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RESEARCH PRESENTATIONS, POSTERS, PERFORMANCES, CREATIVE PROJECTS, AWARDS, EXHIBITS, AND MORE.



18th Annual Celebrating Student Achievement

Program of Events
April 2020



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April 2020

UNDERGRADUATE RESEARCH CONFERENCE

ANNUAL ACADEMIC AND LEADERSHIP AWARDS CEREMONY

SPECIAL EVENTS HIGHLIGHTING STUDENTS' ACCOMPLISHMENTS

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Welcome

Each year, as surely as the spring, Meredith students look forward to presenting the results of their research to their faculty, staff, peers, families, and friends. Throughout the academic year, these students have been sharpening their questions, methodologies, skills, techniques, and powers of observation and analysis as they delve into complex problems in their fields of study. The opportunity to discover or build something unique out of a set of facts, situations, or materials is what separates classroom learning (very much at the heart of foundational knowledge) from experiential learning (when students take that foundational knowledge and explore).

Increasingly, educational studies show that such explorations that give students hands-on experience asking and answering their own questions lead to substantially greater gains in learning. In addition to these studies, most of us know from our own experiences that we learn more and retain that knowledge longer when we have more involvement with our lessons.

Today, you have the wonderful opportunity to see that principle at work as our students present the results of their learning through poster sessions, performances, showcases, and more. Their enthusiasm reflects the depth of ownership and experience they have gained during the past few months of work with their faculty and peers. And there is nothing like displays of “can do” and “did this” and “got it right”—or even “got it wrong, but look what I learned!”—to remind us all of the power of learning and discovering and creating. Perhaps we will even be inspired to pay greater attention to the lessons around us every single day.

Welcome to CSA Day, 2020



Jo Allen, '80, President

Acknowledgements

The commitment and dedication of Meredith students, faculty, and staff make this day of celebrating student achievement possible. Special thanks go to —

Jo Allen, '80, President

Matthew Poslusny, Senior Vice President and Provost

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Carolina Perez-Heydrich, Director of Undergraduate Research

Cheryl Jenkins, Director, Office of Student Leadership and Service

Isabella Rossi, Administrative Assistant for Academic Special Programs

Allison Kvasnicka, Student Assistant, Undergraduate Research Program

The Undergraduate Research Advisory Committee

David Penney, Michelle Casale, and the Staff of Oak Leaf Catering

Department of Marketing, Charlotte McKinney, Assistant Director of Visual Communication-Multimedia, and Roberta Rose, Graphic Designer

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Media Services: Brian Thornburg, Rick McBane, Jessica Jackson
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Eloise Grathwohl and the A&H faculty and students associated with the Activism Then and Now showcase

Meredith Events: William Brown, Jim Frick, Peter Houck, Natalie Herrmann, Ginny Martin, Eric Leary

Caroline Billings, Administrative Assistant to the Vice President for College Programs

Eunyoung Yang and Marie Johnson of the Meredith Fashion Merchandising & Design Program

Sarah Bean and the students of the Meredith Dance Program

The faculty mentors who have given concentration, care, and many extra hours to encourage and support today's student presenters and performers.

Showcases

Improvisational Dance by the Meredith Dance Program

Senior Fashion Show

Interior Design Senior Showcase

Arts & Humanities Activism Showcase

Presentation Playlist

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Stephanie Sierra

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Olivia Trapatsos

*Cloning of *vioA* from Chromobacterium violaceum into Escherichia coli Expression Vector PinPoint*
Alissa Meo

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Annie Kim

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Miranda Tomb

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Afton Wooten

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Spectatorship, Desire, and the Queer Female Body: Representations of Lesbian Sexuality in Contemporary American and Canadian Cinema
Alexandra Rouch

Writing to Save a Life: Kurt Vonnegut's Slaughterhouse-Five
Delaney Rhodes

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Abstracts of Presentations

The Eighteenth Annual Meredith College Undergraduate Research Conference, April 2020

It's Complicated: The Status of Gatekeeping Roles and Processes in Complex Situations

Katelyn Amstutz and Olivia McKain

Research Adviser: Dr. Joy Learman, Amanda Jones, LCSW; Social and Behavioral Science

The social work profession is governed by a Code of Ethics, set by the National Association of Social Workers. Section 3.02(b) requires that social work educators evaluate the performance and qualifications of those entering the field, thus making them professional gatekeepers. Although most social work faculty agree that there are some student behaviors that are clearly in contradiction to the profession's values and standards, today's social work faculty are challenged by complex situations that are not easily defined through professional standards or even explicit program policies. How social work faculty view their roles as the profession's gatekeepers and intervene in these situations will impact how social work education effectively meets the needs of an increasingly variegated and open student body. How does a program document concerns that are not behavioral in nature, such as fit for social work values and ethics? How do social work faculty effectively respond in an era of oversharing through social media outlets? In an effort to gain insight into these gatekeeping questions and others, the research team conducted an online survey of small baccalaureate social work programs (N = 120) to determine how faculty view their role as the social work profession's gatekeepers, as well as the typical timelines in which they felt that they engaged in those roles.

The Effects of External Influences on Children's Play

Margaret Armstrong

Research Adviser: Dr. Fain Barker; Child Development

This study aims to examine the potential impacts of gender stereotypes in regards to how children choose to play. Previous findings show that children display preferences toward toys specifically made for their identified gender (Todd, Barry and Thommessen, 2017). Research suggests that children are influenced toward these gendered toys due to the views and opinions of their caregivers and peers (Dinella and Weisgram 2018; Freeman, 2007; Martin, Fabes, Hanish, Leonard and Dinella, 2011; Wohlwend, 2012). For this study, both parents (n=10) and teachers (n=6) from two different childcare settings were pro-

vided either a paper or electronic survey to learn about their own views regarding gender specific play, if they considered certain toys to be gender specific, and what their children/students are naturally attracted to when they are allowed to play freely. Additionally, children (n=3; ages=2 to 4 years old) were interviewed in a naturalistic setting to determine if the ideals presented from the parent and teacher surveys were illustrated within the answers that were given (Freeman; Todd et.al; Wohlwend, 2011; Zosuls et. al, 2009). Throughout this study, overarching themes of parental and teacher influence and the gendered expectations for children during play appeared through the use of an open coding process. These results allow for a new insight into how children choose their toys.

The Effects of Past Bullying Experiences on Intervention in Present Bullying Situations

Amber Barbour

Research Adviser: Dr. Gwynn Morris;

Psychology/ Social Science/ Behavioral Science

Many college students have experienced bullying as children. The present study examined whether past bullying experiences impacted how one intervenes as a bystander to bullying in the present. Specifically, it was hypothesized that participants who experienced past bullying would be more likely to intervene than participants who had not been bullied. Forty 18-21 year-old students participated in this study, 34 of whom experienced past bullying. Bystander intervention was operationalized both qualitatively and quantitatively. First, the participants provided a written response telling how they would respond to 3 hypothetical bullying situations, such as hearing a friend call a classmate a demeaning name. Next, participants answered a previously validated survey measuring their likelihood to intervene in a bullying situation at each of the 5 steps (notice, interpret as emergency, assign responsibility, knowing appropriate intervention, enacting intervention). Qualitative data was analyzed by a coding scheme that was created by the primary author and classified each response in 1 of 5 mutually exclusive categories. Quantitative data was analyzed by an One-Way ANOVA. Results indicated no differences in the likelihood to intervene between those who had and had not experienced past bullying. However, qualitative results point to circumstances in a particular scenario, rather than past bullying experience, as being an important indicator for participants' intervention.

Forward Family without Machismo: The Recreation of Family

Ariana Barcenas

*Research Adviser: Dr. Kris Macomber;
Social and Behavioral Science*

Traditionally, Machista ideology has been described as dignifying masculine qualities such as aggression, independence and dominance, while stigmatizing feminine qualities as being weak and dependent (Intindola, Jacobson, Delcamp 2016). According to Ceballos, “machismo is a learned behavior beginning from young childhood and practiced in adulthood.” Therefore, if machismo is a learned behavior rooted in Hispanic/Latinx culture with a basis of male dominance – what happens in a matriarchal home? Is the machismo cycle broken?

This research is focused on identifying how Latinx single-mothers define Machismo and how their understanding of machismo affects how they parent their children. Specifically, it examines the extent to which women construct machismo ideals and expectations in the absence of male figures in the family/home. This research is examining the parenting techniques of single-mothers in an attempt to identify specific practices that contribute to or deconstruct machista ideologies. In this study, data was collected through in-depth interviews with middle aged, Latinx single-mothers. Preliminary findings suggest that single-mothers do not actively think about machismo when parenting, but the experience of separation disrupts the reproduction of machismo into family life. Findings suggest the rejection of machismo can either serve as a catalyst for marital dissolution or occur as an aftermath of separation. Findings also reveal that single mothers view independence and education as a way to stop the reproduction of machismo.

Effects of Elemental Body Alignment System on the Flexibility of High School Dancers

Nola Grace Brown

*Research Adviser: Dr. Sharon Malley;
Natural and Physical Science*

Elemental Body Alignment System (EBAS) is a somatic practice; through the regular practice of somatics, a plethora of benefits have been observed. The primary purpose of this research study is to examine the effects EBAS has on the flexibility of high school dancers. The study utilized one control group and one experimental group. The experimental group received EBAS training once a week for six-weeks. Flexibility was measured pre- and post-intervention for both groups over all six-weeks. Goniometric measurements included ankle plantar flexion, ankle dorsiflexion, hip external rotation, and hamstring flexibility. Data was analyzed with a two-tailed T-test in SPSS V21.0. Significant increases in flexibility were seen in the EBAS group in two instances: the left hamstring

and external rotation of the left hip. The flexibility of the EBAS group’s left hamstring was initially significantly less flexible than the control group ($p=0.054$); however, by the end of the study, the two groups achieved incredibly similar measurements ($p=0.637$). At the start of the study, the control group demonstrated more external rotation in the left hip than the EBAS group ($p=0.256$). The final measurement showed a significant difference in which the control group lost flexibility and the EBAS group far exceeded its original measure ($p=0.012$). Multiple trends of positive acute change, though not significant, were seen in the EBAS group more frequently than the control group. The hypothesis was supported, and data indicate practicing Elemental Body Alignment System helps to improve flexibility.

Perception of Inclusivity on College Campuses and Expression of LGBT+ Identity

Carolina Brust

*Research Adviser: Dr. Betty-Shannon Prevatt;
Social and Behavioral Science*

Despite institutional efforts to promote a positive campus climate, minority groups have expressed feeling underrepresented and ostracized by their peers and faculty. Lesbian, Gay, and Transgender (LGBT+) individuals are particularly at risk for victimization, which results in taking protective measures in the form of identity concealment. This expression of inauthenticity in response to the perceived environment has been found to have negative psychological outcomes. The present study examines the relationship between perceptions of campus climate and outness among LGBT+ undergraduate students. The hypothesis is that students who perceive greater LGBT+ acceptance on campus are more likely to live authentically than LGBT+ students who perceive their campus to be less inclusive.

Recruitment is ongoing. Participants ($N = 65$) include 27 heterosexual and 38 LGBT+ students at Southeastern colleges. The study is being advertised through emails to academic departments and fliers in community spaces. The survey consists of demographic information, the Nebraska Outness Scale, items from the Comfort and Conformity of Gender Expression Scale, and the Assessment of Campus Climate for Lesbian, Gay, Bisexual, and Transgender Persons. A two-way between-subjects MANOVA will be performed to compare the effect of campus climate (high and low conditions) on level of gender expression and outness. A hierarchical linear regression analysis will be conducted to determine the effect of race, age, relationship status, and living situations (step 1) and sexual orientation (LGBT+ and straight conditions) (step 2) on perceptions of campus climate. Results from the present study could be applied to campus institutions to create a more inclusive environment for the LGBT+ community.

Personality Type and its Relationship to Stress and Coping Style in High School Students

Ally Cefalu

*Research Adviser: Dr. Cynthia Edwards;
Social and Behavioral Science*

The relationship between personality, stress, and coping were examined among high-achieving students in an academic summer program. High school seniors ($N = 49$) were surveyed over four time-points using the Personality Descriptor Profile (PDP) (Edwards & Hahne, 2006), the Brief COPE (Carver, 1997), and the Brief Academic and Social Stress Scale (Pantlin & Woolard, 2013; Mann, 2017). It was hypothesized that Task-Oriented students would have lower stress scores than Relationship-Oriented students and that Problem-Focused Copers would have lower stress scores than Emotion-Focused Copers. A repeated measures ANOVA comparing the stress scores of Task-Oriented participants over time found that while there was no overall within-subjects significance, $F(1, 4) = 2.45, p = 0.130$; pairwise comparisons displayed significance between T3 and T1, $p < .05$. There was no Relationship-Oriented significance across timepoints. Another repeated measures ANOVA found that there was no within-subjects significance for Problem-Focused Copers, $F(1, 4) = 1.21, p = 0.2$; pairwise comparisons displayed significantly less stress at T2 than at T1, $p < .05$. A final repeated measures ANOVA found that Emotion-Focused Copers had no within-subjects significance, $F(1, 4) = 1.54, p = 0.1$; pairwise comparisons found significantly less stress at T3 than at T2, $p = 0.04$. Discussion focuses on the diffusion of significance due to high variance. Results provide implications about the acclimation of different types of students over time in regards to academic stress, despite the non-graded environment. Development of future interventions in understanding students' personality and coping styles can provide support in stressful academic environments.

An Interdisciplinary, Multi-National Analysis of Gender and Identity within Religious Workplaces

Jenna Curia

*Research Adviser: Dr. Cynthia Edwards,
Dr. Kelly Morris Roberts; Social and Behavioral Science*

A two-part multi-national study examined how women's identity may be impacted by gender-role expectations and social-interactions within religious workplaces. Identity partially depends on the depth of one's relationship within social groups which form and regulate it. Failure to live up to behavioral standards can elicit corrections, waning commitments, and withdrawal from one's social group. Dataset one comprised face-to-face interviews to examine behavioral change and social withdrawal among Christian-Protestant Belizean women ($n = 12$) with work experience in religious organizations. Dataset two diversified the sample and expanded on findings using six online, reflective writing prompts. Additional

female participants ($N = 39$) from seven countries and 12 religions were recruited, seven of whom had participated in dataset one. Belizean participants were visited on-site during a summer 2019 study-abroad term. Themes of identity confusion due to gender-related social and professional limitations identified in dataset one continued to be supported and expanded throughout dataset two. One participant described feelings of guilt regarding the decision to "prioritize herself and her goals" by leaving her workplace and "sinning against her religion." Others reported "tremendous amounts of stress that impacted weight, sleep patterns and mood." Participants experienced relational manipulation that made them feel "forced to stay" in their religious workplaces to maintain belongingness within their community. After a period of denial and withdrawal, career changes for 60% of participants resulted in identity formation and social belongingness apart from professional environments. Decreased levels of stress and an increased sense of personal identity were reported following career changes.

Animals in Real War versus Film Fantasy

Raynor Dail

Research Adviser: Dr. Steven Benko; Arts and Humanities

Today, there are two types of protection provided to animals in the film industry. First, there is the Animal Humane Association which works to oversee safe working conditions for animals. The government, in turn, provides protections for animals through the implementation and enforcement of animal safety laws. Secondly, there are cultural protections provided for animals. If an animal is harmed in a movie, audiences do not want to believe that the animal was harmed in order to produce their entertainment. Four recent movies: *Twelve Strong* and the current *John Wick* trilogy feature animals who play a key role in the plot as well as important action sequences. *Twelve Strong* focuses on the use of horses during the invasion of Afghanistan directly after the events of 9/11. The *John Wick* trilogy begins with the murder of a puppy which leads to lots of death in the inner ring of the world's most elite assassins. In the third movie, two dogs and a horse play a role in several important action sequences. This research attempts to compare how animals are treated in real war to how they are treated in film war and violence by discussing the *John Wick* series and *Twelve Strong*. By focusing on the difference between the two, it becomes evident the standard given to animals in film is much higher than that given to those who use animals in warfare.

Testing the Effects of Oleanolic Acid and its Derivatives on Eukaryotic Cell Division

Shivani Devaguptapu

*Research Adviser Dr. Walda Powell, Dr. Karthik Aghoram;
Natural and Physical Science*

Oleanolic Acid has been shown in previous studies as an effective inhibitor of uncontrollable cell growth by arresting the

first checkpoint in the cell cycle. The present study seeks to test the hypothesis that Oleanolic Acid and its derivatives may serve as inhibitors of eukaryotic cell division using yeast (*Saccharomyces cerevisiae*) cells as a model system. This furthers the understanding of organic chemistry synthesis and its application to biological systems. The organic chemistry component of this research aims to modify functional groups on the structure of Oleanolic Acid, hence preparing the derivatives of the chemical. To assess the hypothesis in the context of a biological setting, yeast cells were grown in a liquid nutrient medium and treated with Oleanolic Acid or its derivatives using DMSO as a solvent. This study utilized two control groups: one group in which there was no solvent exposure and another group where DMSO functioned as a control. Cell division was monitored over a six hour time course by measuring cell densities at regular intervals. Preliminary results show that the treatments with the compound and the controls indicate varying cell growth. The overall goal of this research is to identify specific compounds derived from Oleanolic Acid that have the potential to inhibit cell division and may serve as anti-cancer agents in the future.

Perceptions of GMOs at Meredith College

Samantha Duerring

Research Adviser: Dr. Karthik Aghoram;

Physical and Natural Science

From grocery stores to the evening news, the debate surrounding genetically modified organisms (GMOs) rages on. Some believe them to be part of humanity's future, while others view them as a hazard to consumer safety. The purpose of this study is to look at community concern surrounding GMOs, identify major causes for concern, and compare these correlations to trends found in literature. An online survey was sent to Meredith College faculty, students, staff, and alumni asking questions about overall concern about GMOs, education status, religious and personal beliefs, where survey takers got the majority of their scientific knowledge from, and the strength of their scientific background. Over the course of one month in 2019, the survey received 498 completed responses. In terms of overall concern, 52.09% of students (n=?) either were not at all concerned about GMOs overall or very slightly concerned, 22.05% were somewhat concerned, and 25.85% were concerned to extremely concerned. Faculty, staff, and alumni (n=?) mirrored this trend with 45.45% of them not at all concerned or very slightly concerned, 24.68% somewhat concerned, and 29.87% concerned to very concerned. These trends of lower overall concern about GMOs on Meredith's campus may be because the college promotes the pursuit of correct, valid, scientific knowledge and the importance of scientific research, and is an environment with educated individuals who have better access to scientifically verified information and know how to look for and access it.

Meredith College Students and the Suffrage Movement

Marissa Fowler and Morgan Jonhson

Research Adviser: Dr. Angela Robbins; Arts and Humanities

This year marks the 100th anniversary of the passage of the 19th Amendment, which granted women the right to vote. As North Carolina and Meredith College prepare to commemorate the centennial, research reveals the ways in which women's college students across the state engaged in this fight. Typically, North Carolina suffragists were middle-aged, educated, upper-class women who had the economic freedom and the time to pursue social causes. However, the younger generation, though not as well documented, also played a meaningful role in the movement. An increase in references to suffrage in archival documents from women's colleges--such as yearbooks, literary magazines, and other campus publications--parallels the growing support for the movement both nationally and on a state level in the late 1910s.

North Carolina's women's colleges have a rich history, and Meredith College was one of the most active in the suffrage movement. Meredith students, although not as publicly active in the suffrage movement as their older counterparts, saw women's suffrage as an inevitability, and once gained, a civic responsibility. Campus publications show students were active in on-campus suffrage organizations, held demonstrations, and wrote in support of the cause. Students and speakers on campus alike felt that women's suffrage was a certainty. Through their writings and on-campus events, Meredith students practiced informed citizenship--educating themselves about current events and the American political system--and prepared themselves to exercise their newfound political power.

Blockchain's Potential Impact On The Accounting Industry

Anna Griffin

Research Adviser: Dr. Mary Jane Lenard; Accounting

Technology is always evolving and creating new ways to attempt to accomplish tasks more efficiently and effectively. One such technology is blockchain, a platform used to facilitate and verify transactions between parties. Originally, blockchain was created in 2008 to underlie the usage of Bitcoin. Blockchain is a technology that has the potential to make a large impact on many disciplines (not just in relation to crypto-currencies), but this analysis will focus upon its use and impact on the accounting profession. This analysis addresses what a blockchain is, the different types of blockchains, and overall benefits and concerns of the technology. In addition, present uses of blockchain are discussed, and the future uses of the technology are considered for the accounting industry. When assessing the use of blockchain for accounting, possible benefits and potential concerns the technology poses are examined. While

blockchain is in its infancy with professionals still trying to fully understand it, the potential it provides to impact accounting processes and accountants' roles is a very relevant topic in the accounting field. For instance, blockchain could help accountants spend less time on reconciliations of accounts and more time on advising clients. In addition, blockchain could allow the auditing process to be continuous without the need to sample transactions periodically. Looking ahead, members of the accounting profession will have to evaluate the costs and benefits of implementing blockchain to see where it could have the most impact on their business.

The Effects of Core Stability Training on Athletic Performance in NCAA DIII Collegiate Women Athletes

Lauren Grodi

Research Adviser: Dr. Sharon Malley; Health and Human Performance

Core strengthening exercises are regularly added into training programs though core stability is rarely a feature. The difference between strengthening and stability is that strengthening focuses on resistance of fatigue while stability focuses on maintenance of balance. Research pertaining to core stability and its effect on sports performance, as well as research on female athletes, is scarce. The purpose of this study is to examine the effects of core stability on sports performance in 20 division III female volleyball and softball intercollegiate athletes. Each participant underwent pre-testing of sport-specific movements, followed by a 6-week core stability training program, and finally a post-test of the same of sport specific movements. The volleyball athletes' sport performance was measured by passing accuracy, setting accuracy, and arm hitting speed. The softball athletes' sport performance was measured by throwing accuracy, arm throwing speed, and run time from home plate to first base. There were no significant differences for both groups with respect to accuracy ($p = 0.521$ for volleyball athletes passing, $p = 0.619$ for volleyball athletes setting, and $p = 0.131$ for softball athletes throwing); however, there were significant effects on improving arm speed and run time for softball athletes ($p = 0.001$ for arm hitting speed for volleyball athletes; $p = 0.015$ for arm throwing speed for softball athletes; $p = 0.014$ for run time from home plate to first base). Future research is necessary to fully validate support for the hypothesis that core stability training positively affects sports performance..

Integrating Art into the 21st Century Classroom

Taylor Harris

Research Adviser: Dr. Emily Howard; Art Education

When art is integrated into all subjects, students are allowed to be creative, dig deeper, and build skills they would not have any other way. In this study, teachers from various North Carolina counties and various types of schools were given a Google

form to express their opinions and thoughts on arts integration. Most teachers believe art integration can affect the cognitive, social, emotional, and motivational learning in students. Though this is what they believe, only a few teachers use art integration in their classroom. According to respondents, a few reasons for teachers not using art integration are time, curriculum constraints, and not knowing how.

Is This Being Graded? A Mixed Methods Evaluation of Academic Motivation in a Gradeless Residential Learning Environment

Morgan Hendrix

Research Adviser: Dr. Cynthia Edwards; Psychology

Motivation was examined in academically gifted high school students ($N = 49$) selected to attend a prestigious summer residential program. Recent research has become interested in gradeless environments (McMorran et al., 2017). Self-reported measures of intrinsic motivation, extrinsic motivation and amotivation were measured using The Academic Motivation Scale (AMS). The survey incorporated three subtypes of intrinsic and extrinsic motivation based on Deci and Ryan's (1985) Organismic Integration Theory (OIT) taxonomy of motivation. Twelve survey items measured three subtypes of intrinsic motivation including working to know, toward accomplishment, and to experience stimulation. Twelve survey items measuring extrinsic motivation included identified, introjected, and external regulation. The remaining items measured levels of amotivation. Surveys were administered in two waves, 5 weeks apart. The purpose of the present study was to examine motivation in gifted students in a gradeless environment. The hypothesis of the present study stated that participants would exhibit low levels of amotivation and high levels of intrinsic motivation. Preliminary analyses were conducted. Participants reported higher levels of intrinsic motivation to know and extrinsic motivation to identify. A repeated measure ANOVA analyzed motivation over time. Post hocs showed no significant change in motivation over time $F(1,46) = 1.05, p > .05$. To further examine motivation, individual interviews with participants were conducted regarding rationale behind work ethic at school versus the summer program. Interviews were transcribed verbatim. Analyses are ongoing. Results will be discussed in the context of examining motivation levels in gifted emerging adults.

Readiness for Kindergarten Literacy: Expectations of Parents, Educators, and Experts

Maha Issa

Research Adviser: Dr. Gwynn Morris; Social and Behavioral Science, Psychology

The position statement from the National Association for the Education of Young Children (NAEYC) discusses how "readiness" for school should be "flexibly and broadly defined", and should

go beyond academic skills (2009). However, there is a wide variety of sources of information beyond this statement, and it is yet unclear which of these sources that parents, educators, and developmental experts rely upon, and whether there is a discrepancy in the expectations these groups develop regarding readiness for kindergarten literacy. Hatcher, Nuner, and Paulsel noted differences between teachers and parents in their qualitative, interview-based study (2012). The design of the present study combined a quantitative survey and a qualitative interview to gather a comprehensive understanding of what the expectations of parents, educators, and experts were regarding readiness for kindergarten literacy, and whether there were discrepancies between these groups. The survey asked participants to rank the importance of particular literacy skills, the sources of information on readiness they refer to, and when particular skills should be acquired. The interview consisted of questions that expanded upon the survey, providing insight to the participants' responses, and allowed participants to contribute their thoughts outside of the previous parameters. This research is ongoing, however the preliminary process of data collection has revealed differences between parents, teachers, and experts overall. Determining the nature of these discrepancies and investigating why they exist are the first steps to creating a more unified understanding of readiness for kindergarten literacy that is as developmentally appropriate as possible.

The History and Current Status of Infant Mental Health

Maha Issa

Research Adviser: Dr. Fain Barker;
Social and Behavioral Science, Child Development

Infant mental health is a growing field of study that is often misunderstood due to a long history of misinformation around the abilities and experiences of infants and toddlers. This study sought to review relevant literature surrounding historical beliefs regarding infant mental health, as well as shed light on more current research and resources. Historical understandings of infant pain, their relationships with caregivers, their skills, and their susceptibility to mental illness were examined, and found to differ drastically from what researchers understand today. Understanding the history of how scholars, scientists, and the public have viewed and treated infants could bring awareness to both how far current research has come, and why there is still a great deal of progress to be made with further study.

A Case Study Analysis of Two Rural Entertainment Districts: Rocky Mount Mills and Roanoke Rapids Theatre

Carolyn Jablonski

Research Adviser: Dr. Anne York; Business and Economics

Successful strategies for the economic development of rural areas can induce economic growth in communities, while

unsuccessful strategies can hinder further growth opportunities. Entertainment districts are a new and increasingly popular way of bringing economic growth to communities. Identifying an economic development formula that has yielded success in the past can help communities avoid development projects that could harm their growth. This research examines two North Carolina communities, Rocky Mount and Roanoke Rapids, to evaluate which development measures will position an entertainment district for success or failure. A combination of comparative case study analysis, individual interviews, and secondary research is used to determine the best measures taken to create a prosperous entertainment district. This study shows that a combination of prior economic development experience, private funding, community backing, and adherence to feasibility studies breeds success when establishing entertainment districts for economic development. Communities should direct the development of entertainment districts to experienced developers with a presence in the community.

Effects of Occupational Therapy Exercises on Fine Motor Progression among Preschool-Aged Children with and without Autism

Laura Jenkins

Research Adviser: Dr. Cynthia Edwards;
Social and Behavioral Science

Previous research examined handwriting ability on the basis of grip and pinch strength and found that grip strength correlated with pencil control as well as handwriting legibility (Alaniz, Galit, Necesito, & Rosario, 2015.) Additionally, findings indicate early intervention programs are effective in improving handwriting and general preschool readiness (Lust & Donica, 2011.) The present study examined the relationship between children's in-hand fine motor skills (e.g. grip and pinch) and handwriting ability using both novel and established exercises. It was hypothesized that as the frequency of hand strength exercises increased, handwriting ability would improve. An A-B design was used with participants ages 2-5 from the Meredith Autism Program: eight children diagnosed with autism spectrum disorder and four typically developing children. Each participant completed exercises related to fine motor skills that lasted for 5 minutes twice a week for four weeks. Manipulation of the hand-grip strength during exercises was examined. Exercises consisted of using a pegboard to place and stack pegs, finding and removing beads within putty, and handwriting practice of drawing and tracing letters and shapes. Strength of the individual's grasp and improvement in handwriting ability were measured each session using a predetermined scale. Individual progression and results may differ due to the abilities and different prerequisite skills of the participants. Data collection is ongoing and analyses are forthcoming. Data will be analyzed in reference to individual progression rather than group comparisons. According to baseline and week 1 treatment data, an improvement of handwriting or fine motor skills is projected.

Improved Purity of 3-Methyl-2-Iodoxybenzoic Acid

Ga Hyeon Jeong

Research Adviser: Dr. Walda Powell, Dr. Cassandra Lilly; Natural and Physical Science

Inorganic reagents, such as KMnO_4 and Chromic acid, have been widely used as oxidizing reagents, but these inorganic reagents cannot mildly oxidize alcohols to just the aldehyde stage or sulfides to the sulfoxide stage without further oxidation of alcohols to carboxylic acids and sulfides to sulfones.

A recent literature review has suggested that substituted Iodoxybenzoic Acid (IBX), an organic reagent, mildly oxidizes alcohols and sulfides at a short time for a high yield. However, while attempting to replicate the procedure described in the literature, previous efforts failed to isolate pure, colorless oxidizing IBX agent free from impurities such as Iodosobenzoic Acid (IBA). The focus of this research was to improve the purification of 3-methyl-2-iodoxybenzoic acid (Me-IBX) reagent by modifying the literature procedure. After several trials, the purification of Me-IBX was improved by synthesizing Me-IBX under an inert atmosphere, suggesting that the synthesis of Me-IBX under normal atmosphere was interrupted by the presence of oxygen radicals. Improved purity of Me-IBX was verified by Proton Nuclear Magnetic Resonance (^1H NMR) and Infrared Spectroscopy. The mild oxidation of benzhydrol using our synthesized Me-IBX was completed in approximately 1.5 hours, due to the improved purity of ME-IBX.

Live Music, Large Talent, Local Community - The Economic Trends of Raleigh's Local Music Industry

Anya Johnson

Research Adviser: Dr. Anne York; Economics

Most people would argue that music binds humanity due to its ability to transcend geographical, cultural, and social barriers. Music was one of the first major industries to have its business model be completely reinvented by the popularization of the Internet, which allowed consumers to have greater access to music at lower (or free) prices. However, the inner workings of the industry have always been shrouded by a cloud of ambiguity and uncertainty. Through qualitative case study analysis of local amateur and experienced musicians and booking managers, this research seeks to uncover the economic effects of the changes in the music industry on the local music scene in Raleigh, NC.

Musicians were chosen from personal connections to represent the diverse population of strictly original musicians, cover artists, and those who mix original and cover music. Venues were chosen to represent one founded on the basis of music, and one that chose to add music after opening. Findings from qualitative questions reveal the changes in the sources of music revenue for musicians and venues and provide a recommendation for how musicians can adapt to today's economic trends on a local level.

Investment Analysis, Portfolio Optimization and the Investment Performance

Marie Johnson, Hope Cooper, Callie Copeland, Valerie Crenshaw

Research Adviser: Dr. Bing Yu; Finance and Investment

The Meredith College Business School Student Investment Fund owns and manages an investment portfolio made up of twelve equities. Since Fall Semester 2018, this fund has been run by students in the student investment fund club, which has been able to monitor and manage all decisions through as a management team. As part of the portfolio management, we tracked the performance of the stocks in the portfolio and an investment policy statement was developed which houses our investment objectives and criteria. Historical data on the respective stock prices of the portfolio were collected and used to perform a quantitative portfolio optimization analysis. For the portfolio analysis, we used the S&P 500 index as a benchmark as we built three additional portfolios. As part of the analysis, we developed a risk-averse portfolio, a risky portfolio, and a portfolio based on the highest Sharpe ratio. We used the matrix and the solver function in Excel to build these portfolios, with the purpose of finding the optimal level of capital allocation. We will keep track of the stocks in our portfolio, conducting the same analyses this semester, and making a final decision regarding rebalancing our portfolio in accordance with our investment policy statement.

The AfroFemme Transcendence

Marie Johnson

Research Adviser: Dr. Eunyoung Yang; Fashion Merchandising & Design

The AfroFemme Transcendence fashion showcase was inspired by the Aku (Krio) culture in Africa and the uniqueness of women. Growing up in a society that defined a woman's role as a wife and mother only, I saw many women defy and reject the notion of being limited to those stereotypical women's roles. Instead, women rose to become CEOs of their own companies, activists that fought to end female genital mutilation in The Gambia, advocates for other women, and a chief prosecutor of the international criminal court. Therefore, the purpose of this collection was to celebrate the versatility and uniqueness of women by creating garments with variation from bold and abstract to subtle.

This collection exhibits bold aesthetic appeals created through patternmaking, draping, and construction techniques. Techniques of Couture that are applied include embroidery, beading, and Madame Grès micro pleating. Headpieces, which are a common accessory for women in the Aku culture, are incorporated in this collection. The collection shares color themes, the textiles used, and the unique details of the garments. Through advanced construction techniques and

sophisticated designs, this showcase reflects and honors the intricate yet strong characters of women and celebrates that a woman's role is her own to define.

Degrees of Women's Anger: Burning Hot, Cold, or Out of Control

Eleanor Jones, Bailey Birtchet

Research Adviser: Dr. Steven Benko; Arts and Humanities

This interdisciplinary project compiles various theories and interpretations of women's anger in order to understand how anger is being rehabilitated, where it was previously suppressed, and why feminist scholars, like Sara Ahmed, Rebecca Traister, and Soraya Chemaly, are finding it a useful emotion when advocating for societal change. We discuss two different understandings of anger: first, anger as a slow, cool burn that, while transformative, is always inoculated from charges of chaos and disorder by being an emotion the agent is always in control of. Second, we discuss anger as a burning hot rage that leans towards being out of control. We contrast these two perspectives by putting them in dialogue with another and arguing for when each type of anger is appropriate and effective. Within that dialogue among scholars, theorists, and different interpretations of anger, we can better understand recent feminist activism: the women's marches, #MeToo, push towards intersectionality, and feminist minority dynamics. To further illustrate our point about the uses and usefulness of anger, this presentation contains a discussion of anger as it was used to produce several pieces of visual art that were responding to recent abortion legislation. These works of art and the multimedia platform we created juxtapose historical understandings of anger and then problematize anger as a privilege only available to certain racial and socio-economic classes. Ultimately, the project examines the ways in which women's anger intersects with wide-spread oppressions and contradicts systemic injustices.

Blue: A Pigment of Our Imagination?

Nabiha Khan, Allison Kvasnicka

Research Adviser: Dr. Mark O'Dekirk; Interdisciplinary

Scholars claim blue is the most recently discovered color, stating that humans may not have been able to see blue during the ancient Grecian era. Through an interdisciplinary literature review, the perception of color, or lack thereof, was investigated. The lack of color perception could be attributed to the language acquisition theory; without the language for specific colors, people may not have perceived them the same way. Greek literature, such as "The Odyssey," fails to describe the sky/water as blue, and rather refers to them as a "wine red". Blue is mentioned in religious texts, including the Bible and Quran. The Quran was written during the time of ancient Greece, which creates confusion as to how people interpreted the color blue written in religious texts if they could not "see" the color. Color, on the visible spectrum for humans, is a reflection

of wavelengths off objects. The current explanations for the mechanisms of vision and color blindness in humans and other species are well-known. Given our current understanding of this process, a different theory for the altered color perception at the time ancient texts were written is humans may have either lacked or had inactive/abnormal forms of specific genes related to color vision, and therefore lacked the mechanisms to process the color blue as a physical wavelength. While more research is needed surrounding the historical perception of colors, aspects of interpreting color perception were identified and assessed, specifically how colors are physically and linguistically perceived.

Facial Cleanser Formulations for Various Skin Types

Nabiha Khan

Research Adviser: Dr. Sasha Ormond; Natural and Physical Science

People of all ages suffer from a variety of skin ailments which include aesthetic and medical conditions. To control, prevent, or fight these ailments, over the counter and prescription facial cleansers are often used. Facial cleansers are usually formulated with ingredients to reduce redness, tighten pores, or provide hydration for the skin, but often targeting only one single skin-related issue at a time. The purpose of this research project was to formulate facial cleansers using ingredients that are known to target more than one facial issue, and combining different active and inactive ingredients that are not commonly found together. Additionally, controversial ingredients such as parabens or sodium laureth sulfate were avoided, and instead nature-derived inactive ingredients were prioritized. The active ingredients were researched to be safer to use and included niacinamide, retinol and salicylic acid. Five types of formulations were prepared for various skin types and evaluated by measuring the pH, foaming ability, viscosity, and cleaning ability in comparison to each other and the control. The Burts Bees® Cleansing Oil for normal to dry skin was used as a control for the experiment. The results comparing pH, foaming ability, viscosity and cleaning ability to the control will be presented. Future tests can be performed to evaluate the longevity of these formulations and determine the shelf life for household storage due to the absence of synthetic preservatives, e.g. parabens.

Kinematic Effects of Chronic Entanglement in Humpback Whales

Annie Kim

Research Adviser: Dr. Sasha Ormond

The effects of fishing entanglement nets on a whale's swimming and diving performance is investigated to emphasize the implications of human activity on wildlife. A physical science approach is used to determine kinematics and the maximum weight an entanglement net could have before it is fatal. The procedure will apply kinematic equations and force diagrams to

develop a mathematical model. Results are expected to show the drag and buoyancy forces to be drastically increased while the average swimming velocity would decrease. These findings can theoretically be applied to disentanglement operations and further research on endangered species.

Correlates and Predictors of College Student Retention: Belongingness, Loneliness, Resilience, Parental Education, and Intention to Return

Allison Kvasnicka

Research Adviser: Dr. Betty-Shannon Prevatt; Social and Behavioral Science

Higher education administrators strive to increase student retention. Previous literature implies social support plays a role (Hilts, Part & Bernacki, 2017; Bovier, Chamot & Perneger, 2004). First-generation college students report significantly poorer social adjustment (Hertel, 2002). The present study aimed to predict first-year college student retention rates and intention to return to Meredith College, based on belongingness, loneliness, resilience, and parent's highest level of education. Data from ($N = 199$) undergraduates were collected in 2018 through the First-Year Student Success Survey. The Office of Student Retention and Success provided retention data in the Fall of 2019. A binomial logistic regression produced a significant one-factor model ($X^2(1) = 11.849, p=0.001$). The model explained 10.1% of the variance in retention and correctly classified 84.9% of students. For each increase in a student's intent to return score, the odds of the student returning to Meredith increased by 2.904. A three-factor multiple linear regression significantly predicted student's intent to return for following academic years ($F(3, 199) = 25.296, p=0.00$) and produced the model: $Intent\ to\ return = 2.824 + (0.303 \times Belongingness) + (-0.086 \times Resilience) + (-0.082 \times Loneliness)$ ($p=0.015$). Analyses indicated only the intent to return score was significant in predicting student retention. However, belongingness, loneliness, and resilience were found to be significant in predicting students' intention to return, while highest parental level of education was not. Results are discussed with regard to the unique relationship of resilience, as well as further relationships and implications.

Aldersgate: A Story of Money, Engineers, and Mourning

Jennifer Mackaman

Research Adviser: Dr. Amy O'Keefe

During the 1970s and 1980s in Shelby, North Carolina, Aldersgate United Methodist Church grew from a small country church to a center of power in Shelby. This time was prosperous for Shelby when Pittsburgh Plate Glass diversified the industry in Shelby and brought a new professional class of engineers to the textile mill town. A shift like this happens for so many minute reasons that a list of explanations cannot reach the

complexity and nuance of power. After interviewing members of the church, reading newspaper articles and church publications, and studying population data, I realized that the factors of growth at Aldersgate might be coincidental or so small that they made a difference without anyone noticing. Nonetheless, the major factors that caused the growth of Aldersgate were distinct characteristics of Methodism, the work and death of Reverend DeArmon Hunter, financial contributions to the community, and the entrance of a new class of engineers onto the social scene in Shelby.

Consistency in Perceptions of Social Inequality

Mimi Mays

Research Adviser: Dr. Whitney Manzo; Political Science

Gender inequality, racial inequality, education inequality, and income inequality have all risen substantially over past decades and become an important topic of research and policy. Effective political science research often hinges on the assumption that citizens form consistent political values and attitudes about such issues. This study tests that by analyzing representative state-wide polling data on social inequality to determine the consistency of citizens' perceptions of various forms of inequality in North Carolina. Literature review suggests that respondents' attitudes towards these different types will be mostly consistent, but I predict that consistency is not independent of variables such as political partisanship, race, and gender. The results of this research will be useful for analyzing the extent to which the public is aware of existing social inequality and for designing effective partisan issue framing. This study also serves as a methodological contribution to the field as an evaluation of inequality indexes in polling research and their ability to be generalized and categorized. Data analysis is ongoing; results will be presented at CSA Day.

Cloning of *vioA* From *Chromobacterium Violaceum* into *Escherichia Coli* Expression Vector PinPoint

Alissa Meo

Research Adviser: Dr. Jason Andrus; Molecular Biology

Violacein, a purple-pigmented protein commonly found in the bacterium *Chromobacterium violaceum*, is regulated by quorum sensing mechanisms, and functions as a broad-spectrum antibiotic, antifungal, and powerful antioxidant. The genes that code for violacein are found in the *vioABCDE* operon and span over 10kb. The *vioA* gene codes for a non-pigmented precursor to violacein called flavin-dependent L-tryptophan oxidase. Any disruptions or mutations in the *vioA* gene will cease the production of violacein completely or produce non-functional violacein. The ultimate goal of the research was to induce an overexpression of the VioA protein in *Escherichia coli* for purification. VioA is encoded by the *vioA* (approximately 1.25 kb long) in *C. violaceum*, the first gene in the violacein operon. The *vioA* gene was isolated by methods of polymerase chain reaction (PCR). Primers for the PCR were designed using the Primer3 online

primer design tool to amplify the entire coding sequence of the *vioA* gene, and extracted genomic DNA from *C. violaceum* was used as a template. This PCR product was cloned into the TA cloning vector, pGEM-T Easy plasmid, and transformed into a methylation negative *E. coli* strain and grown on ampicillin selection plates. Ultimately, this gene will be subcloned into the expression vector, PinPoint Xa-1, which will enable purification of the VioA protein.

Breaking the Silence: Women in Music (Identity)

Faith Miller, Leidy Corona

*Research Adviser: Dr. Shannon Gravelle;
Arts and Humanities*

Aziza Mustafa Zadeh (b. 1969) is an Azerbaijani female jazz composer and the daughter of jazz legend, Vagif Mustafa Zadeh, the founder of Azerbaijani jazz. Her work demonstrates how women jazz musicians redefine jazz and some of the challenges that they have faced throughout history. Zadeh came from a musical family, and from a culture where improvisation is a traditional way of making music. Her music includes a fusion of jazz and Azerbaijani folk music. Although she is a gifted performer, composer, and improviser, questions remain as to how she identifies as a musician in the modern jazz scene. This presentation will give some background on her life and career, and explore her role in the jazz mainstream. The presentation will include a performance of "Melancholic Princess," which is a good example of the fusion of jazz and Azerbaijani folk music.

Gabriela Lena Frank (b. 1972) is an American composer who has always put identity at the center of her music. Frank's mother is Peruvian, with Chinese descent; her American father is of Lithuanian and Jewish descent. Her music is a result of exploration of her Latin roots, and her own interpretation of it. Dr. Frank is actively creating opportunities for race equality, and mentorship in the arts.

The Influence of Studying Abroad on Student Self-Concept

Emily Mitchum

*Research Adviser: Dr. Doreen Fairbank;
Social and Behavioral Science*

The present study sought to identify elements of self-esteem and concept that change within college-age students during international travel and study. The influence of studying abroad on self-concept strength and overall change was studied by comparing four cohorts of participants. The participants ($N = 14$) were female undergraduates from study abroad programs organized by the Meredith College Office of International Programs and were compared based on length of term, spring semester-length versus summer-length ($n_1 = 7$, $n_2 = 7$), and on style of program, Meredith College-led or affiliate-led ($n_3 = 8$, $n_4 = 6$). The participants were asked to

complete the Tennessee Self-Concept Scale:2 before and after experiencing study abroad programs, first, within 2 weeks prior to the date of departure, and second, within 2 weeks following the date of return. The study aimed to determine if studying abroad in the spring term or summer term and with a Meredith College program or affiliated program had significantly different influences on self-concept. Results of a repeated-measures analysis illustrated trends toward increased self-concepts in long-term, semester participants compared to short-term, summer participants, and decreased inner conflict in Meredith College program participants compared to affiliate program participants. This indicates that study abroad is a positive element of student development and that program options should be considered greatly as an indicator of self-concept change.

Can I Trust Me to Trust You? The Influence of Self-Esteem on Brand Trust

Fareena Qamar

*Research Adviser: Dr. Lisa Monahan;
Applied Sciences, Business/Marketing*

This research seeks to explore how the level of one's self-esteem affects his or her level of receptiveness towards a brand. Previous research illustrates that interpersonally, one's self-esteem affects his or her ability to trust, and similarly, marketing scholars claim that consumers are capable of experiencing emotions and cognitions towards brands that are consistent with those evidenced in interpersonal relationships (Batra, Ahuvia, and Bagozzi, 2012; Fournier, 1998). The goal of this research is to expand on the role of self-esteem in interpersonal relations to reflect the area of consumer-brand relations. A survey questionnaire was designed to measure consumer perceptions of brands respective to their level of self-esteem. Participants were recruited via MTurk (Amazon Mechanical Turk) in which participants self-select and complete the survey for compensation. Gender has been incorporated in this research as a mediating variable supported by the reasoning that women (vs. men) are disproportionately influenced by self-esteem from a behavioral, affective, and cognitive perspective. Consequently, the effects are accentuated among women. Results indicate that self-esteem is a positive predictor of the level of trust one has towards a brand and his or her perceptions of ad credibility.

Writing to Save a Life: Kurt Vonnegut's Slaughterhouse-Five

Delaney Rhodes

Research Adviser: Dr. Garry Walton; Arts and Humanities

Kurt Vonnegut's 1969 novel, *Slaughterhouse-Five*, depicts the lasting impact of war not only on a global society, but also on the individuals who experienced first-hand the brutality of human nature while serving on the front lines. As the

mental illness of Post Traumatic Stress Disorder (PTSD) was not recognized by the American Psychological Association until 1980, *Slaughterhouse-Five* serves not only as an unconventional and admired antiwar novel of the 1960s, but also as a coping mechanism for some of those who were not able to receive the medical treatment appropriate for their illness. This research analyzes Kurt Vonnegut's novel, various critical receptions of the work, and Vonnegut's official biography by Charles Shields, *And So It Goes*, through a psychoanalytic lens to reveal the mirrored trauma and recovery of Kurt Vonnegut and the novel's protagonist, Billy Pilgrim, as they handle their survivor's guilt following the 1945 firebombing of Dresden, Germany. Vonnegut's depiction of survival, loss, and endurance shapes a story that transcends time and place and offers insight into the power of writing and storytelling to overcome personal trauma. *Slaughterhouse-Five* is a story so deeply connected to humanity that despite the magnitude of tragedy described, it provides a possibility of hope for both a society battling against the ceaseless desire for power, and individuals searching for their own life-saving remedy.

Spectatorship, Desire, and the Queer Female Body: Representations of Lesbian Sexuality in Contemporary American and Canadian Cinema

Alexandra Rouch

Research Adviser: Dr. Holly Fischer; Arts and Humanities

Many feminist film scholars have suggested that cinema is created with an ideal male spectator in mind, a concept scholar Laura Mulvey described in 1975 as "the male gaze." The male gaze objectifies the female body by using specific cinematic language to emphasize a woman's body over her subjectivity or personhood. In the late twentieth century, some scholars began to debate the existence of a female gaze, specifically a queer female gaze, which might offer an alternative way of depicting the female body with the intention of evoking desire but without objectifying the body. However, few have attempted to describe how a film might create this queer female spectatorial position. This research aims to fill that gap by offering a rubric informed by feminist film theory which will help establish parameters for identifying a queer female gaze in cinema. By applying the rubric to a sampling of recent Canadian and American films which feature sexual relationships between women, this project examines potential forms of the female gaze and delineates the differences between the male and female gazes. Ultimately, this research suggests that the cinematic female gaze is highly subjective and personal and is dependent on the spectator's ability to identify with the subject(s) involved, unlike the more voyeuristic and detached male gaze. This rubric is intended to offer a basis for identifying films whose ideal spectator is the queer woman and to open up new ways of thinking about cinematic depictions of the female body.

Effect of a Speech-Generating Device on Emerging Vocalization in a Child with Autism Spectrum Disorder

Kayla Satterwhite

Research Adviser: Dr. Doreen Fairbank; Social and Behavioral Science

Many children with autism spectrum disorder (ASD) have difficulty developing speech and/or have limited or unintelligible vocal abilities (Matson, Mahan, Kozlowski, & Shoemaker, 2010). Often, people with ASD learn to communicate with others using a form of an augmentative and alternative communication (AAC) device called a speech-generating device (SGD). The purpose of the present study was to assess the effect of an SGD on emerging vocalization in a child with ASD. The study was conducted over a period of 8 weeks. It was hypothesized that independent vocalizations to communicate wants would increase with the use of an SGD. The participant ($N = 1$) was a preschool aged male diagnosed with ASD. The participant was observed in two settings: playground and sensory room at the Meredith Autism Program. During Baseline in Weeks 1-2 and Generalization in Weeks 7-8, the participant did not use an SGD to communicate in either setting. During Intervention in Weeks 3-6, the participant used SGD software, Proloquo2Go, to communicate in both settings. The software allows the participant to tap icons that produce a corresponding synthesized speech output. The total number of independent vocalizations was observed in each setting. The mean number of independent vocalizations on the playground during Baseline was 1.00 ($SD = 1.83$). The mean number of independent vocalizations in the sensory room during Baseline was 0.80 ($SD = 0.92$). Data collection is ongoing and will be completed by March 18. Results can be used with children with ASD and families within the home, school, and everyday life to increase quality of life and communication with others.

Diagonal Chromatic Number of a Maximal Planar Graph of Diameter Three with Twelve Vertices

Stephanie Sierra

Research Adviser: Dr. Jennifer Hontz; Natural and Physical Science, Mathematics

The diagonal chromatic number is the smallest number of colors needed to color the vertices of a graph such that any two adjacent or diagonal adjacent vertices are of different colors. This concept was first introduced by Bouchet in 1987. He showed that any plane graph, where the inner faces are triangles, is diagonally 12-colorable. However, in 1990, Borodin was able to show and reduce this bound to 11. In 1995, Sanders and Zhao furthermore reduced the bound to 10-colorable. A similar idea one can consider is how to construct a planar graph such that the diagonal chromatic number is less than 10 colors. In 2019,

DanJun Huang, Yiquao Wang, Jing Lv, Yanping Yang, and Wefan Wang from Zhejiang Normal University in China focused on the structures of maximal planar graphs of diameter two and their diagonal coloring. They showed that if a graph is maximal planar with diameter two, then the diagonal chromatic number of the graph is nine if and only if the graph is a particular graph of nine vertices. This thesis is an exploration of the diagonal chromatic number of maximal planar graphs of diameter less than four. A maximal planar graph is a graph that consists of vertices and edges such that no new edge can be added without intersecting another edge. This thesis will aim to show that if a graph is maximal planar of diameter less than four with twelve vertices, then the diagonal chromatic number of the graph is six.

The Effectiveness of Insecticide Treated Nets in Preventing Malaria in Sub-Saharan Africa

Samantha Smith

Research Adviser: Dr. Carolina Perez-Heydrich; Natural and Physical Science, Mathematics

The purpose of the project was to evaluate the indirect and direct protection conferred by community-level use of insecticide treated bed nets (ITNs) on occurrence of malaria in children under the age of five in sub-Saharan Africa. Whether ITN use protects the users themselves (i.e. direct protection), as well as community members that do not engage in ITN use (i.e. indirect protection) was evaluated. Publically-available datasets were used from the Demographic and Health Survey program corresponding to four sub-Saharan countries that met a set of inclusion criteria for this study. Preliminary analyses identified confounding effects of household socioeconomic status, maternal education, urbanity, age of bednets, existence of standing water located near the respondents, and IRS use. For each country and corresponding year, the crude and adjusted odds ratios along with direct, indirect and total effects of ITN use were estimated. Neighborhood coverage levels of 25-50% and 50-100% and the use of an ITN prevented 2.9 (95% CI: 0.7-4.8) cases and 8.1 (95% CI: 4.8 -11.1) cases per 100 children under 5, respectively. The overall estimate of direct effects indicated that individuals who lived in a neighborhood coverage between 0-25% and 25-50% ITN coverage and were considered ITN users had a reduction of 2.9 malaria cases per 100 children compared to ITN non-users (95% CI: 0.9-4.7 and 0.7-4.8, respectively). Living in a neighborhood with 50-100% ITN coverage resulted in a reduction of 6.1 cases per 100 children for ITN non-users (95% CI: 2.7-9.7), supporting that there was significant indirect protection. Results for country and year specific data varied for total, direct, and indirect effects.

Anxiety Mindsets and Academic Achievement in College Students

Christa Soyars

Research Adviser: Dr. Gwynn Morris, Dr. Betty-Shannon Prevatt; Social and Behavioral Science

Anxiety is on the rise in today's college students, raising questions regarding anxiety's impact on the academic component of college life. The current study explored the relationship between anxiety and end of semester grades, as potentially influenced by growth and fixed mindsets. Specifically, for college aged individuals with a stronger fixed anxiety mindset, stress would strongly and negatively impact grade point average (GPA), whereas for individuals with a stronger growth anxiety mindset, stress would have less of an impact on GPA. Participants (N=109) completed a survey quiering current perceived stress, stressful life events, anxiety mindsets, and end of semester grades. The majority of the college students in this sample experienced moderate to high stress: 64% had moderate stress, 24.8% had high stress, and 11% had low stress. On average, the majority of participants had a growth anxiety mindset (61.5%) compared to a fixed anxiety mindset (38.5%). As expected, current stress significantly predicted GPA. However, mindsets did not moderate the relationship between current stress and end of semester GPA. Even though mindsets did not act as the moderating variable, differences were found between the mindsets. These results suggest that the anxiety mindset negatively impacted overall GPA. That is, the results suggest that GPA is lower when individuals have a fixed anxiety mindset. Continued research in this area is important because learning how to better help students cope with anxiety and stress is important. Changing the way individuals think about anxiety could result in academic benefits.

Matrine Derivatives as Possible HIV-Protease Inhibitors

Shefali Srivastava, Jocelyn Towe

Research Adviser: Dr. Karthik Aghoram, Dr. Walda Powell; Natural and Physical Science, Biochemistry

HIV/AIDS is caused by the Human Immunodeficiency Virus. Its life cycle consists of six steps: infection, reception at the cell, integration into the host DNA, production of non-functional polypeptide, cleavage of polypeptide, and rebudding from the affected cell. The cleavage of the polypeptide chain is catalyzed by the action of HIV protease - a possible target for enzyme inhibition. Oxymatrine is an alkaloid compound extracted from *Sophora flacescens*, a Chinese herb, which has been shown to increase cardiac function by reducing the risk of heart failure and cardiac fibrosis. Through previous research, this compound has also shown inhibition of the HIV protease enzyme, making it a possible treatment for HIV-AIDS. Currently, there is a huge

demand to synthesize chemical derivatives of matrine to make compounds that are more hydrophilic for drug testing. Oxymatrinic and matrinic acid have been prepared and are being tested using the HIV protease assay. The purpose of this study was to explore the inhibition properties of matrinic acid derivatives on the HIV Protease enzyme. Over the course of this study, two derivatives of matrinic acid were synthesized: methyl ester of matrine and matrinamide. They were then tested on an HIV Protease assay to see if they inhibit the enzyme. Neither of the compounds showed any activity for inhibition. While they were both soluble in water, matrine methyl ester proved to be an activator of the HIV Protease enzyme, instead of an inhibitor. However, more research is required to purify the compounds synthesized.

Effect of iPad Intervention on Nonverbal Communication in a Preschool Child with Autism

Michelle Blair Starling

*Research Adviser: Dr. Doreen Fairbank;
Social and Behavioral Science*

Children with autism often have difficulties producing verbal communication. New devices such as iPads may be a choice for an alternative form of communication for children with autism due to its portability and low-cost. The present study was a multiple baseline design used to determine if an alternative form of communication, an iPad, was motivational for the participant to request a toy. Natural gestures (baseline phase) involved any form of communication not involving spoken language such as reaching and pointing. iPad interventions (treatment phase) utilized an app with icons that stated mands (requests) when touched. The participant ($N = 1$) was a 3 year old male with autism and very limited verbal communication skills. Prior to the experiment, the participant completed a free operant preference assessment to determine 2 motivational items for manding. The participant had 4 days of baseline observation with 3 trials per day where the participant used natural gestures for manding and 4 days of treatment with 3 trials per day where the participant used an iPad for manding. The procedures were repeated. Currently, there is a trend in reaction times suggesting that iPad interventions may be effective for encouraging communication. Results show that the reaction times measured using a stopwatch to communicate for Baseline 1 ($M = 11.98$, $SD = 8.07$) is longer than the reaction times for Treatment 1 ($M = 2.85$, $SD = 0.78$). This suggests that iPad intervention may decrease reaction rates for manding in children with autism and could be an effective alternative form of communication.

Benefits and Drawbacks of Different School Settings for Middle School Students

Sara Scott Thompson

Research Adviser: Dr. Julie Schrock; Education

In the United States, the role of schools is to prepare students to contribute to society, but different types of schools may

choose different methods of working toward this goal. These varying methods have, over time, contributed to autonomous schooling: the idea that students have a choice of which school they attend. As more schools are developed, this choice becomes harder. Everyone's school experiences help shape who they grow up to be. Everyone who has children someday will need to face the decision of where to send them to school. It is often difficult to decide which school setting is the best fit for you or your child. This thesis addresses this question: what are the benefits and drawbacks of different school settings for middle school students? Over a few months, 10 students from different school settings were interviewed regarding their experiences in middle school. Interview data were read to identify themes within answers. Data were examined to find the most common benefits and drawbacks of each of the different school settings for middle school students and the factors that seem most important to students. This research provides students' perspectives on different school settings and can be used to help students, parents, and future teachers make decisions about schooling.

Megalopae Molting of *Uca* spp. Fiddler Crabs: Do Habitat and Adult Odor Cues Affect the Timing?

Miranda Tomb

*Research Adviser: Dr. Kathy Reinsel, Dr. Jim Welch;
Natural and Physical Science*

The Atlantic Coast is home to three species of *Uca* fiddler crabs, each with their own unique habitat preferences. At their larval stage, the three species are physically indistinguishable and conduct the same process of settlement site selection. The habitat ranges of the three species overlap, which creates potential competition among them. As such, it is important to understand their habitat selection behavior which begins at the megalopa larval stage. This study sought to examine how a variety of odor cues affects this settlement pattern. Megalopae were collected from the waters off the coast of Beaufort, NC, and individually placed into water with different odor cues: only sand odor, only *U. pugilator* adult odor, both *U. pugilator* adult and sand odor, or control seawater (without a specific odor cue). The larvae were then observed over a ten day period to see how quickly the molting process occurred, if at all. The experiments recorded how many of the three *Uca* species molted in each specific water treatment, along with how quickly they molted. The data from this project was analyzed statistically by using Z-tests and ANOVAs in Microsoft Excel. The results indicated that all three species were affected by the presence of odor cues from adult fiddler crabs. Water treatments that contained the odor cues of adults had some of the shortest molt times and the highest number of molts for each species. The water treatments with sand odor cues also appeared to increase the rate of molting for some of the species, while water treatments without an odor cue had very little effect on the molting process of any of the species.

Development of a Molecular-based Detection Method for the Bacteriocin gene *lctA* in Lactic Acid Bacteria

Olivia Trapatsos

Research Adviser: Dr. Jason Andrus;

Natural and Physical Science, Biology

Lactococcus lactis is a Gram-positive bacteria used in buttermilk and cheese production. This bacterium is known to produce a bacteriocin (LctA), an antimicrobial peptide that protects the bacterium against other bacteria by fighting off closely related bacterial species. LctA is encoded by the 156 nucleotide bacteriocin lactacin 481 gene *lctA*. This particular gene is not found in every strain of *Lactococcus lactis*, or every type of lactic acid bacteria. Finding homologous *lctA* genes in other species may lead to discovery of novel bacteriocins which may potentially be used as novel antibiotics. This project focused on creating a molecular based screening process for the gene *lctA* in a variety of lactic acid bacteria strains using polymerase chain reaction (PCR). PCR is a technique used to amplify specific DNA sequences using DNA oligonucleotides known as primers to target the specific DNA sequence and template DNA which comes from a specific source. Primers were designed using the Primer 3 software and a published sequence of *lctA* (CheeseF and CheeseR) to yield the 156 bp fragment. Lactic acid bacterial strains obtained from bioreactors used to produce ethanol from corn (provided by Novozymes), as well as a commercial strain of *Lactococcus lactis* from Carolina Biological were used to extract template DNA. Template DNA was isolated from the genome using the GeneJET Genomic Purification Kit for all strains tested. PCR conditions were designed and employed to determine if the gene was present by using agarose gel electrophoresis to determine the presence or absence of a PCR product. This work describes the result of this screening attempt. The resulting screening process can be used to identify strains of lactic acid bacteria potentially producing novel bacteriocins for future study.

Confirming the Presence of *Acanthamoeba* spp. with *Mycobacterium leprae* From Soil Samples Collected in the Habitat of Nine-Banded Armadillos

Ayesha Ullah

Research Adviser: Dr. Jason Andrus;

Natural and Physical Science

Acanthamoeba is a type of free-living microscopic amoeba found in soil and freshwater habitats. Some species of *Acanthamoeba* are known to be parasitic to humans under certain conditions, causing infections of the eye, skin, and central nervous system. *Mycobacterium leprae* is a bacterium that causes leprosy, a chronic infectious disease that can cause damage to the peripheral nervous system. *Mycobacterium leprae* is found in soil habitats where leprosy is endemic in humans and where there are suspected animal reservoirs, such as ar-

madillos, which are known to harbor *M. leprae*. Recent research has indicated a possible connection between *Acanthamoeba*, an amoeba found in soil, and *M. leprae*. Polymerase chain reactions (PCR) were performed on gDNA isolated from soil samples collected in Yazoo Wildlife Refuge in MS, a known armadillo habitat, in order to amplify the 18s rDNA gene of interest. The samples of DNA positive for *M. leprae* were then used to amplify the 18s rDNA gene to test for the presence of *Acanthamoeba* using PCR and run out using gel electrophoresis. The 18s rDNA gene in samples negative for *M. leprae* were also amplified in order to determine if there is a correlation between the presence of *M. leprae* and *Acanthamoeba*. By studying soil samples harboring both *M. leprae* and *Acanthamoeba*, we can help further research that supports the importance of *Acanthamoeba* acting as potential reservoirs for *M. leprae*. This work will also help in determining the relationship between *Acanthamoeba* and armadillos in the transmission of leprosy, a study being conducted in collaboration with researchers at Valdosta State University.

Intuitive Eating and Health Outcomes

Emily Watkins, Caroline Coleman, Jessica Long

Research Adviser: Dr. Jennifer McMillen, Dr. Andrea McPherson; Social and Behavioral Science

Intuitive eating is defined as the process of listening to one's hunger and fullness cues and allowing those cues to guide eating choices. In order to explore this concept in Raleigh, North Carolina, a survey was sent to undergraduate students at two local institutions. The final question in the survey invited participants to attend a focus group to discuss students' eating habits, motivations, and barriers to eat of the student participants. The Intuitive Eating Scale (IES-2) and the Visceral Sensitivity Index (VSI) were used to quantify degrees of intuitive eating and gastrointestinal symptomatology, respectively. Extensive qualitative training, memoing, open coding, and consensus were utilized to identify emergent themes and minimize bias. The hypothesis for the quantitative component was that students who scored higher on the IES-2 would score lower on the VSI. In essence, the hypothesis suggested that those who engaged in increased instances of intuitive eating (IES-2) would experience decreased gastrointestinal distress or discomfort (VSI). Participants ($N = 283$) were undergraduates enrolled at Meredith College or North Carolina State University. Participants were recruited via email and invited to complete a survey in Qualtrics. Results from the survey revealed a negative association between IES-2 and VSI scores ($r = -0.43, p < 0.001$). Focus group analysis revealed seven emergent themes: Guilt in Relation to Self, Peers, and Society; Cost versus Waste, Convenience, Habitual Eating, Ignoring Cues, Communal Eating, and Dependence. Thematic saturation has not yet been established so the relationships among the themes and the cultural and societal impact on the themes has not been fully elucidated, and further data collection is warranted.

An Exploration of the Four-Color Theorem

Whitney Watkins

*Research Adviser: Dr. Timothy Hendrix;
Natural and Physical Science, Mathematics*

This thesis is an exploration of the Four-Color Theorem. The Four-Color theorem states that every map can be colored with at most four colors in such a way that neighboring countries/regions are colored differently. In other words, two adjacent regions on a map would not be colored the same color. In this review, there is a thorough analysis of the century-long history of the problem, along with a discussion of the mathematical foundations and concepts used to build the proof of the Four-Color Theorem. This paper examines map coloring topics such as reducibility, discharging, and unavoidability. A map is reducible if it does not contain a minimal counterexample- a map with the least number of regions that cannot be colored with four colors (minimal counterexamples were proven to not exist). The method of discharging is a strategy where regions of a map are assigned 'charges' depending on the number of sides the regions possess, and the charges are distributed throughout the map while the total charge remains the same. The unavoidability of a set (of networks) is a collection of configurations where at least one of which has to appear in every map in order to be four-colorable. Using the literature *Four Colors Suffice* by Robin Wilson, this thesis takes readers on a map coloring adventure.

Environmental Drivers of Infectious Disease Emergence in Brazil 2007-17

Meredith Welch, Hannah Elvington, Shreya Simha
*Research Adviser: Dr. Carolina Perez-Heydrich;
Natural and Physical Science, Public Health, Biostatistics*

Empirical studies evaluating the effects of biodiversity on disease emergence have provided conflicting evidence in support of two different hypotheses. The dilution hypothesis theorizes that richer biodiversity reduces human exposure to infectious diseases because of a higher probability of pathogen spillover into dead-end hosts, whereas the amplification hypothesis posits that increased biodiversity will increase the risk of human exposure to infectious diseases through increased interactions with pathogen reservoirs or vectors. The purpose of this research project is to evaluate the effects of land cover change, a principal factor associated with biodiversity, on the occurrence of infectious diseases in Brazil between 2007 and 2017. Specifically, we focused on three infectious diseases with different modes of transmission: hantavirus (zoonotic), leptospirosis (waterborne), and dengue fever (vector-borne). We obtained disease data from Brazil's Ministry of Health, and land cover data from satellite imagery processed by the NASA EOSDIS Land Processes Distributed Active Archive Center (LP DAAC). Land cover change was classified as percent regeneration or deforestation/degradation based on one- and five-year changes in land cover types within each state. With this poster, we present

results from our preliminary analyses, and show that support for either the dilution or amplification hypothesis depends on the primary mode of transmission for the infectious disease in question.

Emma Hartmann: A Female Composer Masked by a Pseudonym

Afton Wooten

Research Adviser: Dr. Jeanie Wozencraft-Ornellas; Music

The work of Emma Hartmann (1807 – 51), a Danish female composer's work, serves as a representation of resilience and the barriers faced by female musicians throughout history. She has two published works, "Five Pamphlets of 22 Romances and Songs" and "Klaverstykker." These works were published under the pseudonym F.H. Palmer. Publications after her death included both the pseudonym and her name. As with many female musicians in the 19th century, Hartmann came from an upper-class musical family. Although she was surrounded by music and was a gifted composer, there is still controversy regarding the extent of her musical training and the details regarding the performance practice of her compositions. This presentation will include an overview of Emma Hartmann's life, career, and musical impact, as well as the performance of several of her works.

Survey of Racial Tropes in Modern Media Derived from African Slave Stereotypes

Linda Yager

Research Adviser: Dr. Steven A. Benko; Arts and Humanities

Racist tropes and stereotypes were an early feature of Hollywood films. From *Othello* to *Birth of a Nation*, representation of black characters was demeaning, oppressive, and racist as a result of repeated objects of ridicule and persecution. Continued sectarian depictions are remnants of America's racist past. However, the endurance of these symbols and tropes throughout film history inspires an inquiry about film as cultural artifact and a source of identity creation. Given this problematic past and the social stigma attached to racist ideologies and images, the presence of racist symbols and images in contemporary media raises questions about what meaning is actually being conveyed versus what message was originally intended. This paper explores these questions by considering the use of Confederate symbols and racist stereotypes and tropes in films from the early 20th century (*Birth of a Nation*, 1915 and *The Littlest Rebel*, 1935), and more recent films (*The Martian*, 2015). Comparing and contrasting these symbols and tropes found in the material objects within a film, help to interpret that, although more subtle, is still a feature of contemporary cinema. Beginning with Stuart Hall's notion of encoding and decoding, and drawing from material culture theorists Glassie and Miller, this paper will consider how these images are encoded and can be decoded by audiences, and how the presence of racist stereotypes contributes to the larger debate about race in America.

Using Video Modeling to Teach Prayer Time Behaviors to Muslim Children with Autism

Momina Zahid

Research Adviser: Dr. Mark O'Dekirk;

Social and Behavioral Science

The effect of applied behavior analysis techniques using forward chaining (where the initial step in a behavior chain is taught first while the researcher prompts or completes the remainder of the steps) and video modeling (where steps are modeled on a video of the intended step-by-step behavior) were tested on two preschool-aged boys with autism spectrum disorder. Participants ($N = 2$) were recruited from an early intensive behavioral program at a private all women's college. The goal of the present study was to increase prayer time behaviors and familiarize them with the procedure to allow the parents of the children to focus on praying and not having to attend to their child. The researcher modeled appropriate prayer time behavior using shaping and chaining with positive reinforcement and video modeling to teach prayer time behaviors to both participants. Islamic prayer time behaviors (e.g., prescribed sequences of kneeling, standing, bending, and specific hand positions) were assessed by taking initial data without the use of video.

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