economic Development

Bailee M. Castillo (Dr. Tonmoy Islam) Department of Economics

Approximately 59,071 man-made large dams have been constructed worldwide to control flooding, provide electricity, supply water, improve navigation routes, farm animals, etc.; there is an extensive list of dams that are planning on being built for rapid development. While the intention of these dams is positive, their installation has displaced between 40 and 80 million people worldwide. The purpose of this study is to determine if the overall economic health of an area improves or diminishes after a dam is constructed. To address this question, a dataset from the Food and Agricultural Organization of the United Nations which contains characteristics of every man-made dam that has been constructed across all countries was combined with a dataset from NASA's Socioeconomic Data and Application Centers which contains the GDP of every one degree of surface area of every continent. Initial regression results show that in Africa and Asia, the presence of a dam has a nonlinear impact on the surrounding area's GDP. This impact concludes that areas close to the dam are negatively impacted; however, past a certain distance that is specific to each continent, the dam's presence has a positive impact on the area's GDP.

Global Perspective: The Impact of Natural Disasters on Human Trafficking Reporting

Colleen Judge (Dr. Casey DiRienzo) Department of Economics

The International Labor Organization (2017) estimates there are 40.3 million victims of human trafficking worldwide. This indicates there are 5.4 victims for every 1,000 people in the world. In most cases, countries facing severe political, societal, or economic challenges experience more human trafficking due to increased vulnerability. Similarly, natural disasters result in increased vulnerability due to drastic ramifications such as leaving millions of people displaced, homeless and financially unstable. This problem begs the question whether the event of a natural disaster

impacts the number of human trafficking victims reported in a country. In this study, panel data is used from the *Counter Trafficking Data Collective's (CTDC) Global Data Set (2018),* the most up-to-date and extensive human trafficking victim reporting dataset. The results of this paper are preliminary and show evidence that the event of a natural disaster increases human trafficking reporting in a country. The implications of this study suggest more opportunities for research examining the relationship between natural disasters and human trafficking.

The Effects of Parent Incarceration on Their Child's Potential for Success

Kelly Mahoney (Dr. Steven Bednar) Department of Economics

Parent arrests and incarcerations impact almost 3 million children in the U.S. To put things in perspective, this is essentially 1 in every 28 children in the US who has a parent that is incarcerated or has been arrested (Billings 2018). Understanding the effects of parent incarceration are significant because it would help policy-makers and law enforcement understand the repercussions of the sentences they impose on parents. The National Longitudinal Study of Adolescent to Adult Health Data (Add Health) was used to answer how the child's age at the time their parent is incarcerated affects their probability of success. Success was defined by whether or not the child graduated high school and if the child was incarcerated at some point during their own adulthood. The children of incarcerated parents were separated into age groups in this research: child, preteen, and teenager. Along with age, self-control was tested to see if parent incarceration affects the child's emotional development. Results found that preteen are less likely to graduate and more likely to be incarcerated compared to the two other age groups. For self-control, the incarceration of a father has more of an impact on a child's emotional control, specifically affecting the child's temper. Also, mothers are more significant to female children's chances of incarceration and fathers are more significant to male children. This thesis ultimately illustrates an economic analysis of how parent incarceration, gender, age, and self-control can all have an impact on potential for success

The Effect of New School Openings on Achievement in Pre-existing Schools: Evidence from Wake County, NC

Jacob C. Stern (Dr. Katy Rouse) Department of Economics

In the last 20 years, the US public-school system absorbed approximately 3.5 million new students (NCES 2018), oftentimes posing schools with overcrowding problems. A common method of combatting the negative educational effects of school overcrowding is to open new schools. For instance, since 2011 Wake County Public Schools has opened 12 traditional elementary schools to account for the influx of 57,000 new students since 2001 (WCPSS 2018). While new school construction has long been a way to address district growth and overcrowding, minimal research examines how new schools affect student achievement and fewer studies analyze the potential impacts on students assigned to neighboring schools. The limited research suggests new school openings may harm existing neighboring schools. Hashim et al. (2018) finds strategic new school openings in the Los Angeles Unified School District negatively affected student achievement in nearby, pre-existing schools. An analysis of charter school

formation in Michigan suggests competition posed by new charter school openings may compound these negative effects (Yongmei 2009). This study adds to the limited literature on the effects of new school openings. Using data from the NC Report Cards, I compare the effects of both traditional and charter elementary school openings on the student achievement of nearby pre-existing schools in Wake County, NC controlling for both school and year fixed effects. I hypothesize that new school openings will negatively affect the math and reading achievement of students in all pre-existing schools and that a charter school opening will amplify these negative effects, syphoning funds, students, and teachers from pre-existing schools.

Endogenous Capital Concentration: An Examination of Inequality and Growth

Francesco G. Storm (Dr. Brandon J. Sheridan) Department of Economics

Throughout the last 40 years, within-nation incomes have diverged staggeringly in the West. The degree to which this trend impacts growth has yet to be thoroughly examined. Using a merged panel dataset of the World Bank's World Development Indicators (WDI) and Barro and Lee's Educational Attainment survey, this paper scrutinizes Kuznets' hypothesis of the relationship between income inequality and growth. In particular, this study introduces a concentration term to the capital stock component of neoclassical growth theory. Income inequality, conditional on gross capital stock, is examined as an indicator of growth patterns for over 100 countries between the years of 1960 and 2019. Using multivariate quantile regression analysis, findings suggest that the Gini coefficient plays a differential role in predicting output depending on a country's position in the global capital distribution.

The Impact of High Impact Practices on Life After Graduation

Danato Tempesta (Dr. Mark Kurt) Department of Economics

This study explores the correlation between high impact practices and wages for recent college graduates, potentially proving a causal relationship. These high impact practices are complements to undergraduate students' education but can prove to be very helpful in their career after graduation. Some of the major practices include working an internship that is either paid or unpaid, studying abroad, and conducting undergraduate research. Universities are placing much more emphasis on high impact practices for students to pursue, even proudly stating how they compare with other universities in programs such as study abroad. The benefits that come along with high impact practices extend further than just tangible results, but also internal changes and experiences that help lead students to perform better in a work environment. Data used in this study come from the Baccalaureate and Beyond Longitudinal Study conducted in 2016/17 with multiple regressions being analyzed showing the effect high impact practices have on starting salary of recent graduates. Along with these high impact practices, there will be a focus on differences in salary due to undergraduate GPA, major field of study, income dependency and Pell grant status. Taking into account controls for race and gender, the high impact practices should positively correlate with starting salary if more universities are encouraging students to participate in certain practices.

The Impact of Health Insurance and Health Shocks on Labor Supply Decisions

Marina N. Thornton (Dr. Mark Kurt) Department of Economics

Health care, particularly health insurance, accounts for over $3 trillion dollars of spending in the United States ("The Budget and Economic Outlook", 2018). Unlike other developed countries, there is no universal health care program in the US, and many consumers have to make decisions about which program to choose and how they will obtain it. Medicaid is a type of insurance targeted to the poor and disabled and this coverage alone cost the country $583 billion dollars (Berchick, Barnett, & Upton, 2018). The most common choices for health insurance are employer-based followed by Medicaid, making up 55.1% and 17.8% of the population respectively (Berchick et al.). It's important to compare these two major plans because one is connected with labor, and one is not. This in turn could provide evidence about how workers might be impacted by a health shock based on their health insurance plan. The aim of this paper is to compare individuals with employer-based health insurance versus those with Medicaid and analyze the difference in hours worked among both populations following a health shock. Many studies focus solely on one insurance type. This paper adds to the literature with an empirical evaluation of both major health insurance plans for individuals, and how they interact with health shocks and ultimately labor supply decisions. Data will be taken from the National Longitudinal Survey of Youth 1997. Preliminary results indicate that individuals who experience a negative health shock increase their hours worked, compared to individuals who experience a positive health shock, which is opposite of what would be expected.

Contraceptive Access and Female Labor Supply: Evidence from Indonesia

Caitlin T. Wynn (Dr. Steve DeLoach) Department of Economics

Throughout the developing world, there remains a significant gender gap in labor force participation. A high fertility rate is one of multiple factors that contributes to this gap, and while desired fertility rates are higher in the developing world than the developed world, there is an unmet demand for contraceptives in many developing countries. This indicates that increased access to contraceptives would lower fertility rates, which in turn should affect women's labor market behavior. This paper hypothesizes that expanded access to contraceptives will increase women's lifetime labor supply. This is based on the assumption that the availability of contraceptives delays the mean age of first birth, leading to greater educational attainment, which in turn should raise the individual's wage and incentive to enter and remain in the labor force. This paper uses the 2000, 2007 and 2014 rounds of data from the Indonesian Family Life Survey, which is a comprehensive panel of individual, household, and community level surveys conducted between 1993 and 2014. As a proxy for contraceptive access, price variables of three types of contraceptives stocked at public health outposts are regressed on various measures of labor supply, including the number of hours worked for a wage, the likelihood of self-employment, and the likelihood of formal employment. The paper finds that the likelihood of self-employment is statistically significant; in the fixed effects model, results showed that a 100 percent increase in the price of oral contraceptives decreased the likelihood of self-employment by 0.0452 percent.

Education & Wellness

Voices of Spanish Speaking Students: How Linguistic Diversity Affects Students in U.S. Public Schools

Sarah Barron (Dr. Cherrel Miller Dyce) Department of Education & Wellness

Linguistically diverse learners (LDLs), or students whose first language is not English, make up the fastest growing student group in U.S. public schools (de Kleine & Lawton, 2015). However, teachers often express uncertainty and feelings of ill-preparedness towards teaching LDLs, especially with students who are not yet proficient in English (Gomez & Diarrassouba, 2014). Consequentially, LDLs can face adverse academic experiences and generally do not perform as well as their Anglo-Saxon peers on standardized assessments (Gomez & Diarrassouba, 2014). With these problems in mind, this study aims to bring to attention the experiences and voices of LDLs regarding their linguistic and cultural heritage and how it impacted their schooling. While many studies have analyzed teacher practices, and teacher and parents' sentiments, few studies have turned directly towards the students for direct evidence of how linguistic diversity affects learning and schooling. This study aims to fill in this gap in the literature by sharing the experiences of four LDLs as expressed through one-on-one interviews focused on their linguistic heritage and school experiences. Interviews have been analyzed and coded using the Constant Comparative Model, popularized by Glaser and Strauss (1967), to bring forth the various experiences and sentiments expressed by the participants.

Understanding Influences on Cultural Competence in Teacher Candidates

Ashley R. Billie (Dr. Joan Barnatt) Department of Education & Wellness

This mixed-methods study utilizes descriptive statistical survey and interview data from teacher candidates, focusing on influences of cultural competence. Cultural competence is operationalized by performance on the Cultural Intelligence Survey (CQS) which identifies areas of relative strength (Metacognition and Motivation) as well as weakness (Cognition and Behavior) and in four dimensions. Semi-structured, face-to-face interviews were conducted on a sample of teacher candidates with varying cultural competency scores to further explore the reported influences. Teacher candidates identified three areas of major significance that influenced their understanding of cultural competence as teacher candidates. These included the influence of the community they were raised in; perceived strengths and gaps of their teacher preparation program; and the opportunities, or lack thereof, for representation of their own identities in curriculum and pedagogy. As pre-service teachers, it is imperative that one remain cognizant and competent of the various identities that students hold within a classroom. By understanding the influences that teacher candidates have had within their lived experiences, one is able to fully assess best ways to combat their own biases and better direct their teaching towards a diverse classroom. Additionally, teacher preparation programs need to be cognizant of growth opportunities for cultural competence in their programs. In particular, those that may influence cognition and behavior of teacher candidates, while honoring the various identities of all students.

Exploring Pre-K Students' Language Usage in Outdoor Learning Environments at a Title I School

Rachel J. Caldeira (Dr. Scott Morrison) Department of Education & Wellness

In *The Last Child in the Woods*, Richard Louv (2005) introduced and described nature-deficit disorder, the concept that children today do not spend as much time outside as children of previous generations, and this lack of time outside is a detriment to their well-being. Some educators have attempted to remedy this "disorder" with forms of outdoor education such as forest schools. Forest school practices allow children to make their own choices about their learning, explore their environment, and connect with nature. Forest schools are extremely unique and offer many benefits to children. Unfortunately, they are not a viable option for many families. However, teachers are able to implement aspects of outdoor education and forest school principles into their "typical" classrooms, which provide similar benefits for their students. Time spent in nature augments a child's development and can help promote psychological well-being (Chawla, 2015; Hanscom, 2016). Additionally, outdoor education programs for children can "significantly enhance cognitive, linguistic, social-emotional, and motor skills" (Yildirim & Özyilmaz, 2017, p. 5). In this study, I investigated how preschool students at a public, Title I school use language in an outdoor setting to learn and deepen their understanding of the world around them. Participants included two pre-kindergarten teachers and two pre-k classes. Data collection involved interviewing the teachers before and after the study, and observing and recording students outside during the regular school day. In particular, I examined students' vocabulary, phonics, storytelling, conversations, and self-directed, unstructured approaches to learning. These a priori codes came from Teaching Strategies Gold Assessment, an assessment tool utilized by the school system. Data showed that there were multiple and diverse learning opportunities for children when outdoors that benefited their linguistic development and also connected to state standards. It is important for prospective and practicing teachers to be aware of these opportunities in order to best support students' learning. There are numerous studies on language development in early childhood, but there is a paucity of research on language use in outdoor settings. Therefore, this study has the potential to add to the literature in both early childhood language development and outdoor education.

Teacher Disclosure Dilemmas in the 21st Century

Jacob Cisternelli (Dr. Jeffrey P. Carpenter) Department of Education & Wellness

Teachers face dilemmas regarding how much of their own perspectives on contentious topics to disclose to their students; these are referred to as *disclosure dilemmas*. There is a blurred line between what teachers can and can not say in the classroom. For example, many teachers and the communities they serve believe teachers should limit how much of their political beliefs they disclose in class. Teachers' political beliefs may contradict those of their students or their families, and students may feel uncomfortable if their teachers voice their political beliefs in particular ways. Such dilemmas regarding what and when teachers should disclose their perspectives have existed for a while. However, recently social media appears to have added new angles to disclosure dilemmas. Social media can make teachers' opinions on controversial

matters more publicly visible. We therefore sought to investigate the following research question: *How are the disclosure dilemmas that teachers face similar and different in the context of 21st century classrooms?* This question is important because technology and the current political environment make disclosure dilemmas more complicated. We sought to address our research question by conducting a critical literature review related to teacher disclosure dilemmas. We consulted a variety of theoretical and empirical sources that addressed disclosure dilemmas in and out of the classroom, and included case studies of teacher disclosure and its effects. Key themes were ruminated upon in order to come to conclusions regarding teacher disclosure dilemmas. We identified tensions that social media has created and will create around teacher disclosure. For example, social media can lead to in-class and out-of-class comments from teachers being taken out of context and misinterpreted. We also considered what different education philosophies say about the role of teachers, and how that translates into different notions of when disclosure is and is not appropriate. We offer considerations and strategies for managing disclosure dilemmas that teachers could utilize in the classroom and in presenting themselves on social media. We also define areas in need of future research.

Innovative Mathematics Teaching: Taking Math Outside

Madison C. Clark (Dr. Katherine Baker) Department of Education & Wellness

This poster presentation will overview the structure of a qualitative case study and preliminary analyses around an elementary teacher learning to transition her mathematics instruction to outside spaces. The purpose of this study is to share the process of transitioning and facilitating mathematics outside. This study addresses the essential question of how a teacher trained in reform-based mathematics transitions to outside spaces, and if and how the facilitation of instruction changes in ways that benefit the teaching and learning. Initial findings indicate that not only mathematics teaching and learning is positively impacted, but also the development of collaboration and positive classroom dynamics. This research is important to both mathematics education and environmental education because it addresses the dire state of mathematics learning when students are taught through traditional manners (Schoenfeld, 2002), and addresses the dire state of our natural world due to students' disconnection caused by traditional teaching (Smith & Sobel, 2010). Reform-based mathematics instruction emphasizes that mathematics is learned through reasoning and sense-making rather than strict memorization, and is taught through facilitation rather than telling (Cirillo, 2013). Reform-based mathematics is guided by the idea of incorporating equity-based pedagogies into mathematics teaching, allowing every student to have the opportunity to learn and succeed in mathematics (Chao et al., 2013). Teaching mathematics outside is a call to this aim of equity-based pedagogies in that it allows students to thrive and offer mathematical contributions in new and creative ways. The study participant is a fifth grade teacher extensively trained in reform-based mathematics with a Masters degree in the area, but with only one initial training on the possibilities for teaching math outside. This will allow for an in-depth examination of the integration of nature and the outdoors into the teacher's instructional practices. Data sources include teacher interviews, lesson observations, lesson debrief sessions, lesson artifacts, researcher field notes, and researcher memo writing. The poster will outline the initial analysis sweeps through the data and

propose preliminary findings regarding the instruction in order to offer to the field how teachers may begin to take up this work.

"Free to Breathe": Searching for Situated Decoding of Gender in Nature-Based Education

Abigail M. Decker (Dr. Scott Morrison) Department of Education & Wellness

Research has shown that spending time in nature is rapidly disappearing from childhood. One way that educators have attempted to counter this phenomenon is by bringing students outside and using nature as a learning environment. The coexistence of traditionally feminine- and masculine-coded practices in outdoor settings, along with an emphasis on child-centered learning and play, makes nature-based education a unique domain for gender expression. Building off of Sarah Frödén's (2018) theoretical concept of *situated decoding of gender* and ecofeminist critique of the way humanity's dominance over the natural world mimics that of hierarchical social relationships, this research project seeks to explore two questions: How are gender norms communicated and experienced in nature-based education? To what extent is gender decoded? This in-progress study is composed of two phases of data collection: an interview phase with nature-based educators and a fieldwork phase in nature-based education spaces. Thirteen interviews have been completed so far, along with one week of fieldwork observations at a Delaware outdoor preschool. Preliminary data analysis suggests that attributes of nature-based education, like the clothing required for students to wear and the tools and toys used to facilitate learning outside, might bring fewer gendered cues to the space. Additionally, while many interviewed educators were able to provide anecdotes of feminine gender roles being challenged outside, they struggled to discuss masculine roles being subverted without prompting, and rarely moved the conversation beyond the gender binary. If educators utilizing nature-based practices are only aware of how the space can decode gender for girls, there is a risk of nature becoming a hyper-masculine environment where femininity is challenged but masculinity is reinforced. It is also critical to understand that fewer gendered cues existing in a space is not enough to prevent children from expressing their socialized understanding of gender and enacting gender roles on their own. Consciousness and intentionality of educators to trouble gender roles and the gender binary is necessary for nature-based education to become a mechanism for decoding gender and providing all children with opportunities to explore their learning and identity in a diverse and liberating manner.

How Injuries Affect the Mental Health and Academic Performance of Student-Athletes

Sally Doehr (Dr. Carol Smith) Department of Education & Wellness

The purpose of this project was to investigate the effect of injuries on student-athletes' mental health and academic performance. Injuries affect student- athletes in more ways than just physically although this is not something many people are aware of. The participants in this study were collegiate student-athletes that attend Elon and have been injured at some point during their high school or college career. Participants were surveyed and interviewed, and additional data was collected from online sources when needed. The outcome of this research was a greater understanding of the specific effects injuries have on the mental health of student

athletes such as increased depression, anxiety, and substance use. Additionally, these negative effects were shown to impact other parts of their lives such as class attendance and academic performance. This research is applicable to student-athletes and those students who are not athletes but may be a friend or peer of a student-athlete attempting to cope with the side effects of being injured.

The Role of Teacher Professional Development in Initiating Local Level Support for Inclusive Classrooms in the Uganda Education System

Caroline M. Enright (Dr. Stephen Byrd) Department of Education & Wellness

Inclusion of individuals of all ability levels in the school system of Uganda, has been the law since 2006 (Republic, 2006). However, due to the privatization of schools, inconsistency of resources, and incomplete teacher training; the execution of this protection is not reaching every school or every child (Kristensen, 2006). This research questioned this impact of the implementation of a professional development program to equip teachers to manage inclusive classrooms, students with and without disabilities in the same classroom, environments on the teachers' opinions on including students with different abilities in their classroom. If teachers have the tools and skills to teach in an inclusive classroom, will schools and communities be more likely to accept the model (Fisher, 2017)? This research study approached this question through three phases to accurately assess the impact of professional development surrounding inclusion in the classroom. The qualitative study captured the pre and post opinions of Ugandan teachers and school administrators who participated in professional development about the realities and myths of educating students with disabilities. The training was developed with local partners to address stereotypes about students and discuss teaching methods for a more inclusive classroom. This research indicates with initial data, in a complex system like Uganda and with a multilayered issue of inclusion, this singular solution may not be the only answer. The research found teachers held a sense of nervousness to teach students with disabilities and had feelings of being unprepared to support that population, which supported previous research. The study points to additional barriers beyond providing professional development to teachers as a way to change the opinions of the teachers and administration about inclusion.

A Self-Study of Learning to Teach Elementary Mathematics Outside

Alyssa C. Herrmann (Dr. Katherine Baker) Department of Education & Wellness

This poster presentation overviews a qualitative self-study that analyzes the process of learning to teach mathematics, specifically learning to teach math in outside spaces. The method of self-study involves systematic and thoughtful studying of the self as a teacher within a context (LaBoskey, 2004). For this research project, the teacher of self-study is a prospective elementary teacher who is minoring in Adventure-Based Learning and Environmental Education. The context of this study simultaneously negotiates spaces on Elon's campus in a mathematics methodologies course and a fieldwork setting in an elementary school. The overarching question of the research asks, how does a prospective teacher learn to teach math outside?. Through this question, the researcher explores how she navigated decision-making about teaching math and

teaching math outside, including decisions about the mathematics content, the teaching techniques, the behavior management techniques, and the children's safety. Data sources for this study include the researcher's lesson plans, planning sessions with the math methods professor, lesson observation documentation, post-teaching conferences, post-teaching written reflections, and corresponding elementary students' responses to the math lessons. The researcher is unpacking and analyzing the data through three overlapping lenses: what it means to be a teacher, what it means to be a math teacher, and what it means to a math teacher in outside spaces. These overlapping lenses acknowledge past research that teaching mathematics in reform-based ways means teachers must reflect on their students successes through self-observation and self-evaluation (Skinner, Louie & Baldinger, 2019). This study extends mathematics education research because it unites the area of mathematics education with environmental education, and uses the environment to teach and learn mathematics in creative ways that break the traditional mold. Forefronting the environment in an educational space has shown to encourage pro-environmental behavior in students, which ultimately leads to more eco-conscious citizens contributing positively to protect the Earth (Steg & Vlek, 2009). Teaching in ways that value nature attend to students' social and emotional learning through environmental values. Findings from this self-study will help further both fields and support other teachers in their decisions about why and how to move math instruction to outside spaces.

Educators' Perspectives on Excellence in Education: An Examination of the Educational Beliefs of State Teacher of the Year Finalists

Elena M. Lostoski (Prof. Marna Winter) Department of Education & Wellness

One of the difficulties with determining best practice in education is that everyone--teachers, administrators, policymakers, parents, and even students--seems to have a different idea of how school should be structured, the values that are most important, and even the purpose of education. With so many competing ideologies, it can be difficult to settle on one direction to follow or one voice to attend to. While no individual or group has all the answers, it is of particular importance to take into account the educational beliefs of teachers, as they are directly affected by education policy and understand firsthand what works in the classroom. It is particularly important to understand the views of educators who have demonstrated success in their field. This study seeks to learn about the educational beliefs of excellent teachers, defined as those whose skill has been acknowledged by the educational community through the presentation of the Teacher of the Year award or recognition as a finalist for their state. The research involves surveying a target population (teachers from 16 states that are members of the National Network of State Teachers of the Year (NNSTOY) who have received or been a finalist for the Teacher of the Year award in the past 5 years) about their educational beliefs. The survey contains a number of open-ended questions developed by the researchers to probe the respondents' beliefs about broader topics and policies in education, such as "What is the purpose of education?" and "How do you measure your success as a teacher?" Responses were coded for common themes, and the most salient findings from the data analysis will be illustrated in this poster. Some of the most prevalent themes included the importance of building relationships with students and the value of teachers acting as facilitators in the classroom. The goal of this project is to gather information that could help shape future directions of education reform by

identifying the values held by these excellent teachers, as well as the issues they feel are most important to address.

Investigating Pedagogical Differences Between Montessori and Public Kindergarten Classrooms

Makenzie M. Mason (Dr. Heidi Hollingsworth) Department of Education & Wellness

This study compared the pedagogical differences between a Montessori approach and a traditional public school approach to primary education. According to the Riley Institute (2018) longitudinal study, students in the Montessori approach earned higher rates of achievement in English language arts, math, social studies, and creativity than students attending traditional public schools. This study delved into the rationale behind these findings by examining and comparing instructional methodologies implemented by teachers, and accompanying activities between the two approaches. This study used qualitative data from interviews of three Montessori kindergarten teachers and three public school kindergarten teachers in central North Carolina. The interview items each related to a specific kindergarten skill identified by the North Carolina Department of Public Instruction in the content areas of English language arts, mathematics, and health. The six participating teachers were individually interviewed and prompted for explanations and examples of how each skill is fostered in their respective classrooms in order to understand the pedagogical differences of each approach in real classrooms. The data were transcribed and coded to identify pedagogical trends and discrepancies between the two approaches. Preliminary findings suggested some trends within each targeted content area. Trends found in the area of English language arts instruction in the Montessori approach centered around manipulatives and individual sensorial connections to letters and corresponding their sounds, while the public school approach focuses on memorization of letter-sound associations. In mathematics, Montessori teachers reported additional manipulative use, in multiple representations, emphasizing natural materials. In regards to health, Montessori teachers highlighted peacemaking, while public school teachers focused on relationship-building and community. This work will inform teacher candidates of these two approaches to education, as well as provide insight for practicing teachers who might seek to integrate aspects of the Montessori approach into their traditional classroom.

Teaching Math Outside: Intention to Execution

Nicolas Rios (Dr. Katherine Baker) Department of Education & Wellness

A fifth-grade teacher's instructional choices are examined in both the indoor classroom and outside spaces. The teacher—who self-identifies as invested in reform-based mathematics and equity-based, anti-racist teaching—wanted to move instruction outdoors to increase student engagement and learning access. The purpose of the study is to investigate how the teacher's intentions manifested in execution. The overarching research question is as follows: "Why and how does an elementary teacher move instruction into outside spaces?" Data sources include observational field notes, teacher interviews, researcher memos, and researcher reflections. This study is situated at the integration of environmental education and mathematics education,

emphasizing the re-examination of teaching math for the sake of learners' academic access and social-emotional and physical welfare. Previous studies establish the importance and various effects of learning math in alternative settings for students. For example, lessons in nature are beneficial to immediate subsequent classroom engagement (Kuo et al. 2018). Changing where students learn mathematics can also move educators away from transmission-style teaching and toward discussion-based approaches that center the needs and interests of students. In this sense, teaching math outside pushes boundaries on what mathematics is and who mathematics is for (Gutiérrez, 2009). However, moving mathematics to outside spaces may not be successful, even with teachers who recognize its importance. This is sometimes due to barriers outside of the teacher's control, such as limited access to natural outdoor settings, time constraints, or inclement weather. There is extensive research on the external barriers to using outdoor settings as learning environments (Ernst, 2014; Hensberry & Teehan, 2019). Thus, instead of further researching these already identified barriers, this case study explores why the implementation and execution of mathematics outside fall short even when external barriers are mitigated. Preliminary results indicate that intrinsic motivation is a factor in how often an educator takes students outside; fulfilling perceived teaching professional obligations (Bieda et al., 2015) to other sources, however, might still maintain precedence. Implications of this study include its use as a comparative case for further analysis with other elementary school teachers in their aspirations to move math to outside spaces.

The Untold Stories of Desegregation: Learning from the Living Past

Felicia Y. Robinson (Dr. Cherrel Miller Dyce) Department of Education & Wellness

Currently, there is much research and conversation regarding the racialized experiences of Black students in public schools (Brown & Brown, 2012; Cokley, 2006; Saddler, 2005). One point of emphasis in the literature is the historical analysis regarding the experiences of students because of state backed systems of segregation and subsequent court-ordered desegregation (Saddler, 2005). With the death of Linda Brown, in the Brown v. Board of Education (1954) of Topeka, Kansas case, it has become more urgent to capture the experiences of Black students who experienced racial desegregation to see what can be garnered to help the teaching and learning of Black students currently. Brown v. Board of Education of Topeka, Kansas was a turning point for Black students in the education system. However, the same social and economic conditions outlined in Brown still persist today for Black students (Moore & Lewis, 2014). In addition to similar social and economic conditions, racial segregation continues to increase thus resulting in Black students disproportionately attending underfunded and under resourced schools (Moore & Lewis, 2014). In order to improve the educational outcomes of Black students in public education today, this research sought out the voices of those who experienced desegregation to understand and learn from the experiences of Black students in the past. Interviews were conducted and coded using a Constant Comparison Analysis (Glaser and Strauss, 1967). The findings will be analyzed for central themes that will encapsulate the experiences of Black students who endured desegregation.

Transformative Social Studies: Changing Students' Perceptions Through Place-Based Inquiry

Amanda Ruvolo (Dr. Scott Morrison) Department of Education & Wellness

Most students find social studies boring. Part of the reason, according to Milo (2015, 2017), is because they fail to see the relevance to their lives. There are numerous scholars who argue that social studies education needs to undergo a transformation. For example, Ross (2017) suggested that learning become "synonymous with an inquiry into the problems faced by real people in their everyday life" (p. 18). With this in mind, we wanted to see the effects of place-based inquiry in the classroom. Place-based inquiry allows students to create their own compelling questions, investigate issues in their local community, and make connections between social studies standards and their lives. Ideally, place-based inquiry offers students what they think is missing in social studies education. The following research questions guided this study: What are students' perceptions of social studies? What might place-based inquiry in high school social studies courses look like in practice? What are student and teacher perceptions of place-based inquiry in social studies? We conducted a year-long qualitative case study at two rural high schools in North Carolina. Data sources included student and teacher interviews, classroom observations, and documents (e.g., assignment descriptions, student work, assessment rubrics). Our findings showed that although most agreed that social studies should be required, almost all said it does not help them in life. In their own way, students expressed a desire for place-based inquiry. One high school teacher took steps towards transforming social studies through a political engagement project where students connected classroom content and their local community. Students expressed excitement about place-based inquiry and a desire for additional hands-on projects highlighting aspects of transformative citizenship.

The Relationship between Educator Expectations and Burnout in Special Education Teachers.

Dierdre Shivak (Dr. Stephen Byrd) Department of Education & Wellness

The focus of this inquiry is special education teachers' expectations and understanding of their careers as preservice teachers and as practicing teachers, particularly looking at the relationship between expectations and occupational burnout. Research indicates that half of all educators leave the classroom within seven years of teaching and special education teachers leave within six years of teaching (Wisniewski & Gargiulo, 1997). The research also indicates that teachers may have expectations that are not met, including: levels of support from administration and colleagues, professional development opportunities, commitment levels, years in the career, and stress levels (Gersten, Keating, Yovanoff, & Harniss, 2001). My question resides in whether these expectations not being met increases symptoms and feelings of burnout. The participants in this inquiry were special education teachers from the Alamance Burlington School System who have been teaching in some capacity for five or more years. Participants are currently in the early stage of the study, which includes filling out a survey to gather information about their background and the expectations described above. The survey will further examine how those expectations relate to the realities of their careers and if they experience symptoms of burnout.

Results could possibly increase understanding and awareness of occupational burnout within the field of special education. The study could further assist in developing potential strategies and supports for educators feeling the symptoms of occupational burnout.

Social Media Use and Mental Health: Exploring the Link Between Social Media Use in College Students and Symptoms of Anxiety and Depression

Juliana Siler (Dr. Carol Smith) Department of Education & Wellness

Today, a majority of college students are connected to social media, with many students using social media at least once a day, if not multiple times a day. Heavy social media use has been shown to cause negative self-perception, which can lead to symptoms of mental health disorders such as anxiety and depression. Previous research has researched the linkage between excessive daily cell phone usage and negative mental health symptoms, but as social media usage becomes more prevalent in student and academic life, it is necessary to examine the linkage between social media and mental health in college students. This study aims to research this linkage by surveying college students at a small private southern university. The research design involves employing two validated instruments measuring anxiety and depression, a demographic survey, and a questionnaire about social media use.

The Effect of Content Based Activity Breaks on Lesson Engagement in Male and Female Students in the 5th and 7th Grade

Ciara L. Sutherburg (Prof. Elizabeth Bailey) Department of Education & Wellness

Student engagement in classroom instruction has been the subject of much investigation. The use of physical activity to enhance engagement is of particular interest. Research data on the effects of classroom based physical activity on measures of academic achievement suggest that it is effective in enhancing student enjoyment (Vazou and Smiley-Oyen, 2014) and cognitive function (Hill et al, 2010), as well as in increasing student attention (Palmer et al., 2013), all of which can be considered general components of engagement. However, there have been relatively few studies that incorporate current lesson content into these activities. The purpose of this study is to examine the impact of participation in a cognitively demanding, content-based physical activity task on engagement. Parental consent and student assent was collected on 26 5_{th}(N=12) and 7_{th} (N=14) grade students (N_{male}=11). The students completed this study in their Spanish course over a 2 week period (3 classes/week) using their weekly vocabulary words as the course related content for the experimental week. During week 1, students performed step jacks (jumping jacks without the jump) to a metronome beat of 100 while working in two teams and responding one by one to a prompted English translation by providing the appropriate vocabulary word in Spanish until all vocabulary words for the week were reviewed. At the end of each class, students responded to 9 questions using a Likert scale to indicate their current level of engagement in their Spanish class. The second week, students responded to the same questions after each Spanish class in its typical format (no physical activity). Data analysis suggests no significant differences for engagement between the experimental (33.46 $\pm$ 1.20) and typical (33.29 $\pm$ 1.19) conditions for all students ($p=0.36$).

When isolated, data from 7th grade students approached significance in favor of the experimental week (*p=0.06)*. Limitations include the small sample size and the brevity of the activity intervention (<5min). Many questions remain as to the efficacy of content based physical activity on engagement.

Adolescent Perceptions of Learning Math Outside

Rylie J. Torretti (Dr. Scott Morrison) Department of Education & Wellness

Research has shown that being outside has positive effects on both adults and children. Time in nature lowers heart rates and stress levels, reduces the symptoms of anxiety and depression, and increases focus and attention. Unfortunately, children are spending less time outdoors than ever before, resulting in what Louv (2008) has called nature-deficit disorder. There are multiple reasons for this trend, like the increased presence of technology and an emphasis on standardized testing in schools. Because students do not go outside very often during the school day, they are unable to access the physical, psychological, and emotional affordances of nature. In this study, we examined adolescent perceptions of learning math outside with 6th and 7th graders at two Title I middle schools in North Carolina. Boaler (2002) has long critiqued mathematics teaching that focuses on textbooks and algorithms, instead arguing for interactive, collaborative, and constructive approaches. The National Council for Teachers of Mathematics (2014) recommends eight effective mathematics teaching practices, including *using and connecting mathematical representations*, *facilitating meaningful mathematical discourse*, and *supporting productive struggle*. These practices are viewed as a "nonnegotiable core," ensuring all students experience engaging, authentic, high-level mathematics. The participants in this study (N=20) were interviewed about their connection to nature and feelings about going outside to learn during the school day prior to any lessons occurring outdoors. They then experienced approximately three math lessons facilitated on school grounds. Participants were interviewed afterward about their perceptions of learning math outside. Preliminary findings suggest that the participants have positive perceptions of learning math outside. There are few studies that investigate the intersection of math and outdoor learning (Fagerstam & Samuelsson, 2014), making this research novel and needed in the field of math education.

"It Makes Me Feel Like I Have Freedom": Examining the Social-Emotional Effects of a School Garden at a Title I Elementary School

Mara R. Walters (Dr. Scott Morrison) Department of Education & Wellness

The connection between children and nature has increasingly become distant and unfamiliar (Louv, 2008). Beyond the physical wellbeing and advanced motor skills that green space promotes through opportunities for active play, it has also been shown to promote positive mental health and brain development (Kuo, 2015; Barnes et al., 2019; Chawla, 2015; Browning & Rigolon, 2018; Twohig-Bennett & Jones, 2018). While the natural world is known to act as a pathway to healthy youth development, access to such beneficial spaces remains stratified by income and race (Wolch, Byrne, & Newell, 2014). This research project examines the social-emotional effects of a school garden at a Title I elementary school in North Carolina. In a Title I

school setting, in which many of the students come from low-income and marginalized families, gardens can foster life skills, cultivate resilience, and provide access to therapeutic green space (Chawla, Keena, Pevec, & Stanley, 2014). In investigating the social-emotional effects of the garden experience, the connection between the natural world and social-emotional development can be further demonstrated and a recommendation can be made with regards to the future establishment of garden programs. The effects of a school garden were examined through analysis of the voices of both students and teachers. Students' and teachers' perceptions of the school garden were analyzed along with student written reflections. Data collection included interviews with K-5 teachers (n=8), K-5 students responses to journal prompts (n=46), and semi-structured interviews with students (n=20) about garden experiences, as well as direct observations within the garden. Journal writings from students analyzed through open coding and identified three overarching themes: self-awareness, connection to nature, and connection to family and food. Out of all of the student journal writings and interviews, only one recounted a negative garden experience. Teachers noted student excitement, behavior improvement, skill-building, the generation of open-ended questions, genuine care for the garden, and increased vegetable/fruit consumption. Students and teachers both provided evidence that school gardens are sites for positive youth development, garnering support for school garden programs to be implemented in the future as potential health and development promotion tools.

English

Mother, May I: Navigating Mother-Loss in Young Adulthood Through the Personal Essay

Laura E. Braley (Dr. Cassie Kircher) Department of English

In developing a collection of personal essays about loss in young adulthood, this research addresses the question of whether writers in their early twenties can bring a unique perspective to the field of creative nonfiction and the sub-genre of grief narrative. The research enters an already robust field with significant discourse about loss. There are many memoirs and essay collections from women in their thirties and forties who remember losing a mother at sixteen, and even more young adult novels that deal with themes of losing a parent or a mother. However, these texts do little to support the bereaved adolescent; the former is little consolation to a teen dealing with both the immediate sensations of grief and the intense emotions innate to adolescence, and the latter caters to the ordinary sixteen-year-old, not the actively grieving one. Such narratives may in some ways further isolate the bereaved teen from their peers who are learning about grief from books, not life experience. Informed by creative, qualitative, and analytical texts and using literary techniques such as imagery, metaphor, and dialogue, this research addresses that gap in the literature and presents a new narrative. It preserves the experiences and anxieties of a young person in the years after her mother's death, from ages sixteen to twenty-two, while she is still grieving but has begun to bridge the gap between young adulthood and adulthood. This perspective allows a reader to imagine how grief may transform during the critical transition from adolescence to adulthood. In addition, though the collection centers on loss, it also confronts themes of performance, visual art, and travel, among others, presenting a narrative in which a young adult processes a deep loss but is not entirely consumed by it. The research presents a space that encourages young adults to think critically about their

experience with bereavement. Perhaps most significantly, the final product demonstrates that new experiences and growth are possible in the early adult years even after the loss of a parent.

An Unnatural Nature: Christina Rossetti's Grotesque and Carnivalesque Women in *Goblin Market and Other Poems* (1862)

Mary E. Emmerling (Dr. Rosemary Haskell) Department of English

In her volume *Goblin Market and Other Poems* (1862), Christina Rossetti frequently depicts images of beautiful, passive female bodies in nature, while also altering these images in unnatural and disturbing ways. In this project, I argue that the manner in which she corrupts these images challenges hegemonic Victorian cultural perceptions of the female body as dependent and passive and follows Mikhail Bakhtin's concepts of the grotesque and the carnivalesque, introduced in his text *Rabelais and His World* (1984). Other scholars, such as Kathy Psomiades (1999) and Kathryn Burlinson (1999), discuss how Rossetti depicts women's physical bodies to subvert masculine-dominated literary tropes and cultural attitudes in her poem "The Prince's Progress" (1866) and novella *Speaking Likenesses* (1874). Building on Bakhtin, Psomiades, and Burlinson, I argue that when read intra-textually, poems in *Goblin Market and Other Poems* similarly utilizes images of women's physical bodies to present a commentary on and a challenge to Victorian perceptions of women's lives. Reading her volume in such a way reveals how Rossetti reflects and comments on the institutionalized attitudes and `treatment of the disenfranchised Victorian woman, ultimately challenging canonical and cultural representations of women's submissive roles in art and society. For example, in the title poem of the volume, "Goblin Market," Rossetti establishes the woman's body as being inextricably connected with the cycles of nature and the passive passage of the seasons, but then distorts this depiction in "A Triad," "An Apple Gathering," and "Dead Before Death" by exaggerating her physical connection to nature to the point of disgusting grotesqueness and carnivalesque impossibility. In doing so, nature in Rossetti's poetry becomes a sinister challenge to humanity and destabilizes typical Victorian standards for the passive female body.

The Chronotopic Fairy Tale: History, Memory, and the Interconnected Fairy Tale World

Alison M. Heilman (Prof. Margaret Chapman) Department of English

Fairy tales figure prominently in the collective consciousness of both children and adults. While characters from classic fairy tales can be thought of as inhabiting the same theoretical fairy tale world, they do not interact in the original tales. However, some authors in the young adult genre are conceptualizing the fairy tale as a nexus for interconnected fairy tale worlds. These interconnected worlds allow fairy tale characters to interact and those interactions create new stories. In my research, I look at how authors, specifically K.M. Shea, Melanie Cellier, and Alethea Kontis, create overarching plots based on multiple fairy tales where characters, such as Cinderella and the Frog Prince, exist in the same fairy tale worlds, thereby creating opportunities for new interaction between the fairy tales. By understanding which elements of the original stories authors can expand upon, I discovered how varied fairy tales share the same roots and structure, allowing them to be easily intertwined. In their young adult series, these authors create

interaction between fairy tale characters by employing literary time and space to allow for character movement between tales. I define literary time and space as the fairy tale world, or the actual landscape of the story, and the character's memory and knowledge of the history of the world itself. Using Mikhail Bakhtin's idea of the Chronotope—a theory examining the ways in which time and space function in fiction—I examine how each fairy tale acts as the catalyst to begin the next tale and how these authors utilize character memory and history to shape individual stories and in the series as a whole. Thus, story crafting and structure within intertwined fairy tales affect the characterization and plot of the story itself. Finally, by looking into ways that contemporary authors are using these elements to create fairy tale worlds, I can point to new ways to examine relationships between the original fairy tales.

Developing Leadership Awareness Among Consultants in The Writing Center

Erin L. Leonard (Dr. Julia Bleakney) Department of English

The purpose of this study is to assess the impact of learning about leadership on Elon Writing Center consultants' behaviors and attitudes while they are working in, and representing, the Writing Center. Writing center directors and their consultants have long known that the work peer consultants do helps develop their leadership capacities (e.g., Kail, Gillespie, and Hughes, 2010; Hosten, Skjerning, and Sullivan, 2016; Goldsmith et al 2017; Bleakney, 2017). Yet the fact that writing centers are key sites for leadership development has gone unrecognized, by writing center professionals and by colleagues on campus. This is important in light of the recent attention to on-campus employment as a high-impact practice (e.g. McClellan, Creager and Savoca, 2018; Iowa GROW). Our study seeks to make visible to campus the leadership behaviors already built-in to consultants' work and to assess the impact of instruction designed to further enhance consultants' leadership awareness. We will examine if or how knowledge of leadership (gained through leadership instruction in the Writing Center Workshop course and other on-campus leadership experiences) helps consultants manage personal feelings while they are working in the Writing Center. We focus on personal feelings because writing center consulting can be emotionally draining, and the ability to manage emotions is an important leadership capacity. This mixed-methods, qualitative study, which has received IRB exemption, is designed to gather knowledge, perceptions of behaviors, and attitudes at multiple points during the semester. The six study participants are a combination of new and experienced consultants. The study includes the following data points: survey responses to capture knowledge of leadership; daily mood trackers, which the consultants complete at the beginning of each shift; end of study self-reflection of leadership awareness and behaviors over the period of the study; and a focus group to analyze responses and debrief. We hope to find that leadership as a framework for understanding their work in the Writing Center helps consultants develop strategies to manage negative moods.

Breaking Open the Canon: Diversifying Literature in the English Classroom

Haley M. Love (Dr. Kim Pyne) Department of English

The literary canon in America is dominated by literature written by white males and about white experience. As American schools become more diverse, students need to interact with literature that both reflects their experiences, as well as contradicts it. The critical pedagogy approach to the classroom aims to support students who are disadvantaged by the system, particularly students of color. Darder, Baltodano and Torres (2003) explain that critical pedagogy is a method of teaching that brings different views and perspectives into the conversation, allowing educators to engage critically with the impact of capitalism, sexism and racism upon the lives of students who have been historically oppressed in American school systems. Critical pedagogy requires politicizing the classroom, allowing it to become a place for students and teachers to work through tough issues together. In order to begin the challenging sociopolitical work of critical pedagogy, teachers need access not only to new, more diverse literature, but also to critical analysis of this literature in context of the classroom from other educators and scholars. This project is a critical literary analysis of seven novels centered around characters who were written as black females who are experiencing non-heterosexual sexuality in different ways. It analyzes how this intersectional identity is represented in each text and, in response, suggests materials and approaches for teaching each of them in a critical pedagogy-oriented classroom. While this is a project looking to find new literature to add to the classroom, The Color Purple works as a comparative text, allowing comparison between the new literature I have compiled and an older, more canonical novel that explores similar themes of sexuality, race, and gender. Researching the use of The Color Purple in modern classrooms has not only acted as a guide for how this genre of text works in the class, but also revealed some of the missing pieces in the teaching of black, queer literature. The project provides suggested teaching materials, including critical thinking questions, historical/philosophical background readings, and an overview of barriers and challenges to teaching each text.

Making the Topic of Rhetoric More Accessible to New and Current Members of the Field of Rhetoric

Hayden McConnell (Dr. Jessie Moore) Department of English

Can a successful video series provide an efficient understanding of rhetoric and its various components? Can it do all of this while also keeping its audience engaged? This project showcases successful multimedia rhetoric strategies for making complex disciplinary information accessible to both current members of the field of Rhetoric as well as new members. In the past decade, YouTube has become a huge platform for not only entertainment but also a space for learning. An abundance of videos exist that are both aesthetic and engaging and discuss scholarly topics of all kinds. More specifically, a large number of videos discuss rhetoric, but not many of these educational videos successfully visually stimulate and engage their audience. For example, they may have a strong rhetorical component of logos, but have absolutely no visual appeal or visual stimuli. The aim of this research and project is to create a series of Youtube videos discussing rhetoric in a way that also uses rhetorical strategies to successfully engage the intended audience as well as inform them of basic rhetorical concepts. The first part of this project analyzes historical and contemporary texts that define rhetoric and its various components and refines a working definition of rhetoric. This phase collects reliable information that could be referenced in the videos. Part two of the project applies the findings of the research

to create a video series that includes several three to four-minute videos that expand on the question “What is Rhetoric.” The videos go into detail about the varying topics within Rhetoric such as Feminism in Rhetoric and the Five Rhetorical Canons. Trial videos were usability tested, meaning that peers and faculty reviewed and provided feedback which was then used to refine the final product. As a result, this project demonstrates the successful use of rhetorical strategies to create videos that clearly communicate an understanding of rhetoric to new members of the field.

Developmental Editing: Professional Writing & Rhetorical Strategies That Benefit Writers Throughout Their Careers

Jack McIntyre (Dr. Jessie Moore) Department of English

This project focuses on a question pertaining to a number of different aspiring professional editors: how can I support the development of writers while I’m editing their writing? This might seem like a surface-level question. Professional editors rely heavily on their own skills but also have to understand the importance of working with others and working through different development stages with their writers. It’s glaringly obvious that editing involves checking for spelling, grammar, syntax, etc. However, editing is much more complex than only using style guidelines and checking for accuracy. Editing, and developmental editing specifically, is an effective way to help writers refine their works through collaboration. Developmental editing is defined as a form of support and an ongoing process before and during the creation of different texts. Any professional writer needs to rely on developmental editing and collaboration so they can grow in their skill set by learning from more qualified professionals. In the first stage of this project, informational interviews with professional/novice editors informed the development of a WordPress website featuring strategies for developmental editing. Professional/novice editors can speak to the importance of developmental editing in their jobs and help narrow the focus of the strategies featured on this resource site. The interview findings share, inform, and illustrate how developmental editing can be beneficial in any work setting. The second stage of this project focused on usability testing, a common research method in Professional Writing & Rhetoric. The usability testing included student subjects from the Writing Center as well as Elon News Network who reviewed the draft site and provided feedback on how helpful the site is. The participants filled out an online survey afterward about the usefulness of the site and their newfound understanding of developmental editing. This is an effective method since it reflects the beta testing of any new site and points out any major flaws for users. Ultimately this research — and the resulting web resource — can guide any professional writing student in understanding the ins and outs of developmental editing and how it can be applied to their intended jobs

How Rhetorical Training Transfers from College Classes to Writing Beyond the University: A Survey of Current Students and Alumni

Stephanie Neu (Dr. Paula Rosinski) Department of English

Our research asks the following question: to what extent does the rhetorical training of college students and alumni transfer to writing beyond the university contexts? By rhetorical training, we

are referring to strategies for brainstorming, researching, drafting, revising, and editing. We will survey current students and alumni who are currently involved with or were involved with writing in these contexts: writing classes beyond the introductory level, campus employment with elements of writing, writing-focused curricula, and work integrated learning. We are particularly interested in how these intersecting university experiences prepare students for writing beyond the university, as well as how we can potentially make them better.

The Irish Playwright and the Celtic Tiger: Studies on Neocolonialism and Subalternity

Maeve Riley (Dr. Scott Proudfit) Department of English

This essay argues that the plays of the 1990s in Ireland should be studied with a neocolonial lens and a focus on globalization. Despite the usual postcolonial through line of overt political commentary, this essay follows the through line of the subalternity of women throughout Conor McPherson's The Weir (1997), Brian Friel's Molly Sweeney (1994), and Marina Carr's Portia Coughlan (1996). These plays reveal the tragic reality of lower-class women's position in Irish society; unchanged and unheard despite such immense cultural, political, and economic growth during the period of prosperity in Ireland known as the Celtic Tiger. For decades, a postcolonial lens has been applied to Irish drama. For example, it is easy to analyze one of the founding texts of the Irish Literary Theatre, Cathleen ni Houlihan by W. B. Yeats and Lady Gregory, from a postcolonial position, particularly from the work of Edward Said. The play is overtly political and is heavily interested in the political situation between Ireland and England at the turn of the 20th century. Many critics have applied postcolonial theory to the canonical Irish works of Friel, McGuinness, O'Casey, Synge, etc. Less frequently though, plays from the 1990s have been studied in this framework because they are not overtly political and they do not follow traditional postcolonial paradigms. The period of economic prosperity that has been labeled the Celtic Tiger does not invalidate the postcolonial framework, but demands that the theory be updated to late 20th century terms, allowing for accommodations for the ways globalization and neoliberalism has changed how we understand postcolonial theory in the late 20th and early 21st century framework.

Reading is Believing: The Value of Culturally Responsive Literature

Hayley V. Risk (Dr. Heather Lindenman) Department of English

Research on literacy suggests that using culturally literate texts has tremendous potential for helping young people connect to reading (McCollins & O'Shea 2010, Mendoza & Reese 2001). Books have the power to provide young children with mirrors to see reflections of themselves, as well as windows to catch a glimpse into the culture of others (Cox & Galda 1990, Brinson 2005). For this reason, it is vital to ensure that children are provided with both windows and mirrors through the literature they receive in school settings. However, does this always happen? My research investigates these questions at Elon specifically with the student tutors working at the Village Project. My study examines the materials student tutors in The Village Project choose to use, determining whether, to what extent, and in what ways literacy tutors draw on culturally responsive texts in their sessions. In step one, I investigate which texts student tutors in the

Village are choosing to use by observing tutors selected materialsV. Specifically, this part of the study examines three categories of cultural responsiveness in reading materials: broad representations of diversity through character depiction, cultural challenges, and relevant connections between a tutor and their tutee outside of cultural identity. In the second step, I examine why tutors use the books they do. Interviews with tutors (n=7) show that although tutors desire to use culturally responsive literature, barriers such as time restrictions and difficulty choosing texts hinder their ability to find texts that are culturally relevant. Finally, this project also includes the preliminary stages of a resource for student tutors to utilize; this resource will aid the process of finding and selecting culturally responsive materials.

Finding Their Place in The World: Marketing New York City Real Estate to Gen Z Through Visual-Prose Media

Zack J. Stern (Dr. Jessie Moore) Department of English

This project attempts to market NYC real estate to a Gen Z audience based on methods and research created to record their ideals, beliefs, and aspirations. To create marketing content for this audience I surveyed a sampling of upper and lower class-men who desire to live in NYC, and learned of their market sentiment, which apartments they are searching for, and concerns they might have. This is the generation that grew up through unprecedented technological advancement, never knowing life before the internet, social media networks, and smartphones. Gen Zs connect to digital multimedia more than any other generation, which made studying their habits, values, and interests valuable in determining the most effective approach to marketing to them. My audience analysis used online surveys distributed through social media channels, examining students' priorities upon entering the housing market. In the second phase of my project, my role as a field researcher shifted to document-designer, as I created actionable digital content for a mock real estate agent. This content includes a social media account with aesthetic and informative content sought after by Gen Z and real estate advertisements, deploying rhetorical strategies taught in Professional Writing & Rhetoric. Gen Z interests in their preferred housing market provide insight into their social and cultural characteristics that shape their attitudes and knowledge.

Writing About the Black College Experience

Jordan L. S. Williams (Dr. Kim Pyne & Dr. Cassie Kircher) Department of English

For many black students, attending a majority white school, also known as a Predominantly White Institution (PWI), adds an extra layer of complexity to the undergraduate experience. For some of these black students, their awareness about societal struggles such as racism and classism are magnified due to their status as minority students, especially in comparison to their white peers. It can be difficult for these students to adjust to college when they feel isolated, both in terms of their presence on campus now away from spaces where many of the people in their lives were of color, and the lack of representation of other black students on campus at these majority white schools. For my project I conducted interviews with six black students from two private PWIs in North Carolina, and their responses served as inspiration for the creation of

several short stories that focus on common themes which shape the experiences of black students during their first year. These stories, that deal with topics such as loneliness, imposters syndrome, academic struggles, and adjusting to independence, are written to appeal to new adults in the traditional college age range of 18-22 years old. The ultimate goal of my project is to increase the representation of voices often marginalized in literature and inspire conversation about concerns faced by black students across the American higher education system.

Environmental Studies

A Strange New World: Hybridization in the Anthropocene

Sarah Hope Dolce (Dr. Amanda Chunco) Department of Environmental Studies

Although the ecological impacts of invasive species have been well studied, the evolutionary consequences of invasions are still a developing area of research. One example of how species invasions impact the evolution of native species is through hybridization between the native and invading organisms. Hybridization between native and invasive species can cause deleterious effects for native species, but at the same time can produce genetic combinations that potentially fuel species evolution. In this study, we investigated known global hybridization events between native and invasive animal species. We sought to discern spatial patterns of hybrid zone clustering in relation to species invasion patterns. Simply put, we questioned if the number of hybridization events studied would increase in proportion to the number of invasive species in a country. We used the Web of Science database to compile 163 cases of hybridization between native and invasive species published between 2004 and 2016. Our results show that the number of species invasions per country and the number of hybrid zones are correlated. There is clear hybrid zone clustering between 40 and 50 degrees of latitude in the Northern hemisphere with identifiable clusters of hybrid zones in Europe, western and central North America, and on islands. We identified a lack of hybridization studies in South America, Asia, and Africa. It is important for us to further understand where hybrid zones occur for mitigation of genetic losses for at-risk species. The planet is currently in a period of rapid warming and growing international trade; further investigation is needed to understand how a decrease in geologic barriers will allow for continued genetic mixing and speciation in a warming world.

The Highway 64 Project: Developing an Inclusive Inter-Departmental Learning Experience within the College of Arts and Sciences

Andrew C. Hotton, Olivia L. Kinsella, & Erica G. Payne (Dr. Michael Strickland) Department of Environmental Studies

The current Highway 64 Project (https://blogs.elon.edu/highway64/) is a brand new and ongoing research and writing experience for students from classes in Professional writing and Rhetoric (PWR)that connects the entire state of North Carolina from mountains to the sea, via travel and food writing, cultural analysis, and insights into local community preparation for the coming impacts of climate change. This past fall 2019 term, students from PWR collaborated with a

team of seniors from Environmental Studies (ENS) to expand the climate change aspects of the project and to explore ideas for future expansion and collaboration between students in both departments. For this SURF project a team of students from both PWR and ENS have continued to work on 2 new initiatives: 1) Establish a network of expert contacts along Highway 64 who can regularly provide students information on state and community efforts on climate disruption, and 2) Design and create a sustainability plan for year-round maintenance of the web site while solidifying collaboration between students from both departments. This structure will involve not only partnership between classes in both departments, but create appointed positions of co-editors and assistants, and provide research and internship opportunities as well. For this project we have done extensive interviews with climate experts throughout NC, examined potential options for an organizational structure for this new phase of the project, and worked on website redesign. Our teams hopeful conclusions it to find out: 1) How can we create a sustainable project that can build on the strengths of students from two different departments, while also synthesizing the community outreach goals of the College of Arts and Sciences, and 2) How can we establish a fundamental role for Elon students to participate in NC's efforts to adapt to climate change?

Food Insecurity in North Carolina: A Critical Analysis of Local and County Strategic Plans

Conner R. McCarthy (Dr. Ryan Kirk) Department of Environmental Studies

Food insecurity is a persistent problem in many communities across the United States, disproportionately affecting minority and low-income groups. Analysis of food insecurity has recently emerged as a standard practice for many local governmental organizations and advocacy groups looking to care for the underserved in their communities (Gundersen, Engelhard, & Waxman, 2014). These local analyses have resulted in improved data on food insecure populations as well as reports identifying policy options for addressing the insecurity. However, given that these analyses have mostly been developed by local stakeholders, there is limited comparative study across these independent efforts. Therefore, this research will comparatively observe nine case studies within North Carolina, focusing on the actions of local and county groups, and their respective governments' strategic plans, to combat food insecurity. Through observation of variables such as food insecurity, food access, nutrition education, food equity and justice, local agriculture and others, I expect to draw conclusions of successful efforts within North Carolina and efforts that have not yet succeeded. The methods include classifying the stakeholders involved in developing these plans, tabulating and classifying the types of policy actions and recommendations related to food insecurity, and conducting a qualitative policy analysis of proposed policies following the approach of Patton and Sawicki (1993). With these initial results, I will make policy recommendations to certain municipalities based on what has been proven useful in other areas.

Exercise Science

Monitoring Recovery via Salivary Testosterone and Cortisol Changes in NCAA Division I Men's Soccer Athletes

Madeleine F. August (Dr. Takudzwa A. Madzima, Dr. Eric E. Hall, & Dr. Svetlana Nepocatych) Department of Exercise Science

Changes in testosterone and cortisol have been evaluated as physiological markers of the physical demands of a competitive event. The testosterone to cortisol ratio (T:C) has been used as an indicator of anabolic-catabolic imbalances, where anabolic states refers to molecular building and catabolic states refers to molecular breakdown. A high T:C represents a positive anabolic state, whereas a decline in T:C serves as a marker of overtraining. **PURPOSE:** To evaluate changes in salivary testosterone and cortisol immediately prior to pre-season training (PS), before (PreGame) and after (PostGame) a competitive game and at 12 (Recovery12hr) and 36 hours (Recovery36hr) following the competitive game in Division 1 men's soccer athletes. **METHODS:** 19 soccer athletes (age: 18±1years; body fat: 11.0±3.1%). PS salivary samples were collected in August. PreGame and PostGame salivary samples were collected an hour before the start of the fourth game of the season and within 15 minutes after the game's completion. Recovery12hr samples were collected 12 hours later, prior to next morning practice and Recovery36hr were collected prior to the subsequent day's practice. Salivary samples were analyzed via enzyme-linked immunosorbent assay (ELISA) to measure testosterone, cortisol and the T:C. Analysis of variances (ANOVAs) were used with significance accepted at $p<0.05$. **RESULTS:** PostGame testosterone levels (244±108pg/mL) were similar to PreGame levels (174±69pg/mL; $p=0.056$). Recovery12h (410±92pg/mL) and Recovery36hr (398±147pg/mL) were both significantly greater than PreGame (174±69pg/mL) and PostGame (244±108pg/mL) levels ($p<0.001$). When compared to PreGame levels (0.204±0.10 µg/dL), cortisol was significantly greater at PostGame (0.704±0.51µg/dL), Recovery12h (0.510±0.21µg/dL), and Recovery36hr (0.484±0.21µg/dL) ($p<0.05$). There were no differences in cortisol levels between PostGame, Recovery12h, and Recovery36hr. The T:C was significantly lower at PS than all other timepoints ($p<0.001$). T:C significantly declined from PreGame to PostGame (-501±140; $p=0.028$), but returned to PreGame levels at Recovery12h, and Recovery36hr. **CONCLUSIONS:** The PreGame to PostGame decline in T:C suggests that the demands of the game placed the athletes in a catabolic state. However, the rise in T:C back to PreGame levels at Recovery12h, and Recovery36hr indicates the athletes were able to optimally recover in the days following competition.

A New Approach: Investigating the Relationship Between the Pediatric Inactivity Triad and Body Image Perception in Children

Ella R. Barlick (Prof. Elizabeth Bailey) Department of Exercise Science

The World Health Organization recommends that children aged 5-17 should acquire 60 minutes of moderate to vigorous physical activity (MVPA) daily, yet studies show that few children actually attain this minimum. The Pediatric Inactivity Triad (PIT), consisting of physical

inactivity, pediatric dynapenia, and physical literacy, has been proposed as a way to assess insufficient activity in children. To date, the PIT is largely understudied and the relationship between PIT and body image perception in children has not been examined. Therefore, the purpose of this study was to evaluate the existence of PIT and examine its potential relationship to body image perception in children of Alamance County, NC. Subjects (N=93) were recruited from Elon University programs that target grades 3rd-5th, as well as from local schools. Handgrip strength and standing vertical leap were used to assess pediatric dynapenia. Physical literacy was assessed using the PLAYbasic Physical Literacy Score (PLAYbasic), requiring evaluation of five motor tasks. Physical inactivity was measured using the Evaluation of Activity Surveys in Youth (EASY) questionnaire, and body image perception was evaluated using the Social Physique Anxiety Scale for Children (SPAS-C) (N=32), and the Rosenberg Self-esteem scale (SE). The SPAS-C is a better measure of perceived body image, but local schools would not allow the questionnaire to be administered, limiting its contribution to our analysis to a small subset. Results indicated that 62% of participants showed a deficit in at least 1 category of PIT, with 9% showing deficits in all 3 categories. No significant correlations were found between the PIT and SE, however, a negative correlation was found (r value = -0.413) between SPAS-C and the composite PLAYbasic score (p-value = 0.023), indicating increased physique anxiety correlating to deficits in physical literacy. The results of this study verify the existence of PIT and its ability to be evaluated in an empirical setting. However, due to constraints applied by the school system, it was difficult to determine a relationship between body image perception and PIT. With further research, perhaps clinical screening measures for PIT could be implemented to limit negative consequences of inactivity in children.

The Utility of Telemetric Devices for the Measurement of Heart Rate Variability in Older Adults

Emerson E. Bennett (Dr. Simon Higgins) Department of Exercise Science

Heart Rate Variability (HRV) is the dynamic change in one's cardiovascular system in response to autonomic nervous system input and is typically measured via costly medical procedures such as an electrocardiogram (EKG). HRV naturally declines with age and in conjunction with certain chronic diseases such as cardiovascular disease. Despite the importance of HRV as a prognostic tool in older adults, research examining the potential utility of low-cost alternatives to EKG-derived HRV (e.g. HRV from telemetric devices like iPhone applications) has been performed only in young, healthy adults. Thus, the goal of this research is to examine the validity of telemetric devices as a low-cost alternative to traditional EKG based HRV measurement in older adults. Preliminary data are available in four older adult females aged 72.25 ± 2.50 years who were free of cardioactive medications. Participants visited the lab on 3 separate occasions, during which repeated concurrent assessment of inter-beat interval (IBI, used to calculate HRV) occurred via iPhone application, *HRV Logger*, connected via Bluetooth to a Polar H-10 heart rate monitor with lead II EKG (BioPac ECG 100C) simultaneously measuring heart rate. Participants completed a RESTING, REACTION (2-minute stand followed by a 10-minute NASA lean test, NLT), and RECOVERY (5-minute supine) protocol. NLT is a postural challenge that puts stress on one's heart and nervous system, by causing blood to pool in the lower extremities, therefore evoking the heart's ability to respond to stress (i.e. HRV). Validity estimates were calculated in Excel and are reported as the average Pearson's correlation coefficient between IBIs measured

via Polar H-10 and EKG across all three trials in all participants, calculated using Fisher's R-to-Z transformation. Excellent validity was seen between measures of IBI across all aspects of the test; RESTING (r= 0.99, 95% CI: 0.99-1.00), REACTION (stand: r= 0.99, 95% CI: 0.99-1.00 and lean: r=0.99, 95% CI: 0.99-1.00), and RECOVERY (r=0.99, 95% CI:1.00-1.00). These data suggest that telemetric devices may be a valid, low-cost alternative to traditional EKG-based HRV assessment in older adults. Implications of this research could provide healthcare equity for older adults by lowering the costs of cardiac screening.

Balance and Proprioception Intervention in Adult Female Following Ankle Fracture

Emerson E. Bennett, Amanda S. Callum, Paige M. Eck, & Cheyenne V. Wilson (Dr. Svetlana Nepocatych) Department of Exercise Science

Dynamic balance is a necessary part of walking in both healthy and clinical populations. In patients with an ankle injury, a resulting loss of dynamic balance can lead to increased fall risk and an increased risk of future injury. In cases such as these, where dynamic balance is compromised, exercise-based interventions are a necessary part of recovery and rehabilitation. This case study describes a 49-year-old female who previously had a right ankle fracture that was treated with open reduction and internal fixation (ORIF). Six months post-operation, the participant completed a six-week exercise intervention at Elon Department of Physical Therapy's H.O.P.E. Clinic. This intervention consisted of several exercises promoting mobility and proprioception, with the goal being an overall improvement in dynamic balance. Baseline modified Functional Movement Screening (mFMS) and Balance Error Scoring System (BESS) scores were first collected to determine the participant's exercise capabilities. Visits began with five minutes of walking meditation (WM), followed by various Pilates, dynamic strengthening, and *Theraband* ankle mobility exercises, and concluded with low-impact stretching. Each week the participant was given a home exercise sheet that consisted of exercises that the participant was highly encouraged to complete every day until the following clinic visit. mFMS and BESS tests were repeated at the end of the six-week intervention. The participant's mFMS score improved from 5 to 6; despite the seemingly small change, this change was notable with regards to the scoring of this test. Notable BESS improvements include progressing from >10 errors with assistance in tandem stance to <2 errors without assistance. As supported by improvements in the participant's test scores, the exercise intervention was effective in improving ankle mobility and increasing balance and proprioception. This intervention was novel because it was interdisciplinary, as it included WM in addition to Pilates and *Theraband* exercises. Of equal importance was the participant's excellent adherence to the at-home exercises, emphasizing the benefit of prescribing home-based exercises in addition to an intervention. A six-week exercise intervention that includes low-intensity, functional exercises in addition to weekly prescribed home-based exercises is effective at improving balance following an ankle injury in adult females.

Internal and External Factors that Affect Athletes Ability to Achieve Flow

Melissa Birdsell (Dr. Eric Hall) Department of Exercise Science

Flow is a state of mind in which a person is able to perform at an optimal rate due to having a clear positive mindset. (Russell, 2001; Peterson & Greenleaf, 2014) Several studies have been conducted in order to determine how and why athletes are able to achieve flow. Although, no previous known research has examined the relationship between the internal and external factors of sport and athlete's ability to achieve flow. For instance, coaching staff are a key facilitator of athletes' performance levels and therefore may help foster an environment that may be either beneficial or detrimental to an athlete's ability to achieve flow. The primary purpose of this research was to understand the relationship between coaching behavior and ability to achieve flow. Electronic questionnaires were sent out to participants and were filled out during a two-week time period. There were 130 total participants (86 male) all of which were varsity athletes at an NCAA division one university. Questions related to: 1) flow in the athlete's specific sport using the Dispositional Flow Scale, 2) an overall assessment of leadership among the coach based on the Leadership Scale for Sports, 3) a group environment assessment analyzed using the Group Environment Questionnaire, 4) an evaluation of player anxiety based on the Sport Anxiety Scale as well as, 5) a sports confidence measure using the Competitive Sport Anxiety Inventory. Results showed that positive coaching behaviors and player confidence, along with positive group cohesion correlated with athlete's' ability to better obtain flow state during their sport. Inverse results from the Sport Anxiety Scale also resulted in the athlete's ability to better achieve flow. In contrast the results showed negative coaching behaviors and group environment correlated with athletes' lack of the flow state. By understanding the effects that sport environment has on flow state, which include group interaction, athlete's self-assessment of anxiety and confidence as well as coaching behaviors, sports psychologists and other sports researchers can use this information to better educate coaches and enhance certain training techniques.

The Acute Effects of a Relative Dose of Pre-sleep Protein on Recovery Following Evening Resistance Exercise

Juliana V. Costa (Dr. Takudzwa Madzima) Department of Exercise Science

Pre-sleep consumption of protein has been shown to enhance recovery of muscle function after evening exercise. Previous studies have primarily compared casein protein (CP) to a carbohydrate (CHO) placebo, however, less data exists examining the effects of a blend of CP and whey protein (WP; (CP+WP)) or a dose relative to an individual's lean body mass (LBM). **PURPOSE:** To assess the acute effects of pre-sleep consumption of isocaloric CP, CP+WP, or CHO at a dose relative to LBM on recovery following an evening lower-body resistance exercise (RE) bout. **METHODS:** Fifteen active males (age: 21±1yrs, body fat:14.2±2.7%) participated in this randomized, double-blind, crossover study. Participants performed an evening lower-body RE bout and were provided with 0.4g/kg/LBM WP supplement post RE. A single dose of 0.6g/kg/LBM of CP, 0.4g/kg/LBM CP and 0.2g/kg/LBM WP (CP+WP), or CHO was consumed 30 minutes prior to sleep and each trial was separated by 72 hours. Measurements of perceived recovery ((visual analogue scales (VAS) for recovery, soreness and fatigue), appetite (VAS for hunger, satiety and desire to eat), as well as pressure-pain threshold (dolorimeter) and average power (Biodex™) of the right thigh muscles were assessed the following morning. ANOVAs were used for analyses and significance was accepted

at $p < 0.05$. **RESULTS:** There was no significant difference in morning recovery, soreness and fatigue between pre-sleep supplements. There was a significant difference in pressure-pain threshold at the rectus femoris (p=0.001), vastus medialis (p=0.001) and vastus lateralis (p<0.001). Both CP (98.0±17.3N), and CP+WP (98.2±21.7N) had a greater pain tolerance (i.e. less soreness) than the PLA (80.6±21.7N) at the rectus femoris. Average power was similar between supplements. Hunger was significantly greater after CP than CP+WP (52.2±17.2 vs. 39.9±15.9 mm; p= 0.048). There was no difference for satiety and desire to eat. **CONCLUSIONS:** Pre-sleep consumption of CP and CP+WP at a dose relative to LBM may enhance overnight recovery to a greater extent than CHO as a result of less perceived muscle soreness the following morning after an acute evening RE bout.

The Utility of Positive Psychology in the Evolution of Sport Injury Theories

Alanna Dodson (Dr. Caroline Ketcham & Dr. Eric Hall) Department of Exercise Science

Positive psychology is the scientific study of thoughts, feelings, and behaviors that contribute to human flourishing with a focus on enhancing individuals' strengths (Seligman and Csikszentmihalyi, 2000). As a field concerned with the prevention and treatment of injuries and related disorders, sports medicine would benefit greatly from the incorporation of positive psychology into its existing sport injury models. The Biopsychosocial Model, developed by George Engel (Engel, 1980) and the Integrated Model of Response to the Sport Injury and Rehabilitation Process, developed by Diane Wiese-Bjornstal (Wiese-Bjornstal, et al., 1998; Wiese-Bjornstal, 2010) are useful for providing potential explanations for how interacting psychological, physiological, and social factors affect injury outcomes. However, there is room for improvement in getting healthcare professionals to apply this knowledge within a sports medicine context. Thus, a theoretical model was designed that posits the integration of positive psychology at the phases of injury targeted by Wiese-Bjornstal's Integrated Model. A novel theoretical model therefore encompasses concepts of both models by doing the following: (1) emphasizing the consideration of cognitive appraisals and emotional and behavioral responses, as well as sociocultural factors specific to the athlete, (2) understanding and treating the mind and body, instead of simply understanding and treating the injury at hand, and (3) focusing on enhancing what is positively transformative throughout the process of rehabilitation. After review of existing literature, a model was created and presented to clinicians and educators from different disciplines. Professors from the departments of Exercise Science and Psychology, as well as the Director of Counseling Services, the Director of Wellness for Athletic Training and Risk Management, a clinical psychologist, and Elon Football's primary care physician were consulted. Their insight regarding new, relevant theories to reference (i.e., Regulatory Focus Theory), applicability within an athletic population, and other considerations for the model's improvement were recorded. The model was modified to further stratify types of injuries (i.e., by intervention type and verifiability via diagnostic tools) and to implement other psychology themes that reflect their feedback.

Exploring the Relationship between Adiponectin and Bone in Adolescence

Kelly T. Gorman (Dr. Simon Higgins) Department of Exercise Science

Osteoporosis and low bone mineral density (BMD) affect ~54 million individuals in the US, increasing fracture risk. Prevalence of these conditions are significantly higher in women than in men. While research has focused on the role of sex hormones in relation to BMD, other hormones such as adipokines (adipose-derived hormones) may explain some of the sex differences. Specifically, adiponectin is negatively correlated with BMD but research has suggested that this relationship may differ by sex, however, the reasons for any sex-specific effects are unclear. Thus, the purpose of this study was to explore the potential sex-specific relationship between adiponectin and BMD, and to identify whether sex-hormones or adiposity influence this relationship in healthy late adolescents. Cross-sectional assessments of total body BMD (g/cm_2) and adiposity (kg) were performed via dual-energy x-ray absorptiometry in healthy late adolescents (n=40, 18.6 ± 0.6 years, 70% female). Serum testosterone and adiponectin (ng/mL) were obtained via fasted venous blood draw and enzyme-linked immunosorbent assays. Associations among outcomes were assessed using bivariate and partial correlations. BMD, testosterone, and adiponectin were higher in males than females, whereas average total fat mass was higher in females (all $p<0.05$). A moderate, negative association was seen between adiponectin and BMD (r= -0.39, p= 0.039) in females but not males (r= 0.18, p= 0.565). Whereas, small, non-significant associations were seen between testosterone and BMD (F: r= -0.24, p= 0.216 M: r = 0.15, p= 0.651) and between testosterone and adiponectin (F: r= 0.23, p= 0.237; M: r= 0.1, p= 0.781) in both sexes. Paradoxically, a large, positive association was seen between adiponectin and total fat mass (r= 0.64, p= 0.032) in males but not females (r= -0.16, p= 0.426). Adjustment for adiposity did not influence the reported relationships. This preliminary analysis was limited by a small sample size, however, adiponectin still appeared to have a negative association with bone, independent of adiposity, in females but not males. That this association was sex-specific and that no relationships were seen between adiponectin and testosterone suggest that other pathways (e.g. estrogen) must be explored to understand the role of adiponectin on female bone.

Comparison of Virtual Reality Balance Assessment Between Individuals with a History of Concussion Versus Those without a History of Concussion

Mariana Guerena Gonzalez (Dr. Matthew Wittstein) Department of Exercise Science

INTRODUCTION: Individuals with exposures to concussions have shown to demonstrate difficulties when using their vestibular and visual systems effectively especially in the first few days post injury, thus leading to balance deficiencies (Guskiewicz et al. 2001). The recognition and process of improvement of an individual's balance soon after the injury could alleviate some of the cognitive symptoms that later develop from a concussion. METHODS: This study explored balance through the Sensory Organization Test (SOT; NeuroCom International, Clackamas, OR) using virtual reality (VR). The SOT assesses one's ability to use visual, vestibular, and proprioception information to maintain an upright posture. Four previously concussed individuals, and eleven non-concussed individuals were tested in two sessions that were one week apart through six 20-second tests: a regular VR environment, a VR environment without a reaction to head rotation, and a black screen. Participants were tested on a stable and foam surface. A 4-way MANOVA (Group X Session X Condition X Surface) was used to test Ellipse Area, Path Length, Average Speed, estimated Equilibrium Index (eEI), AP DFA alpha,

and ML DFA alpha for significance. DFA α quantifies the randomness of sway patterns, while the other metrics quantify the overall amount of sway. A selective model was used to focus on comparing concussed and control groups. RESULTS: A main effect was identified for Group ($F_{6,153}=10.11$, $p<0.001$). However, no interaction effects were identified in which Group was a factor. eEI and ML DFA alpha were the only statistically different variables between groups. The experimental group demonstrated lower eEI (mean difference=2.08±0.86) and ML DFA alpha (mean difference=0.043±0.007). A lack of Group by Session interaction suggested that balance metrics were stable across sessions, approximately 1 week apart. DISCUSSION: Reduced eEI and ML DFA alpha suggest that both their overall ability to balance (eEI) and postural control mechanisms (ML DFA alpha) may continue to be compromised. Future research should aim to understand if these changes are due to concussion and if they may contribute to future injury or cognitive deficits. Additionally, this study demonstrates that balance measures are stable across testing sessions in both healthy and concussed individuals.

The Effects of Acute Bouts of Cross Training on Affect: A Comparison of Lower Body Positive Pressure Treadmill and Cycling Runners and Non-Runners

Samantha King, Lindsey J. Siska, James A. Davis, & Sibu K. Varghese (Dr. Shefali Christopher & Dr. Eric Hall) Department of Physical Therapy Education & Department of Exercise Science

Aerobic exercise has been shown to enhance mood and affect in adults. Lower body positive pressure treadmills (LBPPTs) have been used to reduce loads on the musculoskeletal system and provide an alternative to running. Although biomechanical and physiological responses to the LBPPTs have been heavily investigated, there is little information on the psychological responses, and how this compares to other exercise forms. Therefore, the purpose of the study was to investigate affect and self-efficacy after an acute, hard-intensity exercise session, and compare these responses among three modalities: cycling, LBPPT running and treadmill running. 10 active adults (average age = 30 years) completed a 30 minute exercise session at 85% of their maximum heart rate on each of these modalities in a random order: bike, LBPPT, and treadmill running. Before and after each session, affect and self-efficacy were determined using the Feeling scale, Arousal scale, Activation-Deactivation Adjective Checklist, and Generalized Self-efficacy survey. From baseline to post-exercise, there was a significant increase in feeling scale (2.4 ± 0.31 vs. 3.33 ± 0.29, $p=0.021$), felt arousal scale (3.23 ± 0.23 vs. 4.07 ± 0.31, $p=0.006$), and self-efficacy (31.83± 0.83 vs. 33.97± 1.16, $p= 0.013$) across all modalities. However, when comparing the modalities, there was no observed significant change in self-efficacy values from baseline to post-exercise ($p=0.708$). For affect, there was a significant increase in energetic arousal (25.9 ± 1.12 vs. 29.43 ± 1.36, $p= 0.023$) and a decrease in state anxiety (20.93± 1.73 vs. 17.37± 1.08, $p= 0.041$) from baseline to post-exercise across all modalities, however, this did not significantly differ. There were no other significant changes in affect observed. This research supported that self-efficacy, affect and anxiety improves following acute, hard intensity exercise sessions. However, these changes do not differ based on exercise modality. Psychological responses to acute exercise differs between runners and non-runners. Future research should investigate how these responses may differ between the two groups based on modality.

Perspectives on Youth Sport Concussion Legislation in the UK

Emily. E Klevan (Dr. Carolina Ketcham & Dr. Eric Hall) Department of Exercise Science

Perspectives on Youth Sport Concussion Legislation in the UK Emily L. Klevan (Drs. Caroline Ketcham, Eric Hall) Department of Exercise Science Concussions pose disproportionate health risks in youth athlete populations compared to adult athlete populations. Youth populations experience above average concussion susceptibility and lengthier recovery times. Youth athlete concussion safety is widely addressed in the United States (US) and Canada. Since 2018, the US and Canada have passed comprehensive youth sport concussion legislation (YSCL). However, youth concussion is unaddressed in United Kingdom (UK) legislation. Whether or not a youth sport concussion protocol is present during sport is determined by each individual youth sports league. While some sports leagues may recognize the necessity concussion protocol, others ignore it or are completely unaware of it as a whole. The purpose of this study was to investigate the perceptions surrounding YSCL in the UK. Coaches of youth athletes (n=3), parents of previously concussed youth athletes (n=3), and physiotherapists of youth athletes (n=3) were all individually interviewed on their perceptions. Participants were selected from the Bournemouth AFC academy in England. Interview questions were based off of topics such as, concussion knowledge, concussion protocol, return to learn, concussion legislation, and concussion challenges. Interviews were transcribed and analyzed for common themes. Notable differences were observed in concussion knowledge between populations. Physiotherapists were literate in concussions while parents exhibited the least concussion knowledge and coaches exhibited limited concussion knowledge. The youth sport concussion protocol concept of return to learn was widely unrecognized or misunderstood by all but one parent and two physios. Concussion protocol and proper management appeared to be largely satisfactory in football clubs, like AFC Bournemouth, but inadequate in grassroots (youth) leagues. All participants positively received the idea of YSCL in the UK. When asked about concussion related challenges, lack of concussion education and access to concussion education was most commonly reported. Many participants recognized that parents, coaches, and youth players were inadequately informed on proper concussion management. Participants identified potential solutions to this problem in the form of mandatory concussion modules, first aid courses, or preseason informational concussion presentations. These solutions should be considered when modeling comprehensive YSCL.

Brain Activity During Unilateral Physical and Imagined Isometric Contractions

Jonathan A. Martinez (Dr. Matthew Wittstein & Dr. Stephen Bailey) Department of Exercise Science

Past studies measuring brain activity within the prefrontal and sensorimotor cortices primarily recorded changes before and after an intervention is performed on one side of the body within one hemisphere (usually the contralateral) of the brain. For example, Ranganathan and colleagues in 2004 found brain activity to increase by 20% in the sensorimotor cortex after a twelve week long mental and physical finger training intervention. The purpose of this investigation was to observe the brain activity within the left and right hemispheres of the prefrontal and sensorimotor cortices during physical and imagined, dominant and non-dominant

unilateral sustained elbow flexion. Fifteen right hand dominant individuals (6 male and 9 female) with an average age of 19, performed four different isometric contractions of their biceps brachii at a preacher curl bench: dominant arm physical contraction (DomCon), non-dominant arm physical contraction (NonCon), dominant arm imagined contraction (DomImagine), and non-dominant arm imagined contraction (NonImagine). Each contraction was sustained for five seconds followed by thirty seconds of rest. Electric potential recordings and frequency bands displayed bilateral activation within the sensorimotor and prefrontal cortices across all tasks, the greatest being observed in the NonCon condition. Both motor activity-related cortical potential and frequency bands across all tasks elicited distinct peak projections at approximately 500 ms after stimulus. Further understanding of bilateral activity through unilateral tasks is valuable for improving rehabilitation practices through mental and physical exercise.

Effects of Unilateral Ankle Fatigue on a Virtual Reality Balance Assessment

Samantha L. Mastrocola (Dr. Matthew Wittstein) Department of Exercise Science

INTRODUCTION: Fatigue can cause a decline in postural control, which may increase the risk of lower limb injuries, particularly to the ankle. Thus, it is important to understand how fatigue influences balance. Virtual Reality (VR) is inexpensive, can be adapted to fit research or clinical needs, and its creative possibilities are limitless. Using VR to assess balance, it is possible to gain valuable information regarding both the practical application of VR while empirically testing how fatigue may impact postural control. Therefore, the purpose of this study was to investigate the relationship between fatigue and balance while in VR. METHODS: Thirteen healthy individuals (20.31±1.18 years) participated in this study. Participants' single leg balance was assessed on a force platform for 20-seconds on foam and firm surfaces in 3 different VR conditions: a blacked out environment, eyes open in a virtual surround, and eyes open in a virtual surround that is locked to the participant's head. Afterwards, participants completed either plantar/dorsiflexion or inversion/eversion repetitions using an isokinetic dynamometer (Biodex Medical Systems, Inc.) to fatigue only their dominant leg. Balance testing was repeated following the fatigue protocol. RESULTS: A repeated measures MANOVA was used to test the effect of fatigue type, session, VR condition, and surface on participants' sway area (SA), total path length (PL), estimated Equilibrium Index (eEI), and DFA α for both the anterior-posterior (AP) and medial-lateral (ML) directions. DFA α quantifies the randomness of sway patterns, while the other metrics quantify the overall amount of sway. Only main effects for session (p=0.011) and surface (p=0.001) were identified. Only DFA α ML was altered following fatigue, suggesting that side-to-side sway patterns were slightly more random following fatigue. As has been previously demonstrated, the foam surface increased amount of sway (SA increased, PL increased, eEI decreased), however DFA α AP increased but DFA α ML decreased. DISCUSSION: These results indicate balance may be subtly influenced by fatigue, though primarily in the underlying control mechanisms, as demonstrated by DFA α ML. Interestingly, the type of fatigue, plantar/dorsiflexion or inversion/eversion, did not seem to influence our outcomes.

Good Food, Good Mood: The Relationship Between Nutritional Habits and Mental Health in Student-Athletes

Emma M. McCabe (Dr. Caroline Ketcham & Dr. Eric Hall) Department of Exercise Science

Docosahexaenoic acid (DHA) is a long-chain omega-3 fatty acid (LCPUFA) that plays a large role in cognitive development and functioning, and makes up 97 percent of LCPUFAs in the brain. DHA can be found in high concentrations in a diet containing leafy green vegetables, walnuts and fish, and is shown to alleviate both symptoms of stress-related mental health disorders, like anxiety and depression, and improve cognitive measures such as learning and memory. Consumption of a high-fat diet (HFD) containing processed, high-fat or sugary foods is connected with higher instances of anxiety or depression and impaired cognition. Conversely, a low-fat diet (LFD) that is high in fruits and vegetables, legumes, and fish has been shown to demonstrate neuroprotective qualities. The Mediterranean diet has been studied and reported as one such LFD that ensures sufficient omega-3 intake. The goal of this study was to observe the dietary habits of student-athletes and relate them to symptomology on anxiety and depressive screeners. In this study, 331 Varsity, Club, and non-affiliated athletes between the ages of 18 and 25 (57% Female, 43% Male) completed a Qualtrics survey to measure eating habits (Dietary Screener Questionnaire, DSQ), and both depression (Patient Health Questionnaire-9, PHQ-9) and anxiety (Generalized Anxiety Disorder Scale-7, GAD-7) symptomology. Analysis of DSQ and depression/anxiety screeners revealed that foods typically categorized as high-fat (chocolate, candy, cookies/cake/pie/brownies, and ice cream/frozen desserts) were significantly correlated ($p < 0.05$) with higher depressive/anxiety scores. Foods consistent with a LFD (red meat, milk, non-fried potatoes, brown rice/cooked whole grains, vegetables) were correlated ($p < 0.05$) with lower symptomology scores. Sports drinks were also correlated ($p < 0.05$) with lower depression/anxiety scores. Therefore, consuming a LFD may provide an individual with greater amounts of DHA, and has the potential to benefit stress-related mental health symptomology and cognitive function of student-athletes.

Self-Perception Differences Between CrossFitters and Other Recreational Exercise Participants

Lauren E. Mihalek (Dr. Eric E. Hall) Department of Exercise Science

Improved mental health is an important benefit of physical activity participation. However, the benefits that might occur based on different modes of recreational exercise are not often examined. With CrossFit's increasing popularity, lack of mirrors, and performance-based approach to exercise, we believed its participants would exhibit unique mental health benefits compared to those of other exercise programs. Therefore, the purpose of the study was to compare physical activity levels and self-perceptions of CrossFit participants with participants of other exercise modes. 103 female participants with various exercise habits took an online survey that consisted of demographic questions and the following scales of physical activity, personality, and mental health: The Preference for and Tolerance of the Intensity of Exercise Questionnaire, Aerobics Center Longitudinal Study Physical Activity Questionnaire, Multidimensional Body-Self Relations Questionnaire, Satisfaction with Life Scale, Rosenberg

Self-Esteem, and the Physical Self-Efficacy Scale. Initial analyses showed that CrossFitters (n=11) scored significantly higher than those who participate in other modes of exercise (n=102) in total mets of physical activity, preference, tolerance, fitness orientation, health orientation, body area satisfaction, and self-esteem ($p<0.05$). Correlational analyses also revealed that total mets of physical activity performed was significantly correlated with intensity tolerance, perceived physical ability, appearance evaluation, fitness evaluation and orientation, health evaluation and orientation, and body area satisfaction ($p<0.05$).Therefore, those who performed more physical activity exhibited more positive self-perceptions and approach to exercise, regardless of the mode of exercise. In addition, those who participate in CrossFit are more likely to perform more exercise overall, be more satisfied with the size and appearance of their bodies, and have greater self-esteem when compared to participants of other exercise programs. They also demonstrate greater preference and tolerance of higher intensity exercise and are more oriented toward living a healthy and fit lifestyle than their alternate exercise counterparts.

Assessment of Pre-Season Body Composition, Meal Patterns, Food Choices and Preferences in NCAA Division 1 First-Year College Athletes

Jennifer Peluso (Dr. Svetlana Nepocatych, Dr. Shefali Christopher, & Dr. Srikant Vallabhajosula) Department of Exercise Science

Background: College athletes are under pressure to maintain a high level of performance. High contact (HCS), low-contact (LCS), and non-contact sports (NCS) require different, but specific body compositions to keep up with demands. Considering that eating patterns and food choices impact body composition, these dietary habits may differ between contact types in sport. Rationale: To assess pre-season body composition, eating patterns, food choices and preferences in Division I NCAA first-year college athletes. Methods: Athletes (n=92; men: n=57, percent body fat (BF%) 14.8 ± 8.4%, BMI 25.5 ± 5.5 kg/m2; women: n=36, BF% 26.7 ± 7.3%, BMI 22.3±2.7 kg/m2) from one HCS, three LCS, and two NCS. Meal Patterns (MPQ), Food Preferences (FPQ) and Food Choices Questionnaires (FCQ) were used to assess eating patterns, factors that influence food choices and preferences. Body composition was assessed using dual energy x-ray absorptiometry (DXA) for lean body mass (LBM), fat mass (FM) and BF%. A two-way ANOVA was used for analysis with significance accepted at $p <0.05$. Results: Significant body composition differences were observed between genders ($p<0.001$) and among sports ($p<0.001$). Evening snack (97.4%) and dinner (83.7%) were the most frequently eaten meals followed by lunch (67.4%) and breakfast (55.4%). Significant differences existed in preference for starches ($p=0.041$) and vegetables ($p = 0.015$), in which HCS had the highest preference for starches (4.30±0.54) while NCS had the highest preference for vegetables (4.13±0.66). Significant differences also existed in the importance of health ($p=0.036$), weight control ($p= 0.05$), and natural content ($p=0.037$), in which LCS placed the greatest importance on health (3.05±0.35) and weight control (2.55±0.73), while NCS placed the greatest importance on natural content (2.73±0.83) Conclusion: Meal patterns, food preferences, and food choices differ between HCS, LCS, and NCS. This demonstrates that athletes exhibit contrasting dietary norms within their sport in order to maintain a body composition to fit their roles.

The Effects of Fat Activism on Food Consumption in Danish Students

Jillian Torrente & Taylor Nichols (Dr. Eric Hall) Department of Exercise Science

BACKGROUND: Past research has found a link between obesity and higher mortality rates, as well as other chronic health conditions. Despite potential health impacts, in recent years, there has been an increase in the Fat Activism movement which promotes the acceptance of people with excess body weight while working to change the social stigmas of obesity. PURPOSE: The purpose of this study was to assess the quantity and selection of food (healthy or unhealthy) consumed by individuals after viewing a Fat Activism video promoting societal acceptance of overweight or obese individuals. METHODS: 16 Danish students between the ages of 18 and 20 participated in the study. Participants were assigned to either one of two groups and asked to watch one of the two TED talk videos. The control video was a TED talk about racial politics (RPT). The experimental video was a TED talk about Fat Activism (FAT). Following the video the participants were asked to complete a couple of surveys about the video. While completing the surveys, participants were invited to eat snacks provided on the table. Participant food choices were measured by counting the total number of healthy foods consumed (e.g., grapes, almonds), total number of unhealthy foods consumed (e.g., chocolate, gummies), and total overall food consumed by each participant. The food choices provided were designated as either healthy or unhealthy depending on levels of sugar and fat. RESULTS: The FAT participants ate more food overall ($p = .099$). T-tests for the overall healthy consumed and overall unhealthy consumed between these groups were not significant ($p = .119$; $p = .271$). From these results, it is unclear whether watching a Fat Activism video affects the category of food that people will eat. However, people who watched the Fat Activism video consumed more overall compared to the control group. CONCLUSIONS: This shows that Fat Activism may have an impact on over-indulgence by consuming more food. Since Fat Activism is a growing social movement, it is crucial to address the real health concerns associated with obesity so people can take steps towards minimizing their health risks.

The Effects of Caffeine Intake and Coffee Volume on Energy Intake, Appetite, Mood, and Cognitive Function in Female Habitual Caffeine Consumers

Vanessa A. Salama (Dr. Svetlana Nepocatych) Department of Exercise Science

Caffeine has several known benefits, including appetite suppression and increased energy metabolism. While several studies have compared the effect of coffee ingestion with differing caffeine doses, none have examined the volume of coffee consumed independent of caffeine dose. Thus, the purpose of this study was to investigate the effects of differing coffee volumes and caffeine doses on energy intake, appetite, mood, and cognitive function. In this study, 19 healthy female (age: 24 ± 8, BF%: 24.9 ± 5.1) habitual caffeine consumers (255 ± 122 mg/day) ingested coffee of different volumes and caffeine doses on four occasions (C1: 237 ml, 4 mg/kg; C2: 237 ml, 6mg/kg; C3: 473 ml, 4mg/kg; C4: 473 ml, 6mg/kg) in a single blind, randomized, crossover design. Participants completed a 0-100 visual analog scale of appetite profile at pre, 0, 30 and 60 minutes. Affective response and cognitive function were assessed using the Activation-Deactivation Adjective Checklist, Trail Making (TM) and Stroop tasks (ST) before

and after test drink. Blood glucose levels were measured at pre, 30 and 60 minutes. In addition, energy intake was recorded at an *ad libitum* breakfast at 60 minutes and over the subsequent 24-hours via self-reported data. A repeated measures ANOVA was used for analysis ($p<0.05$). A main effect of time (all $p<0.001$), but not condition effect was observed in all appetite measures. No significant condition effect was observed in blood glucose levels ($p=0.12$), energy intake at breakfast (C1: 440 ± 213; C2: 400 ± 158; C3: 440 ± 226; C4: 386 ± 138 calories, $p=0.43$) or over 24-hours ($p=0.28$). However, a significant interaction effect was observed in tiredness, calmness, energy and tension ($p=0.02$). In addition, a significant time ($p<0.001$) but not condition effect ($p>0.05$) was observed in TM, ST and state anxiety. Participants' time to complete cognitive tasks decreased and state anxiety increased over time. Coffee volume may not have an effect on appetite suppression and perceived hunger, however, may modulate affective responses.

Affective Responses to an Acute Bout of Moderate and High Intensity Resistance Exercise in Breast Cancer Survivors

Rod A. Salazar (Dr. Takudzwa A. Madzima & Dr. Eric E. Hall) Department of Exercise Science

Breast cancer is the most prevalent form of cancer in women. Despite improved survival rates, breast cancer survivors (BCS) struggle with many adverse side effects of treatment. In some cases, resistance exercise (RE) is discouraged for BCS due to negative affect concerns. Positive affect is defined as feelings associated with a pleasurable experience, whereas negative affect is associated with displeasure. Currently, little research has examined the influence of RE on affect in BCS. Thus, there is a need to identify the optimal RE intensity to elicit improved physiological outcomes yet still elicit feelings of pleasure. **PURPOSE:** The purpose of this study was to compare affective responses to an acute bout of RE prescribed at a moderate, high or self-selected intensity in BCS. **METHODS:** Following familiarization sessions, 6 female BCS (age: 56±5 years) were randomly assigned to exercise at 1) moderate intensity – 60% of 1-RM for 3 sets of 12 repetitions, 2) high intensity – 85% of 1-RM for 5 sets of 5 repetitions, or 3) a self-selected weight for 3 sets of 12 repetitions in a counterbalanced fashion. Affect was measured using the feeling scale (FS) and felt arousal scale (FAS) at baseline, after completion of each set of each exercise, 30-minutes post, and 60-minutes post session. **RESULTS:** There were no statistically significant differences in FS and FAS between RE intensities. Although not statistically significant, feelings of pleasure were higher 30 minutes after moderate-intensity (4.00±0.26) and high-intensity (4.00± 0.26) exercise when compared to the self-selected intensity (3.00±0.86) and remained elevated at 60 minutes. Across intensities, feelings of pleasure were significantly lower between shoulder press and all other exercises in the session ($p=0.013$). **CONCLUSIONS:** Our preliminary findings may suggest BCS experience similar affective responses to moderate and high intensity RE. This finding is positive as generally, greater RE intensities stimulate more positive physiological responses. Interestingly, more negative affect was experienced during the last exercise (shoulder press) of each session. This may indicate that regardless of exercise intensity, BCS experienced muscular fatigue during each session. Similarly, this is a positive finding as muscular fatigue is another key component for eliciting muscular adaptations.

The Behavioral Determinants of Metabolic Syndrome Risk Factor Development During the College Transition

Alexandra N. Smith (Dr. Simon Higgins) Department of Exercise Science

The metabolic syndrome (MetS) is a clustering of cardiometabolic risk factors that increase the risk of cardiovascular disease >2-fold. MetS prevalence increases throughout young adulthood and importantly, the emergence of individual risk factors greatly increases the risk of developing MetS later in life. Though the behavioral determinants of MetS in older populations are known, the early behavioral changes that contribute to MetS risk factor development throughout young adulthood are unclear. Thus, this study aims to identify specific lifestyle behavior changes occurring during the college transition that contribute to MetS risk factor development. Preliminary longitudinal data are available for 21 participants (68% female, 18.2 ± 0.3 y/o). MetS outcomes including blood pressure, waist circumference, high-density lipoprotein cholesterol (HDL), triglycerides, and fasting blood glucose were assessed at baseline. Additionally, self-report behavior change data on dietary habits, physical activity, sleep, stress, drug use, smoking, and alcohol consumption are available through the first semester of college. Though data collection is ongoing, baseline analyses reveal that 57.1% of males and 42.9% of females had at least one MetS risk factor before starting their first year of college, with hypertension and low HDL being the most common risk factor in males and females, respectively. Initial behavior change data indicate a decrease in perceived stress ($p=0.001$) and an increase in alcohol consumption ($p=0.005$) during the first semester of college. Additionally, a decrease in daily moderate-vigorous physical activity approached significance ($p=0.063$). Baseline correlations between MetS risk factors and lifestyle behaviors show a negative association between sleep duration and diastolic blood pressure ($r=-0.437$, $p=0.048$). Collectively, these data suggest that young adults may develop MetS risk factors prior to beginning college and that lifestyle behaviors may be correlated with such risk factors. Moreover, though stress levels appear to decrease, negative changes in lifestyle behaviors may suggest the need for early behavioral interventions on college campuses. Looking forward, continued data collection and the recruitment and testing of additional participants will inform primary prevention strategies for MetS risk development by determining the specific lifestyle behaviors putting college students at greatest risk for MetS.

Beta-hydroxybutyrate Ketone Salt Supplement Alters Energy Metabolism, Blood Glucose and Ketone Levels

Miranda Thompson (Dr. Svetlana Nepocatych) Department of Exercise Science

Achieving nutritional ketosis through the ketogenic diet has become prominent among health-conscious individuals; however, the ketogenic diet is noted as short term and unrealistic. Ketone supplements have been used as an alternative way to achieve elevated blood ketone levels. Ketone salts were found to produce acute nutritional ketosis (defined as having a blood ketone level of 0.5-3.0 Mmol/L), suppress appetite, lower plasma ghrelin levels and perceived hunger. This study was used to determine the acute effect of beta-hydroxybutyrate (BHB) ketone salt (KS) on appetite profile, energy metabolism, blood glucose and ketone levels and subsequent

energy intake. Twenty-two healthy females (age: 26 ± 7 y, Body fat %: 28 ± 8.2, Body Mass Index: 26 ± 8.6 kg/m2) were recruited to participate in a single-blind crossover study design. Participants were randomly assigned to consume either 0.25g/kg of KS or flavor matched placebo (PL). During each visit, participants completed an appetite profile survey using a visual analogue scale before supplement consumption, and at 0, 30, 60 and 90 minutes. Indirect calorimetry using ventilated hood technique was used to measure thermic effect of the supplement at 30-45 and 75-90 minutes. Blood glucose, ketone levels and affect were measured before, at 0, 45 and 90 minutes. Energy intake following an ad libitum breakfast was recorded. A repeated measure ANOVA was used for analysis with significance accepted at $p<0.05$. A significant supplement effect was observed for blood glucose (KS: 91±10, 83±10, 84±8, 82±8 mg/dL and PL: 91±8, 88±10, 89±8, 86±9 mg/dL, $p=0.04$) and ketone levels (KS: 0.3±0.2, 0.5±0.2, 0.4±0.2 Mmol/L and PL: 0.3±0.3, 0.2±0.2, 0.2±0.2 Mmol/L, $p < 0.001$) at pre, 0, 45 and 90 min, respectively. A significant difference over time ($p<0.001$) but not between supplements ($p>0.05$) was observed for appetite profile. Greater oxygen consumption was observed in KS ($p=0.007$) compared to PS ($p>0.05$). However, no significant difference in energy intake at breakfast ($p=0.94$) was observed between KS: 200±116 kcals and PL: 203±107 kcals. Ketone salt supplement caused modest elevation in blood ketone levels and reduced glucose, suggesting improved glycemic control, however, did not have an effect on perceived satiety or energy intake.

Finance

Breaking Through the Glass Ceiling: An Investigation into Women's Compensation and Qualifications in the C-Suite

Julia R. Goldstein (Dr. Kate Upton) Department of Finance

The study into women executives in the business environment is a topic that has garnered significant research and media interest in the last few years. This study investigates gender trends in the corporate executive suite (C-suite) of Fortune 500 companies between 1992-2018, and is split into two portions, quantitative and qualitative. By collecting data from the Execucomp database, three goals are accomplished for the quantitative portion. First, the percentage of women in leadership positions across the entire market is analyzed for significant trend changes. Second, the data is divided into 63 Standard Industry Classification (SIC) Codes, and the percentage of women leaders is examined in each industry to determine if it is significantly different from the mean of the entire sample (5.75%). Third, compensation gaps in each SIC Code are analyzed by comparing the average female compensation to the average male compensation across the different industries. The second portion of the study is qualitative in nature, and features data collected from Bloomberg vetted biographies. One female executive is randomly selected from each SIC Code in 2017, and matched by compensation and age in the year observed to two male executives in the same industry. Each executive's qualifications will be statistically coded and analyzed with hopes to determine if women executives are required to be more or less qualified to achieve the same compensation level as male executives. Characteristics observed include undergraduate, masters, and PhD level education and school reputation, certifications held, number of past positions, number of boards served on, number of memberships held, number of committees served on, and if the company presently has women

serving in the C-suite or on the Board of Directors. This study attempts to shed light on if and why there has been an increase of women executives in the C-suite, and to provide insight on how women can structure their career to have opportunities to achieve higher leadership positions and further change the business landscape.

The Relationship Between Trade Credit and Intangible Assets

Sarah Taylor Hartsema (Dr. Chris Harris) Department of Finance

Many companies use trade credit as a way to finance growth. Trade credit is when a supplier extends credit to a company, allowing them to receive the supplies or product now and pay for it in the future. Suppliers are willing to use trade credit because it allows them to increase sales and gain new customers. Previous research shows that trade credit is most affected by firms that sell differentiated goods and services, in particular businesses with traditional manufacturing processes (Gianetti, 2011; Falato, 2014). However, there has been a decline in the level of traditional manufacturing, as the economy shifts to more service-oriented businesses. Because of this shift, a growing area of interest is examining how intangible assets impact financial growth. Intangible assets are items that a company owns that aren't physical, such as goodwill, brand recognition, or a patent. These assets are important to service firms because they don't have as many tangible assets (that would normally be used for manufacturing processes). The purpose of this study is to first examine whether a firm's trade credit policy is influenced by the amount of intangible assets the firm has, and whether this relationship is influenced by the type of product sold. This study finds a correlation between intangible assets and trade credit, and firms will extend less trade credit if they have more intangible assets. For firms in industries that care more about trade credit, such as service firms, this relationship is even more pronounced. Another important aspect of this research is how trade credit policy is changed when firms are in financial distress. This research shows that firms that care about trade credit are those that are affected by financial constraint. This research was conducted using a fixed effect regression with panel data from Compustat and using STATA to generate results. This study is furthering research in the finance discipline by building on work that other scholars have accom
Municipal bonds have been thought of as risk-free investments that provide investors a tax-free safe haven for their money. However, in recent years this theory has cplished and showing how intangible assets and trade credit are related in ways that have not been shown previously.

Investigating Recovery Rates in Municipal Bond Default

Sam A. Loeffler (Dr. Kate Upton) Department of Finance

Municipal bonds have been thought of as risk-free investments that provide investors a tax-free safe haven for their money. However, in recent years this theory has come under scrutiny as more municipalities are defaulting on their outstanding debt. This project investigates the aftermath of municipal bankruptcies and uses this research to determine recovery rates and reveal recent structural breaks in municipalities repaying their debt, as well as its effect on the living conditions of the municipality. Quantitative analysis of important metrics such as unemployment rates and per capita income were analyzed to determine the impacts of default in

municipalities. Qualitative figures such as governance, standard of living and infrastructure were also employed to help determine the effects of bankruptcy. To accurately capture the evolution of municipal bankruptcies over time, analysis was conducted for both recent and historic cases of default, comparing statistics and policies used across incidents. Preliminary findings include a structural break in General Obligation bonds following the 2008 financial crisis, municipalities' portfolio exposure to asset markets, and an increasing number of cases of service insolvency with connection to rising pension liabilities. Further analyses are still in progress to determine final conclusions, however results of this research will include the ability to identify relevant information for city council members and citizens living in potential bankrupt or previously defaulted areas. These contributions will also provide key recovery rate information for investors in municipal debt.

Gender Diversity and its Impact on Financial Performance and Risk

Simran Puri (Dr. Kate Upton) Department of Finance

Companies in the United States have started to publicly display their high diversity rates to their shareholders and customers because they are aware of the beneficial impact that it has on their firm. Previous studies have indicated that gender diversity is positively related to a firm's profitability. This research will focus on gender diversity and the effects it may have on a firm's risk metrics and financial health. To measure financial health this study employ Return on Assets, Return on Equity, and Profit Margin. For risk metrics this research will utilize Beta and Standard Deviation to measure if the percentage of women employed at a firm affects risk taking within a firm. This study uses regression analysis to determine if there is significant correlation between the percentage of women employed at a firm and the aforementioned risk metrics and financial health variables. The study will explore all companies in the S&P 500, examining effects at the aggregate and then within various sectors. This research shows that the number of women in a firm has a positive correlation between financial health and a negative correlation between risk metrics.

A Study of the Impact of President Donald Trump's Company-Specific Tweets on Company Stock Performance

Charlie J. Trinco (Dr. Kate Upton) Department of Finance

This study investigates the impact of the President Donald Trump's ("the President," "President Trump") company-specific Twitter mentions ("tweets") on respective stock market performances. The impact of Presidential statements on the stock market is of interest and importance to those who invest money in the markets, which fuels the economy. As social media and knowledge-sharing platforms continue to increase in usage, the significance of what is posted by economic influencers is important to consider when investing. In June of 2017, White House press secretary Spicer announced that the tweets and other social media postings of the President are to be considered official statements of the President. This was affirmed by the Department of Justice's consideration of President Trump's tweets in the federal proceedings of a Freedom of Information Act lawsuit later in 2017. From his election as the 45th president of

the United States on November 8, 2016, through the midterm elections of November 6, 2018, President Trump's Twitter account, @realDonaldTrump, released 5,877 tweets. These tweets were used as the sample for this study. Each tweet was coded for company mentions and overall connotation extracted by researcher. Tweets with a company mention were extracted from the sample, and event windows of 30 days prior to the tweet and 1 day after the tweet were created for each tweet. Three data points were collected for each tweet's event window: returns of the S&P 500 stock index, returns of the respective stock mentioned in the tweet, and tweet connotation. Cumulative abnormal returns were calculated to measure the impact of the President's tweets on stock market performance. Preliminary results suggest that there is a positive correlation between the connotation of President Trump's tweets and the cumulative abnormal return of the stock. With an expansion of this research encompassing other presidencies and publications on other media platforms such as Facebook, a more comprehensive understanding of the impact of a president's public declarations on the stock market can result.

History & Geography

The Samuel H. Kress Collection: World War II, Old Masters & The American Tradition of Collecting

Alyssa Caffrey (Dr. Evan Gatti & Dr. Kirstin Ringelberg) Department of History & Geography

Samuel H. Kress left a lasting legacy. Over ninety galleries across the United States of America have Italian masterpieces thanks to the donations from the Kress Foundation. While the circumstances that impacted his collection, such as the disruption caused by World War II, are also seen in the collections of his contemporaries, there is an aspect to his story that differentiates his narrative from the norm. Through my research, I discovered his collecting practices aligned with those of Andrew W. Mellon. I argue that Kress and Mellon consciously used Italian art collections to align their public image with the historical Italian "merchant princes." Merchant princes, such as the Medici family, are positively remembered for their patronage of the arts during the Italian Renaissance. Kress and Mellon hoped to align themselves with these connections through collecting and donating Italian artwork to the public. Following the unethical practices of Gilded Age industrialists, who were particularly criticized for their ostentatious private art collections, later American businessmen like Kress and Mellon began using their art collections in a way that improved their public image. The scale, scope, and lasting effectiveness of these two collector's efforts can be seen in their donations of Italian works to the National Gallery. One of their most significant efforts, the Founding of the National Gallery in 1937 was called "a gift to the American people." The museum was meant to elevate the status of the nation on an international stage, to reaffirm the United States of America's place as a global power, and legitimize its wealthy upper class. Through significant donations to the Gallery, Kress and Mellon were fulfilling the wishes of a Founding Father, John Jay, who had hoped that "American museums would one day be the type of cultural monument that would rival the likes of the Louvre and other famous European art museums." The positive public reaction to the National Gallery and the active legacies of both the Kress and Mellon foundations in support of the arts are a testament to the success of their strategy.

Neighborhood Accessibility: Using GIS to Examine the Intersection of Geographic and Social Barriers to Accessing Healthy Amenities

Lindsay H. Carter (Dr. Ryan Kirk) Department of History & Geography

In the field of urban design, neighborhoods are often intentionally planned so that they offer a feeling of community, as well as accessibility to nearby amenities. Social barriers such as poverty, historical-cultural legacies, and language differences are known to impede accessibility, as are physical geographic barriers such as major roads, waterways, and railroad lines. This research evaluates the interactions of social and geographic barriers in hindering accessibility to amenities in Burlington, North Carolina, a mid-sized post-industrial town. The methodologies consisted of Geographic Information System (GIS) analysis of parcel and neighborhood data, geographic barriers, and locations of amenities such as libraries, public parks, places of entertainment, and supermarkets. A 400m (1300ft) buffer around each neighborhood was created to resemble a reasonable walking distance to an amenity. A ratio of the total length of four-lane roads, streams, and railroad lines within a neighborhood to the total neighborhood area was calculated to estimate the magnitude of geographic barriers. Another ratio of the sidewalk length to buffered neighborhood area was created to represent walkability to amenities. Parcel characteristics were used as a proxy for social barriers. Correlation analyses were conducted to look for relationships between geographic barriers, social barriers, and walkability. Newer neighborhoods are positively correlated with increased geographic barriers. No preliminary correlations were found between geographic and social barriers. Preliminary results indicate a positive correlation between sidewalk length and land values within neighborhoods. Neighborhoods with higher land values, greater walkability, and less barriers may in-turn isolate certain groups based on affordability. This study thus has implications for urban design and planning efforts, particularly for other post-industrial, small towns.

Race and Inequality in Elon's Early History

Rachel B. Feld (Dr. Charles Irons) Department of History & Geography

The University of Virginia created “Universities Studying Slavery” in 2014 as a way for colleges and universities to “address both historical and contemporary issues dealing with race and inequality in higher education” (University of Virginia, n.d. para. 1). Elon joined this consortium in 2018 after a call from President Connie Book to look closer into the University’s history. Coming to terms with the past involves giving an honest accounting of it, and this research on race and inequality in Elon’s early history represents an effort to bring new stories to the forefront. This research specifically investigates three instances in Elon’s history: first, the connection between Elon’s first President, William S. Long (1889-1894), and his brother Jacob, the founder of the Ku Klux Klan in Alamance County, and their shared commitment to militant white supremacy; second, the life of Andrew “Andy” Morgan, Elon’s black maintenance worker during segregation from 1926 – 1964, and finally, Joseph Taylor Stanley, the first black person to receive an honorary degree from Elon in 1971, Stanley was President of Franklinton Christian College, the “sister” school to Elon for African Americans in the Christian Connection (now UCC). Published histories of the university by Durward Stokes and George Troxler provided

some information on these three episodes, but the bulk of the information came from sources found in the University Archives. Specific materials consulted include yearbooks, bulletins, U.S. Census & Slave Schedules, alumni newsletters, and other materials. These materials provided essential context for understanding Elon's history. This research revealed that older attempts at recognizing and commemorating Elon's history were not successful in providing the whole story and certainly not from more than one perspective. Furthermore, in the past fifteen years, additional attempts have been made at sharing Elon's history which included a wide range of perspectives and interpretations but lacked the context necessary to truly recognize the complexities of the history. Based on this study of Elon's history this research calls for a program of restorative justice and a recognition of past wrongdoings through the publication of a university history and memory report and recommendations for the future.

Jewish Life under the Nazi Regime: Voices of the Time

Michael S. Gorman (Dr. Andrea Sinn) Department of History & Geography

World War II saw the domination of a largely unchallenged Nazi regime sweeping over Eastern Europe aiming for the elimination of European Jewry. Already during the prewar years, Jews in Germany witnessed a gradual, albeit historically rapid increase in antisemitic rhetoric within the country they called home. How does a minority group react when it suffers increasing government and public persecution through exclusionary rhetoric and violence? This question, asked again and again today as well as throughout history, inspired a semester-long research project that examined how Jews reacted to the increasingly violent antisemitic agenda set by Nazi Germany, an established totalitarian regime responsible for the deaths of 6 million Jews. To do justice to those persecuted, this research used oral testimonies and diaries of German Jews and precisely analyzed three specific events in pre-war Nazi Germany, namely the boycott on Jewish businesses on 1 April of 1933, the passing of the Nuremberg Laws on 15 September 1935, and Kristallnacht on 9 November of 1938. In utilizing these sources, this research is contributing to the integration of Jewish voices into Holocaust research, which have only since 1990 been given more consistent consideration. This research argues that German Jews, when confronted with increased violence towards Jews in the German public sphere, fueled by Nazi propaganda, rhetoric, and deliberate public events combined with the participation of the German public in antisemitic attacks, typically were forced to turn to their own Jewish communities, relying on themselves for support, while at the same time growing more and more desperate and questioning the future of Jewish life in Germany and for Jewish people as a whole. Moreover, the findings of this paper support claims by historians such as Steve Hochstadt that studying the history of the Holocaust requires a broader perspective on National Socialist policy and ideology, one that considers the perspectives of victims of Nazi persecution alongside other sources in order to fully understand how Adolf Hitler and his Nazi party from 1933-1939 prepared for the attempted total extermination of European Jews, which was systematically organized from 1941 onwards.

The Teaching of Slavery in Public Schools and the Resources Available to Educators

Sara I. Mason (Dr. James Bissett) Department of History & Geography

Historians recognize that America's troubling legacy of slavery and racism dates to its very origins, and that centuries of exploitation based on race have enduring consequences. This uncomfortable legacy makes it difficult to teach slavery in high school history classrooms, a difficulty compounded by the limitations of the content provided in pre-adopted textbooks and the supplemental materials included with those books. This study will begin by analyzing how the most widely adopted high school textbooks in America deal with slavery. The textbooks analyzed were collected from a list of college level textbooks for high school students provided by the American Textbook Council (American Textbook Council, 2018). We used both a rubric created by Tolerance.org and a personally created form which examines word usage, diversity, primary source usage, and overall content related to the topic to analyze and rank the level of sophistication of textbooks' treatment of slavery. The study will also survey teachers in two different states to determine which textbooks and supplemental resources they use and how much freedom they have in choosing those resources. I will conduct this survey of history or social studies teachers in public high schools through my connections with the School of Education at Elon. Preliminary results show that the American history textbooks analyzed have a low amount of content related to the topic of slavery. In analyzing the textbooks, it is also clear that first person language such as enslaved person is used infrequently compared to the word slave. At the end of the study, the results of our analysis of textbooks and supplemental resources will be shared with educators in the systems. The importance of this study is to help teachers assess the effectiveness of the resources they currently use and offer insight into additional resources that address slavery in a more mature way.

Gender and the Flâneurial Gaze: Identifying the Flâneuse Among Working Class Women

Devon Rosenberger (Dr. Kirstin Ringelberg) Department of History & Geography

The concept of the flâneur in nineteenth-century France traditionally describes an upper-class man who wanders the streets of the city while observing modernity. The idea of a female-identified flâneur, or flâneuse, has often been dismissed because of the limitations placed on women's abilities to occupy specific public spaces and the fact that they were believed to lack agency in their gaze sufficient enough to hold dominance over the modernity they would observe. However, I argue that, if having the intention to do so, women were able to hold a reciprocal gaze defined by leisure, agency, and observation. Using feminist theories of the gaze and gendered spheres of influence, alongside close readings of nineteenth-century French paintings, such as Henri Toulouse Lautrec's (1864-1901) *Jean Avril Leaving the Moulin Rouge* (1893) and Edgar Degas' (1834-1917) *Place de La Concorde* (1875), I argue that these limitations were not as rigid as many believe. As women were not accepted in many of the same spaces as men, they would only be able to hold this gaze within the spheres where they were accepted, and, as public leisure was not possible for most women, many would have to hide their leisurely mind-set by masquerading under a different purpose, such as work. Therefore, working women were more able to achieve an observational gaze than middle- and upper-class women, especially as they were relatively anonymous in the streets, which allowed them to embody the flâneuse.

Soaring to New Heights: First American Females in Aviation

Grace A. Stewart (Dr. Rod Clare) Department of History & Geography

Many people know that the Wright Brothers were the first successful pilots in 1903 and Amelia Earhart was the first woman to fly solo across the Atlantic Ocean in 1928. There is a tendency to associate the beginning of women's involvement in aviation with Earhart, but did you know that a woman taught Amelia to fly? Her name was Neta Snook and by the time Earhart started taking lessons in 1921, American women had already been in the air for 13 years. Likewise, the Wright Brothers would have never been airborne if their sister, Katharine, did not help finance their innovation. This study fills the gap of knowledge of early aviation's female engagement between the first successful flight and when Earhart first sat in the cockpit. It answers the questions of "who were the female pioneers of aviation and what were their experiences?" A major conclusion of this study is that there was a generation of women active from the inception of aviation. The methodology of this research employed examining books on early American aviation and women in aviation for secondary sources and visiting Duke's Rubenstein Special Collections Library to uncover primary sources like photographs, pamphlets, and newspapers. More-so, this research delves into the conditions for which these women emerged. At the turn of the 20th century, females integrated themselves into numerous male dominated arenas during the New Woman Movement. This movement sought to overcome immense obstacles across the board for women's equal rights in social, political and cultural avenues. One of the under researched areas of the New Woman Movement is women in aviation. Wanting to assert their freedom on the ground and in the air, daring women fought for the right for flight. Whether they were passengers, spectators, engineers, financiers, authors and readers of aviation literature, or the first-hand pilots themselves, women made critical contributions to the emergence and evolution of American aviation. While these women tend to have a somewhat forgotten legacy and lack household recognition like Amelia Earhart, these are the women that inspired, taught, and paved the way for aviatrixes like her.

A Pawn, a Queen, & a Wedding Ring: The Shifting Spheres of the Victorian Queen

Elizabeth K. Weber (Dr. Michael Carignan) Department of History & Geography

Recent scholarship on Queen Victoria has examined and attempted to assess the influence of her gender on her career, dissecting the significance of a woman in a public role during a time of conservative values for women. Drawing upon conceptions of Victorian women in public roles, contemporary scholarship on Queen Victoria intertwines with separate sphere ideology and other ideals for Victorian women to construct modern interpretations of Queen Victoria's influence on Victorian womanhood. Yet, this scholarship could expand its focus to reflect recent trends in the broader field of Victorian gender studies and women's history. As a wife, a mother, and a monarch, the many roles of Queen Victoria challenge and assert the dominating ideals for Victorian women. Queen Victoria's life is a rare juxtaposition of her public role to the conservative ideals for women during her reign. Hence, this research centers on the question of how Queen Victoria adhered to and defied the ideals of Victorian womanhood and separate spheres during the critical moments of her life. Utilizing primary source documents, from Queen

Victoria's correspondence to her intimate diaries, and secondary sources regarding Victorian gender ideals and the life of Queen Victoria, this study explores gender norms in relation to Queen Victoria. Beyond engaging scholarly and primary sources this research applies Victorian ideologies about gender, such as the belief in separate public and private (domestic) spheres to measure the relevance of contemporary gender standards to the life of Queen Victoria. Using pivotal moments of Victoria's life, such as her ascension to the throne, her career as Queen before her marriage and her marriage to Prince Albert, this scholarship reveals a female monarch who moved between the public and private spheres of society at various points in her life. Initial findings convey that Queen Victoria began conforming to gender standards from the onset of her career and that this thread can be traced through later moments, but in various ways Victoria still refused to fully settle in the domestic sphere, frequently employing political suasion and the authority of her position to solidify her legitimacy as a female monarch.

Human Service Studies

A Critical Analysis of "Push-Pull" Factors Influencing Human Trafficking: Towards an Integrated, Multidimensional Conceptual Model to Inform Interventions

Haley Cole (Dr. Carmen Monico) Department of Human Service Studies

The trafficking of humans is a global crisis that manifests in multiple forms. It can be in the form of forced labor, sex trafficking, or debt bondage. Human trafficking is a unique problem because humans are an untraceable product that can be reused and forced into silence, unlike weapons and drug. In North Carolina, there are no verified data on the number of sex trafficking victims, and no clear answer to what the root of the sex trafficking problem is. What is clear, is the need for education on sex trafficking, effective victim identification, and funding towards anti-trafficking efforts. This study will focus on "push" factors (those enabling the supply side) and "pull" factors (those driving the demand) for sex trafficking in North Carolina. This project aims to look at the multiple factors contributing to sex trafficking in North Carolina to ultimately propose the most comprehensive intervention strategy. The research questions focus on: the scope of the problem, available anti-trafficking organizations, gaps in services provided, and best practices from which to learn. Individual informant interviews of approximately 60 minutes were conducted over the phone or in person using an interview guide with prompts related to the research questions. Thirteen providers were interviewed including law enforcement, legal advocates, and providers of social and therapeutic services. The interviews were conducted between May 2019 and February 2020. Data was analyzed and themes were inferred. Data was then linked to pre-identified categories based on interview questions. Additional literature review was conducted on the existing best practices within the U.S. to carry out a comparative analysis with NC. Preliminary findings show that there are a wide range of victim services, however, there are gaps in organizations coordinating their efforts. There are also discrepancies in funding and comprehensive training for providers, both of which are limited resources. Although NC has made substantial advancements in its legal framework, it can benefit from best practises in other states to improve its internal coordination and practice service framework.

Assessing the Impact of NGO Educational Programs on the Social-Emotional Development of Students in Schools

Grace F. Crowley (Dr. Bud Warner) Department of Human Service Studies

This research examines how programs going into schools address the social-emotional development (SED) of students. If the programs do, how do they structure and fund their programs? This study focused on two of the largest educational non-profits that place individuals into classrooms- one that places its educators in as the teacher (Program A) and one that puts its members in to supplement the classroom work and support the teacher (Program B). A snowball sampling approach was used to identify participants at different levels of each program. Each participant was interviewed with carefully selected questions. DEDOOSE software was used to synthesize data from the interviews and draw conclusions about if and how each program teaches SED and how each program is structured and funded to ensure positive social-emotional growth. Results indicated that Program B was structured more effectively to teach SED to the students it serves. While educators and individuals in upper-management in both programs stated that they were not extensively trained on how to foster the SED of their students, Program A had much less emphasis on fostering SED in the training. With Program A, members need to prepare to be in charge of the classroom so their training emphasis is on the academics. Its funding is also earned based on the positive academic outcomes in their classrooms. Members from both Program A and B said that an emphasis was placed on relationship building and creating a positive classroom environment. Individuals from both programs acknowledged that they do not have enough funding to accomplish everything they would want to. This is an important question for the contribution to the education field, as the findings compared the structure of Program A and B, finding that Program B is a better fit to foster SED. The findings also revealed a lack of funding to support a goal of incorporating SED into the classroom, but how Program B funds to attempt to target that goal.

Hospital to School: Transitions for Children with Special Healthcare Needs

Maggie F. Davis (Dr. Bud Warner) Department of Human Service Studies

This research evaluates inpatient care educational programs for children with special health care needs, and both hospitals' and schools' capacity to effectively support these students as they transition back into "typical" school settings. This project assesses the current inpatient and outpatient personnel's effectiveness in supporting children during their transition. Further, this research seeks to understand methods that could improve such programs. Twenty, semi-structured interviews with healthcare professionals, school nurses, teachers, social workers, and therapists were conducted to evaluate the effectiveness. The program Dedoose was used to pull out common themes in the interviewee's contributions. The research highlights the negative impact of low school attendance on children who are medically fragile. Findings indicate that a common home-hospital liaison or the use of a centralized database could create fluent and effective communication between all parties. Without a cohesive device for communication, the intellectual and physical health needs of the student may be unsupported, and risk significant negative impacts on the child's educational progress. The research aims to create positive change

in the disability, education and healthcare communities by emphasizing the individuals' voices who are impacted by these disparate systems.

Girl Toys Versus Boy Toys: Do You Stereotype Children?

Rachel E. Dzik (Dr. Judy Esposito) Department of Human Service Studies

The goal of my study was to look at the effects that gender stereotypes have on children in the way they learn to play. In previous research involving children's play, it has been argued that parents could be the main source of creating social environments prone to teaching gender stereotypes (Wood, Desmarais, & Gugula, 2002). According to one study about children's play by Lobel and Menashri (1993), it was found that children learn gendered labels about the toys they play with from their parents and peers to create schemas that influence their choice of toy as well as a reasoning behind it. In my study, I wanted to measure college students' ideas about gender and if they were being taught to children as they played together. The experiment included 2 trials, one with a male college student and one with a female college student. Each of the students played with a child under the age of 1, one child was male and one child was female. The child participants were dressed in clothing opposite of the gender assigned to them, and then placed in a structured play environment with the college student. The college students were given a pre and post survey to measure several variables, those being their opinions about gender in school settings, work settings, and home environments. The play sessions measured the influence that gender had on the college students' behaviors towards the child participant. Preliminary results showed that there was little to no relationship between the college students' ideals about gender and the child participants' way of dress during the experiment. Further analyses are in progress and will be continued at a later date. Results of this study will provide evidence of the importance of the effect that gender stereotypes have on the development of children and the way they play in their environment.

Exploring the Effects of Parental Incarceration for Non-Violent Offenses on Their Families

La'Shaundranique Marshall (Dr. Bud Warner) Department of Human Service Studies

The essential question addressed in this research study is: What are the impacts of parental incarceration for a non-violent offense(s) on a family's relations, economic opportunities and social wellbeing during and after the period of incarceration. Beyond analyzing the impacts of non-violent parental incarceration on families, the purpose of the research is to connect the impacts of parental incarceration for non-violent offenses to larger aspects of the justice system, such as sentencing or alleviation for families with incarcerated parents. This pilot study consisted of seven ex-offenders who participate in a local social service program and an employee of that same program. Ex-offender participants were audio recorded and asked a series of fifteen questions pertaining to the impacts of incarceration on them and their families. The employee participant was asked a series of questions pertaining to what impacts of incarceration they have seen on non-violent ex-offenders and their families. The qualitative data was then analyzed for positive and negative familial, social, and economic impacts prior to and after incarceration. The data collected indicates that men ex-offenders reported more negative financial circumstances

during incarceration, and men and women ex-offenders reported similar rates of negative financial circumstances after incarceration. Many of the male ex-offender participants reported being the "breadwinner" of their families prior to incarceration so their inability to have employment during incarceration and after incarceration impacted their financial situations negatively. Women ex-offenders reported less positive familial relationships and support during and after incarceration, many of the participants credited this to having children taken from the mother. And men and women ex-offender participants reported similar rates of social, mental and emotional struggles after incarceration. This research found that families are mostly negatively impacted by the consequences of convictions and incarceration of parental non-violent offenders; most of the negative impacts reported came after incarceration. Participants recommended post-incarceration support in housing, mental health resources and employment opportunities.

Conditions in U.S. Immigrant Detention Centers: The Impact of Family Separation and Apprehension on the Well-being of Unaccompanied Children and Families from Central America

Jovani Mendez-Sandoval (Dr. Carmen Monico) Department of Human Service Studies

Since the beginning of the Trump administration, an increasing number of young immigrants have been held in detention for extended periods; in the case of children, for more than twenty days as legally permitted (Monico, Rotabi & Lee 2019; Monico, Rotabi, Lee & Vissing 2019; Monico & Mendez-Sandoval 2019). Limited research examining the child safety and family-child separation in detention centers has been conducted. Detention centers are broadly defined to include the U.S. Immigration and Customs Enforcement (ICE), U.S. Customs and Border Protection (CBP), and government-funded and privately-run facilities (for-profit companies), as well as government-contracted nonprofit agencies holding children and their families while their legal cases are pending. This study analyzes the role that detention centers where immigrant children are being held and separated from their families have on their overall well-being. The purpose of the study is to identify salient coping mechanisms that young immigrants engage in response to the stressors and trauma generated by being in detention. Besides describing, based on the literature review, the detention centers' conditions and the services provided to these immigrants, the study will collect data through in-depth interviews with service providers and migrants 18 years old or older, to understand how they are affected by family separation. The first interviews are being conducted this spring, so preliminary results will be presented at SURF. The data collected will be analyzed using the software Dedoose. The results will identify solutions, services or mechanisms that could help lower the trauma and stressors that young immigrants experience while being held in detention.

International & Global Studies

Human Trafficking for Sexual Exploitation in Europe: Socioeconomic Drivers of Supply and Demand

Amanda Kehler Bryant (Dr. Joel T. Shelton) International & Global Studies Program

The complexity of human trafficking for sexual exploitation is reflected in the regional character of trafficking patterns. Regional dynamics are particularly evident in Europe, where over the past decades Eastern European countries have predominantly acted as suppliers of trafficked persons whose final destinations tend to be located in the countries of Western Europe. As this problem has grown, so have the efforts of governmental organizations to combat it. However, these efforts primarily focus on assisting trafficked persons after the fact, whether that is in rehabilitating victims or prosecuting traffickers. This research uses regression analyses to identify the significance of various socioeconomic factors that influence both the supply and demand for trafficked women in Europe. This study develops qualitative indicators of potentially significant factors utilizing the existing literature with the purpose of identifying areas where governmental and non-governmental organizations can focus their actions to combat the problem before the trafficking occurs. From this literature 10 origin country indicators and 10 destination country indicators are identified and included in separate regression models to determine their level of significance on human trafficking for sexual exploitation per capita in each European country. The results of this research indicate that economic issues should be a point of focus for governmental organizations in origin countries and social issues should be a larger focus in destination countries to combat human trafficking for sexual exploitation before it occurs.

#MeToo?:An Analysis of NGO Framing of Sexual Assault and Its Implications for Our Understanding of the Issue, a Case Study in Oxfam Involvement in Haiti

Taylor S. Deacon (Dr. Joel T. Shelton) International & Global Studies Program
In light of the 2018 sexual misconduct allegations against Oxfam in relation to their relief efforts following the 2010 earthquake in Haiti, various explanations of the scandal have been presented by Oxfam, the British media, and independent investigators. Through analysis of Oxfam's publicly available reports, independent investigations, media coverage, and other relevant publications, this research will seek to better understand the ways in which non-governmental organizations discuss and frame issues of sexual assault, and will also explore the connection between these discourses and relations of power. Using discourse and content analysis, this mixed method study will explore these documents and assess the language, context, and gaps present, in order to draw conclusions about the way that the allegations were framed. Drawing from theories of organization, accountability, and power this study reveals the way in which a variety of factors including race, gender, and socioeconomic status are represented in prevailing accounts of sexual abuse. By examining the uneven power dynamic and hierarchical structure present in Oxfam, I can conclude that women, specifically lower income brown and black women more susceptible to abuse in emergency situations, and are made more vulnerable by the way the situation is presented. This study suggests that the predominant reports of the Oxfam

allegations have failed to address the intersectional nature of the vulnerability and the role played by power in compounding the issue.

Mobilizing Memories: Women's Affective and Embodied Memory Work in Post-Conflict Societies

Taylor E. Garner (Dr. Sandy Marshall) International & Global Studies Program

This research analyzes the diverse ways in which women transmit intergenerational memories of past political violence in Argentina and Palestine through material and affective practices. Through semi-structured, ethnographic interviews, this paper highlights women's memories of the dictatorship in Argentina and the occupation in Palestine, and the ways that women mobilize memories of the past to critique the present and enact change in the future. Women's memories are particularly informative because not only are women victims of political violence, but their stories often challenge the dominant masculinist/nationalist narratives of political struggle. Efforts to rebuild and reconcile after past violence often focuses on physical reconstruction such as monuments and memorials as well as consolidating an official, national narrative. However, this research sheds light on the embodied, affective, and material practices reproduced in mundane spaces and in what ways women's memories constitute a type of counter-memory. The investigation of women's intergenerational memories in Argentina and Palestine demonstrates the multilayered construction of memories and examines the ways in which women reproduce, resist, and transform collective memories of violence. My research reveals that women's memories in Argentina mobilize public forms of commemoration, but Palestinian memory is restricted to private spaces through oral storytelling and physical embodiments of trauma. In addition, the younger generation in Argentina perpetuates active forms of peaceful resistance to obtain contemporary rights, while young women in Palestine show less inclination to remain mobilized and a greater effort to move on. A commonality between the two societies emphasizes the importance of education in moving towards a more peaceful future. By putting the experiences of Argentine and Palestinian women in conversation with each other, this research illuminates how women's struggle to achieve justice or recognition within the context of violence and conflict is related to their struggle for justice and recognition more broadly.

Negotiating Belonging in Place: Refugee Families and Youth Experiences of Resettlement

Nicole Plante (Dr. Sandy Marshall) International & Global Studies Program

Despite the prevalence of refugees in the news and a surge in research on forced displacements and refugees in general, there is a relative lack of specific research on intersections of their resettlement experiences, belonging, and wellbeing that moves past the mental health view of wellbeing, narrowly defined as acculturative stress. This study aims towards more nuanced understandings of belonging and wellbeing. It examines how newly resettled refugees negotiate belonging in particular places and on multiple scales, from community centers and schools to a broader national sense of belonging. The focus on familiality and space exhibits how refugees create belonging as a family unit and as individuals within a family as well as how space and place play a role in belonging. Specifically, this research seeks to address how current US

rhetoric and policy affect the way refugees create a sense of belonging; how refugee parents and youth differ in their approach to creating a sense of belonging; and how those differences affect relational family dynamics. To do so, this research draws on data from participant observation, interviews, and focus groups carried out with primarily African refugee youth and adults and key-stakeholders in the refugee community in Greensboro, North Carolina. These methods highlight how refugees actively create belonging and home post resettlement in multiple spaces and on multiple scales within the family unit. This research has implications for researchers and practitioners as it provides insight from refugees on what hinders and helps them as they create belonging after resettlement and addresses how familiality, space, and place impact their experiences.

Journalism

Internet Leaders and Innovators Discuss Enhancing Global Cooperation and Human Rights in the Digital Age

Samantha Casamento (Dr. David Bockino) Department of Journalism

What will bring people together for better cooperation on digital issues – what mechanisms might be employed? And should the UN Declaration of Human Rights be updated to include digital rights? One hundred forty-eight video interviews were conducted with top technologists and innovators representing 55 nation-states, at the United Nations-facilitated Global Internet Governance Forum in Paris, France, November 12-14, 2018. The interviewees included senior business development manager of Microsoft United Kingdom, ambassador and Director of International Affairs at OFCOM Switzerland, president and CEO of the Internet Society Canada and other highly qualified technologists and innovators. An eight-student research team from Elon University recorded several hours of focused responses to the research question over a three-day span at the event. The interviews were posted as part of the Imagining the Internet Center's documentary coverage of the Internet's ongoing evolution. This research presents responses from people representing a broad range of geographic, social, political, and economic backgrounds to a voluntary survey in a convenience sample gathered in meeting rooms and hallways of IGF 2018 at the UNESCO headquarters in Paris, France. Results reveal stakeholders' common concerns about how to best deal with global cooperation by working together to ensure the internet is a collaborative place and conflicting opinions as to whether or not digital rights should be considered a human right.

Negotiating Islamophobia: The Experiences of College-Age Muslims in North Carolina

Marjorie Anne Foster (Dr. Amy L Allocco & Dr. Glenn Scott) Department of Journalism

Drawing on extended ethnographic research, my project analyzes the experiences of college-age Muslims in North Carolina and examines how they negotiate their religious identities in the face of stigmatization, Islamophobia, and political and social turmoil. Whereas much recent academic literature takes 9/11 as its point of departure and isolates pre- and post-9/11 Muslim identities (e.g., Ahmed 2015, Ali 2018, Al-Khatahtbeh 2017, Bayoumi 2009), most of the 45 students I

interviewed were born in or after 2001 and have no direct experiences of pre-9/11 realities. I argue that the identities of the current generation of college students are definitively shaped by the policies and general Islamophobia that reflect broader anti-Muslim rhetoric, mass shootings and attacks targeting Muslims, and the Trump presidency. The narratives collected during my community-based fieldwork in 2018-19 reveal that although Muslim college students labor under the multiple burdens of explaining and representing their religion, negotiating perceived disapproval and mischaracterizations of their faith and practices, and navigating their minority identities in majority college cultures, they also report increasingly tangible expressions of solidarity from non-Muslims that provide needed respite from the prevailing Islamophobic climate. I present an overview of the way Islam has been perceived in the United States in both eras before describing the current climate for Muslims. Using my interview data, I examine the impacts of Islamophobia on Muslim college students' evolving identities and experiences as minorities on campuses, and their struggles to find community. Finally, their narratives also describe the supports extended to them in recent years.

Islamophobia in the US Airline Industry

Sonya A. Walker (Dr. Ariela Marcus-Sells & Prof. Colin Donohue) Department of Journalism

Over the course of seven months I conducted over 25 interviews with Muslims and Sikhs about their experiences in airports, and with pilots and other airline personnel – a population whom previous literature on Islamophobia in the United States has not addressed. Both the personal perspectives revealed in this presentation and recent news reports surrounding racial profiling of Muslims – and people mistakenly identified as Muslims – illustrate the ongoing impact of Islamophobia in the United States. Moreover, by including testimony by pilots and airline personnel, this research highlights how airports and airplanes serve as a vehicle for Americans, including pilots, travelers, and those who consume media to perpetuate stereotypes and monger fear about Muslims. My project connects the themes that emerge from these interviews to the academic literature on Orientalism and Islamophobia in the United States (Said 1978). I argue that airports, specifically, are a location in which gendered narratives about the Muslim 'Other' not only persist, but are justified under the guise of national security. This project is immediately relevant to the current American moment in that Islamophobia has been increasing since the 2016 election and Islamophobic rhetoric is perpetuated by the President of the United States, notably resulting in the controversial and high-profile travel bans from several Muslim-majority countries put in place by an executive order.

Management & Entrepreneurship

Production Decisions for Multi-firms Considering Consumer Preference in the Car Industry

Rebecca M. Ellrich (Dr. Xin Liu) Department of Management & Entrepreneurship

Vertical integration strategies have been adapted by firms all over the world as they have realized the importance of consumer preferences. As a result, the car companies have started to

provide different models of similar products to satisfy different demands. In this study, an optimization model is developed in order to determine the production priorities of models as well as the production quantities of multiple companies. By utilizing the variational inequality theory, the optimization model for luxury car companies is formulated to be a problem of variational inequality. Therefore, it is assumed that the profit of each company needs to be maximized, which can be solved by the development of an Euler algorithm. Further, this paper also introduces a series of case studies that focus on the luxury car branch. Here three German luxury car manufacturers are compared on the levels of their competitive models. The goal of the case studies is to show which models each company should shift their focus toward in order to gain the most amount of profit. The demand and prices of the models from 2018 are used to maximizing each company's profit as well as estimating the total costs needed to produce vehicles. This case study is based upon multiple issues like the indication that car companies tend to sell higher-class and therewith, more expensive models. Additionally, the great competition between the manufacturers on their lower priced vehicles is so intense that it benefits the customers but leads to a significantly lower profit on the company side. Therefore, another objective of this paper is to overview car companies and try to provide managerial support from the perspective of the industry.

Cross Promotion Strategy in an Entrepreneurial Community

Ethan M. Kaufmann (Dr. Elena Kennedy) Department of Management & Entrepreneurship

Cross promotion is the practice of collaboration between organizations to enhance the organization's products, services, or brand perception. This has become an adopted business approach to generate more sales and expand marketing efforts in an inexpensive way. The purpose of this research is to understand how cross promotion is leveraged within entrepreneurial communities to support individual businesses. Specifically, organizations within these communities are cross-promoting other organizations on social media to simultaneously support the community and increase their own brand awareness. We utilized a dataset of 1000 Facebook posts from 26 organizations within an emerging entrepreneurial community to examine the cross promotional strategies of individual organizations within the community. Using content analysis, we identified specific patterns within these organizations' posts and discovered the dominant strategies of cross promotion in an entrepreneurial community appear to be the improving brand perception, driving traffic, and transmitting community and event information. We found that some organizations had a dominant posting strategy, while others blended a wider mix of these strategies.

Optimal Production Decisions for Smartphone Firms Considering Consumer Preference

Steven Mei (Dr. Xin Liu) Department of Management & Entrepreneurship

Smartphone firms already account for phone model preferences with the release of new smartphone models and thus firms continue to sell phone models from previous generations to satisfy heterogeneous consumer demands. Besides consumer preferences, smartphone firms making competitive production decisions need to consider competitors' production and

marketing strategies. This study aims to develop an optimization model of smartphone supply chain consisting of oligopolistic firms competing non-cooperatively to determine which generations of smartphone models to produce as well as the production priorities for each generation of each competitor. Due to the complexity of the problem, we plan to employ the variational inequality (VI) theory to reach the equilibrium decision through an Euler method. Although VI theory is widely used for supply chain competition problems, our study tries to contribute to the literature by examining the effect of diversified consumer preferences on smartphone firms' optimal production priorities. The case study will analyze smartphone production data for Apple and Samsung by inputting the data into the proposed optimization model. We expect to find results that contribute to smartphone firms' production decisions and possibly generalize our model to other industries, which sell generational products with short production cycles. To test the robustness of the expected results, we will compare our results with Apple and Samsung global smartphone model shipments and market share data in Q1 2018.

Antecedents and Contextual Influences of Continued Job Search and Reneging Behavior

Alina Prengel (Dr. Brian Lyons) Department of Management & Entrepreneurship

Several surveys between 2017 and 2019 have reported an increase in applicants reneging on their job offer – that is, turning down the offer after accepting it (NACE, 2019; Ri5, 2017; Robert Half, 2019). Specifically, more than a quarter of survey participants had reneged on a job offer, and even 70 percent of participants felt it was acceptable to do so (Ri5, 2017; Robert Half, 2019). This unfavorable trend had led to delayed projects, additional hiring costs, and other unwanted expenses. Various media outlets have offered recommendations on how to reduce the number of reneged offers (Pensado, 2017; Sullivan, 2015); however, no one yet investigated the possibility of personality testing. Therefore, this study analyzes how certain personality traits might be related to continued job search behavior and reneging behavior. Based on social identity theory (Ashforth & Mael, 1989), this study proposes a model that can be used to evaluate the likelihood that an applicant keeps looking for other jobs and reneges on a job offer. Drawing on negative trait research (Harvey & Harris, 2010; Reynolds & Ceranic, 2007), this study focuses on narcissism, entitlement, and internalization of moral identity, using social adjustment concern as a moderator of the relationship between these three predictors and continued job search and reneging behavior. Narcissism describes an inflated self-view with a strong desire for power and esteem (Campbell, Hoffman, Campbell, & Marchisio, 2011). Entitlement refers to a pervasive sense of deservingness regardless actual performance levels (Harvey & Harris, 2010). Internalization describes a person's self-image of being a moral person and concern for social adjustment relates to one's desire to be perceived impressive by others. Data from 312 employed participants were collected from Amazon's MTurk platform. About 21 percent of participants had continued their job search after accepting an offer and about 15 percent had reneged on a job offer. Initial analyses have shown weak, but consistent correlations between the traits measured and continued job search and reneging behavior. Further analyses and hypotheses testing are in progress. Results of this project will indicate whether there is a significant influence of narcissism, entitlement, and internalization of moral identity on continued job search and reneging behavior.

Examining Factors that Influence Entrepreneurship across the 50 U.S. States

Carsten Raum (Dr. Mark Mallon) Department of Management & Entrepreneurship

There is an emerging consensus that entrepreneurship is a regional event (Acs et al., 2008; Bosma & Sternberg 2014), meaning that entrepreneurial activities are not distributed evenly between places. It has also been shown that regions that can attract entrepreneurship can be expected to benefit from it through the creation of jobs, growth in productivity, and the production and commercialization of high-quality innovations (van Praag & Versloot, 2007). While a variety of studies have investigated factors that lead to increased entrepreneurship at the national level, there has been a very limited number of studies that explore this topic at a sub-national level (i.e., different regions within a country). Therefore, this study examines governance factors that influence the quantity and quality of entrepreneurship at the U.S. state level, with a focus on regulatory policy, fiscal policy, and personal freedom. Fiscal policy is represented by the tax burdens a state imposes, while regulatory policy focuses on the labor market freedom a state provides. The concept of personal freedom is represented by the latitude of actions available to individuals in a given state. A regression using data across the years 2005 - 2016 shows that fiscal policy focusing on lower tax burdens and more personal freedom positively affect entrepreneurship, whereas regulatory policy focusing on labor market freedom has a negative effect. The results of this study give state policymakers clear guidelines on what to implement in order to foster successful entrepreneurs.

Looking at Entrepreneurial Success: The Role of Higher Education and Gender

Kathryn E. Robbins (Dr. Elena Kennedy) Department of Management & Entrepreneurship

Research on entrepreneurship, specifically within the context of gender, is still in its nascent stages. Much of the extant research examines the effect of the feminine stereotypes and its constraints on female entrepreneurs. It is commonly known in this field that there are wide discrepancies, impacted by social dominance theory and gender congruency theory, that polarize the resources provided to both genders. In an effort to determine how to negate the opportunity gap, this research examines how the top 10 US undergraduate entrepreneurship education programs identified by US News and World Reports prepare and lead their students to enter into entrepreneurship. By interviewing 20 successful alumni and/or undergraduate students of these programs, and cross-analyzing their experiences with their school's annual reports, the qualitative research indicates that university curriculum can make specific efforts to offset the gender imbalance by providing female students with resources to succeed in a male-dominated industry.

Marketing & International Business

Social Media Influencers' Authenticity and Their Impact on Consumer Perception

Cecile J. Ferreira (Dr. Lawrence Garber) Department of Marketing & International Business

This research focuses on the impact that social media influencers have on consumer perceptions and behavior depending upon how famous they are. In between subjects design, the social media influence of an influencer's leisure travel website will be manipulated at two levels, large and small, represented to experimental participants on otherwise identical websites by the number of posts, the number of people they follow. However, the number of followers shown will be different depending on the survey the respondents are given. It is hypothesized that smaller websites have a greater influence on consumers than larger websites, because they are perceived to be more authentic. Roughly 200 participants are to be solicited online from the Elon community, and asked to complete a Qualtrics survey in which they are exposed to the travel website. They will be asked to rate it on a number of leisure travel attributes, as well as rate the sponsoring social media influencer on a number of personal qualities attributes indicating the influencers efficacy as a social media influencer. Theoretical and managerial implications regarding the various attributes in the survey will be able to help us discover whether the respondents feel some type of similarity with the Influencer and if they would be susceptible to see more of their content.

Stressed and Relaxed Behavior and the Impact on Purchase Intentions Through Menu Labeling

Rani E. Hecht (Dr. Prachi Gala) Department of Marketing & International Business

According to the American Psychological Association (APA), chronic stress is becoming a public health crisis. We define stress as a state of emotional strain resulting from demanding circumstances. A characteristic of stress is that it can lead people to perceive that they currently lack control over their environment. Since one constant in everyone's daily life is food, it becomes important to know how daily stress can play a role in the choices made for food. Despite the time and money that has been put in to implement new rules and regulations, there is little research uncovering how beneficial these changes may be with the new constant of stress. In order to fill this gap, we will answer the question: to what extent does the consumer's level of stress influence their purchase intentions when food images and menu labeling are present? To answer this question, we will conduct an experiment using MTurk that will study the differences in consumer decision-making for food choices under stressed versus relaxed conditions. One group of participants will be "stressed" using a five-question timed logical test while a second group of participants will be "relaxed" using a nature-guided therapy technique. After measurement to confirm their stress levels, participants will examine menus with either food images or caloric labeling and then answer a series of questions about their purchase intentions. We expect that in the presence of both images and calories, an individual under stress is more likely to make unhealthy food choices, because of the overwhelming level of information. Completing this research will not only demonstrate how great of an impact stress has on our lives, but it will also allow managers to understand stressed consumers and cater to these new needs.

Mathematics & Statistics

Approval Voting in Fixed-Length Circular Societies

Megan C. Bargstedt (Dr. Kristen Mazur) Department of Mathematics & Statistics

Approval voting is a single winner voting system that allows voters to select any number of candidates of which they approve. For example, a committee can use approval voting to select the best time of year to hold an annual conference. Mathematically, we can model the calendar year as a circle so that voters can select times that span both December and January. The time period that each voter selects is called an approval set and we require that each approval set consists of a single arc on the circle. Because we view the calendar year as a circle, we call this mathematical model a circular society. In this project, we analyze circular societies in which each voter has an approval set of pre-determined length. For example, when voting on the best time of year to hold an annual conference, committee members may be asked to only select one week out of the year that they feel is appropriate. In this project, we develop a lower bound on the maximum number of people who agree on a single candidate in such a society. Additionally, we develop an upper bound on the size of the smallest set of candidates needed so that every voter approves of at least one of the candidates in the set.

Analysis of Scoring in Women's and Men's College Basketball

Luc Boswell, Rebekah Choi, Timothy Felten, Oddesciey Rone, & Phil Vo (Dr. Ryne VanKrevelen) Department of Mathematics & Statistics

This research attempts to predict points scored by women's and men's college basketball teams by looking at variables like defensive rebounds, two-point field goals attempted, and three-point field goals attempted, among other variables to analyze how many points each of these contributes. We compared the data of women's and men's basketball from the years 2016-2019. However, the data for men's basketball was missing for the 2017-2018 season. From this data, we are able to predict using multiple linear regression how many points each variable contributes to gaining or losing points. To evaluate the data collected from the NCAA website, we used R statistical software to generate models that show the significance of each variable. Next, variables were eliminated that would allow for 'double counting' until we were able to finalize our equation. Our results revealed that the model worked well for predicting scores for teams that had shooting percentages in the middle fifty percent of the data. For teams that had shooting percentages in the higher or lower extremes, the model tends to under and overestimate scoring, respectively. The model also revealed that for both teams, three-point attempts held more weight in scoring than two-point attempts and that defensive rebounds and free-throw attempts were the next most valuable. Our models and their predictions could prove useful for coaches, players, fans, sports analysts, and others interested in college basketball.
* This research was conducted by students at Williams High School.

Predicting Goal Differential in NCAA Division I Soccer

Ty Cryan, Lizbeth Guaman, Kassidy Liggins, Kenzie Talhelm, & Max Van Fleet (Dr. Ryne VanKrevelen) Department of Mathematics & Statistics

This research attempts to predict the goal differential (goals scored minus goals against) for men's and women's NCAA Division I soccer teams based on seven seasons of recent data. We compared our models for both men's and women's soccer teams in NCAA Division I and used multiple seasons as more seasons would be more informative. The ability to predict the goal differential of a soccer team would mainly be useful to coaches as they could use the information to help them win more games. The model may also be useful to players, fans, and those who have alternative interests. We used a multiple linear regression model, which allows us to include many variables that may relate to the goal differential. The purpose of the research is to create a model that incorporates variables over which teams might have control. For example, a goal must be scored for an assist to be recorded, so assists would not provide any additional insights into our model. Once the models were created, each composed of 'significant' variables, we were able to compare the models and predicted goal differentials across the men's and women's games. A major finding was that the red and yellow cards are much more significant in the women's game, and that women's soccer had a larger spread in goal differential than men's soccer. The coefficient of determination was greater for women's soccer than men's, which means that our model for women's soccer better explains the variability in goal differential.
* This research was conducted by students at Williams High School.

Visualizing the British Economy and Its Major Industries

Petra Castedo (Dr. Ryne Vankrevelen) Department of Mathematics & Statistics

The United Kingdom has the fifth largest economy, as measured by GDP, in the world. Following the recent votes in favor of Brexit, a no-deal decision could lead to a recession in the British economy but could also affect the global economy. A no-deal decision means the UK will face tariffs, regulator checks and new border checks for exports and imports. I use statistical visualization to analyze the UK economy over the past several decades in order to have a better understanding of how Brexit has impacted the value of the pound, trade among countries and different industries. To approach this question, I looked at the United Kingdom's exports, imports and largest commodities to other countries, and I also evaluated changes in the British pound. Initial results demonstrate that after Brexit, the amount of exports from the UK increased. Additionally, surrounding key Brexit events, there was a clear change in the value of the pound. I compare these changes to other historical events and find that the historical changes were not as profound as other events.

Comparing the Difficulty of Different Hockey Leagues Across the World

Madeline Gall & Katerina Wu (Dr. Ryne Vankrevelen) Department of Mathematics & Statistics

Comparing hockey players from around the world and assessing how they may perform when transitioning to another hockey league is a complicated problem. Due to the different playing styles and opponent difficulty, there is not one consistent metric to make comparable evaluations of player performance for all hockey leagues. In this project, we introduce a new method for comparing and predicting player performance across leagues using an adjusted z-score metric. This metric controls for factors such as age, league, season, and position that affect a player's P/PG (points per game) metric, and could be applied to any league of interest. Specifically, we standardize the distribution of log(P/GP) within each age-league-season-position group. A players' adjusted log(P/PG) z-score represents where they fall along this standard normal distribution. The dataset contains over 300,000 observations collected from EliteProspects.com, with each initial player-season-league observation containing name, birthday, season, league, position, goals, assists, and games played. First, a dataset was generated of over a million pairwise comparisons of the performances of each player across multiple leagues using the adjusted z-scores calculated for each observation. We then modeled the difference in player performance across seasons conditional on the leagues in which they played, testing different regression methods including logistic regression, OLS regression, and Bradley-Terry Models. The coefficients from the models create a ranking of leagues determined by their strength. It was found that the NHL was unsurprisingly the strongest league throughout the past decade. Other leagues such as the KHL and AHL were also always relatively strong, while newer minor leagues like the OJHL were weaker leagues. These strength coefficients could also be used for scouting purposes, including the ability to gauge a player's performance in any other given league by predicting their z-scores. By using all comparisons from all the leagues to estimate league strength rather than using only league-to-NHL and/or NHL-to-league transitions, we incorporate a greater amount of information for a more accurate estimation of league strength. There are still limitations to the z-scores, but our method provides a more comprehensive framework for estimating league strength than prior approaches.

When Is a Polynomial Isomorphic to an Even Polynomial?

Hanna Noelle Griesbach (Dr. Chad Awtrey & Dr. Jim Beuerle) Department of Mathematics & Statistics

Among the most useful data points associated with polynomials are their roots, which are inputs that produce an output equal to zero. For certain polynomials, we can express the roots symbolically; that is, via nested radicals. But in other cases, we cannot. The mathematical subject known as Galois Theory is motivated by the question of determining which polynomials have roots that can be expressed symbolically. In special cases, like even polynomials where all nonzero terms involve the variable raised to an even exponent, there are efficient ways to make this determination. Our research explores the related question of when a polynomial can be transformed into an even polynomial in such a way so as not to alter the symbolic expression (or lack thereof) of its roots. Such a transformation process produces what we call an isomorphic polynomial, and it has the potential to lead to more efficient computations in Galois Theory. Our main tool is the study of symmetries of polynomial roots. Even polynomials possess a symmetry which amounts to reflecting its graph across the y-axis; i.e., the roots are switched in pairs. In

general, we show how to determine when a polynomial possesses a symmetry that switches roots in pairs, including those nontrivial cases when there is no vertical axis of reflection.

Modeling March Madness Picks

Simon-Peter N. Nyamoko-Agata (Dr. Ryne VanKrevelen) Department of Mathematics & Statistics

Millions of college basketball fans across America participate in the March Madness Bracket Challenge each year. People utilize different strategies, ranging from simple tactics to complex computational strategies. Due to the overwhelming number of possible outcomes, no one has been able to create a perfect bracket; meaning predicting the correct winner of all 68 games of the tournament. This research examines how people choose which teams they predict will advance in the tournament. To do this we collected a variety of data, first and most important being the percentage of people who picked each team to win in each of the six rounds, also known as the statistical distribution of picks. In addition, we included traditional ranking information, advanced team performance data, and previous NCAA Tournament success. This project models the percentage of people who will pick a team to advance to the following round. Specifically, we produced a model for each of the six rounds that reflects the odds ratio of a team being picked to advance. This study produced 6 regression models that select the statistically significant variables for predicting the probability of one team being chosen over another to advance in that particular round, also known as an odds ratio. Via this method, we found that seed and previous tournament wins were significant predictors of the odds ratio for all six rounds and rank was significant for the first three rounds only.

A Sensitivity Analysis on a Mathematical Model of Dengue Fever Focusing on How Different Parameters Affect the Basic Reproduction Number

Hannah L. Parker (Dr. Karen A. Yokley) Department of Mathematics & Statistics

Dengue fever is a major public health threat that is transmitted by day-biting mosquitos in tropical climates. Because the mosquitoes that carry the disease bite during the day, intervention methods, like the bed nets used to protect people from malaria, are ineffective. Understanding how the disease spreads is integral in prevention. We can use a previously developed system of ordinary differential equations to model how dengue fever spreads between neighboring communities (Reagan, 2019). This model describes the rates of changes of susceptible, infected, and recovered populations for humans and the susceptible and infected populations of mosquitoes. This model is based upon two models, a dengue fever model that describes transmission and a malaria model that accounts for movement. We use this combined model to calculate the number of secondary infections that arise from a single infection, which is called the basic reproduction number. The basic reproduction number can serve as a threshold of the virus' progression. Our study focuses on how varying the time parameters among three neighboring communities in Sri Lanka will affect the basic reproduction number. The time parameter, which is the amount of time during a day that people from one patch spend in another, is an important factor in the spread of dengue because of the patterns of travel between

communities for school or work in Sri Lanka. We systematically vary the time parameters to model 180 scenarios and further investigate cases that produced significant reproduction numbers. The simulation results indicate that as people spend more time in areas with higher populations than their community of origin, the reproduction number increases. The results of this study combined with further analyses can help identify intervention methods, including regional or community-specific strategies to combat the disease.

Comparison of Parametric, Nonparametric, and Semi-Nonparametric Survival Analysis Methods with Right-Censored Data

Abigail E. Phillips (Dr. Kirsten Doehler) Department of Mathematics & Statistics

Survival functions are used in a number of industries to predict the time until an event of interest, such as how long a person survives after being diagnosed with a terminal illness. Fields that heavily utilize survival functions include public health, engineering, clinical trials, biology, and business industries. Survival times can be censored if the exact time to the event of interest is unknown. This could occur if a participant unexpectedly drops out of a study before the event of interest occurs or dies from a different cause than the one being investigated. We examined parametric, nonparametric, and semi-nonparametric (SNP) survival function estimation methods to compare the efficiency of the estimators under different conditions. The Kaplan-Meier estimator, a common nonparametric estimator, and numerous parametric estimators are all available in popular statistical software programs. However, this is not the case with SNP estimators, which could explain why they are not used as frequently. Previous research suggests that the SNP estimator may have efficiency gains over the other estimators. Another advantage of the SNP estimator is that unlike the popular Kaplan-Meier estimator, it can accommodate numerous types of censoring in the data. We are running computer simulations in R software using data from different distributions (exponential, log-normal, and Weibull) and varying amounts of right-censored data to compare the efficiencies among the three survival function estimators.

How Good are 538's Prediction Models?

Daniel P. Ryan & Michael C. Golaski (Dr. Mark Weaver) Department of Mathematics & Statistics

In September 2016, The New York Times gave five expert pollsters identical raw polling data collected from Florida (Cohn, 2016). The result: five unique estimations of the current state of the race, with a net five-point difference between the estimates. Using exactly the same data, four experts gave Hillary Clinton the advantage, while one estimated that Donald Trump was ahead. This experiment highlighted the variability in different methodologies for turning raw polling data into estimations, and leads to questions regarding the reliability of political polls. The statistical challenges in polling due to sampling coupled with the historical uncertainty in elections makes accurately predicting elections extremely challenging. On the eve of the 2016 presidential election, the website FiveThirtyEight.com gave Clinton a 71% chance of winning the election (FiveThirtyEight, 2019, November 8). When Trump won the following day, it

appeared that the FiveThirtyEight prediction had been wrong. However, their prediction implied that if 100 elections were held, Trump would win 29 times, so not all that unusual of an event, and not exactly "wrong." But this interpretation requires us to assume that FiveThirtyEight's predictions reflect actual probabilities; that is, events predicted to happen x% of the time would actually happen about x% of the time. This desired concurrence between models and reality is called "calibration." The goal of our research was to assess how well-calibrated FiveThirtyEight's prediction models have been in recent presidential elections. Using data available through FiveThirtyEight.com for approximately 45,000 predictions made for the 2008, 2012, and 2016 presidential elections, we generated calibration plots to compare predicted probabilities versus the actual outcomes. Our results suggest that FiveThirtyEight's Presidential prediction models were not as well-calibrated as they have claimed (Boice and Wezerek, 2019); in reality FiveThirtyEight's predictions for events that were likely to happen underestimated what actually occurred. For example, events that they predicted would happen about 70% of the time (like the 2016 election) have actually occurred about 80% of the time. Thus, although their models have generally been remarkably accurate for picking winners and losers, our results suggest that their model-generated probabilities should be interpreted with more nuance.

Documenting the Effects of a Revised Curriculum in a Prospective Teacher Mathematics Content Course

Lexi B. Uknis (Dr. Aaron Trocki) Department of Mathematics & Statistics

In recent years, the mathematics content course for middle and high school prospective teachers at Elon University has been primarily guided by the same two textbooks, Mathematics for Secondary School Teachers (Bremigan, 2011) and Mathematics for High School Teachers, an Advanced Perspective (Usiskin, 2003). These textbooks tend to be overly complicated and not adequately aligned with the content knowledge expected from mathematics teachers. Further, these books are geared primarily towards high school content despite being used for both middle and high school prospective teachers. The student researcher and mentor developed a course curriculum to better meet the learning goals for prospective teachers. The revised curriculum includes the use of practice praxis exam questions in weekly problem sets and small group activities that aligned with specific Common Core State Standards and the North Carolina Standard Course of Study. The main objective of this curriculum was to simultaneously accommodate the learning demands of both middle and high school prospective teachers. To address the effectiveness of the revised curriculum, we gathered data from prospective teachers at Elon University taking MTH 308, Mathematics for Middle Grades and Secondary Teachers. Prospective teachers provided both qualitative and quantitative feedback through weekly journals and pre-course and post-course exams. It was hypothesized that students would respond favorably to the use of this revised curriculum and demonstrate significant learning gains on the pre-course and post-course assessments. Preliminary results reveal that further revisions to the revised curriculum are necessary. Future analysis will continue to take into account the revised curriculum's current areas for improvement and provide the groundwork for an enhanced version of the curriculum. The results of this research will change the way in which prospective math teachers at Elon are prepared for the classroom and may assist others concerned with the preparation of prospective mathematics teachers.

Music

A Strategy for Improving Choral Expression through an Understanding of Schema

Olivia M. Haley (Dr. Cora S. Palfy) Department of Music

Memorable moments in music evoke emotional responses. Moments of expressivity should be performed to elicit emotion in the audience. While expressivity appears effortless for professional musicians, it can be hard for novice performers to convey the emotional intricacies of a piece. High school choir directors have two challenges to address with students: 1) they must pinpoint moments of expression and 2) find ways to communicate these to students in effort to explain why sections should be expressed a certain way. I propose a methodology for high school choir educators to determine stylistic schema and analyze expressive moments that break stylistic patterns. Leonard Meyer (1956) believed that "musical meaning is, in short, a product of expectation" (p. 35). When composers modify stylistic patterns in their pieces, the musical expectations associated with the patterns are broken. These stylistic patterns are referred to as "schema" (Gjerdingen, 2007; Margulis, 2007). The unexpected nature of stylistic changes triggers an emotional response in listeners familiar with the style. I call breaks in schema "expressive high points," as they draw attention. Educators, therefore, can identify schema within a composer's style, or with works of a similar style. In doing so, they can identify expressive moments. I demonstrate this methodology through Eric Whitacre's choral works. I compared "A Boy and a Girl", "Sleep", and "Lux Aurumque." All are similar in mood and appropriate for an advanced high school ensemble. I determine specific compositional schema within the three pieces, which reveal schemata that characterize Whitacre's style. I then analyze for breaks in the patterns throughout the pieces. I consider the pieces' formal structure, if the breaks across the features fall in similar areas, or if these breaks are audible in a recording of the piece. I then organize my findings into a cleanly constructed chart with specific moments of expressivity, including where they are located, how to treat them, and a summary of the general schemata to be used when teaching. My methodology is an effective way of analyzing music to pinpoint expressive moments. While my work is intended for choral directors, the results can be used in any genre to facilitate a student's understanding of expressivity in their repertoire.

What's New Copycat? : Examining Originality in Pop Music "Sister Hits" Through Formal Schemata and Pop Production Techniques

Taylor A. Stephens (Dr. Cora S. Palfy) Department of Music

The relationship between formal schemata and production techniques has yet to be analyzed; current research in the field examines each separately. Gaps in knowledge can be filled through production analysis of pop songs which use what I term identical "formal schemata." Schemata are defined as "mental representation[s] or categor[ies]," developed by humans based on "sensations and experiences" (Gjerdingen, 2007). In music, these categories can develop from conventional melodic or chordal patterns. For example, ABBA's "Dancing Queen", uses a syncopated ascending melody from G-sharp to A during three lines within the song's chorus (ABBA, 0:29 – 0:40). An identical musical schema is also found in the chorus of Shania Twain's

"C'est La Vie" (Twain, 0:50 - 1:11). Hence, the melodic motion of the seventh scale degree to the first scale degree in both songs combined with a specific rhythm allows listeners to develop a schema from the two songs. While schemata are clearly defined, terminology for songs sharing identical schemata are not classified in current research. My research expands the concept of schema by proposing the term "formal schemata," defined as melodic and harmonic schemata presented in the same structural section of songs (i.e. both schemata found in chorus, verse, etc.). The present research classifies songs containing identical formal schemata as "sister hits". For example, Katy Perry's "Never Really Over" and DAGNY's "Love You Like That" are sister hits because both use the same one-note melody and descending background vocal line of each song's chorus (Perry, 0:57 - 1:07; DAGNY, 1:47 - 1:57). I will analyze three "sister hits" containing identical formal schemata. Songs under consideration are produced and released between 2009-2019, with each "sister hit" pair having significant music industry recognition evidenced by high consumer consumption volume, Billboard Chart information, and YouTube video views. I will discuss the musical structure of each sister hit as well as their pop production. Recording effects, musical arrangement, and timbre will be evaluated to determine how production qualities within selected songs create contrast from identified formal schemata. Through these analyses, we can more broadly discuss originality and its purpose in popular music composition and production.

Performing Arts

The Evolution of Social Theatre: How Contextualization Influences Audience Perception of Shakespeare's Text

Stacey E. Cohn (Prof. Jack Smith) Department of Performing Arts

The works of William Shakespeare have withstood the test of time and are currently taught in most high schools nationwide. The Common Core State Standards for English Language Arts & Literacy (adopted by 41 states) refer to Shakespeare's works as "timeless dramas," but how "universal" and "timeless" are his plays really? If the plays are cast against tradition to include actors of different genders, races, religions, and abilities than the characters intended in the text, would we learn that Shakespeare's themes are only applicable to a certain type of person in a certain place and time? The question Cohn will be examining in this paper is how the non-traditional casting of Shakespeare influences audience perception. The method through which Cohn gathered her data was a revue of classical text being delivered by actors who identify as members of different identity categories. Through multiple performances, surveys, and full audience discussions in a night of theatre titled "Shakespeare in the Dark," Cohn attempted to gauge how connected an audience feels to the story when a scene is cast traditionally for modern American sensibilities and when it is not. Over the course of two nights, Cohn received about 150 survey responses from the six performances of two Shakespeare scenes. The survey intended to study the degree of connection audience members felt to the actors and the performance during the production. It also measured audience understanding of Shakespeare's themes and how it changed with each performance. Cohn has examined the effects of non-traditional casting based on the results of the research to determine the statement a director might be making by casting diverse actors as Shakespeare's characters. The purpose of the research was to determine

whether or not casting a Shakespeare character non-traditionally would be to the detriment of the show in terms of audience response or monetary loss. Cohn hopes that this research might support the idea that the Shakespeare performances a contemporary audience wishes to see is one that reflects the diverse cultural landscape that makes up America.

More: A Solo Choreography and Performance Research Project

Sarah N. DeSordi (Prof. Renay Aumiller) Department of Performing Arts

This study focuses on refining the individual creative process of solo choreography for performance. The exploration of creative scholarship presents the integration of both movement translation and audio visualization as a means of relaying notions of humanism through choreography. The initial phase of this work was developed in the Fall of 2018 for the completion of a course-long project in Choreography I, where the exploration and translation of everyday human movements observed from my daily endeavors were embodied and shaped into choreography for a blackbox theater. I then investigated the process of translating excerpts of an Alan Watts speech into set choreography. The variance in words, phrases, inflection, and timing throughout the audio stood as additional aspects of inspiration for movement creation. During the second phase of creative research in the Fall of 2019, I considered the preparation of the work for a public audience, the effects of particular theater arrangements, lighting and costuming to enhance the perception of the work. The third stage of this project, which took place this Spring of 2020, explored how to translate the creative research thus far onto different bodies in preparation for a more formal presentation of the work before a more educated and influential panel. The outcome of this research is a self-reflection and assessment of the choreography developed for future creations.

CNC Scenery: New Methods of Creating Theatrical Scenery Using Advances in Production Technology

Avery H. Hunt (Prof. Natalie Hart) Department of Performing Arts

The standard construction of typical theatrical “stock” scenery has remained the same for decades. This research explores the possibilities for change and growth presented by the introduction of new technology: specifically, a CNC (computer numerical control) router. In the last decade, CNC routers have become increasingly common in theatrical scenic construction shops, but shops typically use their CNCs for production elements that would be exceptionally difficult to cut by hand. In order to discover and codify techniques for CNC router usage, this research created a theoretical scenic design for *The Mousetrap* by Agatha Christie and then analyzed the design and created technical drawings for key scenic elements that could be cut using only a CNC router. These drawings were tested by cutting and assembling sample pieces, and the drawings modified following these tests. The final drawings and results were compiled in a series of design briefs, as is consistent with industry standards. These briefs document techniques to create easily modifiable classic pieces of stock scenery including platforms, flats, and stairs, all designed to be cut with a CNC and easily constructed. In the manufacturing industry, increased computerization is moving skilled labor off the shop floor and into the office.

This research investigates how that move could play out in theatrical scenic shops over the next few decades.

Health and Wellness Policies in the American Theatre Industry

Cecilia Nelson (Prof. David McGraw) Department of Performing Arts

The theatre industry is unique and unorthodox in the way it operates. This occurs as the demands and format of the industry are irregular. This however, leads to many unsatisfactory working conditions that can lead to physical damage, mental health issues and a toxic work environment. This research explores the different ways there has been unhealthy working conditions and see how they are being addressed and where there is room for improvement. Working conditions that result in an unsatisfactory work life includes things like: sexism in the workplace, lack of a work life balance, and an unsafe working environment. One way these issues can be addressed by providing individuals with resources to help them through various conflicts. Alternatively, activating policies in the theatre would also be a possible solution. The methods for finding resources and other data included referencing articles and journals online as well as contacting several theatres for information. Out of 28 theatres contacted we were able to complete this small survey with 6 organizations. They were given a brief survey which included questions like what type of policies they had in place in their organization, how can individuals report information and what went into creating these documents and policies. The main findings of this research was while the companies who were open about sharing their workplace wellness had many policies on these matters many of them were not willing to share, perhaps underlying a deeper issue in the industry.

The Relationship between Regional/Community Theatre and Theatre Education

Katie Paris (Dr. Scott Proudfit) Department of Performing Arts

This study seeks to understand the relationship between regional/community theatre and theatre education in North Carolina. Currently, most regional and community theatres have educational programming designed to help students of all ages engage with theatre and get involved in the art. Through interviews with theatre practitioners from seven different regional and community theatres, this project explores the impact and growth of this programming and how it affects students. The theatres who participated in the interviews were of a variety of sizes and locations, from large professional theatres in major cities to smaller community theatres in more rural areas. Textual analysis of the interviews revealed several trends in current theatre education, including the implementation of summer camps, engagement with teaching artists, student matinees, and study guides which connect theatre to curriculum. The project concludes that there is a mutually beneficial relationship between theatre education in schools and educational programming in regional/community theatres, demonstrating successful strategies for engaging more young people with the art and creating a new generation of theatre practitioners and audience members.

Freak or Star: Behind the Radical Counter-Culture of Victorian Performance and Circus

Daniel J. Skinner (Prof. Fredrick J. Rubeck) Department of Performing Arts

In Victorian London, the circus was able to cultivate a performance environment that was unlike any other in both its acceptance and its potential exploitation of outsider communities. How does this knowledge impact the production of plays about this era told from the perspective of the in-group? Though narrowly focused, my research broadly examines how we should approach plays of the past that made a cultural impact at the time of their premiere but now prompt concerns about representation as our understanding of diversity deepens. I was able to immerse myself in these topics at the source in London during the Fall of 2018, allowing me to expand my understanding of the Victorian period and the circus environment. I realized Bernard Pomerance's renowned play *The Elephant Man* provided a unique vehicle to explore these topics. I applied my research to develop design and directorial concepts for a production of *The Elephant Man*, which I directed and which was performed at Elon University in November 2019. Such concepts included non-traditional casting, an emphasis on the circus as a design aesthetic, and an original circus skills pre-show that pointedly outlined micro and macroaggressions against minority groups. Although choosing one conclusive answer would be reductive to the nuances of the era, I found the circus was able to societally balance the profitability of stereotyping outgroups with the progressive results of employing and empowering individuals from these very groups. Members of these minority groups were able to financially support themselves and meritocratically climb the social ladder as far as their "otherness" would allow, and they often inspired progressive campaigning and legislation. However, activist groups and patriarchal systems were ultimately successful in dismantling the circus in the name of these outgroups, too. This financially hampered the income of all performing artists but simultaneously established ethical expectations and work standards that still impact contemporary attitudes towards outgroups. Extrapolating from my research, I found that scripts not holding diversity as a central theme can be effectively reexamined when authentic outgroup experiences are made central to the creative process, though perhaps at the alteration of the author's intent.

Physical Therapy Education

Effect of Using Cooling Vests on Exercise Capacity in Individuals with Multiple Sclerosis

Laura Ackerman, Kiristen Draughn, Chelsea Comeau, & Samantha Everett (Dr. Srikant Vallabhajosula & Dr. Crystal Ramsey) Department of Physical Therapy Education

Multiple sclerosis (MS) is an autoimmune disorder resulting in demyelination, axonal damage and symptoms such as visual disturbances, numbness and difficulty with dual-tasking. Individuals with MS often complain of heat sensitivity resulting in increased complaints of fatigue while performing activities of daily living. To address symptoms of heat sensitivity and fatigue, the use of cooling vests have been studied but the effect of cooling vests on dual-tasking is unknown. Seven participants diagnosed with MS were recruited for the study; three participants have completed the six-week intervention and four participants are undergoing intervention. Inclusion criteria were: diagnosis of MS while having the ability to complete the 6-

minute Walk Test (6MWT) and the Timed Up and Go test (TUG). The 6MWT requires participants to cover as much distance as possible within 6-minutes, while TUG requires participants to stand from a chair, walk 3m to a cone, pivot, and then walk back to sit down. Both assessments were completed by participants under single and dual-task conditions, where dual-task conditions included the use of a modified word list generation like names of fruit. Data were gathered at baseline (PRE) and after (POST) the six-week intervention. After baseline testing, two of the participants were randomly chosen to wear a cooling vest while undergoing their intervention consisting of aerobic and strengthening exercises. The single task TUG time for the cooling vest group during PRE and POST were 8.57±0.46s and 8.51±0.03s respectively. The participant who did not use the cooling vest took 9s during PRE and 9.6s during POST. The dual task TUG time for the cooling vest group during PRE and POST were 9±0.15s and 10.3±0.16s. The participant who did not use the cooling vest took 10.27s during PRE and 9.63s during POST. The 6MWT data are currently being processed. Expected data analysis should reveal that participants exposed to the cooling vest intervention will have better overall functional performance (decreased TUG time) and endurance (increased 6MWT distance) during single and dual task conditions. Additionally, improvement in cognitive capacity (able to say more words in a category) is expected for those who wear cooling vests while exercising.

The Effects of Acute Bouts of Cross Training on Affect: A Comparison of Lower Body Positive Pressure Treadmill and Cycling Runners and Non-Runners

Samantha King, Lindsey J. Siska, James A. Davis, & Sibu K. Varghese (Dr. Shefali Christopher & Dr. Eric Hall) Department of Physical Therapy Education & Department of Exercise Science

Aerobic exercise has been shown to enhance mood and affect in adults. Lower body positive pressure treadmills (LBPPTs) have been used to reduce loads on the musculoskeletal system and provide an alternative to running. Although biomechanical and physiological responses to the LBPPTs have been heavily investigated, there is little information on the psychological responses, and how this compares to other exercise forms. Therefore, the purpose of the study was to investigate affect and self-efficacy after an acute, hard-intensity exercise session, and compare these responses among three modalities: cycling, LBPPT running and treadmill running. 10 active adults (average age = 30 years) completed a 30 minute exercise session at 85% of their maximum heart rate on each of these modalities in a random order: bike, LBPPT, and treadmill running. Before and after each session, affect and self-efficacy were determined using the Feeling scale, Arousal scale, Activation-Deactivation Adjective Checklist, and Generalized Self-efficacy survey. From baseline to post-exercise, there was a significant increase in feeling scale (2.4 ± 0.31 vs. 3.33 ± 0.29, p=0.021), felt arousal scale (3.23 ± 0.23 vs. 4.07 ± 0.31, p=0.006), and self-efficacy (31.83± 0.83 vs. 33.97± 1.16, p= 0.013) across all modalities. However, when comparing the modalities, there was no observed significant change in self-efficacy values from baseline to post-exercise (p=0.708). For affect, there was a significant increase in energetic arousal (25.9 ± 1.12 vs. 29.43 ± 1.36, p= 0.023) and a decrease in state anxiety (20.93± 1.73 vs. 17.37± 1.08, p= 0.041) from baseline to post-exercise across all modalities, however, this did not significantly differ. There were no other significant changes in affect observed. This research supported that self-efficacy, affect and anxiety improves following

acute, hard intensity exercise sessions. However, these changes do not differ based on exercise modality. Psychological responses to acute exercise differs between runners and non-runners. Future research should investigate how these responses may differ between the two groups based on modality.

Effectiveness of Physical Therapy Based Intervention Followed by a Home Exercise Program on Gait and Cognition in Individuals with Parkinson's Disease

Morgan R. Reich (Dr. Crystal Ramsey & Dr. Srikant Vallabhajosula) Department of Physical Therapy Education

Background: Parkinson's disease (PD) is a progressive neurological disorder characterized by rigidity, tremor, bradykinesia, balance deficits and cognitive impairments. Several studies have shown that individuals with PD exhibit decreased gait speed and shorter step length. However, it is not known if an individualized and patient-directed program improves these symptoms and whether a home exercise program (HEP) effectively sustains the benefits. It is important to address these factors to reduce fall risk and improve health-related quality of life in individuals with PD. Purpose: To investigate the effectiveness of a physical therapist (PT)-guided intervention followed by a HEP on gait and cognitive function in individuals with PD. Methods: Six participants with PD (Hoehn and Yahr I-III) participated in bi-weekly individualized program for 3 months supervised by a PT and then received an individualized HEP for 3 more months with the participants informing the PT of their preferred activities. Assessments of gait and cognition were administered before the interventions began (pre), after the 3-month intervention period (post) and following the HEP phase (post2). The Montreal Cognitive Assessment (MoCA) was used as a cognitive screening tool to detect clinical impairments. Subjects completed 5 forward and backward walking trials across a 16-foot instrumented walkway. Step length and gait speed were calculated. Results: Step length for pre, post and post2 forward walking averaged 58.11±6.09-cm, 67.56±25.22-cm and 58.53±4.54-cm respectively. Gait velocity for pre, post, and post2 forward walking averaged 1.11±0.19-m/s, 1.09±0.27-m/s, and 1.11±0.18-m/s respectively. Step length for pre, post and post2 backward walking averaged 33.58±11.25-cm, 39.35 ±11.11-cm, and 36.97±12.3-cm respectively. Gait speed for pre, post and post2 backward walking averaged 0.60±0.29-m/s, 0.75±0.33-m/s and 0.70±0.33-m/s respectively. Pre, post and post2 MoCA scores averaged 26.50±2.35, 26.17±2.23, and 26.83±2.04 respectively. Conclusion: The majority of measures increased from pre to post and decreased from post to post2. It is possible not exercising at appropriate intensity at home compared with PT supervision and the rate of neurodegeneration led to this decline in function during post2. The preliminary results from this study can be used to further support the clinical focus on backward gait impairments as it relates to fall risk and disease progression.

Physics

Construction and Automation of a Vibrating Sample Magnetometer

Stratton K. Bacogeorge (Dr. Benjamin Evans) Department of Physics

A vibrating sample magnetometer (VSM) is used to characterize the response of magnetic materials to an applied magnetic field. Understanding a material's magnetic response, in turn, enables researchers to develop and optimize new magnetic materials for a variety of applications including soft robotics. Soft robotics are a new class of robotic components designed with increased flexibility and adaptability to emulate human-like motions. Ultimately, our goal is to characterize the magnetic properties of a novel magnetic polymer developed in-house, to understand its properties and optimize its performance for soft robotic systems. The overall objective of this project was to design and construct the VSM. In a VSM, a current is produced when a magnetic object is magnetized and vibrated within a magnetic field (magnetic induction). The induced current is read with a Data Acquisition (DAQ) device and used to determine magnetic response. In our device, the magnetic response of the sample can be further manipulated by varying the strength of the magnetic field or changing the frequency of vibration, producing a comprehensive magnetic characterization. Thus far, I have constructed the primary mechanical components of the VSM and verified its operation by collecting preliminary data. This was done by manually adjusting the field strength and reading the amplitude of the wave produced. The data was then plotted in a graph of amplitude over field strength, providing proof-of-concept for the device. Future efforts include automating the control of the vibrating sample magnetometer using Simulink, an add-on to MATLAB. At this point, I have written code that will adjust the field to a desired strength. I have successfully read the induced current through the program, although the field strength is still under manual control. I am working on a circuit to communicate with the electromagnet's power supply so the field will automatically adjust across a pre-determined range. Automation will allow the system to read real-time data and automatically adjust magnetic field strength, speeding data collection dramatically and improving resolution.

Energy Efficient Electroporation of Wastewater in Off-Grid Toilets for Destruction of Parasitic Helminths

Skylar Barthelmes (Dr. Scott Wolter) Department of Physics

Parasitic helminths are a virulent family of nematodes prominent in the developing world with various species thought to have infected over half of the world's population. Helminth eggs are incredibly resilient, possessing the ability to survive extreme and varied environmental conditions. While conventional sanitization methods are able to inactivate these harmful nematodes, they are largely inefficient. Research in our laboratory has explored electrochemical treatment coupled with electroporation to find a cost effective and sustainable means of sanitization in off-grid toilets – through support by the Bill & Melinda Gates Foundation 'Reinvent the Toilet Challenge' and collaboration with the Duke University Center for Water, Sanitation, Hygiene and Infectious Disease. In this presentation, we report on energy utilization of electroporation under the broad set of wastewater conditions found in off-grid toilets. Results from previous work in our laboratory have demonstrated the effectiveness of electroporation for permeabilizing ova of Caenorhabditis elegans (C. elegans), a helminth surrogate, through apparent pore formation in the lipid-rich permeability layer within the eggshell. This permeability barrier is crucial to the well-being of the embryo; therefore, this achievement represents a key milestone towards helminth deactivation. Experiments were conducted in 1X,

0.1X, and 0.01X phosphate buffered saline possessing ~20 mS/cm, 2 mS/cm, and 0.2 mS/cm solution conductivities, respectively. Further, pulse voltages in the range of 100 – 800 volts (250 – 2000 V/cm electric fields) and duty cycles of 0.01 – 0.6 ms were examined; a pulse frequency of 1 Hz was used for all experiments. The data showed a linear relationship between solution conductivity and measured electrical current and indicated minimal capacitive contributions. Voltage and current were measured via an oscilloscope used to determine power utilization, and treatment time was factored to compute energy utilization. The results reveal that a 10-fold dilution of standard blackwater (human wastewater with a solution conductivity of ~ 2 mS/cm) with fresh water and/or a reduction of wastewater constituents to effectively reduce the solution conductivity is necessary to meet target energy requirements.

Development of Deep-Imaging Optical Coherence Tomography Graphical User Interface for Quantifying Particle Diffusion Through Diseased Tissue

Brittany Barton & Alexandre Hebert (Dr. Richard Blackmon) Department of Physics

Mucus is viscous fluidic biological tissue that is used for protecting airways by trapping and clearing pollutants and protecting from other viruses. In respiratory diseases such as Cystic Fibrosis and COPD, mucus becomes dehydrated resulting in breathing difficulty and increased infection. By quantifying mucus density, we are both better able to investigate respiratory diseases and evaluate the severity of the disease in patients. Optical Coherence Tomography, a laser based cross-sectional imaging technique with cell-scale resolution, has been used to spatially resolve nanoparticle diffusion throughout mucus in order to non-invasively quantify mucus density. Platforms such as LabVIEW and MATLAB are used to control the DI-OCT system and analyze data. This research includes development of Deep-Imaging Optical Coherence Tomography (DI-OCT) that can image twice as deep as traditionally OCT systems, which would enable doctors to image both mucus and epithelial layers of the respiratory tract, making the technique more clinically relevant. The alignment of the system is complete, which was determined by the output profile of the expected light spectrum. In tandem with DI-OCT development, we have developed new metrics to characterize mucus measured using traditional OCT, which will be later translated to DI-OCT. Spatial mapping of mucus density throughout mucus samples is presented, which could be used to identify local diseased tissue in real-time for targeted respiratory treatment. The combination of DI-OCT with more robust mucus characterization techniques brings this research one step closer to personalized respiratory disease treatment.

Effect of an Electroactive Device on Transcutaneous Drug Delivery

Matthew D. Foster (Dr. Jonathan Su & Dr. Scott Wolter) Department of Physics

Smoking is the leading cause of preventable deaths in the United States. Each year, over 480,000 people die from smoking related causes and 41,000 people die from diseases related to secondhand smoke alone. Transdermal nicotine patches have been used to treat nicotine addiction since the late 1980s, but only around 15% of individuals who use them remain abstinent from smoking for more than a year. One potential reason for this high failure rate is the

difference in nicotine pharmacokinetics between smoking and the traditional transdermal patch system. While the current nicotine patch delivers nicotine at a steady rate, nicotine delivery from a cigarette tends to be pulsatile, coming in an initial high burst, then dropping off rapidly. Thus, while users may be experiencing the same overall amount of nicotine, the dose profile is quite different. Other technology, such as vaporizers, have been developed to address this problem, but health problems have recently been associated with use. In this presentation, we report on development and evaluation of an electroactive device to deliver pulsatile doses of nicotine transdermally on demand. The prototype is designed to be worn on the body in a similar manner to a nicotine patch, but able to be triggered over Bluetooth on demand. This method of delivery will help users who are trying to quit smoking cigarettes because the device better mimics the dosage pattern of a cigarette smoker compared to typical nicotine patches. We are currently testing the device using porcine skin samples to verify capability of delivering desired drug profiles. We are also verifying the nicotine concentration necessary for timely delivery of nicotine. In all experiments, nicotine transport was conducted using Franz cells and nicotine concentration was quantified via UV-VIS spectroscopy.

Deactivation of Parasitic Nematodes for Improved Water, Sanitation, and Hygiene

Faith S. Glover & Emma F. Walker (Dr. Scott Wolter) Department of Physics

Helminth infections, caused by parasitic worms, impact approximately a quarter of the global population according to the World Health Organization (WHO). This global health issue predominantly affects individuals in developing regions of the world, as they are more likely to have insufficient water, sanitation, and hygiene resources. Recent work in our laboratory has reported on deactivation of parasitic worms using high intensity pulsed electric fields to permeabilize cellular and eggshell lipid bilayers. Initial work showed eggshell permeability in *Caenorhabditis elegans* (*C. elegans*) nematodes that was determined to be detrimental to the developing embryo. More recent work by our collaborators at Duke University has shown similar efficacy for destruction of *Ascaris sum*, a helminth parasite of swine. Herein, we report on research to evaluate the impact of varying solution conductivities and *C. elegans* worm and egg concentrations on the pulsed electric field deactivation efficiency. *C. elegans* were placed onto nematode growth media plates, which provided nutritive support allowing the worms to thrive and produce eggs. After approximately two days, 0.1X (solution conductivity ~ 2 mS/cm), 0.01X (~ 0.2 mS/cm), and 0.001X (~ 0.02 mS/cm) phosphate buffered saline solutions were pipetted onto separate plates containing worms and newly hatched eggs, then transferred from the plates into cuvettes fitted with opposing electrodes for electric field deactivation. Additionally, varying concentrations of worms and eggs (0.5, 1.0, and 2.0 times standard worm and egg concentrations) were placed into cuvettes of differing solution conductivities to enable a comprehensive parametric study. Results thus far show a strong relationship between pulsed electric field deactivation efficiency to that of solution conductivity and worm and egg concentration in the buffer solution. We will discuss observations during our experimental work and ongoing effort through our work with the Bill & Melinda Gates Foundation ‘Reinvent the Toilet Challenge.’

Development of a Cost-Effective Kinetic Energy Harvesting Platform

Georgia Gurney, Noah Kagen, & Alexander Sobel (Dr. Jonathan Su) Department of Physics

Much of the kinetic energy exerted when walking is simply wasted, as a result of the inability to convert it into a usable form. By creating a platform that can harness this kinetic energy, we can increase the electricity available in a cost-effective manner in populated areas. The goal of this device is to find a way to harness a relatively untapped green source without making it cost-prohibitive. This device consists of a platform capable of capturing the energy of a step and converting into useful electrical energy. The device contains tiles that are 3D printed in order to create an inexpensive, smooth, and reproducible walking surface for the device. The top tile is compressed from the weight of someone walking on it. This in turn compresses springs, and pushes magnets through a copper coil inductor, which generates an electrical current. This inductor is fed directly to a capacitor instead of a battery, storing the energy for later use. The voltage created by the inductance system was measured using a voltmeter allowing for a full analysis of the power output. The results from the first round of testing showed that some of the moments when the magnet passed through the coil produced more power than others. This is partly due to how quickly the magnet was passing through. The average of all the voltage tests was about 165 milliVolts. That being said, in order for something like this to power an iPhone, which requires about 5 Volts to charge, the number of magnets and coils on the tile would need to be increased. With the one magnet it would take roughly 73 hours to charge or 73 steps to achieve the voltage needed. By increasing that to 5 magnets and coils on the board, only about 15 steps would be required to reach the voltage level required to power an iPhone. This will allow for green energy solutions by harnessing the otherwise ‘wasted’ energy of pedestrians in high-traffic environments.

Expansion of Sensory Perception by Integration of a Thermal Feedback System Within Prosthetics

Cole J. Kocjancic, Matthew R. Del Valle, & Nicholas C. Duff (Dr. Jonathan Su) Department of Physics

The art of a prosthetic is to return the functionality of a missing biological component to the user. Modern prosthetics have a range of functions and abilities suitable for the specific needs required by the user. Basic prosthetics focus on the restoration of mechanical functions such as the movement of fingers or an ankle while more advanced models utilize haptic technology to provide the user with an experience using the sense of touch through motions of vibration and force. However, to our knowledge, the problem of restoring the ability to feel temperature using a prosthesis has never been addressed. We have developed a prosthetic hand model which aims to restore the ability to detect surrounding temperatures through a thermal haptic feedback system. We have 3D printed a functional prosthetic hand with physical movements that are controlled with an Arduino-based MyoWare EMG system. We have added the ability to measure temperature using a sensor mounted on a fingertip. In our initial prototype, this sensor will signal the presence of a dangerous temperature by using an LED indicator. In the future, we are hoping to incorporate a more tactile indicator of temperature, as well as additional sensors to

more fully replicate the range of sensation present in the limb that the prosthetic is intended to replace.

Modeling of Drug and Nanoparticle Diffusion in Epithelial Tissue and Mucus

Jacob M. Lesley (Dr. Jonathan Su) Department of Physics

The overall project will address underlying mathematical modeling of two seemingly disparate problems using COMSOL. The HIV pandemic continues to be a major issue, with 1.8 million new infections and close to a million AIDS-related deaths occurring in 2017. In East and Southern Africa, this pandemic disproportionately affects women, and there is a critical need for protection that can be controlled by women. One important tool in the fight against transmission of HIV is pre-exposure prophlyaxis (PrEP). The concept of PrEP relies on the fact that certain anti-retroviral drugs, taken before exposure, can reduce or eliminate the chances of infection upon exposure. PrEP currently exists as an FDA-approved oral pill in the United States (Truvada) and is being developed as a number of intravaginal rings for use in developing and third world countries. Intravaginal rings have been previously developed for contraception (for example, NuvaRing), and are discreet, capable of lasting up to several months, and entirely controlled by the user. These characteristics make them ideal for HIV prevention in women. While these rings have shown efficacy in animal studies and a phase III clinical trial, little is known about how these rings protect against infection. Since HIV is a disease which targets immune cells, logically drug from the ring must reach and bathe target immune cells. Modeling this process is important to tell us how deeply the drug penetrates, how quickly an intravaginal ring takes effect, and how long protection persists after ring removal. We have developed a pair of mass transport models in COMSOL Multiphysics which reflect the inhomogeneity of the local microenvironment experienced by a diffusing particle. Previous attempts to model the vaginal epithelium as a homogenous block were not successful. We therefore developed a ‘brick and mortar’ model which was compared to drug permeability data obtained in previous Franz cell experiments. Similarly, attempts to model gold nanorod diffusion through mucus required development of a random mesh model. Mucus is a viscous biopolymer which includes multiple mucin strands. This model features variation of mucin density to reflect changing mucin concentrations.

Drug Diffusion and Measurement for Design of Long-Acting Devices

Kaila A. Loera (Dr. Jonathan Su) Department of Physics

Patient adherence to dosing regimens is an issue that has negatively impacted many promising research innovations, markedly with HIV and malaria medications. As a potential solution to improve adherence to drug formulations, long term drug delivery has become a major focus of development, with specialized attention on reservoir devices. These devices rely on drug encapsulation inside an envelope of a polymer. Predicting the rate of drug release, which is controlled by the geometry of the device along with the polymer’s material characteristics, is beyond the current scope of knowledge; thus the design of these devices requires costly and time-consuming trial-and-error. To mitigate this lack of understanding, we are attempting to

determine the relationship between polymer characteristics, such as swelling, and drug characteristics. To do this, we are measuring drug fluxes through polymer membranes using side-by-side diffusion cells. Preliminary findings have indicated a direct relationship between increased polymer swelling and increased diffusion irrespective of drug characteristics. We are using a wide range of polymers to capture a broader range of polymer swelling. Upon the successful completion of this project, we are confident our findings will increase understanding of the diffusion of molecules through polymer membranes, which will improve the design process of reservoir devices. These improvements have the potential to greatly enhance the quality of life for patients, particularly in the fight against HIV and malaria transmission.

Quantifying Mammary Epithelial Cell Growth Using Optical Coherence Tomography

Florentina A. Markwell (Dr. Richard Blackmon) Department of Physics

Breast cancer accounts for 25% of all cancers in women. The mechanisms of cancer metastasis are not fully understood. It is well known that tissue becomes dense as cancer activates and tumors form, but there is a question for which event drives the other. Tools have been developed to quantify 1) cell movement in response to cancer therapy, 2) tissue density as it relates to cell growth and metastasis, and 3) cell growth and density. Combined, these tools can be used to characterize cancerous tissue for development of personalized cancer therapy. However, specific metrics obtained using these tools need to be developed to make this characterization. This study investigates cell growth and density in 3D cultures populated with human pre-cancerous mammary epithelial cells (MECs). When cultured in a confined 3D space, these MECs form spherical organoids that mimic cylindrical mammary ducts, recapitulating breast tissue. MECs were cultured in three different densities of tissue, in order to relate density to cell growth. Optical Coherence Tomography (OCT) was used to obtain images of the cells. OCT is capable of capturing near instantaneous cross-sectional images of cells and tissue structure beneath the surface with resolutions on the order of cell size and no damage to the tissue. However, algorithms to extract metrics described above are needed in order to develop methods of characterizing cancerous tissue. Here, we present a technique to segment cells from other tissue in these images, and report the size, shape, and density of the organoids in the three densities of tissue tested. These will be compared to tissue density and cell movement toward development of new metrics for this comprehensive cancer characterization tool. The tool can then be used to scan human tissue to determine if it is cancerous in real-time, so that the diseased tissue can be instantly treated. This personalized cancer therapy has the potential for higher success rates in removing diseased tissue, rapid treatment results, and less negative effects that are common in traditional cancer therapies.

Enhanced Response in Soft Robotic Components by Chaining Magnetic Particles

Joseph R. Paturzo (Dr. Benjamin Evans) Department of Physics

Magnetoactive elastomers (MAEs) are elastic materials which contain a magnetic component. These materials are both magnetic and flexible and may therefore be controlled by a magnetic field. Such materials have shown promise within the fields of soft robotics and microscale

medical diagnostics. In this work, a novel MAE has been developed which contains ordered chains of magnetic microparticles within a polymer. It is hypothesized that the chains will enhance the magnetic response of the material relative to unchained magnetoactive elastomers. The goal of this research is to collect experimental data on the torques experienced by MAEs within a magnetic field and then to reconcile that data with newly-developed theoretical models. To do this, a torque magnetometer was built to measure the torque experienced by the MAE as it rotates through a magnetic field. In order to collect the most comprehensive data set, several parameters have been varied, including the strength of the magnetic field, the concentration of magnetic particles within the MAE, the chaining state (chained versus unchained particles), and the azimuthal angle at which the MAE is rotated through the magnetic field. Results indicate that magnetic torques increase with field strength, iron concentration, and particle chaining. In ongoing research, we are working to correlate these results with analytical models to better predict the behavior of chained-particle MAEs and inform the design of new MAE materials.

Matrix Formulation of Bound State Problems in Quantum Mechanics

Ryan Paxson (Dr. Martin Kamela) Department of Physics

Matrix Formulation of Bound State Problems in Quantum Mechanics Ryan Paxson (Dr. Martin Kamela) Department of Physics In this project we are looking at the accuracy of quantum mechanical time-independent wavefunctions that are formed through an expansion in the infinite potential well basis. The potential energy of interest is imbedded in an infinite potential well. The Hamiltonian of the combined system is determined as a matrix of expectation values with the infinite potential well wavefunctions. The lowest eigenvalues of this Hamiltonian are the approximate energy levels of the system of interest, and the eigenvectors allow for a reconstruction of the corresponding eigenfunctions. We evaluate the accuracy of this method in 1-D, based on the size of the infinite well and the depth of the potential energy of interest. This will allow us to determine the number of eigenstates required for accurate approximations in higher dimensions. Further we explore the usefulness of this approach to systems in 2-D and higher.

Effect of Electroporation on Transcutaneous Drug Delivery

Ryan Sienerth, Matt Foster, & Skylar Barthelmes (Dr. Scott Wolter) Department of Physics

Transdermal transport of large molecules presents a challenge in existing drug delivery systems due to slow permeation kinetics. This has created opportunities for development of new delivery methods and apparatus. One promising approach that has found utility in cellular drug delivery utilizes electric pulses to open channels in lipid bilayers. This technique, known as electroporation, has recently been shown to affect skin permeation by creation of aqueous pathways in the stratum corneum. In this study we investigate permeation of nicotine through 5 mm porcine tissue. All nicotine samples were prepared in 1x phosphate buffered saline. The electroporation system enabled several parameters to be evaluated, including pulse voltage, duty cycle, and total electroporation duration, while the pulse train frequency was maintained at 1 Hz. Impact of the electroporation parameters on molecular transport kinetics was determined.

Further, physical changes in porcine tissue were inspected by optical microscopy. An important aspect of this research was designing and interfacing the electrodes to the porcine tissue. As such, various schemes for interfacing the electrodes to the tissue were studied to assess the efficiency of this active delivery method.

Comparing Methods of Mixing Excitation Mechanisms for Modeling Composite Galaxies

Connor K. Simpson (Dr. Chris Richardson) Department of Physics

A spectrum is like a fingerprint for each galaxy that determines what elements are inside based on the light it gives off. By analyzing different segments of galactic spectra, we can tell whether a galaxy is star-forming or has an active galactic nucleus (AGN) with a supermassive black hole. There are other types of galaxies such as composite galaxies, which are thought to be a mixture of star-forming and AGN galaxies. These "mixed" galaxies can be modeled using either a self-consistent or empirical methodology, but a robust comparison between the two methods has yet to be carried out. For our simulations using the widely-used software package Cloudy, we vary four parameters: mixing fraction, hydrogen density, ionization level, and elemental abundance. Previously, black hole mass was the primary limiting factor, as intermediate and stellar-mass black hole galaxies were not being detected. Therefore, we used observations of galaxies from the RESOLVE survey, which includes a volume-limited instead of a mass-limited catalog of galaxies. The RESOLVE survey is able to detect dwarf galaxies with intermediate-mass black holes. These galaxies have a low abundance of metals, similar to primordial galaxies from the early universe, yet can be clearly viewed from Earth. The goal of this research is to investigate the difference between the predictions of self-consistent and empirical methods of modeling galaxies with both star-forming and AGN contributions, which could impact assessing how much of a role the AGN emission plays in a given galaxy. Our results show that varying the elemental abundances of the galaxies revealed larger changes in the area between demarcation lines than varying other parameters, but was still not statistically significant. The largest difference resulted from a mixing fraction of 16% at two times solar abundances, creating approximately a factor of two difference in the predictions from each mixing methodology. We conclude that either method can be used to classify galaxies except at two times solar metal abundances and lower percentage mixing fractions.

Using Optical Coherence Tomography to Examine Response of Cancerous Breast Cells to Toxicants

Alex Sobel (Dr. Richard Blackmon) Department of Physics

Breast cancer accounts for 25% of all cancers in women. Techniques to study, detect, and treat breast cancer are still needed to minimize invasive treatment and increase the success rate of treatment. Here, we employ novel techniques to non-invasively quantify the response of cancer cells to toxicants using Optical Coherence Tomography (OCT), a 3D cross-sectional imaging technique capable of capturing sub-surface image with cell-scale resolution. Cancerous human mammary epithelial cells (MECs) were cultured in a collagen matrix to recapitulate diseased breast tissue. The cells formed spherical organoids that mimic the mammary duct. The MEC

organoids were exposed to four different toxicants (Doxorubicin, Blebbistatin, Taxol, and Tamoxifen), and monitored over six days. Periodically, time-lapse OCT scans were collected, providing videos of cell movement beneath the surface of tissue. Statistical analyses were conducted on the movements through time, with metrics extracted to spatially resolve the standard deviation and temporal frequency of motion. Here, we show these metrics spatially resolved throughout the organoid cross-sections that reveal patterns in their spatial distribution for treated organoids. We demonstrate that metrics quantifying the standard deviation and frequency of intracellular motion are sensitive to these treatments via comparison to untreated control samples. These patterns help visualize cell decay in organoids, and suggest potential in using OCT to determine how specific cancers should be treated. Additionally, this real-time noninvasive method of monitoring the response of cancerous cells to toxicants can be translated to monitor other types of cancer treatment, such as photothermal therapy. With real-time feedback on the effectiveness of cancer therapy at the cellular level, personalized cancer treatments can be developed to increase the rate of success of removing all diseased tissue and decrease the likelihood of damaging healthy tissue.

Automated Assessment of Dental Defects in OCT Images Using Machine Learning Algorithms

Reed G. Stasko (Dr. Richard Blackmon & Dr. Ryan Mattfeld) Department of Physics

Recently, OCT has been explored for studying diseased dental tissue. In this study, we use OCT to quantify defects in artificial dental tissue. When cavities are filled with a restorative tissue, defects such as air bubbles, microcracks, or gaps between artificial and native tissue can occur. Methods to determine whether or not restorations contain defects are lacking, which leads to the artificial tissue breaking soon after the procedure. The ability for OCT to noninvasively image beneath the surface of tissue presents a promising method of assessing new restorations in real-time. In collaboration with dentists at UNC Hospitals, we have obtained OCT images of artificial tissue containing defects. Currently, quantification of these defects, such as measuring air pocket diameter or microcrack length, requires hours of manual measurements. This results in delays in research of new restorative tissue and filling techniques, and requires a subjective assessment of restoration quality that could lead to inconsistent clinical application. New technologies enable better practices in medicine by automating therapies and enhancing diagnostic systems. Optical Coherence Tomography (OCT) is an interferometric imaging technique capable of rapidly obtaining 3D subsurface images in liquid and solid materials. OCT has emerged as a state-of-the-art imaging modality for opthamology, and recently has been explored for a much broader range of medical applications in disciplines that include pulmonology, cardiology, pediatrics, oncology, and pathology. Here, we apply image processing algorithms using MATLAB to OCT images of dental defects for automating defect quantification. Automated segmentation of tooth defects using MATLAB will lead to faster analysis of OCT data collected during research. More importantly, automation will enable an objective assessment of tooth restoration quality that makes the application of OCT imaging in dentistry more clinically viable.

Heating Iron-Silicone Composites with Magnetic Hyperthermia to Reduce Bacterial Biofilms on Medical Devices

Anne S. Williams & Paloma C. Dettloff (Dr. Benjamin Evans) Department of Physics

Transdermal medical devices, such as silicone tubing that penetrates the skin, are a leading cause of hospital-acquired infection. Bacteria on the surface of such devices tend to form layers called biofilms, which are particularly difficult to address with antibiotics. One solution is to kill the bacteria with heat; however, this must be done in a way that warms the site of insertion without overheating surrounding tissues. One promising way to do this is magnetic hyperthermia, in which small magnetic particles, such as iron, can be heated remotely by applying an alternating magnetic field. As the field switches direction, energy is delivered to the particles, thus heating the system. By embedding iron particles in silicone, we have engineered an iron-silicone composite material that can be heated quickly to temperatures high enough to eliminate bacterial biofilms. Furthermore, we have found that by applying a magnetic field before curing the composite, we can cause the iron particles to form chains within the silicone which enables more efficient heating. We have designed and built a novel magnetic oven that allows us to make both chained and unchained composites in a variety of iron concentrations, and we have shown that in all cases the chained-particle samples heat more quickly than unchained controls. Using our chained sample with the highest concentration of iron (24 % weight), we show that we are able to heat from 20°C to 110°C in 30 seconds, which will kill the bacteria efficiently. Ultimately, this heating technique can be applied to catheter insertions and other transdermal medical devices, reducing the incidence of hospital-acquired infection.

Political Science & Policy Studies

Pope Protects Paedophile Priests: A Study of the Effects of the Catholic Church Sex Abuse Scandal on Catholic Adult's Trust in Government

Aileen V. Bell (Dr. Kaye Usry) Department of Political Science & Policy Studies

In 2002, the Boston Globe broke a story exposing the Catholic Church for severe cases of child sex abuse within its institution. While past research has looked at social factors and past political scandals effects on political trust, it has yet to consider how a scandal outside of the political realm could have an effect. Due to the power of religion as a political socialization factor, this paper theorizes that the child sex abuse scandal within the Catholic Church will have a negative effect on political trust in Catholic adults. Three one-on-one interviews were held with three Catholic members of the Elon Community with different positions within the Church and the University: a priest, a political science professor, and a student. These interviews asked respondents about their religious upbringing, memories of the scandal, and views of the government. All respondents were found to have their trust in the Church fall after the scandal, but they did not connect the events to their trust in government and their representatives.

Borders in the Middle East in RT

Lily Bennevat-Haninovich & Anastasia Theoharis (Dr. Laura Roselle) Department of Political Science & Policy Studies

This paper analyzes media coverage of Middle East events featured in the RSS feed of RT - Russia's state-funded English media network. In a previous examination of RT data from April, October, and November 2016 we found that a number of articles written about the Middle East mention borders. We are interested in how borders are depicted and in which specific contexts, and we use the qualitative software Quirkos to assess this. We hypothesize that RT's coverage will create a purposeful link between borders and the military. Preliminary findings suggest that RT's rhetoric intersects with Russia's strategic priorities by covering borders in the context of refugees and migration, contested areas, protecting state borders, and smuggling. From these findings, we suggest that RT's coverage of borders is designed to justify the Russian military going into these contentious border regions to "help".

Activism and Advocacy: How Climate Organizations Have Built Political Power in CA

Kathleen C. Canty (Dr. Aaron Sparks) Department of Political Science & Policy Studies

The Intergovernmental Panel on Climate Change (IPCC) 2018 report on climate change explained in great detail the urgent need for policy action to address climate change by 2030. While there has been an alarming lack of action from the US federal government on climate change, several states have emerged as climate leaders during the Trump presidency. In this research we ask what role have climate activist groups played in the passage of ambitious climate policy in California? This question allows for the opportunity to explore how movement organizations build political power. This research borrows from Tufecki's (2014) framework, which describes capacity building in three distinct ways: 1) disruptive capacity, 2) narrative capacity, 3) institutional/electoral capacity. Using a variety of methods from compiling information from press reporting on advocacy activities, to process-tracing, and qualitative website analysis this research shows that as climate advocacy groups build their capacity in all three dimensions, they gain greater power in the legislative process, ultimately leading to the successful passage of several key pieces of legislation in California. We conclude that by using all three methods of capacity building, climate advocacy groups in California were able to successfully pass legislation at a higher rate than those states with advocacy groups who did not employ all three aspects of Tufecki's (2014) framework.

Racial Integration and Mobility Programs: The Effectiveness of the Moving to Work Program in Reducing Racial Segregation

Alison M. Filbey (Dr. Jessica Johnson Carew) Department of Political Science & Policy Studies

This paper examines the effects of the Moving to Work Demonstration Program (MTW) on neighborhood racial segregation in the United States. This program, administered by the Department of Housing and Urban Development, allocates flexible funding to 39 jurisdictions

throughout the United States in order to increase affordable housing options for low income families to encourage sustainable employment and self-sufficiency. Due to the strong relationship between housing segregation, economic insecurity, and minority status, programs which seek to improve conditions for low income residents also must be evaluated for the degree to which they racially integrate neighborhoods and communities. Using data from the 2000 Census and 2013-2017 American Community Survey, the impact of MTW programs on the degree of racial similarity within jurisdictions was measured from 2000 to 2017, a span of time which captures the programs' influence. Recent MTW policy proposals from selected jurisdictions in California and regionally with similar population sizes were also analyzed to identify common themes and practices throughout the programs. Currently, communities within the United States are vastly segregated by race and ethnicity with large disparities in outcomes and opportunities for racial and ethnic minority families. Conclusions from this project demonstrate the relationship between economically based housing assistance programs and racial integration, as there was a statistically significant increase in racial similarity within MTW jurisdictions for Black and Hispanic populations. This analysis can help policymakers recognize how the two goals are connected, leading to an understanding of policy objectives that could influence integration and therefore equity in housing for minority populations in the United States.

US-Pakistan Relations & Pakistan's Religious Minorities: Deepening Disenchantment, 2008-2016

Erin T. Jenkins (Dr. Jason Kirk) Department of Political Science & Policy Studies

Pakistan's tumultuous history involving treatment of religious minorities has dominated politics in the nation since its founding. Pakistan has been a strategic ally of the US for decades; however, relations have often been strained due to cultural and ideological differences as well as a substantial lack of trust. Scholars have investigated the state of religious tensions in Pakistan as well as Pakistan's relationship with the US, but there is limited work that attempts to draw direct connections between the two. Focusing on the time period of Obama's presidency, this research investigates how the understanding of Pakistan's religious minorities in the US relates to foreign policy making, and uses Pakistan as a case study to draw broader conclusions about the ways that domestic political shifts can shape foreign policy decisions. Documents from the congressional record, reports by human rights groups and relevant legislation are chronologically examined to form a broad picture of how US-Pakistan relations developed during this period. Early results indicate a shift in rhetoric around Pakistan's religious minorities following the 2010 midterm elections; religious protection, especially of Christians, begins to be a popular rhetorical tool, specifically for the Republican Party, in order to create reasoning for a congressionally-led change in foreign policy goals. Further results and implications for the current administration are discussed.

RT Coverage of Terrorism in the Middle East

Noah Kutner & Francesco Storm (Dr. Laura Roselle) Department of Political Science & Policy Studies

While numerous studies and official investigations have confirmed the Russian's interference in the 2016 U.S. Presidential election as well as other international events, the extent of this research has focused on the western world. This paper analyzes the media coverage of the Middle East in the RSS feed of RT - Russia's state-funded english media network. This analysis includes news stories which mention Middle Eastern countries and their leaders, and focuses on narratives and framing used when covering terrorist groups and their actions. This analysis will be completed through a cross-sectional, qualitative study of articles written on the Middle East by RT that have been sampled from April, October, and November of 2016. Over 60 topic categories will be tracked in RT's Middle East articles to assess the topics that RT wished to bring to the attention of its audience in regards to the Middle East. The initial findings suggest that coverage focused primarily on Syria and Turkey, where Russian military operations were ongoing.

Strategic Narratives for Political Gain: White House Newsletters (2016-2019)

Faith Leslie & Annie Waddell (Dr. Laura Roselle) Department of Political Science & Policy Studies

Since assuming the presidency in 2016, President Trump and his administration took over the White House's daily newsletter program, going from one to four newsletters in the span of three years. This research focuses on a topic analysis of Trump administration newsletters from 2016-2019. By looking at the use of strategic narratives and word choice to invoke fear and identity politics, this research indicates that the Trump administration aims to create an "us" versus "them" narrative within U.S society and the world through his depiction of both the Democratic Party along with states deemed to be "threats" abroad. This research can assist in formulating conclusions on the political use of strategic narratives in influencing voter opinions of how they view both U.S society but also the international system.

Exploring the Influence of Redistricting Method on the Representation of African-Americans in the US House of Representatives

Derrick L. Luster II (Dr. Jessica Carew) Department of Political Science & Policy Studies

Several scholars have conducted studies on political representation and redistricting. These factors are often examined independently and a scarcity of research exists at the intersection of the two schools of thought. redistricting may influence various forms of representation. This study seeks to examine the impact of independent redistricting commissions on the election of African-American candidates for the U.S. House of Representatives. Redistricting commissions have been employed to ensure fair elections; some of which aim to do so by creating more compact districts. A study, however, discovered that "having a compactness rule [in the redistricting process] increases the probability of having no majority-minority districts" (Barabas & Jerit, 2004, p. 423-424). Majority-minority districts have historically accounted for increases in African-American representation. This research synthesizes the two aforementioned areas of research to examine the effects of recent redistricting shifts, comparing the varying redistricting commission structures to the standard congressional redistricting tactics, on the representation of

African-Americans in the House of Representatives. Using a mix method research design (historical meta-analysis and a quantitative strategies), this study seeks to uncover the influence that the varying redistricting systems have on African-American representation in the federal legislature.

Confronting Islamophobia: Can Media Framing Increase Acceptance of American Muslims?

Megan Z. F. Noor (Dr. Kaye Usry) Department of Political Science & Policy Studies

Islamophobia is a rampant problem in the United States, but some public figures and activists are pushing back. Is there a way of speaking about Muslims that can improve tolerance of this group in American society? Past scholarship indicates that negative framing of Muslims in the media can lead to more negative perceptions, (Collingwood et al., 2018; Saleem et al., 2017) but little research has tested the inverse, leaving activists and media organizations without a concrete means to inform their media strategies. This project examines how activists, politicians, and journalists talk about Muslims in the media. In the first portion, news articles and speeches from political activists and United States presidents were collected and analyzed for positive frames about American Muslims. Results indicated that the most common frames among these media include "Muslims resisting Islamophobia" and "Muslims as members of a broader community." Next, these frames were fashioned into excerpts to be used in an experiment with Elon University students, wherein each student would be randomly assigned to read one of the three narratives or an unrelated paragraph, then answer a questionnaire designed to measure Islamophobia, with results to come in March 2020. These results will indicate which, if any, frames were most effective at reducing Islamophobia in the student participants. Similar studies on reducing outgroup bias have shown promising results; Broockman and Kalla (2017) found door-to-door canvassing an effective means of reducing transphobia, and Saleem et al. (2017) were able to reduce support for policies harmful to Muslims using counter-stereotypical media framing of Muslims. This study advances scholarly understanding of what positive frames commonly exist about American Muslims and which of those frames are most effective at reducing Islamophobia, and provides important insights for activists dedicated to confronting Islamophobia and Islamophobic rhetoric in the United States.

A Qualitative Analysis of Russian State Media (RT) Framing of Syria, ISIS and Other Actors During 2016

Isabella Saputo & Megan Allen (Dr. Laura Roselle) Department of Political Science & Policy Studies

Since the beginning of the Syrian conflict, Russia has supported Bashar Al-Assad's government. Russia has provided political support at the United Nations, military aid in arms to fight back against western backed rebels, and direct military support through air strikes and troops in the region. This research takes a look at the Russian State Media (RT) framing of the ongoing war in Syria and asks the questions "how do they frame their involvement in the area? What other factors do they include coverage of?" The qualitative analysis will come from coding of specific

keywords that have been organized in the program Quirkos. Our preliminary findings show that RT has significant coverage regarding Syria and Turkey, and extensive mentions of military, money, ISIS, U.S., and media.

Leadership Traits and Territorial Withdrawal: Ehud Barak's Retreat from Southern Lebanon

Caitlin T. Wynn (Dr. Baris Kesgin) Department of Political Science & Policy Studies

On May 24, 2000, Israeli forces withdrew unilaterally from the Lebanese security zone after almost two decades of occupation. Thereby, Prime Minister Ehud Barak fulfilled his campaign promise of withdrawing the IDF from Lebanon within a year of forming a government. Whereas Israel had previously withdrawn from territory within the context of an agreement, Barak's decision to withdraw unilaterally was an unprecedented strategy, and Barak deviated from previously held beliefs in pursuing the withdrawal. While factors such as public opinion, governmental dynamics, and external factors are often cited as influencing his decision, there have been no studies examining how Barak's personal attributes affected his decision-making process. This paper considers the role of Barak's personality in the decision-making process, as Barak was the predominant decision-maker throughout the process. To do so, Hermann's leadership trait analysis approach is applied to Barak. Using automated content analysis to analyze Barak's spontaneous foreign policy remarks, personality profiles are constructed for Barak in two periods: during the first six months of his premiership, and then during the months immediately prior to the withdrawal. Barak's speeches during the time frame are then analyzed in the context of his profiles. This paper finds that Barak's personality underwent a significant change between the initial decision-making period and the later implementation period. Barak's traits, including task-focus, self-confidence, and conceptual complexity changed notably between periods, and influenced his decision to withdraw. This evidence suggests that Barak's personality traits played a role in his decision to pursue unilateral withdrawal, indicating that leadership trait analysis and other methods of assessing political personality can be applied to explain why a leader might pursue controversial foreign policy strategies.

Poverty & Social Justice

Gender Justice and the Global Population Debate: A Case Study in Guyana

Louisa M. Sholar (Dr. Rebecca Todd Peters) Poverty & Social Justice Program

The field of international family planning services has historically defined itself within a population control perspective. While such an approach insists that the reduction of birth rates is necessary to preserve economic and environmental security, it pays little to no attention to the lives of women in areas of high population growth, particularly in the Global South. This framework relies on unexamined assumptions about women's reproductive decision-making that fail to understand the nuanced realities of the lives of poor and marginalized women in the Global South. A growing trend in the ecumenical movement and development field has been to

operationalize gender justice as a foundational principle in community organizing efforts. This research examines how the gender justice approach brought by Reverend Sheeratan-Bisnauth during her tenure as the executive director of the Guyana Responsible Parenthood Association (GRPA) from 2011-2018 offers a more fulsome framework for addressing the reproductive healthcare needs of poor and marginalized women than the population control approach. I conducted participant-observation research and semi-structured interviews with GRPA staff and community partners in order to document and analyze how their use of gender justice facilitated the transformation of women's access to reproductive healthcare in Guyana. I focus my analysis on gender justice's contributions to the implementation of a law decriminalizing abortion that passed within the country 25 years ago. Despite being legal, the procedure was not made publicly accessible to low-income, rural women. The potential of gender justice to provide both formal accountability and social accountability on this topic marks it as a more ethical and effective alternative to traditional development field frameworks and the global population debate.

Psychology

Bulimia and Impulsivity

Grace Bailey, Lindsey Bischel, Bridgette Harrell, Alex Grillo, & Cali Beeson (Dr. Bilal Ghandour) Department of Psychology

Previous research has explored the possibility of women with bulimia nervosa (BN) embodying impulsive traits. Impulsive traits are identified as rash decision making, an inability to think thoroughly before acting, obsessive thought processes clouding judgement, and the urgency to act despite negative consequences. This study explores the connection between such impulsive traits and bulimia nervosa (BN). Using Q sort, a methodology specifically well suited to the expression of individual viewpoints, twenty-six undergraduate women ranked a total of forty-four statements that reflected themes related to impulsivity. These statements included characteristics of impulsivity-related constructs and were derived from a multitude of sources to ensure proper representativeness: academic literature, the popular press, various audio-visual media outlets, focus groups and social media sites. A factor analysis was performed that generated two distinct factors that essentially split participants along the lines of a presence or absence of BN. Factor A, called Thinking Through, was characterized by a methodical and carefully processed approach around decision-making, thinking through consequences of actions, and a general tendency towards planning and organization. With the exception of one participant, this factor was represented by participants with no history of BN. Factor B, called Negative Urgency and Obsessive Thinking, was characterized by an urge for pleasure-seeking, quick action, a lack of self-control and difficulty postponing reward. Endorsers of this factor often regret decisions made rashly yet tend to repeat actions that feel urgent, despite negative consequences. This factor was endorsed by all participants with a history of BN with one exception. Such finding provides additional evidence for a pattern of impulsivity in women with BN that is not found in their healthy counterparts. In addition, it provides clinicians with a guidepost for a more targeted treatment of BN and further enhances the need for impulsivity to be included as one of the diagnostic criteria for BN.

Exploring the Academic and Social Experiences of Elon Students With ADHD

Jayne L. Bennett (Dr. Katie King) Department of Psychology

Attention-deficit/hyperactivity disorder (ADHD) is well-researched in children. Although we now know it often persists into adulthood and affects many aspects of adult life, research on college students with ADHD is lacking. My research seeks to add to the knowledge of the effects that ADHD has on college students by specifically exploring their experiences while navigating their academic work, jobs, and social lives at Elon. Also of interest was whether or not these students felt as if their individual needs were being met, especially in academic settings. Fifteen Elon students ranging from first-years to seniors were interviewed in focus groups. The participants engaged in semi-structured conversations with one another, sharing their experiences as college students with ADHD. Although each participant had a different story, some common themes were shared between the participants in all five groups. Although they shared a wide variety of responses to each question asked during the focus groups, significant themes were noted when three or more participants mentioned them. Some of these major themes that emerged included having some knowledge of the effects of their ADHD and strategies to overcome those effects, appreciating the ability to record lectures and access notes and PowerPoints before class, struggling to get to work on time and do mundane office work, being less likely to participate in extracurricular activities because of issues with time management, and having communication difficulties with their friends due to a tendency to get off track or talk too fast. In general, the participants reported being open to discussing their ADHD, but they avoided telling their friends about their medication, which they kept hidden. In addition to these difficulties, though, participants reported that their ADHD made them more creative, more open to trying new things, and more capable of relating well to others facing similar challenges. They also reported that, for the most part, their needs were being met. The opportunity to share their experiences with other students seemed valuable to our participants, leading to the conclusion that for students with ADHD, peer support groups might enhance the process of adjusting to college.

A Retrospective, Cross-generational Study of Children's Play Behaviors in Venezuela

Isabel Blanco Araujo (Dr. Maureen Vandermaas-Peeler) Department of Psychology

Through unstructured outdoor play experiences, children develop cognitive, physical, social, and emotional skills (Wilson, 2012). Over the past generation, children's opportunities for unstructured outdoor play have been increasingly restricted due to growing demands on their time; a lack of safe, accessible places; increased technology; and parents' fears related to safety (Charles & Louv, 2009). However, little research has examined these trends in Latin American countries. This study investigated the influences of a rapidly changing social ecology on children's play patterns in Caracas, Venezuela. Venezuela has experienced economic and political crises over the past 15 years. This drastic social change provides a unique opportunity to study generational shifts in play patterns. Semi-structured interviews were conducted with 18 adolescents and 18 parents. Transcripts were coded and analyzed using Bronfenbrenner's bioecological framework, in which biopsychological characteristics are studied over the lifespan,

across generations and historical time (Bronfenbrenner & Morris, 2006). Findings indicated that although adults and adolescents described vivid memories of childhood play, the frequency of nature and unstructured play activities declined from one generation to the next. Adults remembered playing in community spaces such as parks and in the streets of Caracas. Adolescents talked about playing at home and school in safely enclosed spaces. Although parents and adolescents grew up in the same city with similar environmental affordances, the socio-political climate and rise in insecurity were described by both groups as primary influences for the decrease in outdoor and unstructured play. As expected, increased technology over time also influenced this shift in play. These findings highlight the importance of the sociocultural context in which play occurs and contribute to the sparse body of knowledge on outdoor, nature, and risky play opportunities for children in Latin America. Considering the Venezuelan context, the findings regarding intentionality of play and lack of accessible safe spaces showcase the importance of parental influence in creating outdoor play opportunities. Additionally, in the future, policy makers and city planners could take these findings into consideration in order to create more spaces for exploration within a safe context in Caracas.

The Feminine and the Freaks: Linguistic Frames Differentially Impact Perceptions of Individuals

Jessica K. Burchett (Dr. L. Kimberly Epting) Department of Psychology

Linguistic frames can perpetuate stereotypes and increase discriminatory behavior toward out-groups (Hallahan, 1999; Landau, Sullivan, & Greenberg, 2009). Gender- and mental illness-related stereotypes permeate many aspects of Western cultures (Broverman, Broverman, & Clarkson, 1970; Coverdale, Nairn, & Claasen, 2002). Often, language both constructs and perpetuates such stereotypes (Crawford, Leynes, Mayhorn, and Bink, 2004; Maurya & Dixit, 2008). Consequently, perceptions of others may partially depend on attributes like gender and mental health status. In two experiments, we examined how linguistic frames relating to gender or mental health status affected perceptions of a hypothetical individual. In Experiment 1, which used a between-subjects design, 418 participants viewed one of four lists of 8 descriptors (2 gender frames, 2 mental health status frames, 4 control frames) that framed the hypothetical individual as feminine/mentally ill, feminine/mentally healthy, masculine/mentally ill, or masculine/mentally healthy. Participants indicated their perceptions of those individuals on 9-point scales responding to ten questions (e.g. How much do you like [initials]? How likely do you think it is that [initials] has a diagnosable mental illness? How likely would you be to hire [initials] if you were an employer?). To consider how results may change when one compares individuals, Experiment 2 had 239 participants view all four of the lists and answer questions after viewing each (within-subjects design). Results of both experiments indicated a main effect of mental health status frame on most dependent variables, including likability, trustworthiness, responsibility, employability, and likelihood of having a diagnosable mental illness, with mentally healthy frames producing more “desirable” scores. Similarly, in both experiments, gender frames yielded a main effect on likability-related measures such that feminine frames increased likability. In the second experiment only, a single interaction between gender and mental health status frames on whether individuals should seek professional help demonstrated that, even when framed as mentally healthy, individuals framed as feminine were more strongly

encouraged to seek help than those framed as masculine. Both experiments demonstrate notable effects of mental health status frames and gender frames independently; yet, when participants compare individuals, nuanced findings shed light on areas where biases may linger.

What Is the Role of Locomotor Development in Mothers' and Infants' Co-Creation of Relational Space During Play?

Pamela Danko & Regan Fleischer (Dr. Sabrina Thurman) Department of Psychology

Infant development occurs largely in a social context. As infants age, mother-infant dyads use relational space during interactions differently. For instance, over time, infants tend to see fewer caregiver faces and more hands in natural environments (Fausey, Jayaraman & Smith, 2016), and mother-infant proximity decreases (Thurman & Corbetta, 2017). However, we know little about the role of locomotor development (e.g., crawling, walking) in the co-creation of relational space, as locomotor skills allow infants to gradually become able to position their own bodies in relation to their caregivers. In the current study, we aim to identify whether the acquisition of locomotor skills affects the ways in which mother-infant dyads co-create relational space during free-play. Thirteen mother-infant dyads were followed biweekly from 6 to 17 months. Their activities were monitored during 10-min sessions held in a free-play laboratory space. Sessions were recorded and video-coded in Datavyu. We coded: (1) the mother's position relative to her infant (e.g., front, behind), and (2) when they moved closer or further away from one another. When coding is complete, we will determine whether mother-infant proximity was maintained by one of the members of the dyad. Results are forthcoming, but across pre-locomotor to locomotor sessions, we expect that mothers will go from mostly being positioned behind their infants to increasingly being positioned in front of their infants. We expect mothers may be responsible for maintaining proximity to their infants. Once infants gain locomotion, we expect infants to take a lead role in maintaining proximity to their mothers. The acquisition of locomotion grants infants their first opportunity to participate in the co-creation of relational space with their mothers. This could impact how and when they travel closer to or face their mothers during free play (e.g., proximity seeking), or if they turn or move away from her. Thus, the way infants and mothers engage in a space together could have meaningful influence on the types of interactions performed and could provide non-verbal information about the emotional bond between the mother and infant.

Perfectionism in the Academic Context: Strivings, Concerns, Workaholism and Burnout

Sydney A. DeCaro & Kaylie N. Murphy (Dr. Erika C. Lopina) Department of Psychology

The current study integrated the job demands-resources (JD-R) model (Demerouti et al., 2011) with the transactional theory of stress (Lazarus & Folkman, 1984) to explore the relationships between perfectionism and engagement and burnout. Specifically, the JD-R model posits that demands, or difficult aspects of work, are predictive of burnout (characterized by exhaustion, professional inefficacy, and cynicism). Resources, or aspects of the job that help with work, are predictive of engagement (characterized by vigor, dedication, and absorption). Within the JD-R framework, perfectionism—the "combination of the setting of exceedingly high standards and

relentless self-criticism, in pursuit of standards" (Lee, 2018; p. 2)—can be considered a personal demand. Contrary to the JD-R model, previous research has shown that perfectionism is sometimes—but not always—related to burnout (Slaney, Rice, Mobley, Trippi, & Ashby, 2001). Previous research has called for the extension of the JD-R model through the application of theory. One such promising theory is the transactional theory of stress (Lazarus & Folkman, 1984), which further classifies demands as hindrances (negative stressors) or challenges (positive stressors). Thus, it was hypothesized that perfectionist concerns (PC; apprehension for meeting expectations, characterized by self-doubt) would be positively related to burnout and perfectionist strivings (PS; going above and beyond to achieve exceedingly high expectations) would be positively related to engagement. Previous studies have shown that PS and PC are related to workaholism, and workaholism is a predictor of burnout. Therefore, workaholism was hypothesized to mediate the relationships between both types of perfectionism and burnout. Online, self-report surveys were administered to current undergraduate students (n=143). Results of multiple regression analyses support the main hypotheses, such that PC and PS were uniquely related to burnout and engagement, respectively. Preliminary analyses support workaholism as a mediator between PS and burnout, but not between PC and burnout. Additional results and implications will be discussed.

Role of Social Influences in Help-Seeking for Adolescents With Anxiety

Jordan E. DeVries (Dr. CJ Fleming) Department of Psychology

Adolescents have the highest rate of mental illness of any age group, yet the lowest treatment seeking rate (Calear, Batterham, Griffiths, & Christensen, 2017). Several factors may influence this, but the Theory of Planned Behavior suggests that social norms play a role in help seeking (Ajzen, 1991). Social norms are a critical influence on adolescent behaviors, and include the beliefs of parents, friends, and peers. The specific norm under investigation in this study is parental tactic use – positive, negative, direct, and indirect – when discussing mental health with their high schooler. It is essential that we better understand tactic use, as the tactics parents use when discussing mental health with their high school student may impact how their student handles future concerns. Forty-six private high school students and their parents (N=92) received an online survey that asked questions about diagnoses, help-seeking history, attitudes about help-seeking, stigma, behavioral and emotional tendencies of students, parental accommodation and vicarious distress, social norms, and student behavioral control. A regression including behavioral and emotional tendencies of students, parental accommodation, vicarious distress, social norms, student behavioral control, and attitudes about help-seeking as predictors of parental tactic use was significant ($F(4,40)=11.72$, $p<.001$, $R^2=.54$). In particular, severity of student symptomology ($p=.006$), parental distress resulting from student distress ($p=.003$), and parent ratings of student conduct problems ($p=.004$) were significant predictors of parental tactic use. Paired samples t-tests suggested that students are significantly more anxious ($t(44)=5.85$, $p<.001$) and depressed ($t(44)=6.29$, $p<.001$) than their parents believe them to be, while parents report using significantly more positive ($t(44)=-3.51$, $p=.001$) and direct ($t(44)=-3.59$, $p=.001$) tactics than their students perceive. The results suggest that parental use of positive, direct tactics when symptomology is less severe could help to prevent student symptomology from worsening. Discrepancies between answers regarding the severity of mental health symptomology, beliefs

about control, stigma, and tactic use indicate that further research is needed on opening the lines of communication between parents and high schoolers about mental health.

The Role of Infant Locomotor Experience in Whole-Body Object Retrieval Tasks

Grace Feiner (Dr. Sabrina Thurman) Department of Psychology

When learning to walk, infants gain experience maintaining upright control while locating and retrieving objects in play spaces, which is crucial in completing daily activities. This skill involves coordination between the upper and lower limbs (e.g., hands, arms, legs), as well as cognitive abilities such as planning and problem solving. However, we know little about how these processes improve or change over time. Here, we examine how infants' problem-solving strategies in a whole-body object retrieval task change as they gain walking experience over time. Ten infants will be observed in 4-6 consecutive weekly sessions, beginning soon after the infants take their first independent steps. At each session, we will assess the infant's hand preference with a brief reaching task while they remain seated. Next, over a series of trials, infants will be prompted to travel across a play space to retrieve a toy from different drawers of an infant-sized dresser. For each trial, we will code the infant's method of locomotion to the dresser, arm and body postures during travel, and how infants orient themselves and adjust their bodies strategically to open the drawer and retrieve the object. We will note changes in these behaviors, and their relation to the infants' measured hand preference throughout a single session and across multiple sessions. This presentation will report pilot data from one or a few infants. However, we expect that as infants gain walking experience, infants will exhibit more useful and strategic postures and bodily orientations, walk to the dresser more frequently than crawl, and learn to use their non-preferred hand to open the drawer, and their preferred hand to reach. We also expect that they will learn to place the non-pulling hand on the dresser for support when opening the drawer. Studying learning in action could make clearer how newly walking infants become better able to adjust their motor behaviors concurrently with their object-related problem-solving strategies as they achieve their goals. These foundational skills could impact knowledge about overlaps across developmental domains involving both cognitive and motor skills, and could help inform interventions designed for children with motor impairments.

Standing Experience and Environmental Contexts: What Affects Infants' Manual Interactions With Objects?

Alexandra N. Grillo (Dr. Sabrina L. Thurman) Department of Psychology

Manual interactions with objects appear early in infancy and are the primary way infants gain information about the world, but these interactions change with postural development. With each novel posture, infants gradually learn about and more readily adapt to the relationship between their new body position and the wider space. In the current study, we investigate how learning to stand affects infants' manual interactions. We ask, do infants modify their manual interactions with objects when trying to stand while hindered or assisted? Participants will be infants who are capable of standing while leaning on an object (novice standers) or who can stand on their own for at least 20 seconds (experienced standers). So far, we have collected data from 10 infants.

Infants were prompted to manipulate an interactive toy on an infant-sized table in three 1- to 2-minute standing conditions: control, supported (infant placed in a standing harness), and hindered (infant stood on foam flooring at a "wobbly" table). Sessions were video-recorded and synchronized for coding in Datavyu. We coded infants' hand use (e.g., unimanual, bimanual) and manual exploratory behaviors: no contact with the object, rudimentary exploration (e.g., banging, slapping), or sophisticated exploration (e.g., fingering, pushing buttons). We used non-parametric Freidman and Wilcoxon tests to assess differences in manual behaviors within and between conditions. Preliminary analyses from the current sample of 10 infants revealed in all conditions, rudimentary and sophisticated behaviors were the most commonly displayed (*p*s < .05). However, no contact was displayed significantly more in the control and supported conditions compared to the hindered condition (*p*s < .05). Rudimentary manual exploration was more commonly displayed in the hindered condition compared to the control (p < .05). All other forms of manual exploration were similar across conditions. In all conditions, infants displayed significantly more unimanual than bimanual behaviors (*p*s <.05). These results suggest infants' manual interactions with objects are affected when standing upright becomes more difficult. Gains in postural experience may help infants better control their body and adapt to environmental demands. This could impact object interactions, a main strategy of information gathering, leading to differences in learning opportunities.

Perceived Partner Accommodation Among Couples With Post-Traumatic Stress Disorder (PTSD)

Robyn M. Lane (Dr. CJ Fleming) Department of Psychology

Mental illness is an immense public health concern, with over 60 percent of those diagnosed not seeking professional help. Social support, such as that from romantic partners, is widely shown to aid treatment of those diagnosed with mental health disorders, such as post-traumatic stress disorder (PTSD). Previous research has suggested that partners may influence one another's health behaviors in several ways. One example being through partner accommodation, defined as behaviors elicited in response to symptoms intended to decrease distress and minimize conflict. While partner accommodation often stems from good intentions, it can lead to increased PTSD symptomology and decreased help-seeking behavior. Since limited research exists on the factors that contribute to this process, the present study sought to investigate partner accommodation for mental health concerns by examining the impact of PTSD symptomology, relationship satisfaction, and treatment beliefs. The sample consisted of 58 adults recruited using online and local advertising who reported being diagnosed with post-traumatic stress disorder and currently in a romantic relationship. Utilizing an online survey method, each participant was asked about their mental health history, romantic relationships, and help-seeking perceptions and behaviors. The linear regression model predicting perceived accommodation was significant ($F(3,33)=8.46$, $p<.001$, $R2 =.46$), with PTSD symptomology ($p=.002$) and social norms ($p=.021$) emerging as significant predictors of perceived partner accommodation for the partner diagnosed with PTSD. These findings suggest that when PTSD symptoms are severe and social norms around help-seeking are not accepting, individuals perceive a higher level of partner accommodation. This may ultimately reflect that when individuals feel uncomfortable seeking help outside their home, they often search for help from family members, which may result in higher levels of

accommodation. Since these behaviors meant to mitigate PTSD symptomology or distress may actually have deleterious effects, further research is needed to understand this process and to potentially adjust patterns of mental health behaviors and responses at home. Further implications of these findings, as well as the study's limitations, are also discussed.

Exploring Outdoor Play: A Mixed-Methods Study of the Quality of Preschool Play Environments and Teacher Perceptions of Risky Play

Annie C. LeMasters (Dr. Maureen Vandermaas-Peeler) Department of Psychology

Risky play occurs when play is accompanied by thrilling feelings with a real or perceived level of risk (Brussoni et al., 2015). Research has demonstrated cognitive, social, and physical benefits of engaging in risky play for children's development (Sandseter, 2009). However, risky play opportunities are declining as children are spending less time outdoors as compared with previous generations. Elements of the sociocultural context, such as playground quality, and teachers' and parents' attitudes about risk, influence outdoor play opportunities. This study explored the connections between outdoor play environment quality and teacher perceptions of play in 10 federally funded preschools in two neighboring counties. The quality of the 10 preschools' outdoor play environments was assessed using The Seven Cs Scale, an environmental rating scale of the character, context, connectivity, clarity, chance, change, and challenge of outdoor playgrounds (Herrington, Lesmeister, Nicholls, & Stefiuk, 2007). Playgrounds scored lowest in challenge, demonstrating a lack of risky play opportunities such as play at great heights and high speeds. Playgrounds scored higher in context scores, demonstrating appropriate safety measures and clear boundaries, and higher in connectivity scores, illustrating appropriate entrances, exits and ample pathways. Playgrounds could be improved by incorporating more diverse opportunities for risky play into their design. The Tolerance for Risk in Play Scale (Hill & Bundy, 2012) was used to assess 58 teachers' perceptions of risky play. On a scale of 0 (lowest risk tolerance) to 100 (highest risk tolerance), the average risk tolerance score was 29. Although a minority of respondents reported tolerance for risky play, most teachers were unaccepting of risk. Across the categories of risky play, teachers were most accepting of rough and tumble play and least accepting of play with dangerous elements and tools. During a focus group, teachers reinforced these findings and also expressed concerns regarding safety regulations that restrict play. Findings highlighted the importance of the sociocultural context for risky play opportunities and the need for further teacher education on the importance of risky play.

Effects of Oral 5-HTP Administration on Wisconsin Card Sorting Test Performance

Elena M. Lostoski (Dr. Mathew Gendle) Department of Psychology

Neurotransmitters are chemicals released by nerve cells in the brain that send signals to other nerve cells and play a fundamental role in information transmission and processing. This study examined the effects of 5-hydroxytryptophan (5-HTP), the precursor to the neurotransmitter serotonin, which is both naturally occurring and sold over the counter as a dietary supplement. Historically, it has most often been utilized to treat mood disorders (Turner et al., 2006; Birdsall,

1998). Theoretically, consuming 5-HTP supplements should not affect serotonin levels in the brain because autoreceptors should prevent the release of any additional synthesized serotonin. However, there is evidence from behavioral studies to suggest that the ingestion of supplemental 5-HTP may paradoxically reduce levels of dopamine, another neurotransmitter, in the brain under some circumstances (Gendle & Golding, 2010; Gendle et al., 2013). This double-blind, placebo-controlled study intended to further explore the hypothesis that oral 5-HTP administration produces neurobehavioral effects consistent with dopamine reduction. Eighty-four university undergraduates were recruited from an institutional participant pool at a mid-size university in the southeastern U.S. Participants were randomly assigned to receive capsules containing either a total oral dose of 150 mg 5-HTP or a matched placebo. They were instructed to take the capsules following a specific schedule prior to arriving at the lab for assessment. All participants completed the Wisconsin Card Sorting Task (WCST), a measure of attentional set shifting that is sensitive to behavioral changes associated with reductions in dopamine, but not to those associated with increases in serotonin (Roberts et al., 1994). The groups did not significantly differ on any WCST outcome (all p's >= 0.23). This result suggests that oral 5-HTP did not cause a dopamine deficiency as was hypothesized in prior published research, or that participants' levels of compliance in consuming the 5-HTP or placebo before the testing session was low. Dietary supplements are regulated as food rather than drugs, meaning that the claims made regarding their psychoactive effects are not guaranteed to be accurate. This finding allows us to better understand the potential effects of one such over the counter dietary supplement.

Anxiety & Self-Esteem: Predictors of Engagement & Burnout in the College Classroom?

Heather A. Pastore (Dr. Erika C. Lopina) Department of Psychology

The current study applied the Job Demands-Resources (JD-R) Model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) to understand unique individual characteristics that may be predictors of academic engagement (i.e., feeling energized, committed, and absorbed in one's work; Schaufeli & Bakker, 2003) and burnout (i.e., feeling stressed and disillusioned with one's work, Demerouti et al., 2001). The JD-R Model suggests that demands are obstacles that make performing work difficult (e.g., work overload), which in turn leads to burnout; resources are defined as aspects of the job that make performing work easier (e.g., supervisor support), which results in engagement. Existing research examines specific job demands and resources; however, there is a growing interest in the individual characteristics that may play a role in workers' perceptions of demands and resources and the resulting burnout and engagement. The current study focused on two individual characteristics, apprehension and self-esteem. Apprehension, the anxiety or fear that something bad may happen (Daly & Mccroskey, 1975), may influence perceptions of the job demands. Self-esteem, the positive perception of one's own worth or abilities (Rosenberg, 1979) may influence perception of job resources. Thus, we hypothesized that: 1) class apprehension would be positively related to burnout; and, 2) self-esteem would be positively related to engagement. College-aged students (n=143) were recruited through convenience sampling to participate in a two-part online self-report survey. The first part of the survey contained scales regarding apprehension and self-esteem, as well as demographics; part two (administered ten days post part one) was a short survey containing questions about engagement and burnout. Multiple regression analyses were conducted and both hypotheses were

supported: 1) class apprehension was uniquely positively correlated to burnout; and, 2) self-esteem was uniquely positively correlated to engagement. Additional hypotheses and results will be presented and discussed. This study adds to literature by expanding the empirical support around individual characteristics that might function to predict student engagement and burnout.

Change Detection and Recollection in Younger and Older Adults: An Eye Tracking Study

Emma M. Siritzky, & Hannah P. Greenwood (Dr. Amy Overman) Department of Psychology

Prior research has found that hippocampal function is related to eye movements in response to unfamiliar stimuli (novelty preference) in the Visual Paired Comparison task (VPC; Manns, Clark, & Squire, 2000). A separate line of research found that age differences in memory performance when participants are required to notice a change between stimuli (change detection) and remember changes that were previously detected (change recollection; Wahlheim, 2014). It is unknown whether VPC performance is related to change detection and change recollection performance, which is critical for understanding neural mechanisms of memory. In this study, younger (age 18-25; n=33) and older adults (age 65+; n=31) were tested using a novel experimental design in which a modified version of VPC measured novelty preference for image-based stimuli, combined with associative memory tasks that measured change detection and change recollection (Wahlheim, 2014). Participants first completed VPC, in which an image was paired with a copy of itself during a familiarization trial, after which one copy changed to a different image (recognition trial). Eye movements were recorded using a Gazepoint eye tracker. This was followed by a memory task in which the same images were presented in either intact or recombined pairs (change detection). The subsequent task presented a cue image and participants were asked to recall what the cue's associate had been during the change detection phase, and whether they recalled a prior associate (change recollection) from the VPC phase. In VPC, both young and older adults exhibited a novelty preference such that they spent more fixation time looking at the unfamiliar than the familiar image. In change detection, both groups performed similarly; however, in the cued recall portion of change recollection, young adults performed significantly better than older adults. Further, young adults' novelty effect in the VPC task was significantly positively correlated with performance in change detection and cued recall, whereas this correlation was not significant among older adults. (All p's$<.01$). The results provide novel eye-tracking evidence that item encoding does not predict associative memory in older adults, providing new support for the Associative Deficit Hypothesis (Naveh-Benjamin, 2000; Overman et al., 2018).

Recommending Help in a Suicide Crisis

Brittany E. Walsh (Dr. CJ Fleming) Department of Psychology

Suicide is the second leading cause of death for college students (Drapeau & McIntosh, 2015). Seeking professional help when suicidal can be lifesaving, but suicidal individuals usually turn to friends or family instead of professionals. When they do go to professionals, though, 89% do so because of direct influence from other people (Downs & Eisenberg, 2012). Thus, the purpose of this research project is to examine how college students respond to a suicide crisis vignette

involving a hypothetical peer and the effect of the peer's gender and perceived sexual orientation. An online survey was conducted with 158 adults ages 18-25 from Amazon's Mechanical Turk service. The study presented participants with one of four vignettes of a hypothetical peer exhibiting suicidal ideation. This peer was either male or female and either in a same-sex or opposite-sex relationship. Participants then identified the problem and if they would recommend the peer seek help, and then answered questions regarding their beliefs about suicide, help-seeking, and attitudes towards LGBTQ+ individuals. Data were analyzed using a logistic regression, regressing the predictor variables onto the decision to tell someone about the suicidal peer (yes/no they would/would not tell someone else). The overall regression model was significant, X_2 (4) = 42.16, $p < .001$, Nagelkerke R_2 = .32. Significant relationships were found between the decision to tell someone and level of concern about the suicidal peer (OR = 1.37, p = .017), suicide literacy (OR = 33.31, p = .001), and attitudes towards help-seeking (OR = 1.10, p = .011). These data indicate that the more concerned the participant was about their peer, the more they knew about suicide, and the more positively they felt about mental health help-seeking, the more likely they were to tell someone about their concern. These findings suggest that an important way to increase the likelihood of college students reaching out when they notice a friend might be suicidal is to increase their knowledge of suicide and their attitudes towards seeking help for any mental health concern.

Public Health Studies

Transferring Knowledge into Action: Examining the Impacts of a Rural Indian Adolescent Girls Program at the Individual, Familial, and Community Levels

Griffin P. Barriss (Prof. Amanda Tapler) Department of Public Health Studies

The Comprehensive Rural Health Project (CRHP) in Jamkhed, India, uses the evidence-based "Jamkhed Model" to solve public health issues by utilizing communities' existing resources and adapting public services in consideration of communities' values. CRHP's Adolescent Girls Program (AGP), a critical component of the Jamkhed Model, teaches girls valuable health and social justice lessons to be agents of change in their communities. While it is believed that AGPs play a pivotal role in their communities (CRHP, 2014), resource restraints inhibit CRHP from conducting research on the impact of AGP graduates on their communities', reflecting similar gaps in the literature regarding the impact of AGP graduates in communities across the globe. Building on existing relationships between Elon University in North Carolina, USA, and CRHP, this project investigates how knowledge gained by AGP graduates diffuses into their communities. By conducting semi-structured interviews with AGP graduates in cooperation with the CRHP research team, we will describe what knowledge graduates gain from the program and how that knowledge influences AGP participants, their families, and their communities in the short term and potentially for years after graduation. Using convenience sampling, the most appropriate system of data analysis given CRHP's community connections and graduates' sporadic availability, 25 to 30 AGP graduates between the ages of 18 and 35 will be interviewed in local villages around the Jamkhed block in Maharashtra, India. In January 2020, we conducted pilot interviews and focus groups with local stakeholders to ensure that interviews would be effectively phrased to elicit the anticipated responses. Pilots allowed us to test our interview

questions and rework questions addressing community engagement, AGP programming, and plans for raising children among AGP graduates that were less clear in their original vernacular. Since then, the CRHP research team has begun collecting data from local AGP graduates, which will be completed by Summer 2020. At that time, the Elon researchers will join the CRHP research team for data input and analysis. Our findings will contribute to the literature on adolescent girls in community health interventions across the globe and help CRHP assess the impacts, efficacy, and outcomes of their existing programs.

A Qualitative Longitudinal Study of Adoption and Disclosure Narratives Among U.S. Families With Internationally Adopted Children Living With HIV

Amanda Bingaman (Dr. Cynthia Fair) Department of Public Health Studies

In 2010, loosened restrictions on immigration of HIV-infected individuals allowed children with HIV to be adopted into the U.S.. Consequently, an increasing number of families pursued the adoption of international children with HIV, yet little is known about their families' experiences. This project explores parents' adoption and HIV disclosure narratives, both of which may influence adjustment to the HIV diagnosis as well as their child's identity development. A purposive snowball sample of 24 parents of 27 internationally adopted children with HIV (IACH) was recruited at two pediatric infectious disease clinics. All parents identified as white and 22 as Christian. Mean age of children at enrollment was 9.2 years. Parents completed two semi-structured audio-recorded phone interviews approximately one year apart. The first interview centered on the adoption story and HIV disclosure decisions. The follow-up interview focused on parents' and children's experiences within their families and communities. Drawing on analytic principles of constant comparison, transcripts were analyzed for emergent themes. Analyses revealed that adoption and disclosure narratives changed over time. Parents took cues from their child to determine how much adoption and HIV-related information to divulge. Parents wrestled with when to share potentially traumatic adoption-related information and decided to withhold information based on the child's age and maturity, nature of the adoption story, faith, and contact with the birth family. Parents revisited adoption narratives as children matured and began to acknowledge racial/ethnic/cultural differences between themselves and their adoptive parents. Adoption narratives were shaped by level of HIV disclosure to the child and became increasingly complex as children gained understanding of their HIV status. Parents indicated that "HIV is socially, but not medically difficult." They discussed medical aspects of their child's diagnosis with them first and, subsequently, sought to help their child prepare for HIV-related stigma by normalizing HIV in the home and building their child's confidence. Adoption and HIV disclosure narratives play an important role in the development of IACH, as adopted children learn to manage their illness and develop their own unique identity across the lifespan. Understanding these narratives may help healthcare providers offer higher quality individualized comprehensive care to IACH.

Psychotherapeutic Interventions and Utilization by Pediatric Psychosocial Providers

June Burke (Dr. Cynthia Fair) Department of Public Health Studies

Children with cancer and their families experience drastic challenges in their lives as they face physical changes due to medical treatment, various alterations in social and familial roles, and the sudden threat of death. The Standards of Psychosocial Care for Children with Cancer and their Families are evidence-based standards designed to serve as guideposts for psychosocial care to pediatric cancer patients and their families. One standard states, "All youth with cancer and their family members should have access to psychosocial support and interventions throughout the cancer trajectory". This study was designed to identify and explore the psychotherapeutic interventions providers are currently using with pediatric cancer patients and their families. An online survey with a list of psychotherapeutic interventions based on relevant literature was disseminated to psychosocial care providers through national and international professional organizations' listservs. Two hundred forty-two psychosocial providers responded to the survey, including psychologists (41%), social workers (29%), music therapists (10%), child life specialists (5%) nurses (4%), psychiatrists (3%) and other (8% e.g. health educators, teachers). Most providers identified as either early (39%) or mid-career licensed professionals (34%) and worked in the United States (80%). Participants endorsed psychotherapeutic interventions provided to patients and their families and the frequency of interventions offered. Interventions most often offered to pediatric patients were psychoeducation (66%), health promotion interventions (e.g. exercise interventions, online apps) (60%), mindfulness-based interventions (58%), cognitive behavioral therapy (57%), and supportive individual therapy (54%). For caregivers, psychoeducation (62%), referrals to social support groups (52%), anticipatory guidance (50%), and cognitive behavioral therapy (47%) were most commonly offered. Psychosocial providers offer a wide range of psychotherapeutic interventions to pediatric cancer patients and their families. Cognitive behavioral therapy and mindfulness-based interventions are frequently used evidence-based interventions. However, evidence-based interventions and protocols designed specifically for the pediatric oncology population (e.g. Bright IDEAS Problem-Solving Skills Training, Surviving Cancer Competently Intervention Program-New Diagnosed) were not commonly endorsed, further underscoring the importance of fully integrating the Standards of Psychosocial Care for children and their families. Future research should focus on increasing accessibility to population-specific evidenced-based interventions and translating science to practice.

Childbirth Outcomes and Responses from Mothers with Doula-Assisted Births in Alamance County

Elise R. Granath (Dr. Stephanie Baker) Department of Public Health Studies

The Alamance Volunteer Doula Program has provided women in child labor and birth with doulas since 2017. Doulas are trained to offer physical and mental support measures to expectant mothers before delivery, during labor and birth, and postpartum, and are proven to increase birth outcomes for both the mother and baby (Gruber et al., 2013). The program was created in an effort to reduce infant mortality, maternal mortality, and racial and socioeconomic-driven health disparities within Alamance County by offering a doula to be present at labor and delivery, should the mother desire one. The purpose of this research is to collect and analyze qualitative data from the women who utilize these doulas during their labor and delivery in order to understand birth experiences, outcomes, benefits, and areas of improvement. Mothers with

doula-attended births at Alamance Regional Medical Center were asked to complete an open ended, multiple choice, and scaled-response survey to gather data on the birth, baby, and doula. The analysis included multiple choice and scaled-response data from 30 mothers and open-ended responses from 15 mothers who are ages 15-44, 64% White, 18% African American, and 18% Hispanic or another race. Results show overwhelmingly positive outcomes, with 100% of mothers reporting that having a doula was beneficial to their experience. Common sentiments among mothers were feeling empowered, comforted, courageous, reassured, and in control of their birth experience. 33% of respondents reported that their doula was a source of valuable information and support for the mother's partner and family as well. The aspects of the program identified for improvement are marketing the program more and encouraging mothers to focus on birth goals rather than birth plans, as 47% of mothers felt their birth was not what they envisioned. Overall, these results show a positive effect on the mother's birth experience as well as identify areas for improvement, and these findings may allow current and future community doulas within Alamance County to better understand, care for, and support their patient population.

"It's About Labels": Parenting Experiences Amongst Caregivers of Adolescents and Young Adults Living With Perinatally-Acquired HIV (PHIV)

Ashley Jutras & Kathryn Weitzner (Dr. Cynthia Fair) Department of Public Health Studies

Prior to the advent of antiretroviral treatment in the early 1990's, approximately 30% of children born to HIV-positive mothers were HIV-infected, many of whom did not survive early childhood. Children born with HIV typically experienced upheaval in their daily lives due to parental illness and absence resulting in the need for additional caregivers. Today the risk of mother-to-child- transmission in the US has reached a record low and youth with perinatally-acquired HIV (PHIV) are living well into young adulthood. While there has been extensive research related to the social impacts PHIV has on individuals, little recent research has examined their broader family system. Because of their lived experience, caregivers of adolescents and young adults with PHIV have a unique perspective regarding the ways in which the social context of HIV has impacted parenting relationships. This qualitative exploratory project examines themes found in caregiver/child relationships among 13 caregivers (12 females) who cared for adolescents and young adults with PHIV over the age of 14. Participants included eight biological mothers (all HIV-positive), two caregiver relatives (maternal aunt and older sister), two adoptive/foster mothers and one step-father. Nine identified as African American, two as white, one as African, and one as Hispanic. Mean age of participants was 50.5 years (range 40-75). Transcripts from semi-structured interviews focused on parenting experiences were coded for emergent themes. Analyses revealed several common themes including a strong sense of pride related to their children's accomplishments, a sense of hopefulness in the reduction in HIV-related stigma, and the utilization of doctors and social workers as forms of support. However, they also noted continued HIV-related discrimination in the medical field and felt that their children were still judged based upon the labels associated with HIV. Participants explored aspects of parenting an adolescent with PHIV and indicated focus on safe-sex as compared to abstinence-based discussions, fear of HIV transmission to future generations, and challenges in allowing their adolescent to self-manage their illness. Considering these unique

challenges felt by caregivers, collaboration amongst social workers and healthcare professionals to identify support strategies will benefit both caregivers and adolescents and young adults with PHIV.

Understanding Social Media's Impact on Breastfeeding Black Millennials

Yasmeen I. Lee (Dr. Stephanie Baker) Department of Public Health Studies

The World Health Organization recommends six months of exclusive breastfeeding for infants. Race disparities exist, where only 27.9% of black women exclusively breastfeed at 6 months compared to 45.1% of white mothers. Previous research suggests that these disparities are due to a variety of factors including poor paid leave policies, racism, and bias. This mixed-method study aimed to understand the racialized experiences of breastfeeding among black millennials and whether social media is a space that could impact the effects of racism. Social media has a significant influence on black millennials' lives, yet little research has explored its connection to breastfeeding. The quantitative phase involved a 48-item online survey (N=51) and included questions about demographics, breastfeeding, social media use, and the Major Experiences of Discrimination Scale. Quantitative survey results informed the qualitative phase of the study which included three focus groups (N=15). Participants were recruited through social media sites, emails to breastfeeding/black maternal health organizations, and local partnerships. Inclusion criteria included self-identification as a black/African American woman, born between 1981-1996, and having at least one child five years or younger. Quantitative results showed that 82% of mothers used social media for most of the day and mothers that breastfed longer than 6 months mostly used Facebook and Instagram. Women who reported zero experiences of racism were 11 times more likely to have breastfed for 6 months or longer. Women who saw representation of black women breastfeeding in public and as lactation consultants were 2.8 and 1.4 times more likely to breastfeed past 6 months, respectively. Five major themes emerged from the qualitative analysis including: (1) institutional racism & barriers, (2) challenges to motherhood, (3) black experiences, (4) breastfeeding in the millennial age, and (5) hopes for the community. Results show that black millennial mothers use social media to support their breastfeeding journey, although not specifically as a strategy to impact racism/bias, though they expressed being treated differently and poorly due to race. Further research should explore differences between online social support and in-person support groups for black millennial mothers, additionally to how social media can become more inclusive for this population.

African American Women's Experiences with Birth After a Prior Cesarean Section

Megan W. Miller (Dr. Stephanie Baker) Department of Public Health Studies

Women who have had a cesarean section (c-section) and become pregnant again may choose to have a planned repeat c-section or a vaginal birth after a cesarean (VBAC). There is limited research on women's experiences with pregnancy and birth after an initial c-section, especially for African American women who have higher rates of c-sections as well as higher rates of maternal morbidity and mortality compared to white women. Research suggests that although more African American women than white women prefer and attempt VBACs, African

American women have higher rates of VBAC failure. This study aimed to characterize the pregnancy and birth experiences of African American women who had a successful VBAC, a failed VBAC, or a planned repeat c-section. Additionally, this study sought to understand the factors that influence the mode of delivery decision (the decision between either a VBAC or a planned repeat c-section) and how race and racism impacts African American women's experiences during pregnancy and birth. Eligible participants (n=25) self-identified as African American, had a c-section and a subsequent birth(s) in the past ten years, were aged between 27-42 years old, and were educated past high school. Each participant was individually interviewed via phone call. Interview transcripts were analyzed using the Sort and Sift, Think and Shift method that aims to minimize researcher bias and emphasize the voices of the participants. Six themes emerged: the importance of support during pregnancy and childbirth, the value of autonomy in maternal health decision making, the impact of providers on pregnancy and childbirth satisfaction, the role that racism plays in African American women's birth experiences, the dichotomy between birth expectations versus actual experiences, and the influence of prior birth experiences on future delivery decisions. Some participants recalled a positive experience however, the presence of implicit and explicit racism, limited autonomy, and lack of support indicates that birth after a prior c-section for African American women should be improved, particularly through the work of providers. Providers should foster open communication, positive language, and understand the structural components of racism in addition to racial bias to improve the experience for African American women.

"We Are Not Different Than Others": A Qualitative Study of Career Aspirations, Relationships and Childbearing Among Hispanic/Latino Adolescents With Perinatally Acquired HIV

Maria A. Santana-Garcés (Dr. Cindy Fair) Department of Public Health Studies

Little research has investigated Hispanic/Latino youth with perinatally-acquired HIV (PHIV), that comprise 26% of those living with PHIV and are now surviving into young adulthood. This population faces a myriad of challenges such as stigma from peers and family members, rejection from potential sexual partners, and difficulty navigating the United States healthcare system. Hispanic/Latinos are also disproportionately affected by high rates of poverty and low educational status. This qualitative study examined the lived experiences of 18 Hispanic/Latino adolescents living with PHIV recruited from two pediatric clinics. Mean age of participants was 20.8 years (range 15-29; 12 females and 6 males). Interviews included questions regarding adolescents' future career aspirations, relationship and childbearing intentions, and narratives of living with PHIV. Interview transcripts were analyzed for emergent themes. Many did not view HIV as a barrier to their career aspirations. Two participants were married and eight were in committed relationships. Of the unmarried participants (n=16), 15 expressed a desire for marriage. While participants frequently tried to minimize how HIV had influenced their romantic relationships, every participant acknowledged that their illness had caused issues related to disclosure along with fears of rejection and transmission. Thus, they stressed the importance of maintaining a suppressed viral load by adhering to treatment. Participants with children (n=7) expressed a strong desire to continue educational and career goals for the benefit of their children. The majority of participants expected to have children in the future and did not

consistently use contraceptives or condoms. In addition to living with HIV, participants also frequently discussed adverse childhood experiences including incarceration of a parent, death or suicide of a parent, and physical/verbal/sexual abuse during childhood. While living with a stigmatizing illness certainly influenced their daily lives, the challenges of living in poverty and experiences of loss and trauma also shaped their well-being. Hispanic/Latino adolescents with PHIV may benefit from the provision of trauma-informed and culturally competent care with the goal of supporting educational goals, risk reduction, and managing fear of rejection. Future research needs to assess current interventions with the aim of supporting this vulnerable population in their transition to adulthood.

Religious Studies

"We Become Capable of Handling Everything": Gender and Gulf Migration in Kerala, South India

Kathryn B. Gerry (Dr. Amy L. Allocco) Department of Religious Studies

Worker migration from Kerala to the Gulf touches virtually every household in this South Indian state. Women–whether as family members of migrants or those who migrate themselves–have a unique set of relationships with migration. Drawing on 55 semi-structured interviews and one month of ethnographic fieldwork in India, this paper examines the intersections of gender and migration in contemporary Kerala. I argue that the pervasive phenomenon of worker migration from Kerala to the Gulf catalyzes significant social change in terms of gender roles and expectations and newly positions women as economic agents. My fieldwork reveals that women take jobs abroad out of personal circumstances, especially economic necessity, as well as to align with local ideas about modernity. Furthermore, it reveals that women whose spouses emigrate experience increased independence and autonomy in their daily lives at home. Both categories of women are attuned to others' perceptions of their roles vis-à-vis migration, which range from respect and admiration to jealousy and disdain. Despite these sometimes negative evaluations, women report that they are empowered on the everyday level by worker migration. This project builds on scholarship examining the status of women in Kerala (Eapen and Kodoth 2003), the experiences of migrant spouses (Osella 2016), and female Christian nurses' Gulf migration (Percot 2006). It extends this work in new directions by analyzing the personal narratives of individual women who work in the Gulf, head their own households in Kerala, and experience stigmatization because of emigration and absence.

Grief Unobserved: The Portrayal of the Jerusalem Temple and the Jews in Justin Martyr's *Dialogue with Trypho*

Candace M. Hall (Dr. Lynn Huber) Department of Religious Studies

The destruction of the Second Temple in Jerusalem by the Romans in 70 C.E. was a tragic moment in Jewish history. Because of the Jewish origins of Christianity, language surrounding the temple and its destruction was actively present in the movement's earliest writings (e.g. the epistles of Paul and the gospel of Luke). However, later Christian apologists interpreted the

destruction and subsequent exile as evidence for God's rejection of the Jewish people. Because of the nature of this change, the question arises of *where did this fundamental shift take place*? In an effort to engage this question, this paper contrasts the works of Justin, a gentile convert to Christianity, who utilized anti-Jewish arguments regarding the temple in his *Dialogue with Trypho* c. 155, with the writings of the earliest followers of Jesus of Nazareth (most of whom were Jews). In addition to the primary sources from the time period in question (the eyewitness account of Josephus in addition to the New Testament writings), this paper uses the works of influential scholars (Peter Schäffer and Paula Fredriksen among others) to place both the original Christians and Justin within their own historical frameworks. As a result, this paper argues that the assertions of Justin and the writings of the first followers of Jesus fundamentally differed from each other. This dichotomy sheds light on some of the origins and causes of anti-Judaism within Christianity, a trend that persists to this day.

Religious Boundaries and Cultural Identity in Miami's Haitian Community

Katie L. Hooker (Dr. Amy Allocco & Dr. Brian Pennington) Department of Religious Studies

In their study of Haitian immigrants' religious practices in Miami, Terry Rey and Alex Stepick identify "a unifying Haitian religious *collusio*," an amalgamation of Christian and Vodou traditions, that they argue underlies and transcends religious difference in Haiti and the Haitian diaspora (Rey & Stepick, 2013, p. 5). The four-week collaborative research project I conducted in Miami during the summer of 2019, however, exposed a different landscape than the picture of religious harmony Rey and Stepick describe. Drawing on the ethnographic data we collected in Miami's Haitian community, this paper examines the porosity—or lack thereof—between Christian and Vodou traditions for Haitian immigrants in Miami and their perceptions of their own religio-cultural identities. My study relies on thirteen long-form interviews, participant-observation at religious sites in Miami, and the vital guidance of my research partner, Elisson Adrien, a Haitian native himself. Our research participants expressed a multitude of beliefs concerning Haitian religion and identity, many of which were rooted in a deep historical self-consciousness as well as an awareness of new struggles that Haitians and Haitian-Americans face today. These interviews revealed discrepancies between how Haitians view themselves and how Haitians believe Americans perceive them, juxtaposing insider and outsider notions of Haitian cultural identity. My paper describes and analyzes the varying perspectives my research subjects took on the question of how the boundaries of Haitian religions are and should be defined, noting the differences between self-identified Christian and Vodou practitioners. Ultimately I argue that—contrary to the *collusio* Rey and Stepick identify—the persistence of colonial attitudes and paternalism, combined with heightened tensions about immigration more broadly, are contributing to a chasm between Haitians and non-Haitians in the United States today vis-à-vis religious practice and cultural identity.

Reclaiming the Moral High Ground: Reframing Our Understanding of the Christian Position on Abortion

Lucy Jones (Dr. Rebecca Todd Peters) Department of Religious Studies

While one in four American women will have a legal abortion in her lifetime, women are still required to justify their abortions. The cultural conversation in the United States around abortion is dominated by this framework of justification, which deems abortions for reasons other than prenatal health, rape, incest, or the life of the mother (PRIM), as unacceptable. The result of this is a national conversation that presupposes the immorality of abortion and that paints women as irresponsible, selfish, and careless. This conversation fails to recognize the complexity of existing obligations on women's reproductive decisions. While the national conversation often assumes the singularity of an anti-abortion "Christian" position, Christians have been on both sides of the abortion debate since long before abortion was legalized. My research examines the missing narrative of a Christian position in support of abortion, and the dangerous impacts of a national conversation based on the assumption that all Christians believes abortion is immoral. In order to understand the establishment of conservative Christian views on abortion as the dominant religious voice over the last fifty-five years, this research tracks the activities of the Religious Right and the Religious Coalition for Reproductive Choice since 1973. Finally, I discuss the Reproductive Justice framework, which was created in 1994 by twelve black women and seeks to reframe how we think about women's reproductive lives in this country. I conclude by arguing for Christianity to address the historical roots of reproductive oppression that women experience on the basis of conservative Christianity, Christians need to more intentionally engage with Reproductive Justice as part of their intersectional, anti-racist, and feminist approach to social justice.

Queering Ancient Sex Objects: Representations of Prostitutes in Classical Greece

Phoebe A. Mock (Dr. Lynn Huber) Department of Religious Studies

An *Askos*, a ceramic vessel, from around 440 BCE in the Kerameikos Archaeological Museum in Athens, Greece challenges our understanding of ancient Greek gender and sexuality. A woman, likely a *hetaira*, also known as a courtesan or a prostitute of the elite class (Glazebrook, 2011), uses a pillow for balance while a man penetrates her sexually from behind. Here, it can be argued that the pillow is no longer being used for its normal function (its "forness" or what its intended use is for, as theorist Sara Ahmed would say); rather, the pillow has become a queer object by being used for a sexual act. In this paper, I explore the queer use of objects, using ideas from Sara Ahmed's *Queer Phenomenology* and *What's the Use?* (Duke University Press, 2019), in ancient Greek depictions of prostitutes, both visual and textual (e.g. Demosthenes' defense of Neaira, *Oratations*). The dominant narrative of sexuality in ancient Greece emphasizes the act of penetration between the subordinate actor (women, children, and slaves) and the superordinate actor (adult male citizens), where the superordinate is always supposed to be the one *to penetrate* and has agency (Halperin, 1989). The different usage of objects signals to the viewer non-normative sexual interactions that complicate the dominant narrative of sexuality in ancient Greece. I argue that the queer uses of these objects signals that the prostitute, despite her subordinate position in this representation, herself should be understood as "queer." Her use of objects demonstrates an agency that challenges the viewer to see her outside of the "normal" trajectory followed by women during this time. This reconsideration prompts us to re-look at other such representations with queer eyes as a way of understanding ancient sex and sex-workers.

Race, Religion and Nationalism: Jewish Responses to White Nationalist Movements

Hannah Thorpe (Dr. Geoffrey Claussen) Department of Religious Studies

Race, Religion, and Nationalism: Jewish Responses to White Nationalist Movements Hannah L. Thorpe (Dr. Geoffrey Claussen) Department of Religious Studies On August 12th, 2017, over 100 white nationalists gathered in Charlottesville, Virginia at a rally to protest the removal of Confederate monuments and unite far-right extremist groups; the chant "Jews will not replace us" rang throughout the city's downtown mall as Nazi symbols were displayed. A number of other aggressive white nationalist threats and attacks have occurred in the United States over the past three years, including the Tree of Life massacre, the deadliest antisemitic attack in American history. Over the course of 6 months, I conducted ethnographic research at a synagogue that had directly experienced white nationalism in order to examine shifting conceptions of racial identity, attitudes towards ethnic nationalism, and Jewish identity. Drawing on 26 interviews with congregants and synagogue leaders, I analyze how whiteness is negotiated by members of this Jewish community, some of whom reject whiteness completely, some of whom grapple with the weight of whiteness, and others who are ambivalent towards race in general. I will argue that the way race is conceptualized influences the way participants view white nationalist movements, if they stand in solidarity with other targeted groups, and how they understand Jewish values and Jewishness as motivating their responses to white nationalism. The majority of participants in this congregation feel that their Jewish identity, informed by Jewish values that challenge "whiteness" as a power category calls them to stand up to white supremacy and resist the oppression of minority groups.

Sociology & Anthropology

Nostalgia in Travel: Examining Walt Disney World as a Destination That Curates Sentimentality

Victoria Egan (Dr. Alexis Franzese) Department of Sociology & Anthropology

Nostalgia has often been defined as a sentimental longing for the past. Traveling often creates feelings of happiness and a longing to return to the past for individuals. Walt Disney World is one of the most popular tourist destinations in the world and is known for the nostalgia that vacations to this resort create for families. This research examines the role that nostalgia plays in travel, using Walt Disney World as a case study. The essential questions of this research are: (1) how does Walt Disney World create a sense of nostalgia for its guests and, (2) what elements of Walt Disney World do guests find the most nostalgic? The study relies on survey data collected with a sample of individuals who follow a Disney guidebook author on Twitter, and through observations in Disney parks. The survey questions addressed what guests of Walt Disney World found most memorable about their visits. Respondents included over four hundred individuals with a mean age of 41 years. Observational data assessed elements in all four of the theme parks as well as Disney transportation from the Orlando International Airport. Results indicate that through the use of music, scents, marketing and promotional videos, and photographic locations, Walt Disney World creates a sense of nostalgia for its guests. This research is important in

understanding how the memories Walt Disney World advertises are created and curated, as well as the cultural, social, and historical significance of creating such an environment. The results further display that there is a connection between nostalgia and the self, and that different locations can create nostalgic feelings for various individuals. Finally, it was discovered that evoking nostalgia is something that can be manipulated to create a form of escape and create interest in visiting a particular place. These results are valuable in understanding the role that nostalgia plays in tourism and how nostalgia is cultivated in travel and leisure settings.

Perceptions of Healthcare by Women with Hepatitis C Virus and History of Opioid Use in North Carolina

Gabrielle M. Giroux (Dr. Jennifer Carroll) Department of Sociology & Anthropology

The aim of this research is to investigate the perceptions of provisional medical care given to women with a history of illicit opioid use and who have been diagnosed with Hepatitis C virus (HCV). In the years 1999 to 2016, more than 12,000 North Carolinians have died from opioid-related overdoses, Opioids, which include heroin, synthetic fentanyl and some prescription pain medications, are a class of drugs that are used to reduce pain. They reduce intensity of pain signals that reach the brain while also affecting the areas that control breathing and emotion (NCDHHS). HCV is a viral infection that is spread through blood, and its acquisition is closely linked to opioid use due to needle sharing among people who inject opioids. Though HCV is curable, reinfection is a major concern within the population of people who inject drugs (PWID), often resulting in treatment being denied to individuals who are actively using. Women with opioid use disorder are an especially vulnerable population due to sex-related stigma, discrimination, and marginalization, all of which negatively impact access to HCV treatment, prevention and care. In recent literature that investigates HCV and its relation to opioid use, precious few studies investigate interactions between female patients and healthcare providers in the context of HCV treatment and treatment seeking. Our research investigates the perceptions of women who inject drugs (WWID) who are actively seeking treatment for HCV about their treatment options, treatment access, and quality of care. Data collection consists of a series of semi-structured interviews conducted over a semester with WWID who are positive for HCV at a harm reduction and mutual aid organization in Greensboro, NC. These interviews will be analyzed for emergent themes to describe the health care experiences of WWID who are living with HCV, and illuminate how healthcare provision in North Carolina needs to be adjusted to better treat this highly affected and vulnerable population. This investigative process will permit a plethora of insights that can stem further research and awareness of this prevalent issue facing our nation.

The Work of Leisure: Family Experiences at Disney World

Jacob P. Hayward (Dr. Alexis T. Franzese) Department of Sociology and Anthropology

Literature on the management of emotion within social settings to date has focused primarily on occupation-based *emotional labor*, largely neglecting how emotion work functions within families. Observational study of parents and their children at Walt Disney World was conducted

to document and categorize parental use of emotion work in interactions with children to determine how parents engage in emotion work within theme parks. The goal of this inquiry was to expand the concept of parental emotion work through application to the study of leisure. Three means of inquiry were conducted, yielding three distinct contributions to the research literature. First, the Emotional Regulation of Others and Self scale (Niven, Totterdell, Stride, & Holman, 2011) was applied to verbal interactions between parent and child to identify motivations for parental emotion work. Second, a typology was created detailing differences in parental involvement with the fantasy constructed by the Disney parks, finding eight distinct modes of parental fantasy involvement. Finally, these modes are ranked in terms of demand for emotion work and attention paid to the parent's compliance to or deviance from emotional norms within the park.. The research indicates that the extent of parental emotion work falls along a spectrum, but the motivations are primarily to improve the child's experience. Findings suggest that parents' can best achieve this role through engagement with pre-existing fantasy imagery.

Alcohol Consumption: Student Perceptions of Risk and Risk Management

Kaylynn L. Hiller (Dr. Jennifer Carroll) Department of Sociology & Anthropology

Background: Many students on university campuses engage in underage drinking. The following study was created to provide insight into the college student drinking experience at Elon University, gather information on student's current views and perceptions, and synthesize the results to better communicate the risks and consequences to students and create a baseline of communication to keep faculty and university personnel informed. The purpose of this study is to explore and examine how Elon University students view their relationships with alcohol and the risks associated with alcohol consumption. Methods: This is a qualitative, cross-sectional, cohort study designed to explore the relationship between student perceptions of risk and behaviors in the context of alcohol consumption. A convenience sample of 35 Elon students were invited to sit for a semi-structured interview, led by student researchers in ANT/SOC 215 in the Fall 2019 term. Each interview was audio recorded and transcribed by the team member who conducted the interview. The findings presented here were discussed and agreed upon by the whole class following several rounds of open coding. Results and Discussion: Students described Elon University as having a heavy drinking culture, predominantly facilitated by the large presence of sorority and fraternity life. Respondents reported physical, social, academic, and legal risks that come with drinking. Students stated that there is a greater safety risk for women than men. Risk management was framed by respondents as a personal responsibility and reported multiple strategies for managing risk. The primary student strategy to manage risk was going out with a trusted group. Respondents generally reported the Medical Safety Policy as one of the few things they remembered from their first orientation at Elon, but lacked in depth knowledge of how the policy or state laws worked.

Laboratory Meat, Bugs and Bloody Soy: An Exploration of the Ethical Implications of Novel Protein

Elli B. Knowlton (Dr. Robert T. Perdue) Department of Sociology & Anthropology

American consumption of meat products is increasing at an alarming rate. In 2018 the average American consumed over 200 pounds of meat, the highest rate in history. This is about double what nutritionists recommend for a healthy daily intake, and it is only expected to increase going forward. This diet also comes with significant costs to the environment, including harming animals and accelerating changing climate. Alternatives to animal protein are increasingly sought out, while formerly marginal ideas about the very definition of food are becoming more mainstream. As such, research is needed that explores the complex ethical dimensions of alternatives to meat. We begin this work here by examining three "novel proteins": (1) laboratory made "in vitro" or "clean" meat, (2) entomophagy, or the eating of insects, and (3) "fake meat", or plant based products, typically composed of soy that mimic established meat products. Multiple methods are employed to better understand the way that these products are being framed by advocates, as well as the reception to these messages by the public. These include content, discourse, and social media analysis. Thus, the goal of this research is threefold: (1) to compare the ways these novel proteins impact the environment, human health, and animals, (2) to shed light on how advocates frame the benefits of these alternative foods, and (3) to explore how these messages are received and interpreted by the broader U.S. public.

No Place to Call Home: Housing Instability and Adolescent Wellbeing

Andrea Morrello (Dr. Rena Zito) Department of Sociology & Anthropology

Housing instability affected an estimated 21.3 million households in 2014 (Harvard University, 2016). Unstable housing comes in several forms, ranging from chronic homelessness to more common occurrences, such as having financial strains regarding paying rent for the month, overcrowding, frequent moves, and eviction (Sandel et al., 2018). The chronic stress that families undergo when experiencing housing instability is linked to anxiety and depression, as well as social, attention, and delinquency problems in children, but few studies address adolescent mental health outcomes. There are multiple pathways whereby housing instabilities might affect adolescent mental health, including exposure to disorganized social environments and the stress instabilities create on family functioning. Using the Fragile Families & Child Wellbeing Study (FFCWS), a longitudinal panel study sampling about 5,000 children of primarily unmarried parents, I measured adolescent mental health and behavioral problems. I used Chi-Square tests and ordinary least squares regression to model the influence of housing instabilities on adolescent depression, anxiety, impulsivity, and internalizing and externalizing behaviors. Analyses indicated that housing instability significantly predicted three out of the five outcomes (depression, internalizing behaviors, and externalizing behaviors). Further, multiple factors at play such as neighborhood disorganization and mother-child relationship explained the relationship between poorer mental health outcomes in housing unstable adolescents. Results of this project demonstrate how intense and chaotic housing instability is, particularly for low-income adolescents who are already experiencing a number of other stressors in their lives. This study is useful for identifying intervention models for reducing negative consequences for adolescents experiencing unstable housing that focus on addressing the three significant outcomes (depression, internalizing behaviors, and externalizing behaviors).

Hurt at the Happiest Place: First Aid for Guests and Cast Members at Walt Disney World

Kacey R. O'Donnell (Dr. Alexis Franzese) Department of Sociology & Anthropology

Walt Disney World (WDW) is regarded as a place that curates a guest experience from pre to post-departure. Research on Disney parks has been published in the fields of sociology, psychology, tourism studies, economics, and other disciplines and subdisciplines. However, within this scholarship, there is a relative neglect of the medical resources available within the parks. Publications on these topics are focused on specific factors such as mobility issues and park layout. The purpose of the current study was to identify the available services for medical emergencies and non-emergency health needs at WDW in Orlando, Florida. Specifically, the study evaluated the first aid centers and assessed their comprehensibility in each of the four parks. This research is embedded in the symbolic interactionist tradition and considers the possibility of Disney parks as fitting within components of Goffman's framework of total institutions. Through participant observation, it was found that most cast members were knowledgeable of the first aid centers and their services. The first aid facilities blend into the themed environment in a way that is aesthetically pleasing, though not distracting, while concurrently ensuring that the facilities are available and fully equipped for a variety of situations. Sociologically, the efforts of the Disney parks to regulate the guest experience are in alignment with an approach to the parks as a total institution environment. Disney has uniquely assessed how to function positively in this capacity, creating a setting of retreat that can accommodate guests' needs, including entertainment and interaction, dining, and unanticipated contingencies such as illness and injury. The Disney approach to first aid for guests holds a balance between aesthetics and availability and may serve as a model for other theme parks.

No Choice is the Right Choice: Examining the Double Standards Faced by Women in Higher Education

Hannaleigh J. Pierce (Dr. Jennifer J. Carroll) Department of Sociology & Anthropology

This project began with a simple question: why was a class in the statistics department largely filled by men, while the majority of students in a concurrent creative writing course were women. Through a mixed-methods approach that allowed for the development of new insights and hypotheses during the research process, this project has shifted to focus on the following question: do female-identifying students in higher education face a double standard when choosing an area of study and, if so, what form does it take? Preliminary interviews were conducted with female-identifying students in order to formulate questions, develop hypotheses, and develop a survey about the experience of choosing a major. The subsequent survey, distributed online, gathered basic demographic information about respondents, asked respondents to define their area of study, and asked questions about interactions with parents and other close adults on the topic of their chosen major—especially whether those interactions could largely be described as supportive or critical of the student's choice. Female-identifying students in the arts and humanities faced criticism from parents and other close adults about their choice of major as well as questions about their ability to be financially self-sufficient after graduation. In contrast, female identifying students in business and the sciences faced criticism from parents

and other close adults about their ability to hold a job in a STEM field while also raising a family and performing domestic duties commonly assigned to women. Women in higher education face a double standard, told by the adults in their lives that their career choice is the wrong choice—no matter what that career choice may be.

Do Child Care Providers Discriminate Based on Sexual Orientation? An Audit Study

Kate E. Pierson (Dr. Raj Ghoshal) Department of Sociology & Anthropology

In this study, I aim to determine whether perceived sexual orientation of parents affects their access to affordable and convenient home child care. While there is literature on the importance of access to child care, there is a gap in the literature that investigates the extent of discrimination against parents of different sexual orientations. I designed an audit study in which I replied to listings on Craigslist advertising child care services using two different email templates: one of a person in a same-sex marriage, and one of a person in an opposite-sex marriage. The sex of the individual in the email is identified by using stereotypically gendered names, and then referencing either a wife or a husband in the body of the email to designate sexual orientation. I aim to see if individuals discriminate based on sexual orientation in the child care service field, as that greatly impacts parents' ability to work. I aim to measure discrimination by counting email responses from child care providers: if they offer services or require additional information, the response is coded as a positive reply; if they do not reply or write a message denying services, the response is coded as a negative reply. Findings so far show no evidence of differential treatment. I consider variation by parents' gender and discuss possible explanations and implications.

Sport Management

Career Experiences of NCAA Division I Athletic Directors: A Kaleidoscope Perspective

Natalie F. Cummins (Dr. Shaina Dabbs) Department of Sport Management

Recent research across disciplines is concerned with the changing nature of careers and how one defines their career needs overtime (Nagy, Froidevaux, & Hirschi, 2019). In sport, this may be important because the sport industry is outstandingly male dominated, with only 10.5 percent of women holding the athletic director position at Division I institutions (Lapchick, 2019). The leaders or "CEOs" of college athletic departments are Athletic Directors (ADs). These individuals have responsibilities to their university, athletes, parents, and fans. Understanding sport leaders' careers may give insight into this discrepancy. The Kaleidoscope Career Model (KCM) was used to study the career paths of ADs. This model posits that throughout their career spans, men and women have three primary career needs: authenticity, balance, and challenge. Traditionally, research shows men value challenge, authenticity, and balance across the career span, and women value challenge, balance, and authenticity as their career progresses (Mainiero & Sullivan, 2005, 2006). This model uses traditional career stages (early, mid, and late). However, recent literature suggests in mid-career individuals experience shifts in perspectives about their career and are juggling family and finance demands (Grady & McCarthy, 2008).

Therefore, to add to the current body of knowledge, this study used five career stages (early, early-mid, mid, mid-late, and late) to better understand the KCM career needs of D-I ADs. An online survey was emailed to all D-I ADs (N = 351) working at universities in the United States with a final sample of (n = 53) with a response rate of 15 percent. A Multivariate Analysis of Variance (MANOVA) was run to determine differences in ADs career needs across gender and career stage. While no significant differences existed, authenticity was highest in mid and mid-late career, balance was highest in early and mid-late career, and challenge remained high throughout the career span. Contrary to the KCM literature, female ADs valued challenge, followed by authenticity, and balance. This research provides new insight into understanding careers of leaders of university athletic departments. Administrators can provide more tailored and individual-specific support needed to help ADs effectively complete their jobs and achieve their career goals.

The Role of College Athletic Department Pro-Environmental Initiatives: Examining Belief-Attitude-Intentions Hierarchy

Ashley LaPlaca (Dr. Young Do Kim) Department of Sport Management

Sustainability has become an institutional priority and identity in higher education due to urgent environmental pressures (Ralph & Stubbs, 2014). College athletic departments in North America are highly visible and uniquely positioned to present opportunities to leverage sustainability through their community outreach activities, efficient facility operations, and educational marketing efforts (Casper, Pfahl, & McCullough, 2014). Despite these pro-environmental efforts, McCullough and Kellison assert that (2016) the overall environmental impact of sporting events is not just limited to operations of games and facilities, sport managers also play a role concerning sport consumers. In this perspective, one of the objectives of the athletic department's pro-environmental initiatives is to inspire/induce fans to engage in environmentally responsible behaviors (ERBs) supporting its green movement (Inoue & Kent, 2012). Sport managers surely believe that their pro-environmental initiatives encourage sport fans to perform ERBs inside and outside sporting events. However, there is still a lack of empirical evidence to prove the effects of the initiatives on sport consumers' ERBs in the context of collegiate sport (Casper & Pfahl, 2012). Further, little is known about the key underlying mechanisms of how and why sport consumers engage in ERBs. Given this gap in the literature, the purpose of this study was to examine the psychological mechanism of sport consumers' ERBs on the basis of a belief-attitude-intentions hierarchy model proposed by Madrigal (2001). A cross-sectional, online survey-based research design was employed and a test of the hypothesized model was achieved through structural equation modeling using Mplus 8.4. The results revealed that sport consumers who believe the benefits associated with the athletic department's pro-environmental initiatives have positive attitudes toward the initiatives. In turn, sport consumers' intentions to participate in ERBs were influenced by their positive attitudes toward the initiatives. The findings of this study provide evidence that the athletic department's pro-environmental initiatives have a positive impact on sport consumers' cognition-behavior link. Further, the belief appears to play a key role in initiating the groundwork of the hierarchy process. More importantly, these findings postulate that the athletic department indeed plays a vital role in the fulfillment of the institutional priority.

The Application of Sport Betting to Network Broadcasts: Consumer Behaviors and Attitudes Towards On-Screen Sport Betting Information

Carter T. Martin (Dr. Young Do Kim) Department of Sport Management

While it has existed in various forms for decades (Ignatin, 1984), sport gambling has undoubtedly become a more relevant activity in recent years. Aided by the recent Supreme Court ruling, which allowed individual states to outline specific laws regarding sport betting in their own state (Liptak & Draper, 2018), sport gambling has risen to greater prominence, especially in sport media. Increasing attention and interest of legalized sport betting has triggered sport networks to enhance the availability of betting information during their live broadcasts. As a result, the phenomenon of constant on-screen betting lines has already appeared in the world of sport broadcasting and in turn, become more widespread. However, with any new on-screen features in sport broadcasting, resulting consumer attitudes are bound to be mixed. While some viewers may find the simultaneous display of on-screen betting information generally informative and visually entertaining, others may find a certain level of distraction at their presence and be unable to focus on the actual game (Chatterjee, 2008). That is to say, little empirical evidence exists to help substantiate the effects of on-screen betting information on sport media consumer attitude and behavior. Therefore, the purpose of this study is to investigate how sport media consumers' perceptions of on-screen betting information influence their attitude toward such information and behavioral intention to watch sport broadcasts featuring the on-screen betting information. A cross-sectional survey-based research design was employed to examine the hypothesized model. Participants watched a two-minute video clip of a Major League Baseball game featuring on-screen graphics of sport betting information/data and then completed a survey questionnaire. Hypothesized causal relationships among the latent constructs were examined through structural equation modeling using Mplus 8.4. The results indicated that sport media consumers' perceptions of informativeness and novelty value of on-screen betting information positively influenced their attitude toward the betting information. Also, the consumers who perceived the betting information as less distracting had a more positive attitude toward the information. More importantly, the consumers' favorable attitude, in turn, positively influenced their intention to watch future sport broadcasts on a network providing the betting information.

Communicating Study Abroad Opportunities to Student-Athletes: What's Happening at Division I Schools?

Alyssa N. Zee (Dr. Tony Weaver) Department of Sport Management

The opportunity to participate in high impact practices (HIPs) in college is often beneficial and rewarding (Kuh, 2008). Among many effective HIPs, studying abroad has become gradually more important in developing better educational programs at colleges over the years (Kitsantas, 2004). The opportunity college students have to study abroad is a unique experience for many reasons. In particular, students return with a new perspective on culture, a greater knowledge and understanding of the world, and open-mindedness (Hadis, 2005). O'Neil (2017) emphasized the importance of study abroad opportunities at colleges as they "have evolved to be more inclusive of students' desired durations, topics of study, and the locations of the host countries" (p.1).

Although numerous studies have examined the impact studying abroad has on college students, minimal attention has focused on communicating in-depth information about the opportunities that student-athletes have to participate in study abroad (Henderson, 2018; O'Neil, 2017). Therefore, the purpose of this study was to understand the landscape of Division I student-athlete opportunities in studying abroad and examine the benefits and challenges associated with studying abroad. Data was collected from 351 Division I university academic and athletic department websites. Content analysis was used to analyze findings from Division I institution websites relative to the level of communication and information provided on study abroad offerings and experiences for student-athletes. Results showed that schools provided very limited amount of information about study abroad programs specifically tailored to student-athletes on either athletic or university websites. Only one-third of the schools offered any information on their athletic website. Furthermore, when universities did present information, it was not specific enough on ways to overcome barriers unique to student-athletes, such as limited availability based on athletic participation, financial restrictions, and other logistical challenges. The findings from this study are beneficial to future development of university webpages to implement more in-depth information displaying the opportunities for student-athletes to study abroad.

Strategic Communications

Crisis Communication: A Sentiment Analysis of YouTube Comments About Operation Varsity Blues Focusing on Felicity Huffman and Lori Loughlin

Jacqueline N. Hickey (Dr. Daniel Haygood) Department of Strategic Communications

Operation Varsity Blues, the college admissions scandal that broke in March 2019, demonstrates the pressures that parents place on their children to succeed and attend the best university possible. Lori Loughlin and Felicity Huffman, two famous actresses, were among the 50 people who broke the law and paid their children's way into top universities. Since this is a recent occurrence, limited research has been conducted on this topic. This study examines how society and individuals reacted to the scandal in the comments section on three major news sources' YouTube channels. It provides foundation and insight for understanding how individuals react to celebrities' different methods of communication in response to a crisis. For this research, sentiment analyses were conducted on 15 YouTube videos to identify the overall sentiment and themes over five major events of the scandal from March 12th to September 13th. The comments from each video were scraped from YouTube using Scrape Storm. The researcher used RStudio to analyze the overall sentiment for each new source, the evolution of sentiment over the course of the scandal, and the differences in comments between Loughlin and Huffman. Results showed that the overall sentiment of the comments was positive, meaning that users commented more positive words and phrases about the scandal on the videos than originally thought. There was no distinct pattern in the sentiment score across the duration of the scandal, but every news channel's third major event video discussing Loughlin pleading not guilty had a negative sentiment score. The data suggests that people were upset with Loughlin pleading not guilty instead of accepting a plea deal. The study concluded that the themes being discussed were centered around people's opinions about corruption of the privileged celebrities and punishment possibilities for Loughlin and Huffman. There were overall more negative sentiment comments

and words about Loughlin on each news source because of her lack of apology and lack of communication with the public. The research suggests that communicating with and apologizing to the public during a scandal is a stronger communication strategy because individuals are expressing more positive opinions and attitudes toward Huffman.

Born for the Big Leagues: A Qualitative Study of Cuban Major League Baseball Players in *Sports Illustrated* from 1992 to 2019

Kelsey E. Milo (Dr. David Bockino) Department of Strategic Communications

For nearly a century before the Cuban Revolution in 1959, baseball served as a bond between the United States and Cuba. In 1961, Fidel Castro changed the Cuban professional baseball system and forbid Cubans from playing Major League Baseball (MLB) in the United States. Despite these changes, Cuban players still came to America, by way of defection. While there was hope of a deal between Cuba and MLB in 2018, allowing Cuban players to join the league without defecting from their home country, the situation has been complicated by the Trump administration, leaving Cuba's relationship with MLB in an uncertain state. Although Cuban players defected from Cuba for decades to play baseball in the United States and although there is a substantial amount of scholarly literature that utilizes framing theory to study the media representation of athletes, no researcher to date has analyzed the representation of Cuban baseball players in American sports media. This study fills that gap through a qualitative analysis of 276 *Sports Illustrated* articles about Cuban MLB players between 1992 and 2019. Initially guided by frames proposed by previous scholars, the data were then distilled into four larger thematic categories: rhetoric around coming to the U.S., excitement surrounding new players, players as risky investments, and both baseball and non-baseball-related illegal activity. This study discusses those four themes before laying the groundwork for future research regarding Cuban athletes in American media.

Crime Drama Portrayals of our Criminal Justice System and Their Potential Implications

Daria B.I. Sprague (Dr. Harlen Makemson) Department of Strategic Communications

Among such shows as Criminal Minds, White Collar, and Law and Order, there is no shortage of content for those interested in immersing themselves in the world of crime. This study analyzes the ways that crime dramas portray our criminal justice system and the potential implications they may have on jurors. With an increase in crime drama viewership, there have been more incidents of jurors basing their decisions in court on what they have seen on television. A theory called the CSI effect states how jurors who watch more hours of crime dramas tend to be more selective in court of the information that they will convict a defendant on (Tapscott, 2017). In order to possibly combat these effects, it is important to understand just how these jurors are receiving their information and how the information could be more transparent. This study analyzes six episodes from the show Law and Order and looks for information that could be misleading for the viewer. The content was coded into six different categories, ranging from the number of times that the court room was shown to the number of times that technology was depicted stretching beyond its normal means. Throughout the six episodes there were various

instances where information could be misleading for the viewer, leading them to gather wrongful information. This information includes the number of confessions in court and perfectly placed forensic evidence. This study concludes that the show Law and Order can have potentially harmful effects on our criminal justice system through the CSI effect and the tech effect. Through picking a jury that has not been previously exposed to large amounts of crime shows, as well as various media surrounding crime, this effect can be reduced and lead to a different outcome of a case.

Connecting Strangers and Dividing Generations: A Comparative Qualitative Study of Uber's Branding and the Resulting Cultural Impact

Bridget Turner (Dr. Daniel Haygood) Department of Strategic Communications

Uber's strategic branding as a technology platform has encouraged a pre-conditioned trust in its service among tech-savvy millennials, which has reversed a deeply embedded cultural norm of "stranger danger." This concept is analyzed through Uber's brand strategy, its position as a technology platform reflective of millennial values, and how it has altered perceptions of stranger danger among two generations: millennials and baby boomers. The study was conducted through a series of one-on-one semi-structured interviews of four millennials and four baby boomers. The results of each group were compared in order to uncover the criteria for accepting the brand, the breadth of the perceptual divide between the two generations, and the overall awareness of the brand's influence on society. It was found that the main motivation for use is the convenience aspect of the app, yet due to technology, the criteria for accepting the service are different. Overall, the study found that millennials use technology far more than baby boomers and are comfortable in sharing personal information on social apps. Furthermore, millennials have adopted the brand due to their pre-established trust in technology, while baby boomers have accepted it because of their past experience with similar transportation services. Although both generations have the same concerns about stranger danger, baby boomers practice an active cautiousness by utilizing the safety features due to their wariness of offering personal information. However, millennials are far more passive in their cautiousness due to a lifelong exposure to technology and are therefore accustomed to being open with strangers and the concept of ride sharing. Both generations described Uber's current brand strategy as a reflection of on-the-go, techy youth, signifying their acknowledgement of Uber's intentional strategy to convey a lifestyle similar to its target. This study highlights the threat of an inherent trust in technology among digital natives, and how this carelessness will continue to permeate other aspects of our lives. Uber exemplifies a modern technology brand with the ability to harness and exploit this trust and stands as an indicator of how a pre-conditioned trust in technology will continuously pose a direct threat to societal caution.

Living through the Lens: The Evolution of Photography Habits & Motivations

Reilly S. Welsh (Dr. Daniel Haygood) Department of Strategic Communications

With ever-increasing access to photography technology, more people are becoming amateur photographers in their own right. An estimated number of 85% of photographs are taken on a

smartphone (Richter, 2017), with more photographs taken in 2015 than were taken in all of the twentieth century (Schrag, 2015). Previous research has explored the effects that photography has on people, as well as how posting photography to social media platforms in particular affects the value of an experience and the photograph itself. However, there is a gap in information regarding the factors that contribute to photography preferences, habits, and frequency. This research creates a bridge between the internal and external thoughts and motivations leading up to taking a photograph and the following impact of photography on individuals. Additionally, this research examines how the purpose and meaning of photography have developed over lifetimes and across generations. As the means to photography continue to become more widely attainable, it is important to understand the driving forces behind photo-taking decisions. This study utilized semi-structured, one-on-one interviews with eight individuals ranging from ages 20-55, both male and female. The information obtained from the interviewees helped to determine four key findings: internal motivation is the primary driver for photography; individuals seek validation from outside sources when photography is shared with others; availability of time, access to photography technology, and significance of life events affect photography frequency; and photography's primary purpose across all age groups is for memory purposes. In addition to this information, the following trends emerged. The first recurring theme was the "pics or it didn't happen" phenomenon, in which interviewees expressed how photography shared with others is often used to prove something happened. Additionally, as individuals age, they have increased appreciation for photographing "ordinary" moments. Finally, because of increased access to cameras as well as to the internet, some participants noted a decrease in their own likelihood to take a photograph. Overall, this research uncovered previously unexplored elements of the photo-taking process and its evolution over time.

WORLD LANGUAGES & CULTURES

Physiognomy in Ancient Roman Art

Madison M. Aycock (Dr. Kristina Meinking) Department of World Languages & Cultures

Although the existence of the discipline of physiognomy has been recorded in ancient literary sources, this field has been discussed rarely in modern scholarship. Those who studied in the field of physiognomy held that a connection existed between one's physical body and one's character traits. With bodies being primary subjects of ancient Roman art, I sought to discover whether these Roman statues could be interpreted through the ancient physiognomic lens. Thus, this research aimed to answer the question: "Do features of the body as represented in ancient Roman statuary (200BCE-200CE) reflect the character of the subject?" Current scholarship on this topic tends to focus on how the body is shaped by society or the iconography that is found in these statues, but little touches on how representations of the body may reflect the character of the subject being portrayed. To answer this question, I adopt an interdisciplinary approach, combining theory from the social sciences, Classical primary sources, and a stylistic approach to art from Art History. Using these methods, I show that one's character is most likely to be reflected in ancient statuary when the statue is made in the 'natural' style, rather than when made in the 'idealized' art style. I suggest that while idealized (or mathematically proportional) bodies may have originally made a claim about one's character, the style became standardized and its

popularity diminished its original significance, but when depicted naturally, features of the body as depicted in ancient Roman statuary and busts can communicate information about one's character, such as one's headstrongness, gentleness, kindness, or virility.

Women's Identity and Spatial Existence in Chicano Culture: A Feminist Analysis of *The House on Mango Street*

Jizelle P. Campbell (Dr. Pablo Celis-Castillo) Department of World Languages & Cultures

The novel *The House on Mango Street* published in 1984 by Sandra Cisneros tells the day-to-day life of a poor, Chicago neighborhood through a series of poetic vignettes. These short sketches are told from the perspective of Esperanza, a young Hispanic girl, who introduces a collection of characters representing the Chicano experience - the experience of Mexican-Americans living in the U.S. Embodying themes of identity, desire, and the relationships of power, Cisneros' novel serves as an artistic, social commentary of the cultural expectations that burden Chicana women and the socio-cultural structures which negatively impact women at large. Throughout the text, questions arise: In what ways do the attitudes and social beliefs about gender in Chicano culture affect the way women are represented in the novel? How do the relationships of power create a gendered division between men and women? Women are largely depicted throughout the novel as occupying a space by the window – how does this speak to the ways in which Chicana women exist in space and time? Through a feminist theory lens, this research aims to form a correlation between the development of identity and cultural background in *The House on Mango Street*, as well as offer a critique of the ways in which machismo restrains Chicana women both literally and figuratively. Using a textual analysis of the novel as well as secondary, scholarly sources this research yields a magnitude of clairvoyance that bring together the interdisciplinary fields of feminism and Latin American studies. Such insights include how self-definition through acceptance of one's name is influenced by blended heritage as both Mexican and American, and the ways in which gender hierarchy physically and psychologically entrap women.

Categorization, Colonialism, & the Gender Binary

Jenna N. Dahl (Dr. Sarah Glasco) Department of World Languages & Cultures

Gender binarism stems in large part from European colonialism through the 15th – 20th centuries and embodies the classification of gender in two distinct, opposite forms of masculine and feminine. The binary allows for identification of groups: male vs. female, cisgender vs. non-binary, etc. The identification of groups leads to the formation of psychological ingroups in which biases can lead to the justification of violence and aggression towards outgroups. Those that identify as non-binary, transgender, and gender fluid, falling outside of the gender binary, are often ostracized in modern day society. Therefore, this research project seeks to explore the factors that lead to the discrimination of those who are gender nonconforming. In doing so, I aim to illuminate how the dominant gender system is a weapon that was historically forced upon indigenous populations to gain control and allow for exploitation of resources for European capitalism. I will also discuss how the ideologies of colonialism gave birth to the ingroup of gender normativity and concurrently, gender discrimination. Resistance of a societal - or ingroup

- norm is often met with aggression, a product of outgroup bias, and an attempt to further solidify ingroup ideologies. Thus, through close readings of the essays in Kate Bornstein's Gender Outlaws and Scott Lauria Morgensen's article Theorising Gender, Sexuality and Settler Colonialism, among other theoretical gender studies texts, I will explore representations of the experiences of indigenous peoples, and those who identify as female, two-spirit, non-binary and transgender in particular in order to expose violence and aggression towards those who fall outside the gender dichotomy. In sum, I will discuss how these representations and resulting discrimination and violence are directly related to colonization and categorization of in/outgroups and continue to affect global power dynamics.

Student-Faculty Partnerships to Support Study Abroad Reintegration

Emily T. Ford (Dr. Olivia Choplin) Department of World Languages & Cultures

Studying abroad has become a main pillar of undergraduate student experiences at Elon and many other U.S. universities. Though study abroad is such a significant part of undergraduate experiences, there are few programs that help students prepare for making the most of or supporting students as they reintegrate to their home culture upon return from a semester abroad. It is widely acknowledged by scholars in the field of global education that readjustment post-study abroad, including the challenges of reverse culture shock, is something students often find difficult (Young, 2014). Elon University's own Department of World Languages and Cultures has implemented a three-part course program for language majors and minors to take pre-, during, and post-study abroad as a way to account for these challenges, though the first few cohorts faced challenges related to student interest, student perceptions of the benefits to the course, and whether students believed the class provided transformative learning (Hoggan, 2016). This project was undertaken as a student-faculty partnership between a professor and student from one of the early cohorts in order to redesign the course based on student feedback, the analysis of student work, and study abroad reintegration literature. The research also examines student perceptions of the course immediately after taking it in comparison to their feelings towards the course a year out collected via a survey of former students. In addition to analyzing the first cohort's perceptions, this study examines how to maximize the benefit of the WLC course for students' integration of the study abroad experience into their overall personal and academic trajectories through course redesign. Working as a student-faculty partnership, the research was used to implement changes to the course in order to better promote student growth and impact student attitudes in the new cohort. This presentation will offer results of this project and provide insight into the impact of student voice in course redesign related to student buy-in and successfully supporting student needs in study abroad preparation and reintegration.

The Humanity of Animals and the Animality of Humans: A Literary and Socio-Philosophical Analysis of Human-Animal Relationships in Four Contemporary French Memoirs

Claire P. Gerkins (Dr. Olivia Choplin & Dr. Sarah Glasco) Department of World Languages & Cultures

The distinction humans have drawn between what is human and what is animal is an idea that has been considered by philosophers in the past, but it has not necessarily been explored within the context of the contemporary, and often contradictory, relationships that humans have with animals as companions, as food, and as workers today. This study, therefore, examines how the boundary or *frontière* between animals and humans is presented in four contemporary French memoirs. Guided by the arguments of French philosophers Montaigne, Descartes, and Derrida, a close literary and linguistic analysis of memoirs by Brigitte Bardot, Hugo Clément, Anny Duperey, and François Nourissier reveals the complex nature of this boundary. The memoirs of Bardot and Clément focus on human treatment and uses of animals as food, entertainment, and fashion. The memoirs of Duperey and Nourissier, on the other hand, are centered around the authors' relationships with individual companion animals. This study explores what specific boundaries are presented by the authors and how the language they use surrounding animality helps to either construct or deconstruct these boundaries. There are several different "boundaries" discussed in the memoirs. Primarily, the authors explain that there is no boundary between humans and animals at all, meaning that there are no distinguishing factors that separate all of humanity from all of animality. However, in their efforts to prove that a boundary does not exist, the authors occasionally construct them with their language. These boundaries include, but are not limited to, one through which humans and animals are separate, but still able to form two-sided relationships, another that establishes a parent-child relationship between humans and animals, and yet a third that separates humans and animals, but only those used for meat or labor. This presentation will be given in French.

"Honte d'avoir honte": A Son's Shame in the French Novel "Mon père est femme de ménage" by Saphia Azzeddine

Leila Jackson (Dr. Sophie Adamson) Department of World Languages & Cultures

The relationship between Paul, the young narrator, and his father is a critical element in the novel "Mon père est femme de menage" by Saphia Azzeddine. In this paper, I analyze Paul's contradictory emotions towards his father, and I show through close textual reading that his attitude evolves throughout the novel. Without a doubt, Paul's perceptions are also influenced by the status of his father's job. Paul is ashamed to be the son of a housecleaner, designated as feminine in "femme de ménage" in French. This shame reveals itself, for example, through detailed depictions of his father being demeaned by his boss. Over time he realizes his shame is unjustified and later admits he is "ashamed of being ashamed." The research included in my analysis, by sociologist Vincent de Gaulejac, gives more perspective on shame and poverty in young teenagers. According to Gaulejac, the shame of children from poor families manifests itself at two levels. Not only do they feel deeply ashamed, but they are ashamed of being ashamed, as I am able to support through examples from the novel. Through close reading, it becomes clear that his father serves as an important role model in his life and even impacts the career that Paul eventually chooses. This research contributes to a better appreciation of the novel in analyzing this teenager's language, behavior, and evolution through textual analysis.
* This presentation will be given in French.

Ha Ha Hitler: *Er ist Wieder Da* as a New Form of Heimatfilm

Olivia Kendrick (Dr. Scott Windham) Department of World Languages and Cultures

The concept of *Heimat* describes the feelings people have towards a particular location that is defined not only geographically but also culturally, linguistically, and socially. David Wnendt's *Er ist Wieder Da* (2015) challenges post-war ideas of German *Heimat* by inserting an Adolf Hitler character in today's Germany. The film follows the unscripted antics of actor Oliver Masucci as he interacts with ordinary Germans while in character as Adolf Hitler. *Er ist Wieder Da* turns Masucci's conversations into evaluations of the current state of the *Heimat* concept instead of a discussion of Hitler's actions in the past as German citizens react to him in both positive and negative ways. Similar to traditional *Heimatfilme* there is barely any attempt to come to terms with the atrocities of the German past but insists that modern-day Germany recognizes that Hitler is an essential part of the concept of German *Heimat*. *Er ist Wieder Da* is essentially creating a *Heimatfilm* that rejects conventional ideas of Germany untainted by the Nazi past. *Er ist Wieder Da* echoes the traditional *Heimatfilme* forms such as the use of symbolic color and traditional costume while also challenging the *Heimat* concept by reinserting Hitler into the modern-day.

La Nécessité de la Transmission entre les Générations

Grace H. McGuirk (Dr. Sarah Glasco) Department of World Languages & Cultures
This presentation will discuss and analyze the effects of traumatic experiences on two female protagonists, An Tinh, in Ru by Kim Thùy, and Mika, the matriarch in Femmes au temps des carnassiers by Marie-Célie Agnant. Through close readings of these novels, I will detail how their traumas impact their relationships with their children in particular. An Tinh fled from Vietnam to Quebec with her family, and this traumatic experience translates to immense nostalgia for her past. Mika, on the other hand, was brutally sexually assaulted by the government workers who enforced the terror of Papa and Baby Doc Duvalier. Her traumatic experience invokes sorrow and pain for not only herself but her daughter as well. Historically, women have often been overlooked and forgotten in times of great peril. In Haiti under the abusive rules of Papa and Baby Doc, men were exiled, and women were left to sit at home in constant fear. Moreover, the untold stories of immigrants such as that of An Tinh and other Vietnamese families forced to flee their homes are ones that should be acknowledged and illuminated. Their stories were left frozen in time, and this research aims to dissect these stories in order to communicate their impacts more holistically and give them a proper place in history. These women lived through trauma and past pain and have managed to survive and live with their posterity. In analyzing how these women are able to live successfully in the present with their families with the weight of these traumas, I insist that the concrete oral transmission of their stories to their offspring is, in fact, a moral imperative for them, a necessary act/coping mechanism that helps them survive and navigate relationships in the present. Through textual analysis and application of scholarly work on these novels and the topics of trauma and immigration, in particular, my study will reveal the necessity of transmission in the context of immigrants in Quebec with their children who identify as French-Canadian as well as the

"ruptures" created by immigration between parents and children. This presentation will be in French.

Flânerie dans le roman La Vagabonde de Colette: La Modernité dans des espaces féminins (Flânerie in the Novel *La Vagabonde* by Colette: Modernity in Feminine Spaces)

Devon M. Rosenberger (Dr. Sarah Glasco) Department of World Languages & Cultures

In this presentation, I analyze the novel, *La Vagabonde*, by Colette that tells the story of a woman named Renée who works in a traveling theater group. I argue that Renée is a flâneuse, or female-identified flâneur, because of the ways in which her work allows her to experience modernity through observation and participation in both masculine and feminine spaces. Traditionally, the flâneur is a masculine character, conceived in nineteenth-century France, who walks the streets while actively observing the changing urban cityscape during the time of industrialization in Paris. Nineteenth-century French author Charles Baudelaire, in particular, speaks of the flâneur in his prose poem, *Le Peintre de la vie moderne*, but only in relation to public, and therefore masculine, spaces. Authors of the era, such as Baudelaire, constructed images of modernity through the male gaze, while the experiences of women as observers and participants were often dismissed due to the perceived limitations of gendered spheres. Contrary to representations of the time like those of Baudelaire, the life of Renée reflects the notion that separate gendered spheres were not so rigidly divided by gender. Furthermore, her experiences as a woman in the public sphere demonstrate that she had more autonomy and agency to "flâner," or to observe in a leisurely manner, than many scholars today believe was possible.

Violencia intrínseca: La violencia caracterizadora de México en el siglo XX en *El cielo árido* de Emiliano Monge

Lily P. Sobalvarro (Dr. Celis-Castillo) Department of World Languages and Cultures

This project explores the use of literary tendencies of 21st century Latin American authors within the novel *El cielo árido*, by Mexican author Emiliano Monge. As a member of Latin America's generation of young authors, born after 1970, Monge's adherence – or resistance – to the general literary tendencies of his generation informs the present state of Latin American literature and its emerging trends. This analysis explores specific tendencies – such as the contemplation of the concept of truth, the use of crime and violence subgenres, and critiques of sociopolitical contexts – to determine the extent to which *El cielo árido* reflects these trends. In my paper, I will explore the intrinsic link between violence and the protagonist, Germán Alcántara Carnero, revealed by his consistent efforts – and failures – to escape his violence-filled past. Additionally, as the personification of Mexico in the 20th century, Germán Alcántara Carnero's intrinsic ties to violence reflect and establish a connection between violence and the Mexico of that era. Therefore, the findings of my analysis indicate Mexico's intimate and intrinsic link to violence, which is a defining and inalienable characteristic of its history during the 20th century.

The Cultural Pertinence of Family Planning Projects Implemented by NGOs in the District of Acomayo, Cusco, Peru

Sadie B. Traylor (Dr. Federico Pous) Department of World Languages & Cultures

A defining characteristic of Peru is its diversity; indigenous peoples in Peru account for 45% of the population (Minority Rights Group International, 2018). This diversity, however, creates a disparity in equity between rural and urban populations — a disparity that is seen clearly in each group's access to health services and resources, including those related to family planning (UNFPA, 2016). However, the disparity in access to family planning services is not due only to a lack of resources, but moreover to a lack of cultural pertinence in the provision of those resources. In order to evaluate this trend, this investigation identifies and analyzes the cultural pertinence of the aid efforts of two NGOs - one local and one international - looking specifically at each NGO's approach to increasing access to family planning resources amongst Quechua populations in the District of Acomayo, Cusco, Peru. It goes further to study how this focus on cultural pertinence aligns with the Política Sectorial de Salud Intercultural (Sectoral Policy on Intercultural Health), a government policy in Peru that intends to standardize intercultural health actions in order to achieve health care as a human right at the national level. Data was collected throughout a two-week field work period in November of 2019 utilizing personal observations and in-depth interviews with NGO personnel, an obstetrician from the local health center, directors of two local high schools where the projects are executed, and female beneficiaries. As a whole, the qualitative data set reflects on the abilities - or the lack thereof - of each NGO to achieve cultural pertinence in their projects as a means to increase access to family planning. Final results reveal that while the local NGO successfully and exceptionally achieves cultural pertinence, the international NGO fails to do the same. The results also reveal that in practice, the Política Sectorial de Salud Intercultural does not effectively legislate and, therefore, does not achieve its goal of fairness and equal opportunities for the citizens of Peru.